

5.4.2 Wetlands, Riparian, and Littoral Habitats

This discussion of wetlands, riparian, and littoral habitats is divided into three sections. Section 5.4.2.1 describes existing conditions related to wetlands, riparian, and littoral habitats. Section 5.4.2.2 describes effects of the Licensees' Proposal, including the Licensees' PM&E measures, on wetlands, riparian, and littoral habitats. Section 5.4.2.3 addresses any unavoidable adverse effects to wetlands, riparian, and littoral habitats.

The Licensees augmented existing, relevant, and reasonably available information relative to wetlands, riparian, and littoral habitats by conducting Study 4.1.5, *Botanical Resources Study*. The study is complete, and the study results are incorporated into this section. Refer to Appendix B for a copy of the FERC-approved study plan and study data.

5.4.2.1 *Existing Environment*

Besides this general introductory information, this section includes three main sub-sections: the first section describes the pre-field investigation, including wetlands identified by USFWS in its NWI maps; the second section discusses a literature review of wetlands identified within the proposed Project boundary by previously conducted surveys; and the third section describes the results of field surveys conducted in 2017 and 2018. Each of the sections addresses habitats associated with Project reservoirs within the proposed Project boundary and along Pyramid reach. Pyramid reach is outside the Licensees' Botanical Resources Study area; however, this area was considered as requested by agencies. For information on special-status aquatic species, AIS, and fish resources, refer to Section 5.3.

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

Riparian areas are vegetated zones that form a transition between permanently saturated areas and upland areas, and that typically exhibit vegetation and physical characteristics associated with permanent sources of surface or groundwater (USACE 1987). Littoral areas, per Cowardin et al. (1979), are those with standing water of depths less than 6.6 feet. These areas typically support aquatic bed or emergent vegetation and would likely be classified as wetlands.

When on NFS lands, wetlands, drainages, and riparian areas are subject to land management measures as dictated by USFS and are outlined in USFS's Land Management Plan (USFS 2005).

Pre-Field Investigation

Prior to field surveys during the pre-field investigation, the Licensees accessed USFWS' NWI data (USFWS 2017) to identify wetlands within the proposed Project boundary for surveying. NWI mapping provides preliminary data on potential location and type of wetlands. These data are based on aerial imagery, which is not typically ground-truthed, and likely do not capture some areas where wetlands may occur, such as in and adjacent to riparian areas. NWI provides no information about vegetation, condition of the wetland, whether an area meets the U.S. Army Corps of Engineers (USACE) definition of a wetland, or whether it would be considered jurisdictional (USACE 1987).

In addition, a literature review was conducted of various studies that described wetland habitat within the proposed Project boundary and along Pyramid reach. These studies are presented in the "Literature Review" section in greater detail.

National Wetlands Inventory Mapped Wetlands

NWI areas are described using the Cowardin classification (Cowardin et al. 1979), a hierarchical system that defines wetlands and deepwater habitats according to System, Subsystem, Class, Subclass, and Modifiers. Mapped features are not always described using all categories, but they are typically classified by System and Class, at a minimum. Table 5.4.2-1 summarizes Cowardin classification system descriptions for Cowardin classifier wetland systems. This classification system is different from that in Section 5.4.1, which utilizes CDFW's CWHR classification system (Mayer and Laudenslayer 1988). Cowardin is more specific to classifying water bodies, while the CWHR classification system is used to analyze habitats for wildlife use.

Three Cowardin classifications were mapped by NWI within the proposed Project boundary: Palustrine, Lacustrine, and Riverine. Palustrine wetlands include all non-tidal wetlands dominated by trees, shrubs, emergent plants, mosses, or lichens. Lacustrine areas include wetlands and deepwater habitats that: (1) are located in a topographic depression or a dammed river channel; (2) are lacking in trees, shrubs, persistent emergent plants, emergent mosses, or lichens with greater than 30 percent areal coverage; and (3) are greater than 20 acres in area. Riverine areas include habitats contained in natural or artificial channels with periodically or continuously flowing water, or which form a connecting link between two bodies of standing water. Lacustrine and riverine habitats are generally not considered wetland areas, but they are included here for completeness in evaluating NWI data.

NWI wetland and other water types and specific features mapped within the proposed Project boundary and Pyramid reach are described below and are depicted in Figures 5.4.2-1 through 5.4.2-9.

Table 5.4.2-1. Cowardin Classification System Descriptions for Cowardin Classifier Wetland Systems

Cowardin Classifier ¹	Abbreviation	Description
System		
Palustrine	P	Non-tidal wetlands dominated by trees, shrubs, emergent plants, mosses, or lichens
Lacustrine	L	Wetlands and deepwater habitats that (1) are located in a topographic depression or a dammed river channel; (2) are lacking in trees, shrubs, persistent emergent plants, emergent mosses, or lichens with greater than 30 percent areal coverage; and (3) are greater than 20 acres in area
Riverine	R	Habitats contained in natural or artificial channels with periodically or continuously flowing water, or which form a connecting link between two bodies of standing water
Subsystem – Riverine		
Lower Perennial	2	Characterized by a low gradient and slow water velocity, with some water flows throughout the year. The substrate consists mainly of sand and mud, and the floodplain is well developed.
Upper Perennial	3	Characterized by a high gradient and fast water velocity. Some water flows throughout the year. This substrate consists of rock, cobbles, or gravel with occasional patches of sand. There is very little floodplain development.
Intermittent	4	Describes channels that contain flowing water only part of the year, but may contain isolated pools when the flow stops
Subsystem – Lacustrine		
Limnetic	1	Extends outward from Littoral boundary and includes all deep-water habitats within the Lacustrine System
Littoral	2	Extends from shoreward boundary to 2 meters (6.6 feet) below annual low water or to the maximum extent of nonpersistent emergents, if these grow at depths greater than 2 meters
Class		
Unconsolidated Bottom	UB	Wetlands and deepwater habitats with at least 25 percent cover of particles smaller than stones (less than 6 to 7 centimeters) and a vegetative cover less than 30 percent
Unconsolidated Shore	US	Wetlands and deepwater habitats characterized by substrates lacking vegetation, except for pioneer plants that become established during brief periods when growing conditions are favorable
Forested	FO	Wetlands characterized by woody vegetation with height 6 meters or taller
Emergent	EM	Wetlands characterized by erect, rooted, herbaceous hydrophytes (plants adapted to growing in wet conditions), excluding mosses and lichens. This vegetation is present for the majority of the growing season in most years, and most emergent wetlands are dominated by perennial plants.

Table 5.4.2-1. Cowardin Classification System Descriptions for Cowardin Classifier Wetland Systems (continued)

Cowardin Classifier ¹	Abbreviation	Description
Scrub-shrub	SS	Includes areas dominated by woody vegetation less than 6 meters (about 20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions.
Subclass		
Persistent	1	Dominated by species that normally remain standing at least until the beginning of the next growing season
Modifiers		
Temporarily Flooded	A	Areas in which surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the growing season. Plants that grow both in uplands and wetlands may be characteristic of this water regime.
Seasonally Flooded	C	Areas in which surface water is present for extended periods especially early in the growing season but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
Semipermanently Flooded	F	Areas in which surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
Intermittently Exposed	G	Areas in which surface water is present throughout the year, except in years of extreme drought
Permanently Flooded	H	Areas in which water covers the land surface throughout the year in all years
Artificially Flooded	K	Areas in which the amount and duration of flooding is controlled by means of pumps or siphons in combination with dikes or dams. The vegetation growing in these areas cannot be considered a reliable indicator of water regime. Wetlands within or resulting from leakage of man-made impoundments, or irrigated pasture lands supplied by diversion ditches or artesian wells, are not included.
Special Modifiers		
Excavated	x	Areas that occur in a basin or channel that have been dug, gouged, blasted, or suctioned through artificial means
Diked/ Impounded	h	Areas that have been created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water

Source: Cowardin et al. 1979

Note:

¹Non-exhaustive list of Cowardin classifications

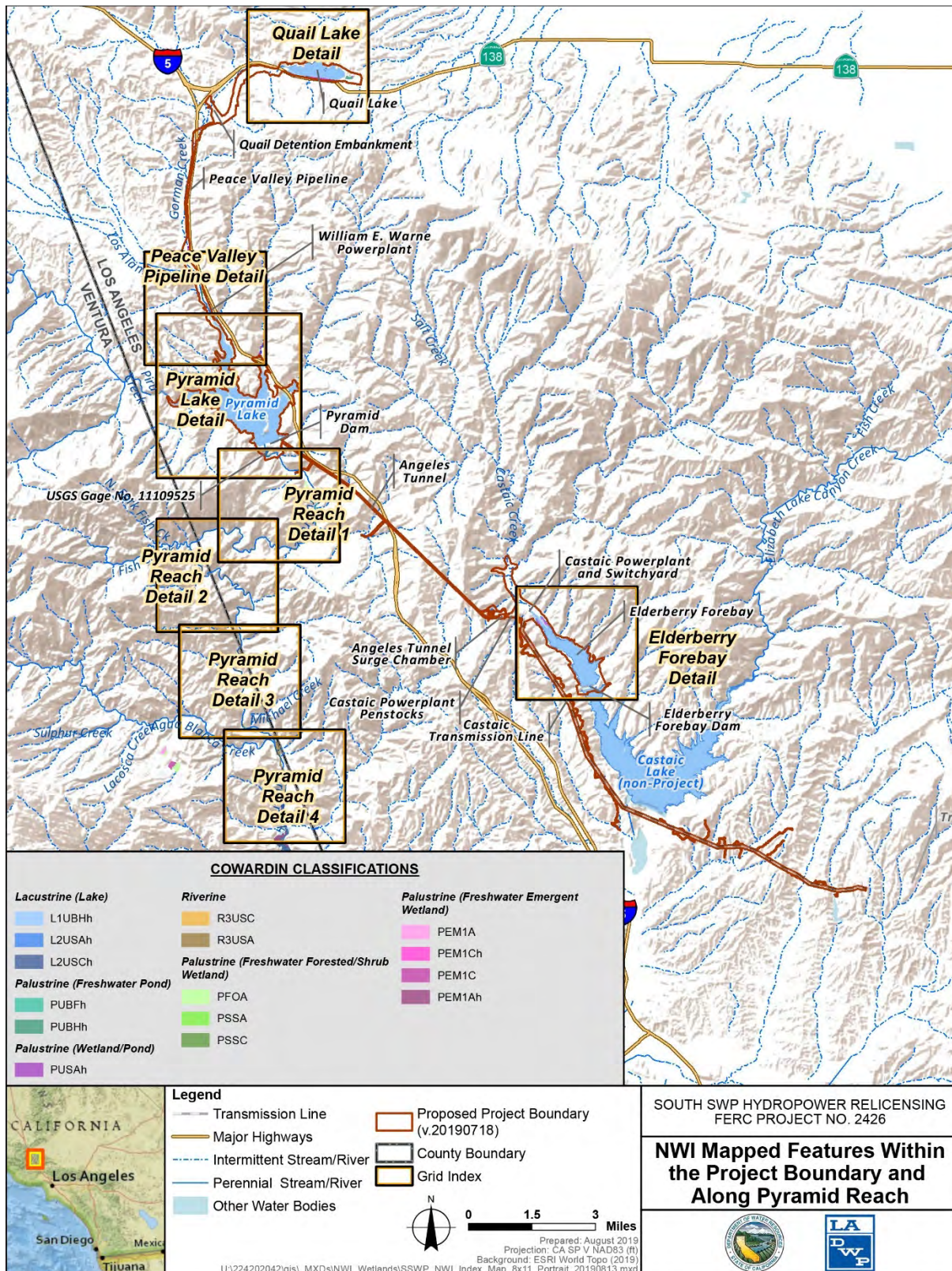


Figure 5.4.2-1. National Wetland Inventory Within the Proposed Project Boundary and Along Pyramid Reach – Key Map

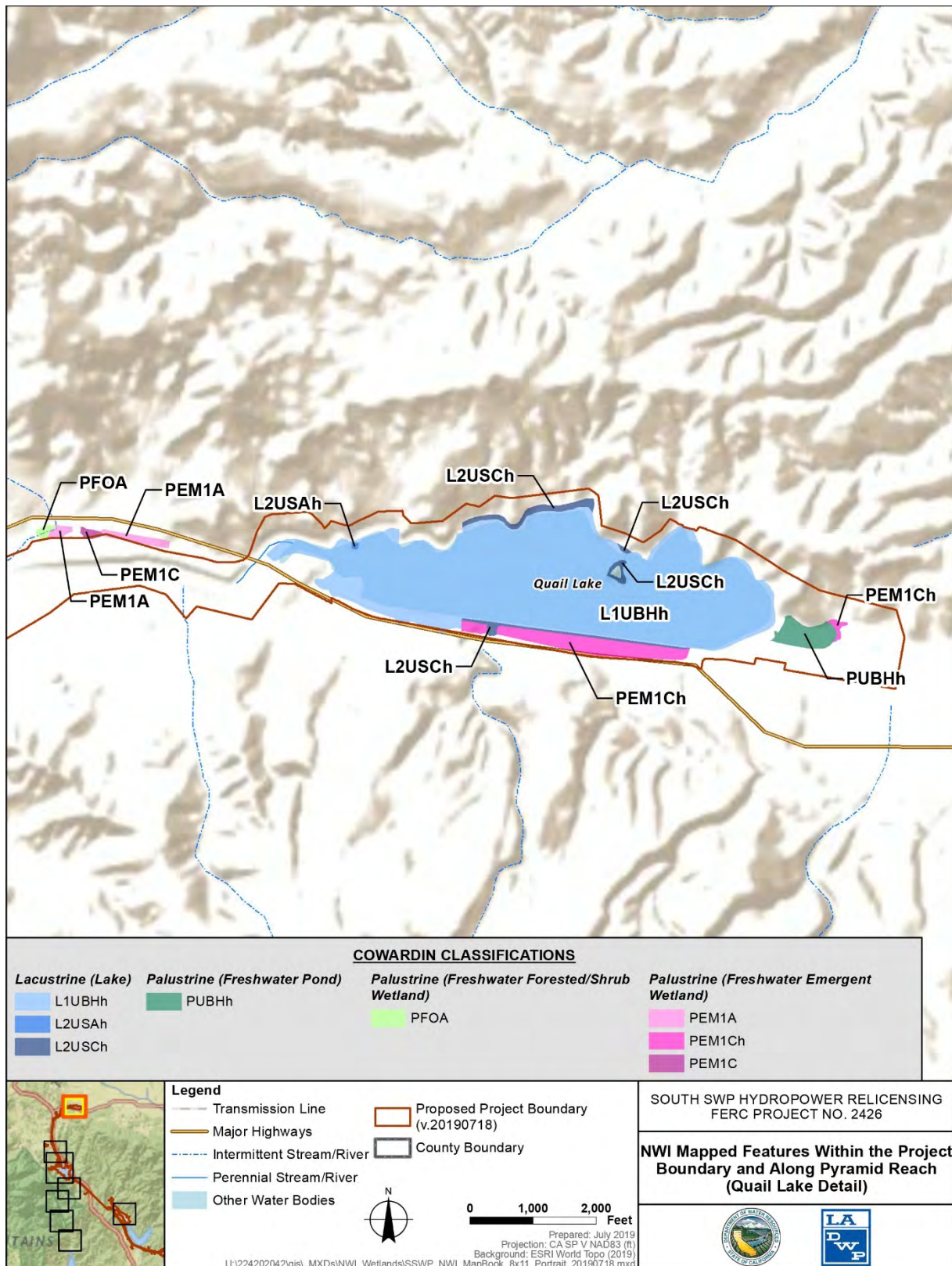


Figure 5.4.2-2. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Quail Lake Detail

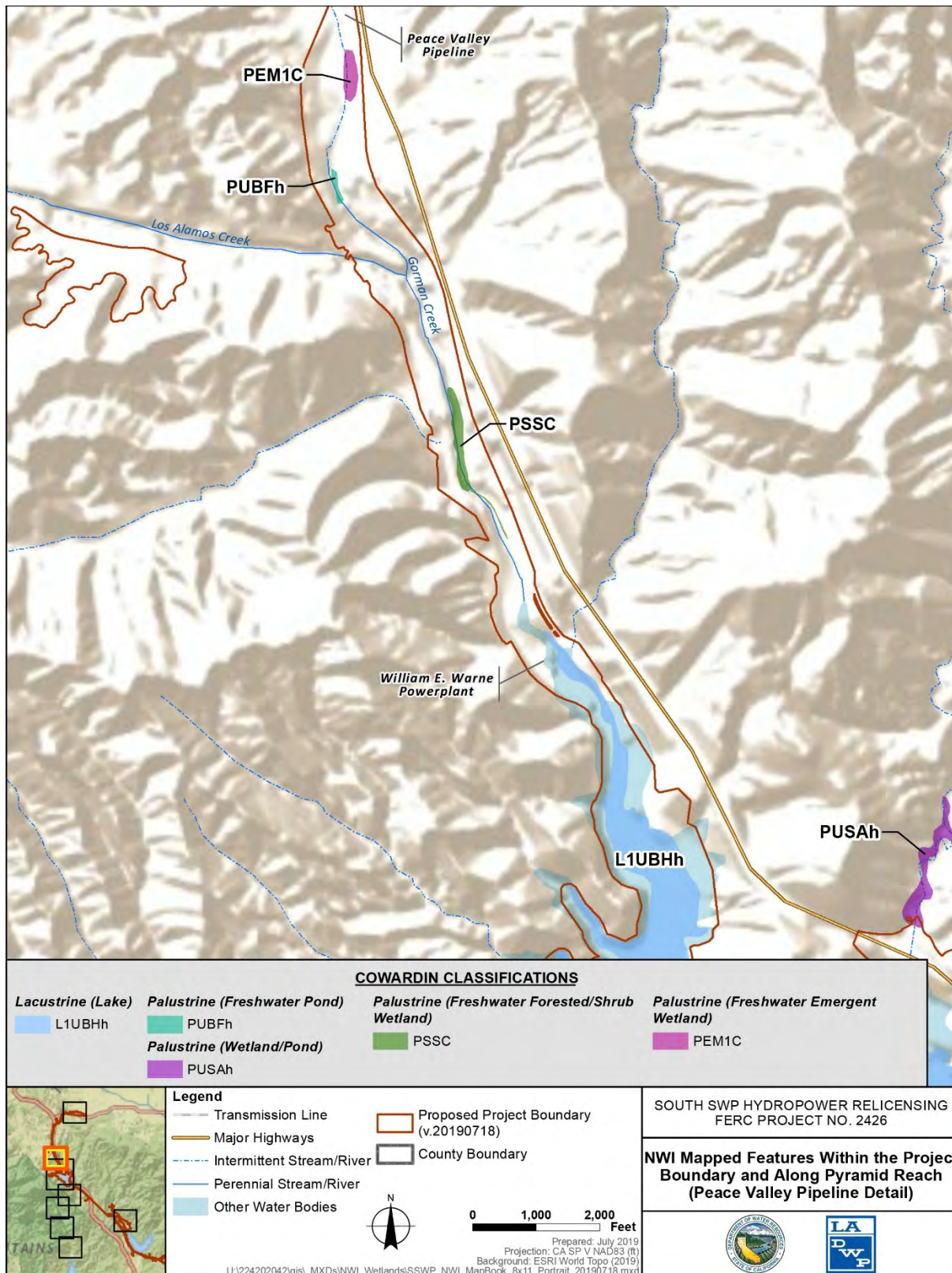


Figure 5.4.2-3. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Peace Valley Pipeline Detail

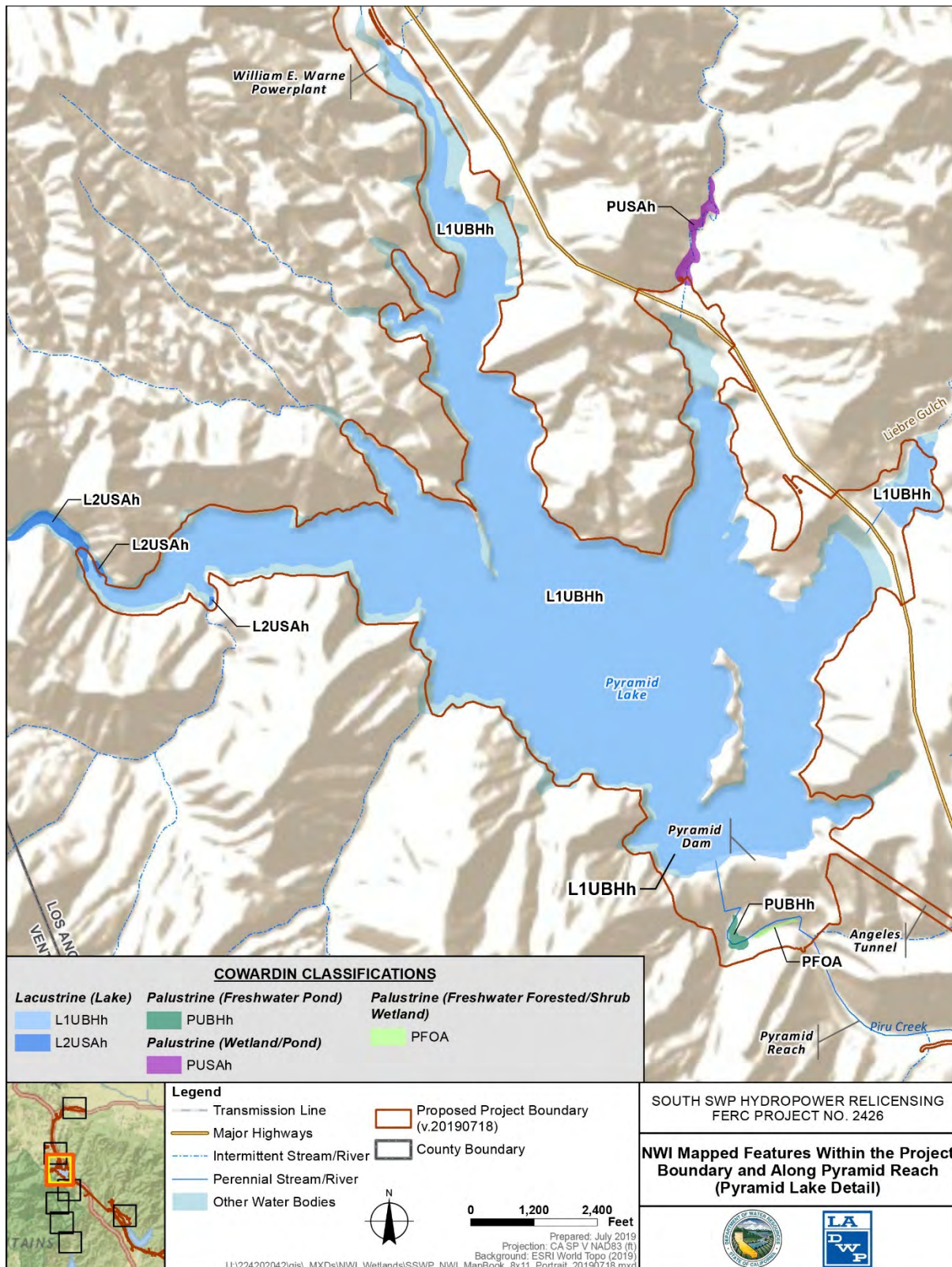


Figure 5.4.2-4. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Pyramid Lake Detail

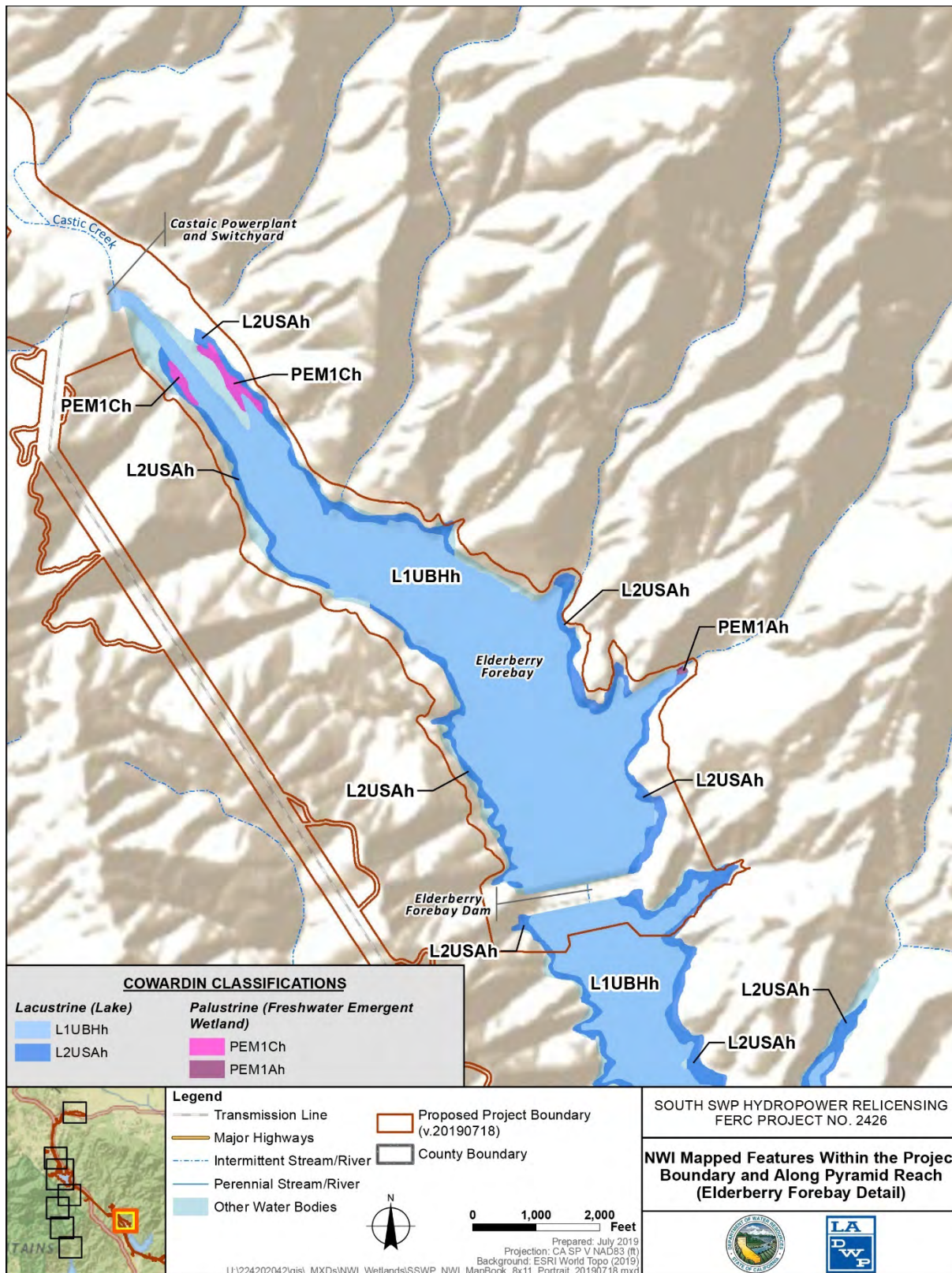


Figure 5.4.2-5. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Elderberry Forebay Detail

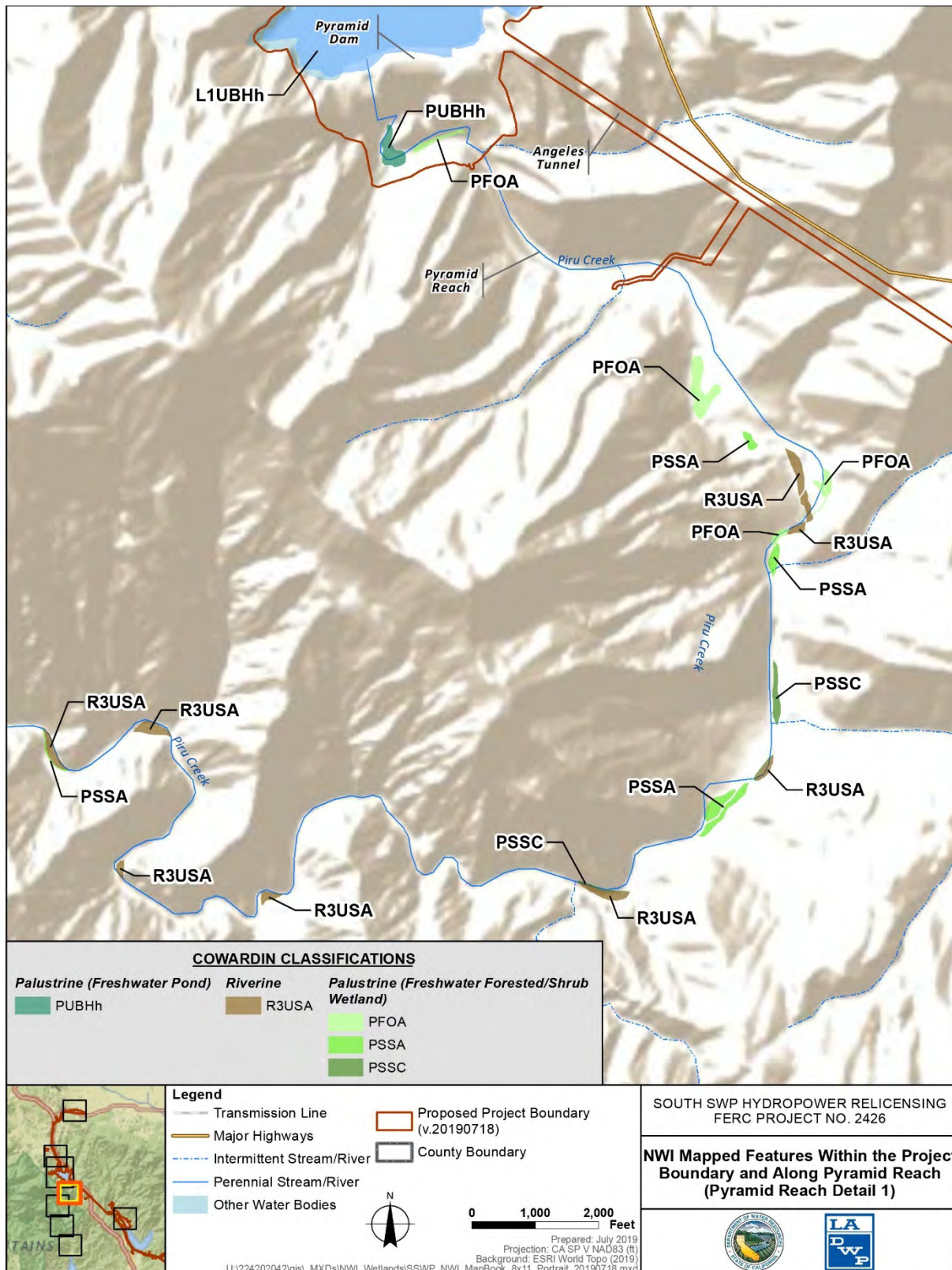


Figure 5.4.2-6. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Pyramid Reach Detail 1

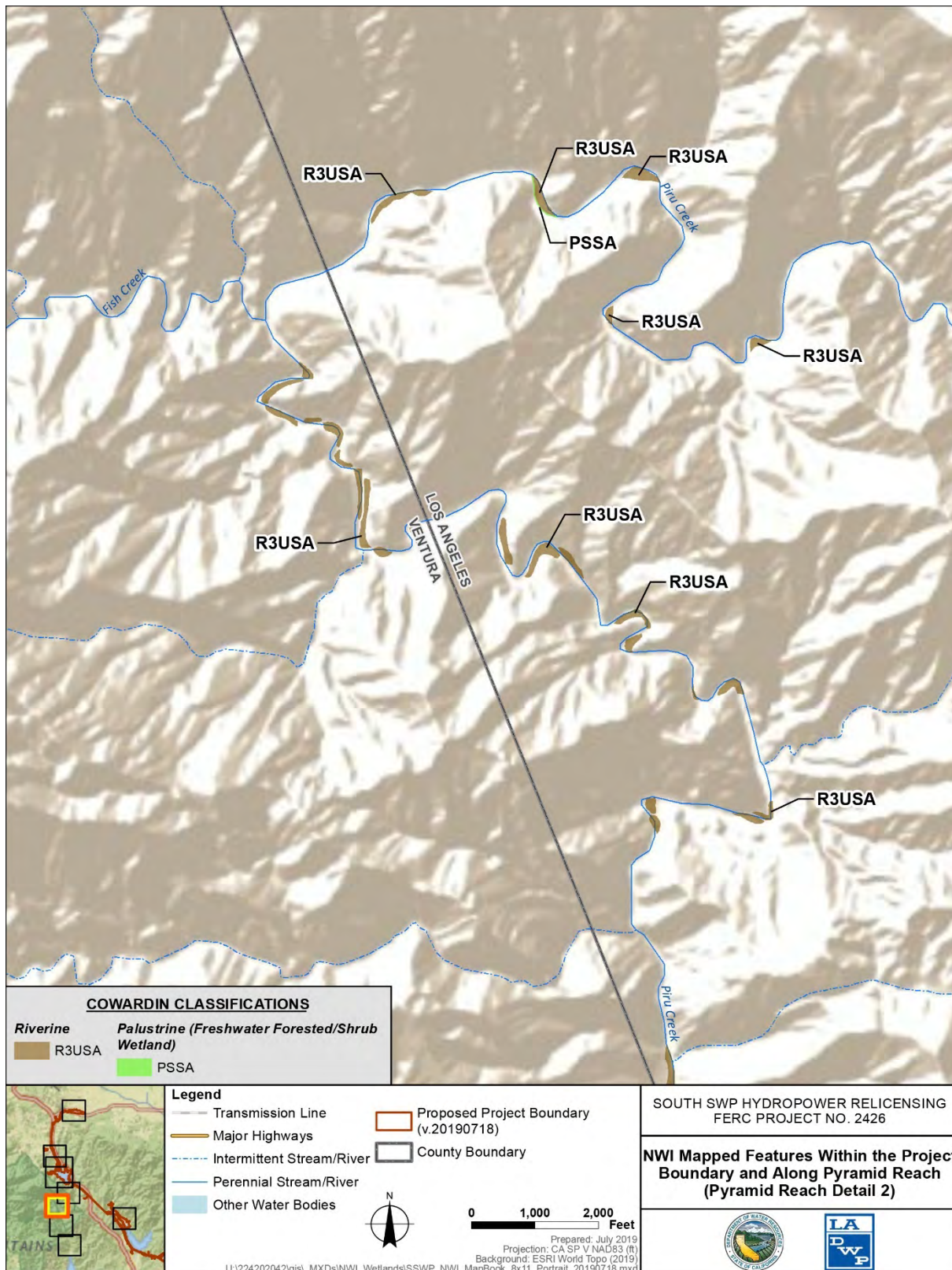


Figure 5.4.2-7. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Pyramid Reach Detail 2

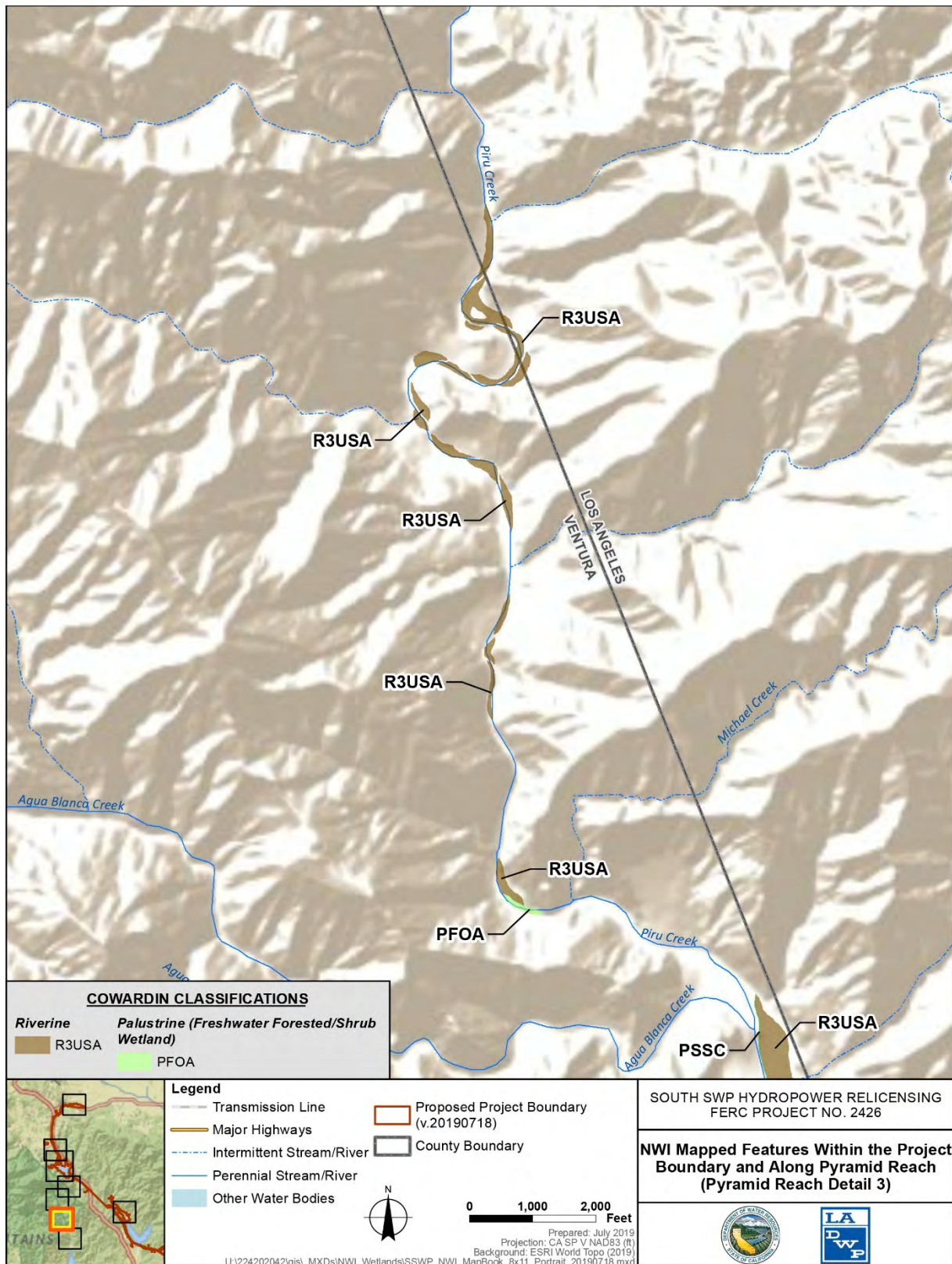


Figure 5.4.2-8. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Pyramid Reach Detail 3

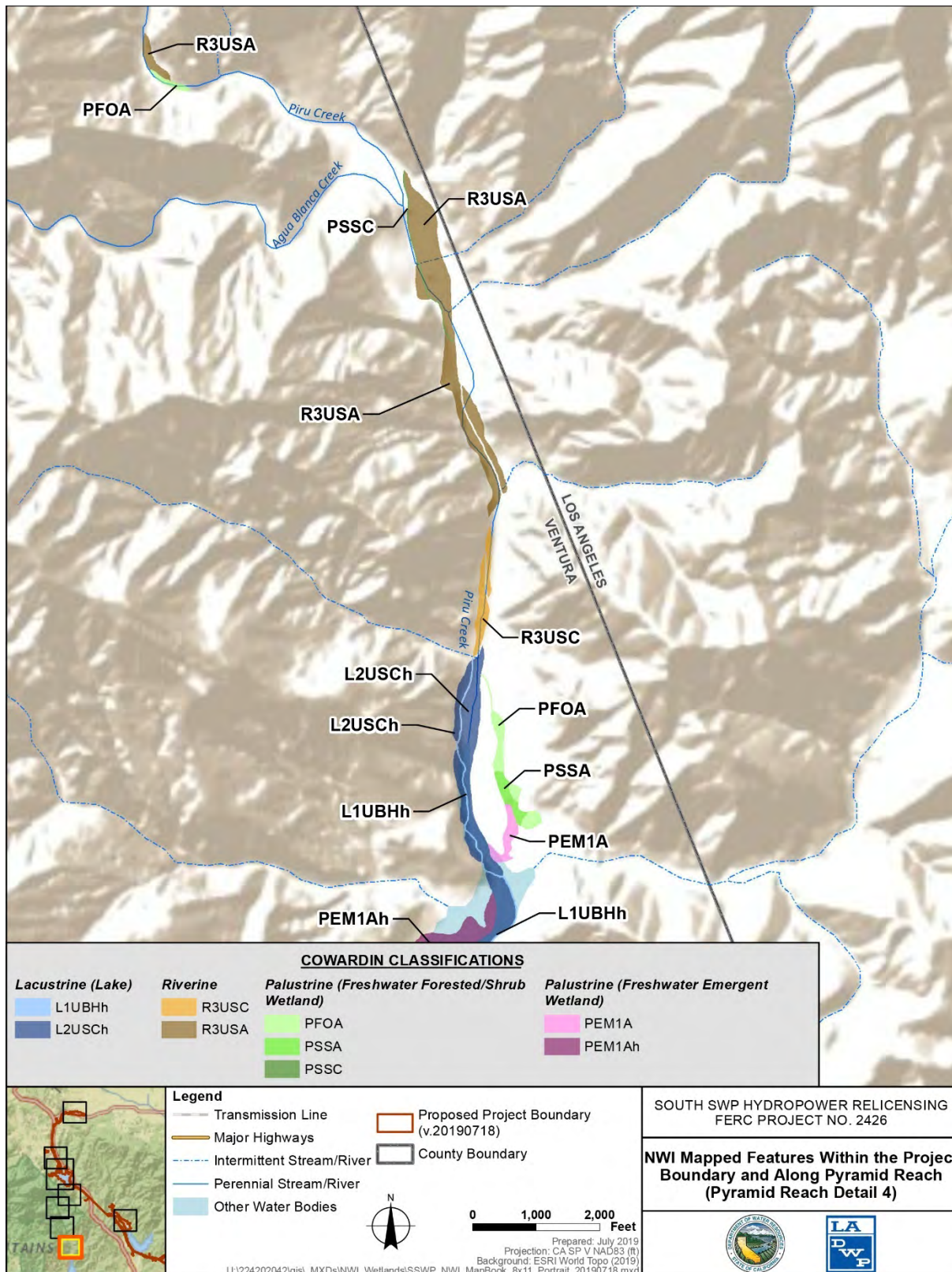


Figure 5.4.2-9. National Wetland Inventory Mapped Features Within the Proposed Project Boundary and Along Pyramid Reach – Pyramid Reach Detail 4

Lentic Features

Palustrine

Palustrine areas were mapped within the proposed Project boundary and are described below.

Palustrine areas mapped along Quail Lake and Lower Quail Canal are as follows:

- Palustrine--Emergent--Persistent--Seasonally Flooded--Diked/Impounded (PEM1Ch) areas were mapped by NWI on the margins of Quail Lake.
- Palustrine--Unconsolidated Bottom--Permanently Flooded--Diked/Impounded (PUBHh) was mapped east of Quail Lake (east of the unimproved road on the east end of Quail Lake). These areas are all considered impounded.
- Palustrine--Emergent--Persistent--Temporarily Flooded (PEM1A), Palustrine--Emergent--Persistent--Seasonally Flooded (PEM1C), and Palustrine--Forested--Temporarily Flooded (PFOA) areas were mapped on the north side of the Lower Quail Canal.

Palustrine areas were mapped along the Peace Valley Pipeline, including at the Gorman Bypass Channel. These palustrine areas include:

- Palustrine--Emergent--Persistent--Seasonally Flooded (PEM1C)
- Palustrine--Unconsolidated Bottom--Semipermanently Flooded--Diked/Impounded (PUBFh)
- Palustrine--Scrub-Shrub--Seasonally Flooded (PSSC)

Palustrine areas were mapped by NWI in several locations along the margin of Pyramid Lake and in the area immediately below Pyramid Lake, specifically:

- One Palustrine--Unconsolidated Shore--Temporarily Flooded--Diked/Impounded (PUSAh) area on the east side of Interstate 5 along West Fork Liebre Gulch
- One Palustrine--Unconsolidated Bottom--Permanently Flooded--Diked/Impounded (PUBHh) area immediately below Pyramid Lake

Palustrine areas were mapped in several locations on the margins of Elderberry Forebay within the proposed Project boundary, specifically:

- Palustrine--Emergent--Persistent--Temporarily Flooded--Diked/Impounded (PEM1Ah)

- Palustrine--Emergent--Persistent--Seasonally Flooded--Diked/Impounded (PEM1Ch)

Palustrine areas were also mapped along Pyramid reach. These are:

- Palustrine--Forested--Temporarily Flooded (PFOA)
- Palustrine--Scrub-Shrub--Temporarily Flooded (PSSA)
- Palustrine--Scrub-Shrub--Seasonally Flooded (PSSC)
- Palustrine--Unconsolidated Bottom--Semipermanently Flooded (PUBF). (Please note that PUBF is mapped as open water because it is not considered a wetland)

Lacustrine

In the Cowardin et al. (1979) classification, the Lacustrine System has two Subsystems: littoral (shallow water) and limnetic (deep water). Littoral areas per Cowardin et al. (1979), are those with standing water of depths less than 6.6 feet. These areas typically support aquatic bed or emergent vegetation and would likely meet wetland criteria. Unvegetated littoral areas (Unconsolidated Bottom, per Cowardin et al. [1979]) also occur; these areas are not considered wetlands based on USACE wetland criteria (USACE 1987).

Limnetic and littoral lacustrine habitat was mapped within the proposed Project boundary. Quail Lake, Pyramid Lake, and Elderberry Forebay were mapped as Lacustrine--Limnetic--Unconsolidated Bottom--Permanently Flooded--Diked/Impounded (L1UBHh) areas, as were areas at the confluence of the Gorman Bypass Channel and at Liebre Gulch east of Interstate 5. Littoral habitats occur throughout the proposed Project boundary on the margins of Quail Lake, Pyramid Lake, and Elderberry Forebay, but they have not been fully delineated or previously described. Other mapped lacustrine areas within the proposed Project boundary were Lacustrine--Littoral--Unconsolidated Shore--Temporarily Flooded--Diked/Impounded (L2USAh) areas at the impounded area on the margins of Quail Lake, two areas at the confluence of the Piru Creek arm to Pyramid Lake, and several areas on the margins of Elderberry Forebay that are almost completely dominated by tamarisk (*Tamarix ramisissima*) (POWER 2013). Lacustrine--Littoral--Unconsolidated Shore--Seasonally Flooded--Diked/Impounded (L2USCh) areas occur on the north side and in a small area on the south side of Quail Lake.

Lotic (Riverine) Features

Downstream of Quail Lake, open water areas of the Lower Quail Canal were mapped as Riverine--Lower Perennial--Unconsolidated Bottom--Artificially Flooded (R2UBK), and one Riverine--Intermittent--Temporarily Flooded (R4A) area was mapped downstream along the Peace Valley Pipeline. Pyramid reach was mapped by NWI primarily as a Riverine--Upper Perennial--Unconsolidated Shore--Temporarily Flooded

(R3USA) area for most of its length, as well as Riverine--Upper Perennial--Unconsolidated Shore--Seasonally Flooded (R3USC) at its interface with Lake Piru. These areas of open water are shown as open water on the map as they are not considered wetlands.

Literature Review

The following sections describe information obtained from the Licensees' literature review with regard to riparian habitat conditions within the proposed Project boundary and Pyramid reach. The available literature pertaining to the Licensees' Proposal primarily focused on riparian areas and habitats as components of the surveys.

In particular, the following arroyo toad reports pertinent to the local area were examined:

- Frank Hovore & Associates in 1999 and 2005 (Castaic Creek and Elderberry Forebay, respectively)
- POWER Engineers in 2013 (Elderberry Forebay)
- Environmental Science Associates from 2010 through 2018 (Pyramid Reach from Ruby Canyon to Blue Point Campground)
- Sandburg in 2006 (Pyramid Reach)

Other literature reviewed included DWR's EIR (DWR 2005) and FERC's EA (FERC 2008) for the simulation of natural flows. In addition, surveys (Environmental Science Associates 2014a) were conducted along the perimeters of Quail Lake and Pyramid Lake to evaluate the potential effects of the Licensees' application of copper-based herbicides to control aquatic weeds and algal blooms.

Quail Lake

Environmental Science Associates (2014b) reported that riparian forest/scrub was observed sporadically along the perimeter of Quail Lake, particularly in the southeastern corner near the access road. These areas were dominated by arroyo willow (*Salix lasiolepis*), with an understory of other willow species (*Salix* spp.) and mule fat (*Baccharis salicifolia*). Fremont cottonwood (*Populus fremontii*) were scattered sparsely along the perimeter of the lake. The small patch of riparian forest/scrub in the southeast corner of the lake would be described as Southern Willow Scrub based on the Holland (1986) classification (Environmental Science Associates 2014b).

Pyramid Lake

Environmental Science Associates (2014b) reported that riparian forest occurs sporadically along the perimeter of Pyramid Lake at the confluence with natural drainages. Dominant trees observed included Fremont cottonwood along drainages upstream of the shoreline, and arroyo willow along drainages at or below the lake

shoreline. Understory species included other willow species and mule fat. These areas transitioned into broadleaf cattail (*Typha latifolia*) marsh at the edge of Pyramid Lake. The riparian areas would be classified by CDFW under the Holland (1986) system as Southern Cottonwood Willow Riparian Forest where cottonwood is the dominant species, and as Southern Willow Scrub where willow is dominant (Environmental Science Associates 2014b).

Pyramid Reach

Both Sandburg and Environmental Science Associates reported on vegetation along Pyramid reach between Ruby Canyon and Blue Point Campground, and along Agua Blanca Creek upstream of Lake Piru during arroyo toad surveys in 2005, as well as 2010 through 2018. Surveyors noted that riparian plant communities in this area are dynamic, primarily due to the intensity of winter stream flows. After consecutive years of severe drought throughout southern California, the winter of 2016/2017 brought above-average rainfall to the region. The extensive precipitation scoured the bed and banks of Pyramid reach, removing existing riparian vegetation. In contrast, the 2017/2018 winter precipitation was much less significant, and flows remained low throughout the 2018 season. As a result, an early reduction in water level and the regeneration of riparian vegetation was observed throughout Pyramid reach in 2018 (Environmental Science Associates 2018).

Riparian vegetation identified in DWR's Simulation of Natural Flows in Middle Piru Creek EIR (DWR 2005) and FERC's EA (FERC 2008) includes a variety of riparian plant communities primarily dominated by dense stands of willows (*Salix* spp.) and cottonwoods. Other common riparian trees and shrubs documented include white alder (*Alnus rhombifolia*), elderberry (*Sambucus mexicana*), and western sycamore (*Platanus racemosa*). In addition, Cattails (*Typha* sp.), sedges (*Carex* sp.), and rushes (*Juncus* sp.) were identified in the lower banks of middle Piru Creek and have colonized many in-stream sandbars and benches.

In 2014, Environmental Science Associates observed widespread vegetation encroachment on the riparian channel, with mule fat, willow, Fremont cottonwood, white alder (*Alnus rhombifolia*), and broadleaf cattail being dominant on stream banks. The non-native tamarisk was reported to be expanding in this area, but was primarily confined to isolated locations on gravel bars. Southern Willow Scrub was reported to be the dominant plant community in the riparian floodplain, with dominant species being willows (*Salix* sp.) and mule fat, and occasionally poison oak (*Toxicodendron diversilobum*) and Spanish broom (*Spartium junceum*) (Environmental Science Associates 2010, 2011, 2012, 2013, 2014a, 2015, 2016, 2017, 2018).

Mule fat scrub was found on lower and upper flood terraces in drier areas. Narrow creek gorges that experience frequent flooding supported alluvial scrub, consisting of scale broom (*Lepidospartum squamatum*), mule fat, California buckwheat, California sagebrush (*Artemisia californica*), California brickelbrush (*Brickella californica*),

scattered riparian trees, hairy yerba santa (*Erioduction crassifolium*), shortpod mustard (*Hirschfeldia incana*), black mustard (*Brassica nigra*), and non-native grasses.

Southern Sycamore Alder Riparian Woodland (as identified under the Holland 1986 system) was observed upstream and downstream from Blue Point Campground (approximately 0.5 miles north of Lake Piru). At Frenchmans Flat (approximately 1.5 miles downstream of Pyramid Lake) and upstream from Blue Point Campground, Southern Cottonwood Riparian Forest (as identified under the Holland 1986 system) was observed, with large Fremont cottonwoods in the overstory, and less frequently coast live oak (*Quercus agrifolia*), white alder, and California sycamore (*Platanus racemosa*). Understory species included arroyo willow and bush senecio (*Senecio flaccidus* var. *douglasii*) (Environmental Science Associates 2014a).

Castaic Creek Upstream of Elderberry Forebay

Frank Hovore & Associates described riparian habitat during 1999 and 2005 arroyo toad surveys along Castaic Creek in the check dam basins upstream of Elderberry Forebay (Frank Hovore & Associates 2005). Weather in 1999 was relatively dry and cold, which resulted in low to intermittent stream flows in the Piru-Castaic drainage basins. However, record high rainfall occurred in the winter of 2004/2005 that resulted in heavy erosional flows from surrounding uplands into Castaic Creek, particularly from canyons that had been recently disturbed by fire or human activity. Large mud and debris flows altered channel morphology by downcutting the channel bottom in the upper portions of the basins, and depositing silt and gravel fans in the middle and lower portions. During this period, mature riparian vegetation was scoured from the banks in many areas.

POWER Engineers reported on vegetation in the three check dam basins during 2013 arroyo toad surveys. In Basin 1 (furthest upstream), the upper third contained a dense cover of sandbar willow (*Salix exigua*) and tamarisk. The middle section of Basin 1 was dominated by sandbar willow, and the southern end was dominated by sparse sandbar willow and broadleaf cattail. The margins of Basin 1 were dominated by tamarisk and tree tobacco (*Nicotiana glauca*), with some additional sandbar willow. The northern half of Basin 2 supported very dense broadleaf cattail cover, and the lower half contained a relatively even mixture of mule fat and cottonwood saplings, with the lower 25 to 30 feet being primarily tamarisk. With the exception of some broadleaf cattail clusters, the lower half of Basin 2 is generally sparsely vegetated. The margins of Basin 2 supported emergent vegetation, with the southeast end containing a row of mature cottonwoods above the basin along the access road. Vegetation in the northern half of Basin 3 (the furthest downstream basin) was primarily made up of broadleaf cattails and willows. The southern two-thirds of Basin 3 was almost completely dominated by tamarisk (POWER 2013).

Field Survey Results

As part of the *Botanical Resources Study*, the Licensees performed field surveys between May 1, 2017 and May 23, 2017, to map and assess wetland and riparian

habitats using BLM's Properly Functioning Condition (PFC) assessment. During field surveys, a qualified team of field staff assessed the condition of wetland and riparian habitat using the PFC qualitative methods for wetland (i.e., lentic) (Prichard et al. 2003) and riparian (i.e., lotic) areas adjacent to flowing water (Dickard et al. 2015). Surveyors identified areas to be evaluated prior to field surveys during the review of existing information. Field staff traversed all features on foot or by boat, depending on accessibility, including the entire length of riparian vegetation within the study area whenever safely accessible, and collected data at representative areas. Surveyors determined the locations where PFC data were collected (sample points) while in the field based on site observations. Surveyors collected data at a minimum of one sample location at each discrete wetland or riparian area. For wetland or riparian areas that span a sufficiently large area, such that physical and biological features vary significantly (as determined in the field based on best professional judgment by the Licensees' field staff), up to three sample points were evaluated. Field staff completed the Reach Information Form and PFC Assessment Form (either lentic or lotic). The Reach Information Form records key information that must be included with the assessment. Surveyors recorded locations with a GPS unit, took photographs at each sample point, and photographed features at other locations to document conditions within each wetland and riparian area. Maps of the field results are shown in Figures 5.4.2-10 through 5.4.2-16.

Previously recorded wetlands from the NWI wetlands mapping and literature review components generally corresponded with the information obtained in the field survey. However, using information from the field survey gave greater detail on wetland boundaries and plant species composition. In addition, the field survey identified new wetlands not observed in previous studies nor mapped by the NWI (i.e., GC-2-Lo-A, Py-3).

Lotic Features

The Licensees identified nine lotic areas in Gorman Creek, Pyramid reach, Pyramid Lake, and Castaic Creek. These are summarized in Table 5.4.2-2 and are shown in Figures 5.4.2-10 through 5.4.2-16. All areas found to have no wetland/riparian vegetation were excluded from the field summary maps.

Seven of the nine lotic areas were determined to exhibit "Proper functioning condition," and two areas, one at the inlet of Gorman Creek and Pyramid Lake (PL-10-Lo-A) and one at Castaic Creek (CC-4-Lo-B), were determined to be "Functional – at risk." These two areas were determined to be "Functional – at risk" based on their simplified geomorphological structure (e.g., channelization) and limited ability to dissipate energy. None of these characteristics are due to existing Project operations or were created from conditions attributable to Project operations. In addition, Castaic Creek is upstream of the proposed Project boundary above Elderberry Forebay and is not subject to Project-induced water level fluctuations or influences, and therefore is not considered to have a nexus with the Licensees' Proposal.

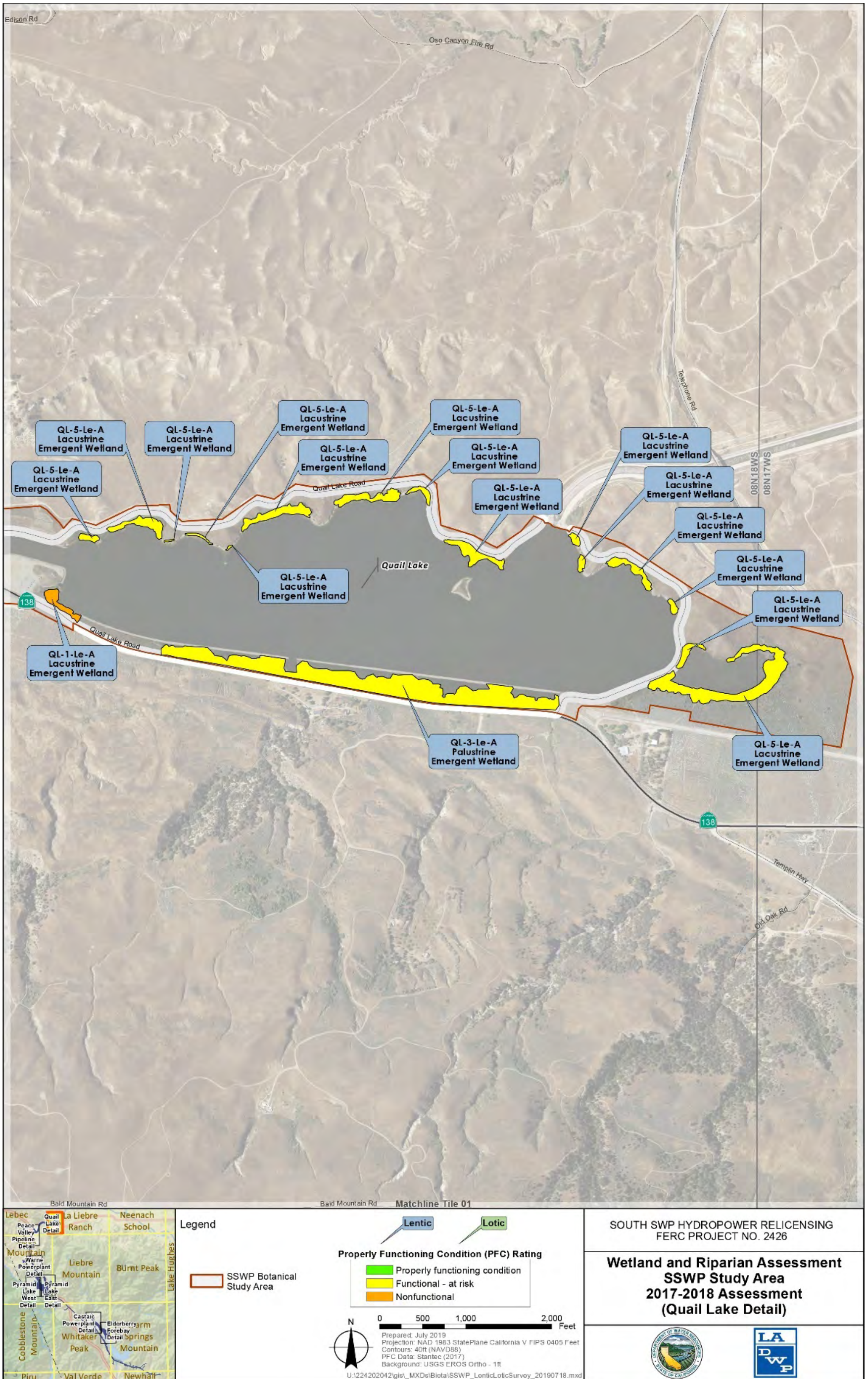


Figure 5.4.2-10. 2017-2018 Wetland and Riparian Assessment – Quail Lake Detail

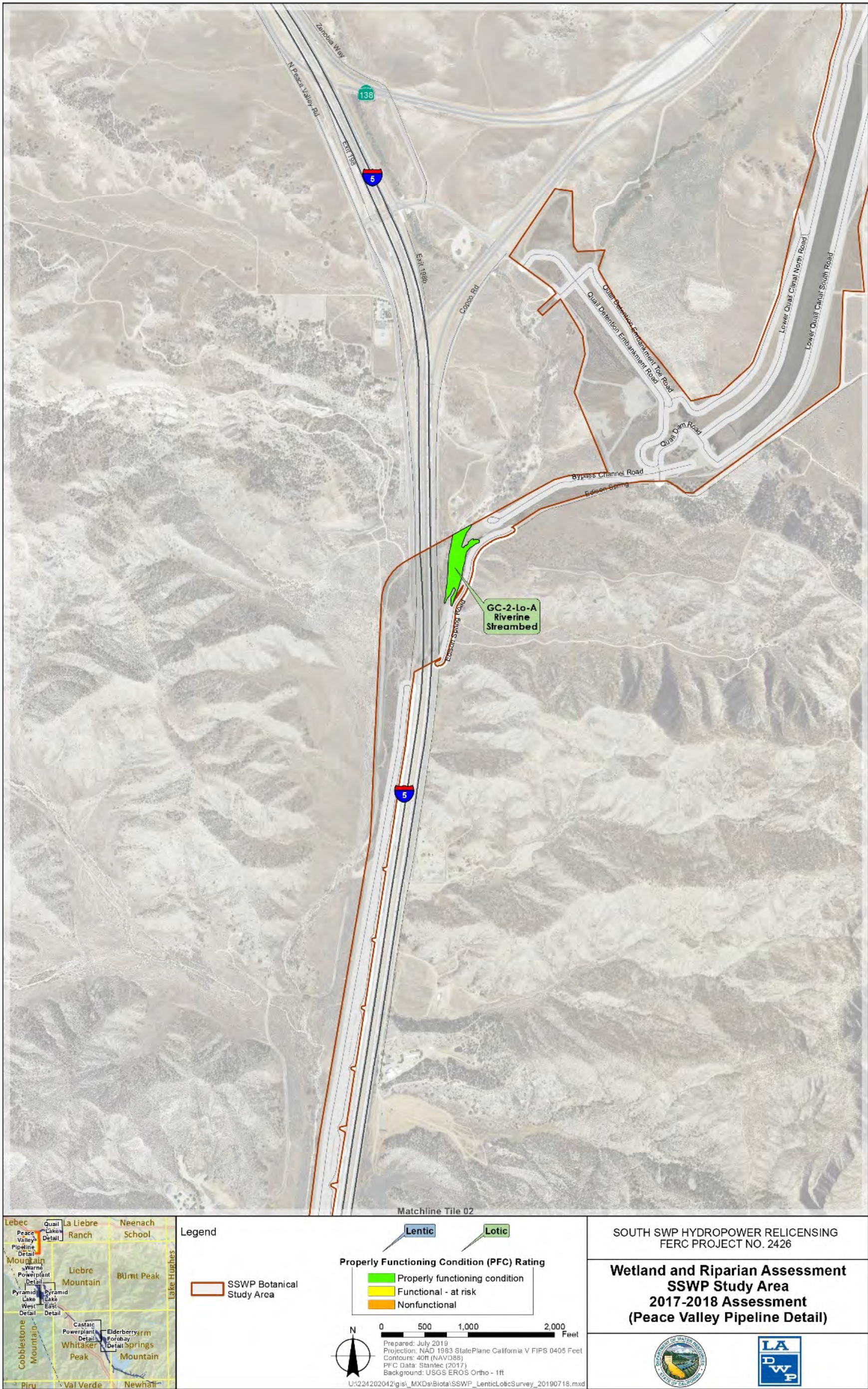


Figure 5.4.2-11. 2017-2018 Wetland and Riparian Assessment – Peace Valley Pipeline Detail

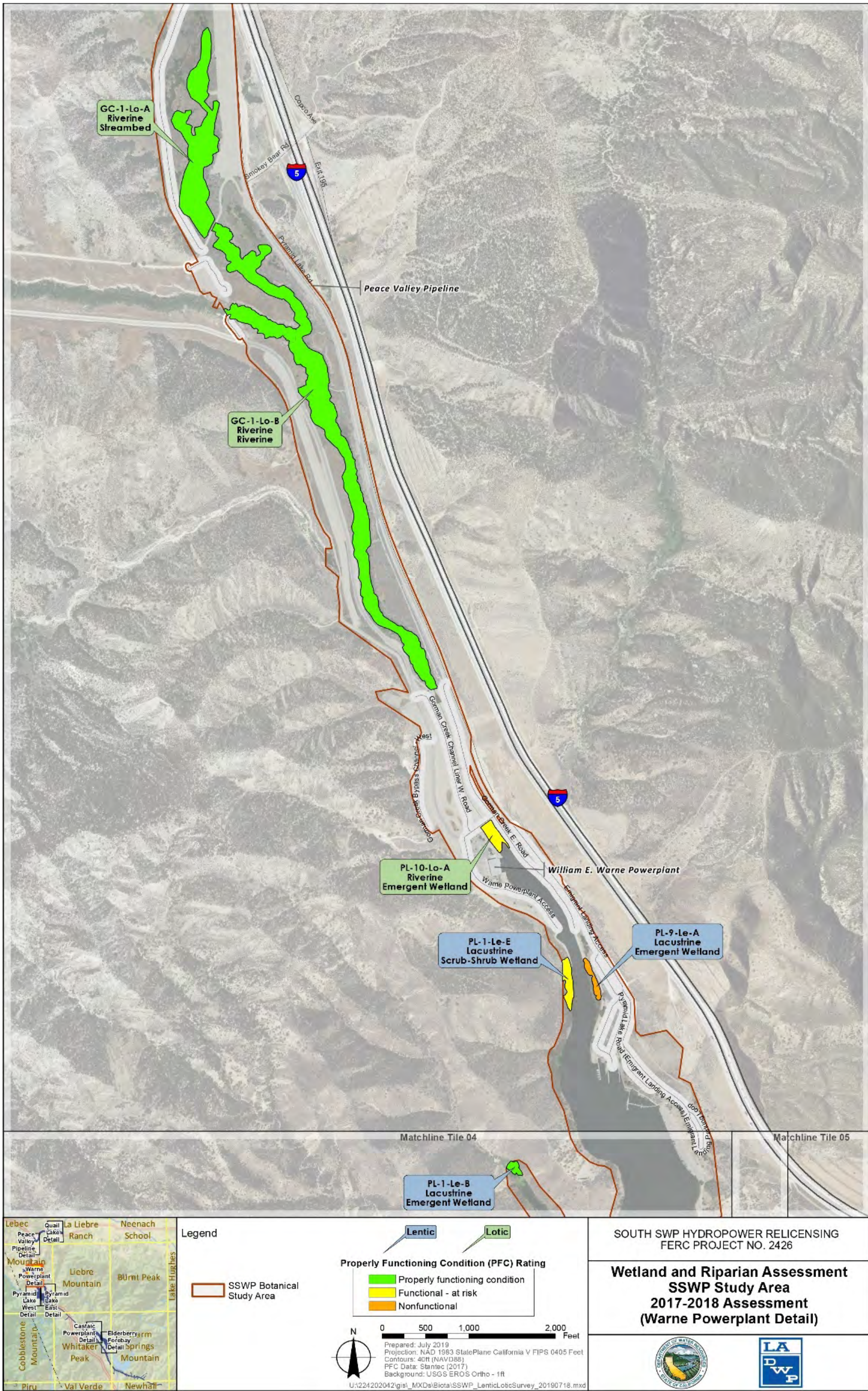


Figure 5.4.2-12. 2017-2018 Wetland and Riparian Assessment – Warne Powerplant Detail

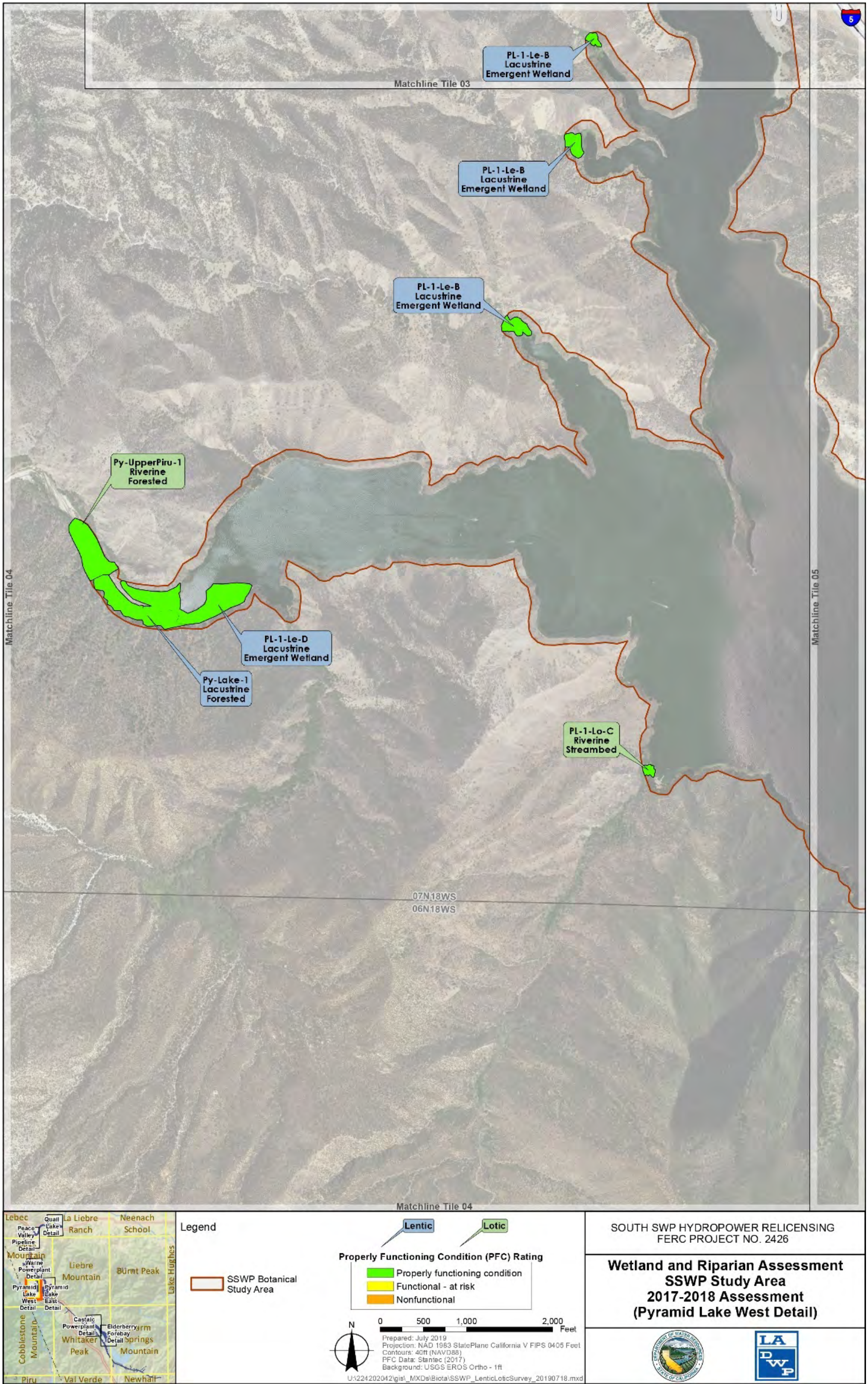


Figure 5.4.2-13. 2017-2018 Wetland and Riparian Assessment – Pyramid Lake West Detail

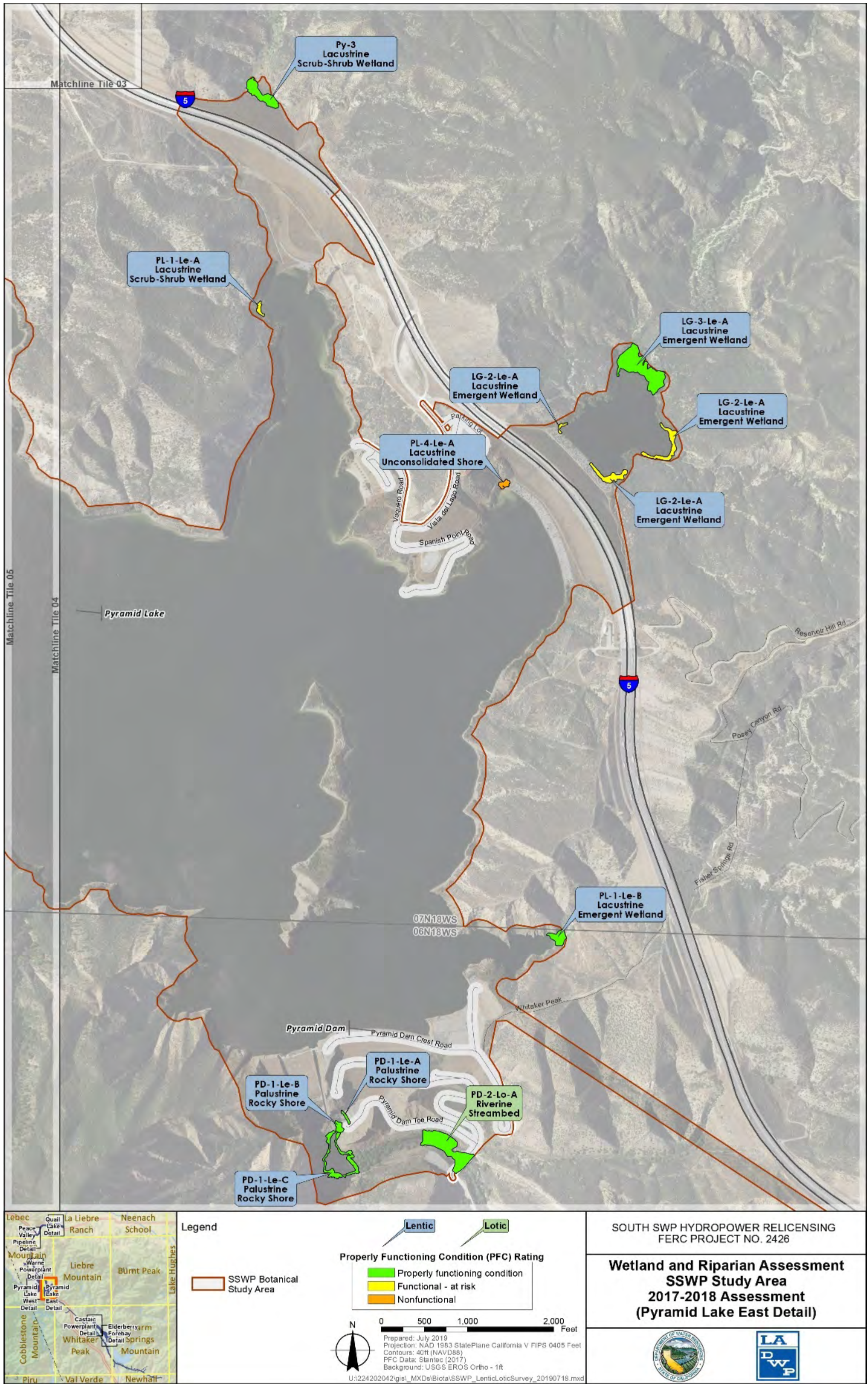


Figure 5.4.2-14. 2017-2018 Wetland and Riparian Assessment – Pyramid Lake East Detail

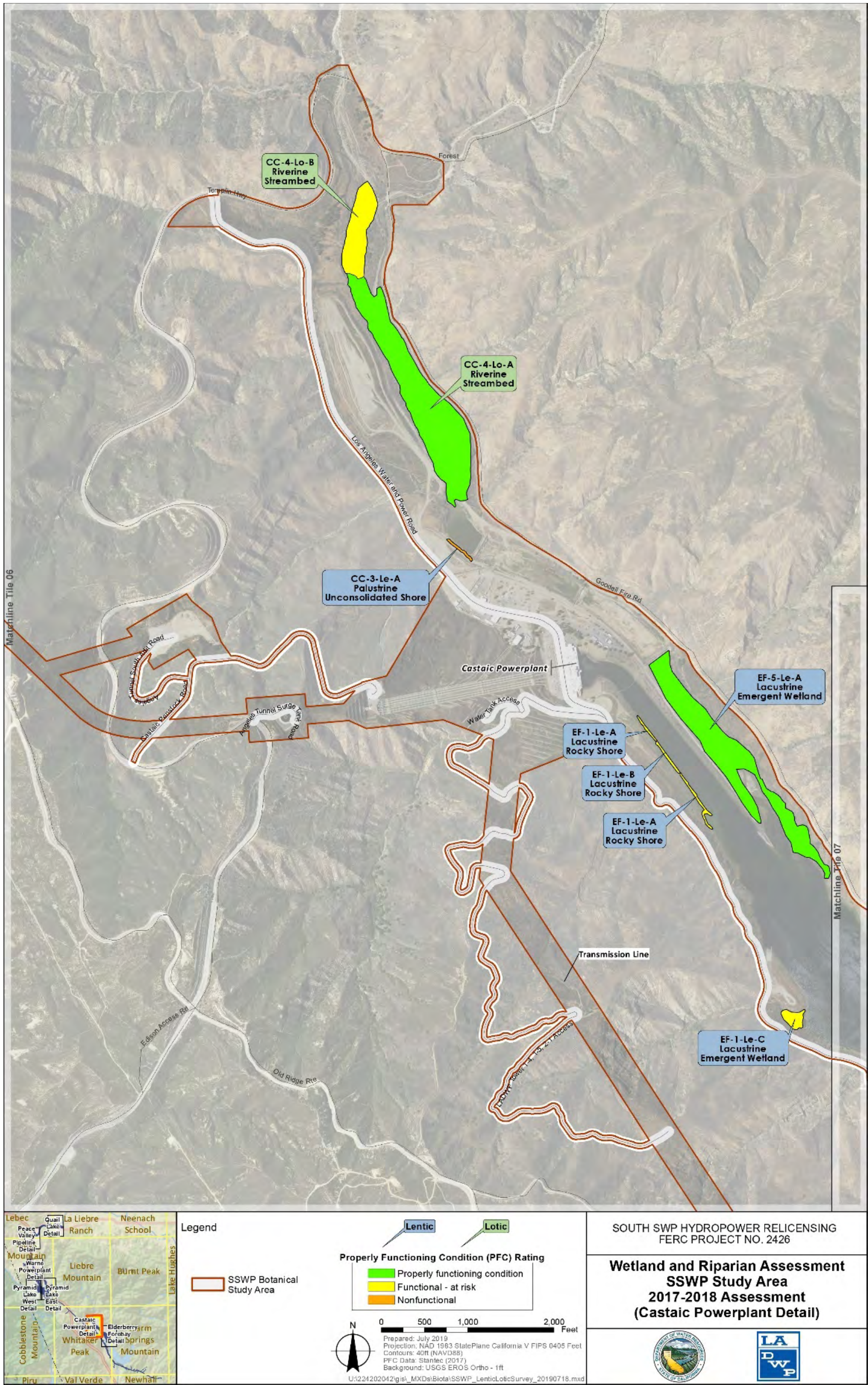


Figure 5.4.2-15. 2017-2018 Wetland and Riparian Assessment – Castaic Powerplant Detail



Figure 5.4.2-16. 2017-2018 Wetland and Riparian Assessment – Elderberry Forebay Detail

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Table 5.4.2-2. Lotic Features Observed During 2017 and 2018 Field Surveys

Feature ID	Location	Functional Assessment	Wetland System (Cowardin)	Wetland Class (Cowardin)	Water Regime (Cowardin)	Basis for Conclusion	Land Ownership
CC-4-Lo-A	Castaic Creek	Proper functioning condition	Riverine	Streambed	Permanently flooded	Hydrologic, vegetative, and geomorphic conditions appear stable	State lands
CC-4-Lo-B	Castaic Creek	Functional at risk	Riverine	Streambed	Intermittently flooded	No significant scouring, erosion, or sediment deposition in system; at risk of excessive sedimentation	State lands
GC-1-Lo-A	Gorman Creek	Proper functioning condition	Riverine	Streambed	Semi-permanently flooded	Hydrologic, vegetative, and geomorphic conditions appear stable	State lands
GC-1-Lo-B	Gorman Creek	Proper functioning condition	Riverine	Riverine	Semi-permanently flooded	Hydrologic, vegetative, and geomorphic conditions appear stable	State lands
GC-2-Lo-A	Gorman Creek	Proper functioning condition	Riverine	Streambed	Permanently flooded	Hydrologic, vegetative, and geomorphic conditions appear stable	State lands
PD-2-Lo-A	Pyramid Reach	Proper functioning condition	Riverine	Streambed	Permanently flooded	Hydrologic, vegetative, and geomorphic conditions appear stable	NFS
PL-1-Lo-C	Pyramid Lake	Proper functioning condition	Riverine	Streambed	Permanently flooded	Hydrologic, vegetative, and geomorphic conditions appear stable	NFS
PL-10-Lo-A	Pyramid Lake	Functional at risk	Riverine	Rock Bottom	Permanently flooded	Geomorphology is a result of channelization; area likely to be maintained; this may eliminate structure such as natural debris buildup	NFS
Py-UpperPiru-1	Pyramid Lake	Proper functioning condition	Riverine	Forested	Flowing	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS

Lentic Features

Twenty-two lentic areas were identified and assessed in the 2017 and 2018 surveys. The areas identified included several disjunct areas that were similar and close in proximity, but not connected (e.g., areas of cattail marsh that were similar in structure and composition, but separated by a different type of vegetation or shoreline structure). Disjunct features in proximity were combined into a single feature for purposes of analysis and reporting. These twenty-two features are summarized in Table 5.4.2-3 and are displayed in Figures 5.4.2-10 through 5.4.2-16. Ten features were found to have “Proper functioning condition,” eight “Functional – at risk,” and four “Nonfunctional.” Areas were determined to be “Functional – at risk” or “Nonfunctional” for a variety of reasons, including limited vegetative structure and riprapped shorelines. Of the features that were categorized as either “Functional – at risk” or “Nonfunctional,” it was determined that in all but three features the characteristics were not due to existing Project operations and were not created from conditions attributable to Project operations. However, the “Functional – at risk” characteristics of three features at Elderberry Forebay – EF-1-Le-A, EF-1-Le-B, and EF-1-Le-C – were most likely due to ongoing effects of the Project, as determined by the survey data, with the details described below.

Project Effects of Features Identified in Field Survey Results

Lotic Features at Gorman Creek (GC-1-Lo-A, GC-1-Lo-B, and GC-2-Lo-A) are subject to minor impacts from ongoing effects due to infrequent operations of the Gorman Bypass Channel, the canals, and Project roads. Minor amounts of local precipitation, in the form of overland flow or flooding, is directed away from natural drainages by Project canals and Project roads. Due to the quality of wetlands at GC-1-Lo-A, GC-1-Lo-B, and GC-2-Lo-A, which exhibited “Proper Functioning Condition,” these effects were determined to be minor and not significant.

In addition, ongoing effects at Gorman Creek are having minor impacts on PL-10-Lo-A, a lotic feature adjacent to the Gorman Creek inlet at Pyramid Lake. Although PL-10-Lo-A was determined to be “Functional – at risk,” this determination was based on the channelization of the wetland and its limited ability to dissipate energy. The characteristics that qualify PL-10-Lo-A as “Functional – at risk” were determined to not be a function of existing Project operations.

Lentic Features EF-1-Le-A, EF-1-Le-B, and EF-1-Le-C have fluctuating water levels due to existing Project operations. Observations of riparian vegetation during field surveys indicated vegetation in these areas is suppressed due to fluctuating water surface elevations. Although lake levels also fluctuate at Pyramid Lake and Quail Lake, the lentic features in those areas were all shown to have “Proper Functioning Condition.” This observation implies that these features are not as greatly impacted from surface water level fluctuations and do not show the lack of vigor in riparian vegetation compared to those at Elderberry Forebay.

Table 5.4.2-3. Lentic Features Observed During 2017 and 2018 Field Surveys

Feature ID	Location	Functional Assessment	Wetland System (Cowardin)	Wetland Class (Cowardin)	Water Regime (Cowardin)	Basis for Conclusion	Land Ownership
CC-3-Le-A	Castaic Creek	Nonfunctional	Palustrine	Unconsolidated Shore	Ponded	Flow patterns altered by disturbance, structure does not accommodate safe passage of flows, lack of structure, diversity in riparian-wetland vegetation, lack of shoreline structure, excessive erosion	State lands
EF-1-Le-A	Elderberry Forebay	Functional - at risk	Lacustrine	Rocky Shore	Ponded	Fluctuation of water levels, flow patterns altered by disturbance, lack of vigor in riparian-wetland vegetation	State lands
EF-1-Le-B	Elderberry Forebay	Functional - at risk	Lacustrine	Rocky Shore	Ponded	Fluctuation of water levels, flow patterns altered by disturbance, lack of vigor in riparian-wetland vegetation	State lands
EF-1-Le-C	Elderberry Forebay	Functional - at risk	Lacustrine	Emergent Wetland	Ponded	Fluctuation of water levels, flow patterns altered by disturbance, lack of vigor in riparian-wetland vegetation	State lands
EF-4-Le-A	Elderberry Forebay	Proper functioning condition	Lacustrine	Emergent Wetland	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	State lands
EF-5-Le-A	Elderberry Forebay	Proper functioning condition	Lacustrine	Emergent Wetland	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	State lands
LG-2-Le-A	Liebre Gulch	Functional - at risk	Lacustrine	Emergent Wetland	Ponded	Lack of structure and diversity of riparian-wetland vegetation	NFS
LG-3-Le-A	Liebre Gulch	Proper functioning condition	Lacustrine	Emergent Wetland	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS

Table 5.4.2-3. Lentic Features Observed During 2017 and 2018 Field Surveys (continued)

Feature ID	Location	Functional Assessment	Wetland System (Cowardin)	Wetland Class (Cowardin)	Water Regime (Cowardin)	Basis for Conclusion	Land Ownership
PD-1-Le-A	Pyramid Reach	Proper functioning condition	Palustrine	Rocky Shore	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS
PD-1-Le-B	Pyramid Reach	Proper functioning condition	Palustrine	Rocky Shore	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS
PD-1-Le-C	Pyramid Reach	Proper functioning condition	Palustrine	Rocky Shore	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS
PL-1-Le-A	Pyramid Lake	Functional - at risk	Lacustrine	Scrub-Shrub Wetland	Ponded	Lack of diversity in riparian-wetland vegetation, and lack of energy dissipation in system	NFS
PL-1-Le-B	Pyramid Lake	Proper functioning condition	Lacustrine	Emergent Wetland	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS
PL-1-Le-D	Pyramid Lake	Proper functioning condition	Lacustrine	Emergent Wetland	Ponded	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS
PL-1-Le-E	Pyramid Lake	Functional - at risk	Lacustrine	Scrub-Shrub Wetland	Other	Lack of structure in riparian-wetland vegetation	NFS
PL-4-Le-A	Pyramid Lake	Nonfunctional	Lacustrine	Unconsolidated Shore	Other	Excessive erosion, natural flow patterns altered by disturbance, inadequate riparian-wetland vegetation to prevent erosion, inadequate soil saturation, inadequate underlying geologic structure, inadequate shoreline structure	NFS

Table 5.4.2-3. Lentic Features Observed During 2017 and 2018 Field Surveys (continued)

Feature ID	Location	Functional Assessment	Wetland System (Cowardin)	Wetland Class (Cowardin)	Water Regime (Cowardin)	Basis for Conclusion	Land Ownership
PL-9-Le-A	Pyramid Lake	Nonfunctional	Lacustrine	Emergent Wetland	Ponded	Continual disturbance by human activities, lack of structure and diversity of riparian vegetation, artificial banks	NFS
Py-Lake-1	Pyramid Lake	Proper functioning condition	Lacustrine	Forested	Flowing	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS
Py-3	Pyramid Lake	Proper functioning condition	Lacustrine	Scrub-shrub	Ephemeral	Hydrologic, vegetative, and erosion/deposition conditions appear to be functioning properly	NFS
QL-1-Le-A	Quail Lake	Nonfunctional	Lacustrine	Emergent Wetland	Ephemeral	Natural flow patterns altered by disturbance patterns, lack of diversity and vigor in riparian-wetland vegetation, inadequate underlying geologic structure	State lands
QL-3-Le-A	Quail Lake	Functional - at risk	Palustrine	Emergent Wetland	Ponded	Area is disturbed by recreational use	State lands
QL-5-Le-A	Quail Lake	Functional - at risk	Lacustrine	Emergent Wetland	Ponded	Inadequate underlying geologic structure	State lands

5.4.2.2 *Effects of the Licensees' Proposal*

This section discusses the potential environmental effects of the Licensees' Proposal on wetland, riparian, and littoral habitats. The Licensees' Proposal includes three measures related to wetland, riparian, and littoral habitats: Measure AR1, Measure WR1, and Measure TR1. Measure AR1 would continue the existing license Article 52 natural hydrograph flow releases, which mimic the natural hydrograph, in Pyramid reach to the extent operationally feasible and consistent with safety requirements, with the exception that the multiplier for estimating the ungaged flow into Pyramid Lake has been updated based on current GIS and hydrologic methods, as described in Appendix A to Exhibit E of this Application for New License. Measure WR1 would continue the existing limits on water surface fluctuations at Pyramid Lake. Measure TR1 would implement the IVMP that includes measures for controlling non-native plant species, protecting special-status species, and re-vegetating disturbed areas. These measures proposed by the Licensees are included in Appendix A of this Application for New License.

The Licensees are not proposing any changes to Project O&M operations. As described above, based on the Licensees' study, the existing licensed Project does not have a significant effect on wetlands, riparian, and littoral habitats, except in some areas bordering Elderberry Forebay due to water level fluctuation. Very minor water surface fluctuations also occur at Quail Lake and Pyramid Lake. At Quail Lake, these fluctuations are minor enough that they do not have any noticeable effect on wetland, riparian, and littoral habitats as observed in the field survey results. Pyramid Lake water surface fluctuations are also relatively minor, and have no significant effect on wetland, riparian, and littoral habitats as observed in the field survey results. Licensees' proposed Measure WR1 would assure these water level fluctuations at Pyramid Lake remain minor during the term of the new license. Further, because the existing licensed Project mimics the natural hydrograph in Pyramid reach, the existing licensed Project has no effect on wetland, riparian, and littoral habitats in the reach. Continuation of the existing license Article 52 under Licensees' proposed Measure AR1 would maintain the simulation of the natural hydrograph to the extent operationally feasible and consistent with safety requirements under Article 52 of the existing license during the term of the new license.

The existing Project also has minor impacts to features along Gorman Creek (GC-1-Lo-A, GC-1-Lo-B, GC-2-Lo-A) and the Gorman Creek inlet at Pyramid Lake (PL-10-Lo-A). The minor impacts occur due to the infrastructure and infrequent operations of the Gorman Bypass Channel. Local precipitation, in the form of overland flow or flooding, is directed away from natural drainages by Project canals and Project roads. These effects are relatively minor and are expected to remain insignificant during the term of the new license.

In addition, the Licensees found three features (EF-1-Le-A, EF-1-Le-B, and EF-1-Le-C) at Elderberry Forebay that are not functioning properly and lack vigor in riparian-wetland vegetation, likely due to fluctuating lake levels and disturbance to natural flows. These features are presented in Tables 5.4.2-2 and 5.4.2-3. Although these effects are

expected to continue, they will not become more substantial under the Licensees' Proposal as compared to current conditions.

The IVMP includes BMPs and measures for controlling non-native plant species, protecting special-status species, and re-vegetating areas disturbed by O&M. Specifically, the IVMP includes:

- Replanting procedures for areas where riparian and upland native vegetation is disturbed from activities such as check dam excavation as well other O&M activities. The replanting will work to target native species that occurred prior to the disturbed conditions. This will include specification of native species that are sourced from local plant stock and are suitable for the habitat in which they are planted. Any replanted areas will be monitored for a period of up to five years, with monitoring plans approved by appropriate regulatory agencies.
- Methods of weed removal and disposal, including manual removal and potential herbicide application. On NFS lands, methods of weed management will be conducted in accordance with USFS guidelines (USFS 2014). In aquatic habitats, for the treatment of algal blooms and aquatic weeds, the methods of removal and dispersal will comply with State and federal regulations (including the SWRCB).
- Specification that the application of herbicides will avoid sensitive habitat areas, and that in aquatic areas, only approved herbicides for use in and near aquatic areas will be utilized when controlling aquatic weeds and algae.

5.4.2.3 Unavoidable Adverse Effects

Continued fluctuation of lake levels at the Elderberry Forebay is not expected to result in any new, unavoidable adverse effects to the three lentic features (EF-1-Le-A, EF-1-Le-B, and EF-1-Le-C) referenced above. No new impacts to these features will occur with the Licensees' Proposal, nor are there opportunities for enhancement, particularly as this water body was purposely created to provide a cycling water supply and the wetlands are nonetheless functioning with that fluctuating water supply. In addition, as described above, existing minor impacts are expected to continue due to reservoir water level fluctuations at Quail Lake and Pyramid Lake, operation of the Gorman Bypass Channel, and operation of canals and Project roads.

5.4.3 Federal ESA, Listed and Candidate Species

This section provides information regarding species listed as FE, FT, candidates under review (FC), or proposed for listing under the federal ESA that are known or have the potential to be affected by the Licensees' Proposal. Species that are not candidate species under the definitions set forth by USFWS and NMFS, including species under petition review or 12-month status review by USFWS and NMFS, are not discussed in this section.

In addition to this general introductory information, background information, and definition of terms provided below, this section is divided into two subsections. Section 5.4.3.1 describes existing Project conditions, including the Licensees' efforts to identify ESA-listed and candidate species potentially affected by the Licensees' Proposal and a species account that includes a brief life history, status, and any known occurrences and abundance within and near the proposed Project boundary. Section 5.4.3.2 describes the potential effects and cumulative effects of the Licensees' Proposal.

The Licensees augmented existing, relevant, and reasonably available information regarding potentially affected ESA-listed species by conducting the following five studies:

- (1) *ESA-Listed Amphibians – California Red-legged Frog* (Study 4.1.9)
- (2) *ESA-Listed Riparian Bird Species, Southwestern Willow Flycatcher, Least Bell's Vireo, and Yellow-Billed Cuckoo Riparian Habitat Evaluations* (Study 4.1.10)
- (3) *Special-Status Raptors* (Study 4.1.20)
- (4) *ESA-Listed Terrestrial Wildlife Species – CWHR [California Wildlife Habitat Relationships]* (Study 4.1.18) and
- (5) *ESA-Listed Plants* (Study 4.1.8)

The results of these studies are incorporated into this section. The study plans can be found in Section 5.0 of the South SWP Hydropower Revised Study Plan as approved in the FERC Study Plan Determinations dated June 14, 2017 and September 7, 2018. In addition, all incidental observations of ESA-listed species during the relicensing studies are noted in this section. Refer to Appendix B of this Exhibit E or to the South SWP Hydropower relicensing website (<http://south-swp-hydropower-relicensing.com/>) for the detailed study approaches, study summaries, and detailed study data.

This Section 5.4.3 and Section 2, Proposed Action and Alternatives, in Exhibit E of this Application for New License fulfill the requirements at 18 CFR Section 5.18(b)(3)(ii) that an applicant include in its application for new license a draft biological assessment. The Licensees have not included an applicant-prepared draft Essential Fish Habitat (EFH) assessment in their Application for New License because the Licensees' Proposed Project does not have any measurable effect on designated EFH. Generally, Sections 5.4.3 and 2.0 provide the basis upon which consultation may be conducted between FERC and USFWS, and FERC and NMFS, pursuant to Section 7(c)(1) of the ESA (16 U.S.C. § 1536[c][1]), and the implementing joint agency regulations for BAs (50 CFR § 402.12). For the purpose of these ESA consultations:

- FERC is the Action Agency. On September 30, 2016, FERC initiated informal consultation with USFWS and NMFS as required under Section 7 of the ESA and the interagency cooperation regulations in 50 CFR Part 402, Subparts A and B.

- The Licensees are FERC’s designated non-federal representative. On September 30, 2016, FERC designated the Licensees as FERC’s non-federal representatives for purposes of informal consultation under Section 7 of the ESA.
- The Proposed Action is the issuance of a new license to the Licensees for the South SWP Hydropower as proposed by the Licensees in this Application for New License (i.e., the Licensees’ Proposal).
- The Action Area is the area within the proposed Project boundary and Piru Creek below Pyramid Dam downstream to the NMWSE of Lake Piru. Under the ESA, the Action Area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 CFR § 402.02). The downstream extent of the Action Area is defined as the point where effects to river flow and habitat availability associated with the Proposed Action are no longer measurable. The Action Area is distinct from the geographic scope for cumulative effects on aquatic species, which encompasses a larger area in the Piru Creek Basin from Pyramid Lake to the confluence of Piru Creek with the Santa Clara River, and from Pyramid Lake to Elderberry Forebay within the Castaic Creek drainage.
- The environmental baseline includes the past and present impacts of all federal, State, or private activities, and other human activities in the Action Area, as well as the anticipated impacts of all proposed federal projects in the Action Area that have already undergone formal or early ESA Section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process (50 CFR § 402.02). The environmental baseline includes effects attributable to the existence of previously constructed dams or diversions and O&M to maintain those structures. The baseline for geology and soils, water resources, aquatic resources, and terrestrial resources are described in Sections 5.1, 5.2, 5.3, 5.4, respectively, in this Exhibit E.
- Direct effects are defined as “the direct or immediate effects of the [Proposed Action] on the species or its habitat” (USFWS and NMFS 1998).
- Indirect effects are defined as those that are caused by the Proposed Action and are later in time, but still are reasonably certain to occur (50 CFR § 402.02).
- Cumulative effects are those effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation (50 CFR § 402.02). The major non-federal project in the Action Area is the SWP and the associated water supply operations. In addition, cumulative effects may be associated with the UCWD Santa Felicia Hydroelectric Project (FERC Project No. 2153), particularly regarding fish passage issues.

- No anticipated interrelated or interdependent actions are associated with the Proposed Action at this time. Interrelated actions are those private actions that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those private actions having no independent utility apart from the Proposed Action (50 CFR § 402.02). If a particular private activity would not occur “but for” the occurrence of the proposed federal action, the effects of that private action are interdependent and interrelated to the federal action, and the effects of that private action are attributable to the federal action for consultation purposes. To the contrary, activities that would occur anyway, with or without the occurrence of the federal action at issue, are not interdependent or interrelated to the proposed federal action. The ESA Consultation Handbook (USFWS and NMFS 1998) further clarifies that if a project would exist independently of a Proposed Action, it cannot be considered interrelated or interdependent, even if the Proposed Action is required to bring the existing facility into compliance with federal law. Specifically, DWR’s operation of the South SWP Hydropower and delivery of SWP water to users are not interrelated or interdependent with FERC’s issuance of a new license to DWR and LADWP for the Project, because, regardless of whether FERC issues a new license, DWR would continue to operate the SWP and provide SWP water to users.

Prior to filing its NOI and PAD, the Licensees met with Relicensing Participants, including USFWS and NMFS, to familiarize them with the Project and its operations, discuss process, identify issues, and, most importantly, to collaboratively develop study proposals, including for species listed as threatened and endangered under the ESA. Since that time, the Licensees have held numerous meetings to discuss process, and study methods and results. USFWS and NMFS were individually notified of and invited to each meeting, and both agencies have participated in some of the meetings during which ESA-related items were discussed. The following provides a summary of informal consultation with NMFS and USFWS regarding ESA-listed species.

- Pre-Initiation of Informal Consultation under Section 7 of ESA
 - August 1, 2016 – The Licensees filed with FERC and distributed to USFWS and NMFS the NOI and PAD. The PAD described existing, relevant, and reasonably available information regarding ESA-listed species, and other potentially affected resources. The PAD also described the studies the Licensees proposed to conduct to supplement existing, relevant, and reasonably available information regarding the Project and potentially affected resources.
- Post-Initiation of Informal Consultation under Section 7 of ESA
 - September 30, 2016 – FERC initiated informal consultation with USFWS and NMFS as required under Section 7 of the ESA and the interagency cooperation regulations in 50 CFR Part 402.

- September 30, 2016 – FERC designated the Licensees as FERC’s non-federal representatives for purposes of informal consultation under Section 7 of the ESA.
- September 30, 2016 – FERC issued SD1 for the relicensing.
- October 25, 2016 – FERC hosted a Project site visit. All agencies were invited. USFWS and NMFS participated.
- October 26, 2016 – FERC held morning and evening joint meetings with agencies, Native American tribes, and the public to discuss the relicensing. NMFS participated.
- November 28, 2016 – NMFS filed with FERC comments on the Licensees’ NOI and PAD, and FERC’s SD1.
- November 29, 2016 – USFWS filed with FERC comments on the Licensees’ NOI and PAD, and FERC’s SD1.
- January 13, 2017 – FERC issued SD2 for the relicensing.
- January 13, 2017 – The Licensees filed with FERC a Proposed Study Plan that included studies related to ESA-listed species.
- February 8, 2017 – The Licensees held a public meeting with agencies, including USFWS and NMFS, and other interested parties to discuss the Licensees’ Proposed Study Plan. On March 1-3, 2017 and March 7-8, 2017, the Licensees held follow-up focused study plan meetings with USFWS, NMFS and other agencies.
- April 13, 2017 – NMFS filed comments with FERC on the Licensees’ Proposed Study Plan.
- April 13, 2017 – USFWS filed comments with FERC on the Licensees’ Proposed Study Plan.
- May 15, 2017 – The Licensees filed with FERC a Revised Study Plan that included studies related to ESA-listed species.
- June 14, 2017 – FERC issued a Study Plan Determination.
- June 27, 2017 – NMFS filed comments with FERC on FERC’s Study Plan Determination.
- May 15, 2018 – The Licensees filed with FERC an ISR.

- May 23, 2018 – The Licensees held an ISR meeting. The meeting participants were: FERC, USFS, NMFS, CDFW, Los Angeles Department of Parks and Recreation, MWD, UWCD, NPS, SWRCB, and USFWS.
- June 7, 2018 – The Licensees filed with FERC an ISR meeting summary.
- June 21, 2018 – NMFS filed with FERC comments on the Licensees' ISR and ISR meeting summary.
- August 8, 2018 – The Licensees filed with FERC a reply to comments on the Licensees' ISR and ISR meeting summary.
- September 7, 2018 – FERC issued a Determination on Requests for Study Modifications and New Studies.
- May 15, 2019 – The Licensees filed with FERC a USR.
- May 29, 2019 – The Licensees held a USR meeting. The meeting participants were: FERC, USFS, NMFS, CDFW, UWCD, NPS, SWRCB, and USFWS.
- June 13, 2019 – The Licensees filed with FERC a USR meeting summary.
- July 11, 2019 – CDFW and NPS filed with FERC comments on the Licensees' USR and USR meeting summary.
- July 12, 2019 – AW and USFS filed with FERC comments on the Licensees' USR and USR meeting summary.
- July 22, 2019 – USFWS e-mailed comments to the Licensees on the Licensees' USR and USR meeting summary.
- August 12, 2019 – The Licensees filed with FERC a response to comments on the USR and USR meeting summary.

5.4.3.1 Existing Environment

Identification of ESA-Listed Species

In 2015, the Licensees developed an initial list of ESA-listed species under the jurisdiction of USFWS that are known, or have the potential, to occur in the Project vicinity by first querying USFWS' online Information for Planning and Consultation (IPaC). The information gathered from IPaC was used to generate an unofficial list of federally listed and proposed endangered, threatened, and candidate species that should be considered as part of any future effects analysis of the Proposed Action (USFWS 2015). The query was based on the area of the USGS 7.5-minute topographic quadrangles in which the proposed Project boundary is located (i.e., La Liebre Ranch, Lebec, Black Mountain, Liebre Mountain, Whitaker Peak, Warm Springs Mountain, and

Newhall), and the adjacent quadrangles (i.e., Burnt Peak, Cobblestone Mountain, Piru, Val Verde, Green Valley, and Mint Canyon), covering approximately 744 square miles. This is an area much larger than the Action Area, but is intended to establish a comprehensive initial list of potentially affected species.

The initial query performed for the PAD in 2015 was repeated on October 15, 2018. The second query revealed one change to the list. The San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*) was previously included as a Candidate species, and on September 15, 2016, USFWS proposed listing the species as threatened (81 FR 63454). However, the proposed rule was withdrawn on March 15, 2018, based on information that threats to the species have been sufficiently reduced by current and planned conservation efforts, such that listing was not necessary (83 FR 11453); therefore, the San Fernando Valley spineflower is no longer listed by IPaC. For species under the sole responsibility of NMFS, the Licensees reviewed National Oceanic and Atmospheric Administration Fisheries online information (NOAA Fisheries 2018), FR notices, and literature providing species information. Licensees also reviewed the list of species to be considered provided by USFWS to FERC (filed on November 28, 2016). The list included 11 species, 10 of which are discussed below, but also included mountain yellow-legged frog (currently known as southern mountain yellow-legged frog) (*Rana muscosa*). However, no other sources support historical or current occurrence of this species in the Santa Clara River Basin, and therefore, this species is not discussed further.

In addition, the Licensees accessed existing species records through the CNPS online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2018) and CDFW's CNDDb (CDFW 2015, 2018). Plant species records were also reviewed on the CalFlora website (CalFlora 2018). The database queries were each based on a search of the same area as described above. Project-related EAs, Biological Evaluations (BE), and BOs were also reviewed for information on ESA-listed species not provided by other sources.

The Licensees' searches resulted in a list of 22 species from the IPaC report and one anadromous species. In addition, the western Distinct Population Segment (DPS) of yellow-billed cuckoo (*Coccyzus americanus*), a species not reported by the IPaC query, was included based on FERC's Study Plan Determination that presence/absence surveys for yellow-billed cuckoo be performed as part of the relicensing *ESA-Listed Riparian Bird Species, Southwestern Willow Flycatcher and Least Bell's Vireo Habitat Evaluations Study*. Therefore, the result was a list of 24 species (Appendix O). The Licensees then researched the known distribution, habitat associations, and requirements of these 24 species, as summarized in Appendix O, to exclude from further consideration those species known to be endemic to restricted geographic areas and/or habitat types not found within the Action Area.

Based on the information derived from these searches, the Licensees determined that seven of the 24 species have no known occurrences within the Action Area or nearby areas; no designated critical habitat for these species occurs within the Action Area; and

the area is not within the species known native range. The seven species excluded from further consideration for these reasons are:

- Riverside fairy shrimp (*Streptocephalus woottoni*) (FE)
- Blunt-nosed leopard lizard (*Gambelia silus*) (FE)
- Mojave desert tortoise (*Gopherus agassizii*) (FT)
- San Joaquin kit fox (*Vulpes macrotis mutica*) (FE)
- Conejo dudleya (*Dudleya parva* [*D. abramsii* ssp. *parva*]) (FT)
- Braunton's milk-vetch (*Astragalus brauntonii*) (FE)
- Lyon's pentachaeta (*Pentachaeta lyonii*) (FE)

Santa Ana sucker (*Catostomus santaanae*), which occurs within the Project vicinity, was also excluded from further consideration, because the population within the Santa Clara River Basin is not covered by the ESA listing, which includes only populations in the Santa Ana, Los Angeles, and San Gabriel river basins (65 FR 19686). Additionally, there is no designated critical habitat for Santa Ana sucker within the Santa Clara River and its tributaries. At the time of the listing in 2000, the population in the Santa Clara River drainage was believed to be introduced and hybridized with introduced Owens sucker (*C. fumeiventris*), but recent genetic analysis suggests that the population is native to the Santa Clara River watershed (Richmond et al. 2018). Refer to Section 5.3 for a detailed discussion of the Santa Ana sucker and the results of the relicensing *Pyramid Reach Fish Population Study*.

On the basis of these analyses, the Licensees identified 16 species that are listed as FE or FT, and have the potential to be affected by the Licensees' Proposal. No species listed as FC or proposed species were identified. These listed species include one invertebrate, two fish, two amphibians, five birds, and six plants. Table 5.4.3-1 includes a brief species account and specific information regarding their status, habitat associations, and known occurrences within or near the Action Area.

Table 5.4.3-1. ESA-Listed Species Potentially Affected by the Licensees' Proposal

Common Name¹ (Scientific Name)	Status²	Habitat Associations	Known Historical or Recent Occurrences in Project Vicinity USGS Quadrangles³
Vernal Pool Fairy Shrimp (<i>Branchinecta lynchi</i>)	FT	Branchiopod endemic to vernal pools and other seasonally flooded landscape depressions; species distribution includes disjunct occurrences in the Coast Range.	MTC quadrangle; no records or designated critical habitat within Action Area.
Unarmored Threespine Stickleback (<i>Gasterosteus aculeatus williamsoni</i>)	FE SE FP	Small fish found mostly in perennial, isolated headwaters of the Santa Clara, Los Angeles, San Gabriel, and Santa Ana Rivers.	GRV, PIR, NEW, and WSM quadrangles; no records or designated critical habitat within Action Area.
Steelhead, Southern California DPS (<i>Oncorhynchus mykiss</i>)	FE	Anadromous form which spawns mostly in upper stream reaches and tributaries. The southern California DPS inhabits coastal drainages from the Santa Maria River in San Luis Obispo County, California, down to the United States-Mexico border.	Not reported by CNDDB, but considered by NMFS to have occurred historically in the Piru Creek drainage, including the Action Area; no critical habitat within Action Area.
Arroyo Toad (<i>Anaxyrus [Bufo] californicus</i>)	FE SSC	Breeds in low-gradient perennial and seasonal streams; terrestrial habitat is within associated riparian and adjacent upland areas.	BMT, COB, NEW, and WTP quadrangles; known populations and designated critical habitat in Piru Creek and Castaic Creek.
California Red-Legged Frog (<i>Rana draytonii</i>)	FT SSC	Largely aquatic, except during dispersal, summer aestivation, and foraging in riparian areas; breeds in still or slow-moving water, but not in large lakes or reservoirs.	WSM quadrangle (San Francisquito Creek) and within Action Area in COB quadrangle (Piru Creek), within designated critical habitat.
California Condor (<i>Gymnogyps californianus</i>)	FE SE FP	Soaring bird that seeks carrion in open habitats and nests mostly in cavities on escarpments and in hollows of old growth conifers.	BMT, COB, LIM, PIR, and WTP quadrangles, with records and designated critical habitat within Action Area.
Coastal California Gnatcatcher (<i>Polioptila californica californica</i>)	FT SSC	Non-migratory songbird associated with coastal sage scrub and chaparral in coastal California to Baja California, Mexico, mostly below 2,000 feet elevation.	LEB, MTC, and NEW quadrangles; no records or designated critical habitat within Action Area.

Table 5.4.3-1. ESA-Listed Species Potentially Affected by the Licensees' Proposal (continued)

Common Name¹ (Scientific Name)	Status²	Habitat Associations	Known Historical or Recent Occurrences in Project Vicinity USGS Quadrangles³
Southwestern Willow Flycatcher (<i>Empidonax traillii extimus</i>)	FE SE	Migratory songbird breeding in dense riparian thickets along streams and wetlands.	Not reported by CNDDB, but designated critical habitat within Action Area.
Least Bell's Vireo (<i>Vireo bellii pusillus</i>)	FE SE	Migratory songbird breeding in dense riparian habitat and adjacent chaparral in river valleys from interior northern California to Baja California, Mexico.	VAV, NEW, PIR, and WSM quadrangles; no records or designated critical habitat within Action Area.
Western Yellow-Billed Cuckoo, western DPS (<i>Coccyzus americanus</i>)	FT SE	Migratory songbird associated with large, structurally complex blocks of riparian habitat, usually on large streams.	VAV quadrangle in 1979; no records or designated critical habitat within Action Area.
Slender-horned Spineflower (<i>Dodecahema leptoceras</i>)	FE SE	Annual herb found on floodplain terraces and sandy benches with alluvial fan scrub vegetation at about 660 to 2,300 feet elevation.	NEW and MTC quadrangles; no records or designated critical habitat within Action Area.
Marsh Sandwort (<i>Arenaria paludicola</i>)	FE SE	Annual herb associated with freshwater marshes and swamps; currently known to occur at only two sites in San Luis Obispo County, California.	None.
Nevin's Barberry (<i>Berberis nevinii</i>)	FE SE	Perennial native to chaparral and in washes with scattered occurrences in Riverside, Los Angeles, and San Bernardino Counties at 1,400 to 2,000 feet; known occurrences include transplants outside of natural range.	NEW quadrangle (possibly extirpated) and WSM quadrangle (from transplants); no records or designated critical habitat within Action Area.
Gambel's Watercress (<i>Nasturtium [Rorippa] gambelii</i>)	FE ST	Perennial herb in freshwater marshes and near streams in southern California and a site in Mexico; currently known to occur at a site in Santa Barbara County and introduced at another site in San Luis Obispo County, but may be under-reported.	None.

Table 5.4.3-1. ESA-Listed Species Potentially Affected by the Licensees' Proposal (continued)

Common Name ¹ (<i>Scientific Name</i>)	Status ²	Habitat Associations	Known Historical or Recent Occurrences in Project Vicinity USGS Quadrangles ³
Spreading Navarretia (<i>Navarretia fossalis</i>)	FT	Annual herb from vernal pools and poorly drained, seasonally flooded, alkali playas; species distribution includes a few sites in Los Angeles County.	MTC quadrangle; no records or designated critical habitat within Action Area.
California Orcutt Grass (<i>Orcuttia californica</i>)	FE SE	Annual grass endemic to deep vernal pools with clay soils in Ventura, Los Angeles, Riverside, and San Diego Counties.	MTC quadrangle; no records or designated critical habitat within Action Area.
Summary	16 species potentially affected, and 4 with designated critical habitat in Action Area		

Notes:

¹No federal candidates or proposed species were identified, and none of these species are listed by the U.S. Department of Agriculture, Forest Service as sensitive.

²Status: FE = federal endangered, FP = California fully protected, FT = federal threatened, SE = California State endangered, ST = California State threatened, SSC = California State species of special concern

³USGS Quadrangles: BMT = Black Mountain, COB = Cobblestone Mountain, GRV = Green Valley, LEB = Lebec, LIM = Liebre Mountain, MTC = Mint Canyon, NEW = Newhall, PIR = Piru, VAV = Val Verde, WSM = Warm Springs Mountain, WTP = Whitaker Peak

Key:

CNDDDB = California Natural Diversity Database

DPS = Distinct Population Segment

NMFS = National Marine Fisheries Service

USGS = U.S. Geological Survey

Vernal Pool Fairy Shrimp²²



The vernal pool fairy shrimp (*Branchinecta lynchi*) was listed as threatened on September 19, 1994 (59 FR 48136). Critical habitat was designated for this species on August 5, 2003 (68 FR 46684), with subsequent economic, non-economic, and administrative revisions in 2005, 2006, and 2007 (70 FR 11140; 70 FR 46924; 71 FR 7118, 7316). The 2007 FR notice was a court-mandated requirement to clarify the economic and non-economic exclusions. A 90-day finding to petition to revise critical habitat was filed in 2011 (76 FR 7528). A recovery plan was issued on December 15, 2005 (USFWS 2005a), and the results of a five-year review was issued on September 28, 2007 (USFWS 2007b). No recovery actions specific to the Licensees' Proposal or Action Area are identified in the recovery plan or five-year review.

²² Photo credit: Dwight Harvey, USFWS [public domain], via Wikimedia Commons

The vernal pool fairy shrimp is a relatively large (0.12 to 1.5-inch) branchiopod (crustaceans of the Class Branchiopoda, Order Anostraca) endemic to vernal pools and other seasonally flooded landscape depressions, both natural and artificially created, including small, clear, sandstone rock pools; ephemeral drainages; road rut pools; roadside ditches; vernal swales; and large, turbid, alkaline, grassland, valley floor pools (Eng et al. 1990; Helm 1998). Occurrences are predominantly within the Central Valley of California from Shasta County to Tulare County, but the species is also found in California in the Coast Ranges and in Riverside County, as well as in the Agate Desert of Jackson County, Oregon. The loss and degradation of habitats are the primary factors responsible for the decline of the species.

Critical habitat has been designated in 24 counties in California and in Jackson County, Oregon (71 FR 7118). There is no designated critical habitat in Los Angeles County, the county in which the Project is located. Fairy shrimp are non-selective filter feeders, consuming detritus, bacteria, algae, protozoans, and other small organisms. Like other vernal pool branchiopods, vernal pool fairy shrimp have a relatively short life span that allows them to hatch, mature to adulthood, and reproduce during the brief time period when vernal pools contain water (USFWS 2005a). Vernal pool fairy shrimp mature in 18 days at optimal conditions of 20°C, and reproduce within an average of 39 days (Helm and Vollmar 2002). Populations occur annually between October and March, completing the lifecycle in as little as nine weeks (Helm 1998). Vernal pool fairy shrimp cysts (i.e., “resting eggs”) survive long periods of desiccation and temperature extremes. Cysts may be ingested and passed undamaged through the digestive tracts of migratory birds and amphibians, providing a means of dispersal, and are also inadvertently carried on the skin and feathers of waterfowl and other animals (USFWS 2005a).

Although the vernal pool fairy shrimp has been documented at large vernal pools, including one exceeding 25 acres in area, it tends to occur primarily in smaller pools and is most frequently found in pools measuring less than 0.05 acres in area (Eriksen and Belk 1999). Habitats are usually characterized by low to moderate levels of salinity or total dissolved solids (Eriksen and Belk 1999). The vernal pool fairy shrimp occurs over a broad range of elevations, mostly from 30 feet to 4,000 feet (Eng et al. 1990). Vernal pool fairy shrimp pools range in water temperature from 4.5°C (Eriksen and Belk 1999) to about 23°C (Helm 1998; Eriksen and Belk 1999).

There are no known records of vernal pool fairy shrimp within the Action Area. There are two CNDDDB records of vernal pool fairy shrimp in the Project vicinity, both from the Mint Canyon quadrangle in the Santa Clarita area of Los Angeles County, 12.8 and 13 miles away from Elderberry Forebay (CDFW 2018). The nearest designated critical habitat is located about 11 miles west of Pyramid Lake in Ventura County (USFWS 2018f). No incidental observations of vernal pool fairy shrimp were noted during the Licensees’ relicensing field studies.

Unarmored Threespine Stickleback²³



The unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) was listed as endangered on October 13, 1970 (35 FR 16047). Critical habitat was proposed on November 17, 1980 (45 FR 76012); however, no final rule was issued because USFWS later determined that the designation of critical habitat was not warranted (67 FR 58580). A revised recovery plan was issued on December 26, 1985 (USFWS 1985), and the results of a five-year review was issued on June 15, 2009 (USFWS 2009e). No recovery actions specific to the Licensees' Proposal or the Action Area are identified in the recovery plan or five-year review.

This small fish is native to the Santa Clara, Los Angeles, San Gabriel, and Santa Ana River drainages, and a few locations in Santa Barbara County. Most known populations were extirpated prior to listing, often through hybridization or competition with a more common form of threespine stickleback, *G. aculeatus microcephalus* (partially armored threespine stickleback) (USFWS 2009e). Populations in the upper reaches of Piru Creek and Castaic Creek were extirpated prior to listing (USFWS 1985). Exposure to predation may also strongly select for individual sticklebacks with lateral plates (i.e., "armor"), gradually eliminating the unarmored form (USFWS 1985). Unarmored threespine sticklebacks are associated with perennial headwater streams, where populations are isolated at most times by intermittent stream courses from armored forms of threespine stickleback and from larger, predatory fishes.

The unarmored threespine stickleback currently occurs in Los Angeles County in the Santa Clara River, primarily in Soledad Canyon upstream of Santa Clarita and intermittently downstream of Soledad Canyon, and in Santa Barbara County in San Antonio Creek. Unarmored threespine sticklebacks have also been found in Castaic Creek downstream of the Interstate 5 bridge, where occurrences may be intermittent (USFWS 2009e). A population may persist in the lowermost reaches of Bouquet Creek, a tributary of the Santa Clara River, although replacement by introduced partially armored threespine sticklebacks has evidently occurred in the upper reaches (Richmond et al. 2015). Recent severe drought has imperiled the Santa Clara River population, prompting emergency translocation of fish to San Francisquito Creek, where the native population may have been extirpated earlier (CDFW 2018). Threespine sticklebacks isolated in the Baldwin Lake drainage in the San Bernardino Mountains are "low-armored" (Swift et al. 1993) and treated by USFWS (2009e) as *G. aculeatus williamsoni*, although they may be genetically distinct. Existing populations are threatened by competition and genetic introgression with partially armored threespine stickleback, predation by larger fish and other introduced predators, stochastic

²³ Photo credit: Barrett Paul, USFWS [public domain], via Wikimedia Commons.

extinction events, changes to stream hydrology, including depletion from groundwater pumping, and degradation of water quality.

Unarmored threespine sticklebacks spawn in vegetated pools and other sheltered, slow-moving stream sections, mostly in early spring and summer. Eggs are laid in nests constructed and guarded by the males until fry disperse (USFWS 2009e). Fry and early juvenile stages are restricted to shallow, densely vegetated stream edges, whereas larger juveniles and adults are more widely distributed. Individual unarmored threespine sticklebacks are probably short-lived (i.e., usually one year or less).

There are no known records of unarmored threespine stickleback within the Action Area. There are eight CNDDDB records of unarmored threespine stickleback in the Project vicinity on the following quadrangles: Piru, Val Verde, Mint Canyon, Newhall, Green Valley, and Warm Springs Mountain (CDFW 2018). These records are from the Santa Clara River upstream of the confluence of Castaic Creek, Bouquet Canyon Creek, San Francisquito Creek, and within the lowermost mile of Castaic Creek between Highway 126 and Commerce Drive, where one unarmored threespine stickleback was found during a survey for the species in 2005 (CDFW 2018). The latter site is approximately 7.6 miles from Elderberry Forebay. Occurrences at two of the locations, Bouquet Canyon Creek and San Francisquito Canyon, which are tributaries of the Santa Clara River upstream of the confluence of Castaic Creek, are regarded as extirpated (CDFW 2018). The San Francisquito Canyon population was located about 4 miles upstream of the Castaic Transmission Line crossing. No incidental observations of unarmored threespine stickleback were noted during the Licensees' relicensing field studies.

Steelhead, Southern California DPS²⁴



“Steelhead” is the term commonly used to describe the anadromous form of the biological species *Oncorhynchus mykiss* (*O. mykiss*). The southern California DPS of steelhead (SC steelhead) was formally listed as endangered on August 18, 1997 (62 FR 43937). After this initial listing, the range of the listed evolutionary significant unit was extended south to the United States-Mexico border on May 1, 2002 (67 FR

21586). In January 2006, NMFS reaffirmed its listing determinations for steelhead based on the DPS policy (71 FR 834), ruling that the SC steelhead remain listed as endangered. On September 2, 2005, NMFS published a final rule designating critical habitat for SC steelhead (70 FR 52488). Critical habitat was designated to include all naturally spawned anadromous populations below natural and manmade impassable barriers in streams from the Santa Maria River to the United States- Mexico border. A recovery plan was issued on January 11, 2012 (NMFS 2012).

²⁴ Photo credit: Oregon State University [CC BY-SA 2.0 (<http://creativecommons.org/licenses/by-sa/2.0/>)], via Wikimedia Commons.

The SC steelhead DPS is estimated to have had annual runs of 32,000 to 46,000 returning adults historically, declining to currently less than 500 returning adults (Busby et al. 1996). NMFS (2012) stated that the Vern Freeman Diversion Dam on the Santa Clara River, Santa Felicia Dam (Lake Piru), and Pyramid Dam (Pyramid Lake) on Piru Creek effectively impede or block fish passage to spawning and rearing habitat in the major tributaries of the Santa Clara River. It is NMFS' view that construction of both Santa Felicia and Pyramid dams on Piru Creek blocked steelhead migration to historical spawning and rearing habitat, and that Santa Felicia Dam blocks 95 percent of the SC steelhead habitat in Piru Creek and its tributaries (NMFS 2006). According to NMFS, these dams and other water control structures have modified flow regimes from their historical hydrographs, increased downstream water temperatures, degraded riparian habitats, and reduced gravel recruitment (NMFS 2012).

SC steelhead are categorized as “winter run,” displaying a migration period into natal streams between December and May, reaching reproductive maturation at the time of arrival. Individual SC steelhead may migrate from several miles to several hundred miles to reach their spawning grounds. SC steelhead have evolved to migrate deep into watersheds to exploit the environmental conditions that favor the production of young. Unlike other Pacific salmonid species, not all steelhead adults die after spawning and some individuals may spawn up to four times (Moyle 2002).

The life cycle of *O. mykiss* is variable but consists of three main strategies: fluvial-anadromous, lagoon-anadromous, and freshwater-resident. Fluvial-anadromous individuals are those that migrate to the ocean after smoltification, mature in ocean, and return to freshwater to spawn. Lagoon-anadromous individuals may spend an extended period of time rearing in estuarine environments before migrating to the ocean. Lastly, freshwater resident fish, commonly referred to as rainbow trout, spend their entire life in freshwater environments. Zimmerman and Reeves (2000) found that *O. mykiss* populations can switch life history strategies from a resident form to a migratory ocean form and vice versa. The variability in potential life cycle strategies can increase the persistence of the species or DPS as a whole.

Female steelhead excavate a nest, called a redd, in habitats containing appropriately sized gravels with a range of depths and velocities. After fertilization by a male, steelhead eggs incubate from three to 14 weeks, which may vary depending on water temperatures (Shapovalov and Taft 1954; Barnhart 1991). After hatching, newly spawned individuals, or alevins, will remain in the gravel for an additional two to five weeks (Barnhart 1991). After emergence, fry move to shallow water, low velocity habitats, such as stream margins and low gradient riffles, in order to forage in open areas lacking instream cover (Hartman 1965; Everest et al. 1986; Fontaine 1988). Reportedly, as fry increase in size and their swimming abilities increase, usually in late summer and fall, juveniles tend to occupy areas with cover and higher velocities occurring in deeper mid-channel areas, near the thalweg (Hartman 1965; Everest and Chapman 1972; Fontaine 1988).

During winter periods, SC steelhead prefer low velocity pool habitats with substantial cover (Hartman 1965; Swales et al. 1986; Raleigh et al. 1984; Fontaine 1988). During high flows and colder conditions, juvenile steelhead seek refuge in interstitial spaces in cobble and boulder substrates (Bustard and Narver 1975; Everest et al. 1986).

Freshwater residency can be variable for steelhead, ranging from one to three years. Steelhead usually migrate to the marine environment for the first time after two or three years in freshwater (Busby et al. 1996), but have been known to reach sufficient size to smolt after one year in productive environments (Bond 2006). Juvenile emigration generally occurs between March and July annually, and usually coincides with high flows (Shapovalov and Taft 1954; Spina et al. 2005).

UWCD's Vern Freeman Diversion Dam, a water control system on the Santa Clara River, was constructed in 1991 and it is used to divert water for enhancing groundwater recharge and maintaining seawater intrusion through artificial basins at the Piru, Saticoy, El Rio and Noble spreading grounds. The diversion dam was modified in 1993 to include upstream fish passage facilities that consist of a fish trap, a fish ladder, a screened fish bay, and a downstream migrant trap. During the period of 1993 to 2014, only 16 adult SC steelhead were observed there between March and April. Three of the 16 SC steelhead observed were kelts. Although other anadromous species, such as Pacific lamprey, were detected in higher numbers during the initial years of observation, SC steelhead numbers have remained minimal. Most years, no SC steelhead adults are observed, and no more than three adults or kelts have been observed in any year. Out-migrating smolts were also observed at the Vern Freeman Diversion Dam facilities, ranging from 0 to 839 individuals a year. Variability in these numbers may be attributed to changes in stream discharge (UWCD 2016). The UWCD is in the process of improving the fish passage facilities at the diversion dam.

Genetic evidence suggests that anadromous populations of *O. mykiss* occurred in Piru Creek prior to the construction of Santa Felicia Dam (Girman and Garza 2006; Boughton and Garza 2008; Clemento et al. 2008). Based on collected juvenile *O. mykiss* from freshwater habitats in southern California, including Piru Creek, resident, reproducing populations of *O. mykiss* were descended from relic populations that included the anadromous form, rather than from planted trout originating from the Fillmore Hatchery or northern California hatcheries (Nielsen et al. 1997; Girman and Garza 2006; Clemento et al. 2008). Although it has been debated whether SC steelhead existed naturally in the Piru Creek watershed, NMFS concluded that SC steelhead were naturally present in the Piru Creek drainage prior to the construction of Santa Felicia Dam (NMFS 2008). However, SC steelhead have not existed in Pyramid reach since the construction of Santa Felicia Dam. There are no records of SC steelhead in the Project vicinity (CDFW 2018). Additionally, FERC (2008) stated that "there are no current reports of steelhead or rainbow trout in Piru Creek downstream of Santa Felicia Dam."

SC steelhead and its designated critical habitat do not occur within the Action Area. Santa Felicia Dam blocks all upstream and downstream migration of SC steelhead into

and out of Pyramid reach should steelhead be present at Santa Felicia Dam. It is important to note that there has been no evidence of steelhead upstream of Santa Felicia Dam. Although the Licensees' relicensing studies did not specifically target SC steelhead, resident *O. mykiss* were observed during the *Pyramid Reach Fish Population Study*. eDNA analysis detected *O. mykiss* mitochondrial DNA in 59 out of 60 sample locations, although it cannot be determined if the detections originated from resident *O. mykiss* or *O. mykiss* stocked in Pyramid Lake. Three-pass depletion electrofishing surveys also found *O. mykiss* in two of the three sample locations. More information on these findings is presented in Section 5.3 of Exhibit E in this Application for New License.

Arroyo Toad²⁵



The arroyo toad (*Anaxyrus [Bufo] californicus*) was listed as endangered on December 16, 1994 (59 FR 64859). Critical habitat was designated for this species on February 7, 2001 (66 FR 9414), with multiple revisions on April 13, 2005 (70 FR 19562) and February 9, 2011 (76 FR 7246). A recovery plan was issued on July 24, 1999 (USFWS 1999), and a five-year review was issued 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 exist and new threats were identified (80 FR 79805).

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).

Designated critical habitat for arroyo toad has been designated in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties. Critical habitat unit 5 is located on Piru Creek and unit 6 is located, in part, on Castaic Creek (Figure 5.4.3-1a). Sub-unit 5a is defined by USFWS as the 17-mile reach of Piru Creek and adjacent uplands from the confluence of Lockwood Creek downstream to Pyramid Lake, whereas sub-unit 5b is a 15-mile reach of Piru Creek beginning at the confluence of Fish Creek and extending downstream to Lake Piru as well as Agua Blanca Creek from Devils Gateway downstream to the confluence with Piru Creek (76 FR 7246). Both sub-units are described in the final rule as having substantial arroyo toad populations (76 FR 7246). Sub-unit 6a is defined by USFWS as a 7-mile reach of Castaic Creek from Bear Canyon downstream to Elderberry Forebay, and 0.7-mile of

²⁵ Photo credit: USFWS [public domain], via Wikimedia Commons.

Fish Creek from Cienaga Spring to the confluence with Castaic Creek. Sub-unit 6b includes the lowermost 2.6-mile reach of Castaic Creek extending up from the confluence with the Santa Clara River, as well as a 4-mile section of the Santa Clara River between the mouths of Castaic and San Francisquito Creeks (76 FR 7246). Arroyo toad designated critical habitat and areas surveyed by the Licensees are presented in Figures 5.4.3-1a through 5.4.3-1e.

Population loss has been largely attributed to development of coastal areas, flood control projects, and other stream modifications, with declines likely exacerbated by introduced predatory fish and American bullfrog, and the spread of tamarisk or salt cedar (*Tamarix ramosissima*) in riparian areas (59 FR 64859). Suitable aquatic and riparian habitat is maintained and supported by fluvial processes, including a natural flood regime or conditions similar to a natural regime, with large flows resulting from large storm events providing the scouring flows necessary to control vegetation encroachment and to create available pool habitat to encourage breeding opportunities. Within watersheds, the most robust arroyo toad populations may do best at the lower end of the upstream sections of third to sixth order streams (Sweet 1992, as cited by Sweet and Sullivan 2005). These are streams characterized by sand and gravel substrates, where flows are sufficient to suspend silt and clay. Periodic flooding is important to scour vegetation, redistribute fine sediments, and re-form suitable, shallow pools. However, flood flows occurring during the breeding season disrupt breeding and are a potential source of mortality to eggs and larvae. Existing populations of adult arroyo toads are relatively small compared to historical data (Sweet and Sullivan 2005). Populations in headwater areas upstream of reservoirs may be limited by marginal habitat conditions (Sweet and Sullivan 2005; USFWS 2009a). Fluctuations in arroyo toad population size may result from natural variation in seasonal and annual rainfall (USFWS 1999).

The arroyo toad breeds in low-gradient, broad, open streams or low-gradient sections of streams, and is largely terrestrial outside of the breeding season. Breeding habitats are located in overflow pools, old flood channels, and shallow pools and margins with little or no flow. Substrates in breeding areas are usually sand or gravel, with little or no emergent vegetation. Adult males in breeding condition typically call from suitable egg-laying sites almost every night during the breeding season, which can last from February to July, whereas females are present only when they are ready to breed. Breeding behavior may be interrupted by flooding, but typically resumes when flows are again favorable. Most streams supporting arroyo toads hold surface water for at least four to five months in most years; however, streams with water for as little as two months in spring in most years, the minimum required for at least some of the larvae to complete metamorphosis, are considered suitable (76 FR 7246). Larvae may utilize areas with water velocities of up to 1.3 feet per second (Sweet 1992, as cited by Sweet and Sullivan 2005).

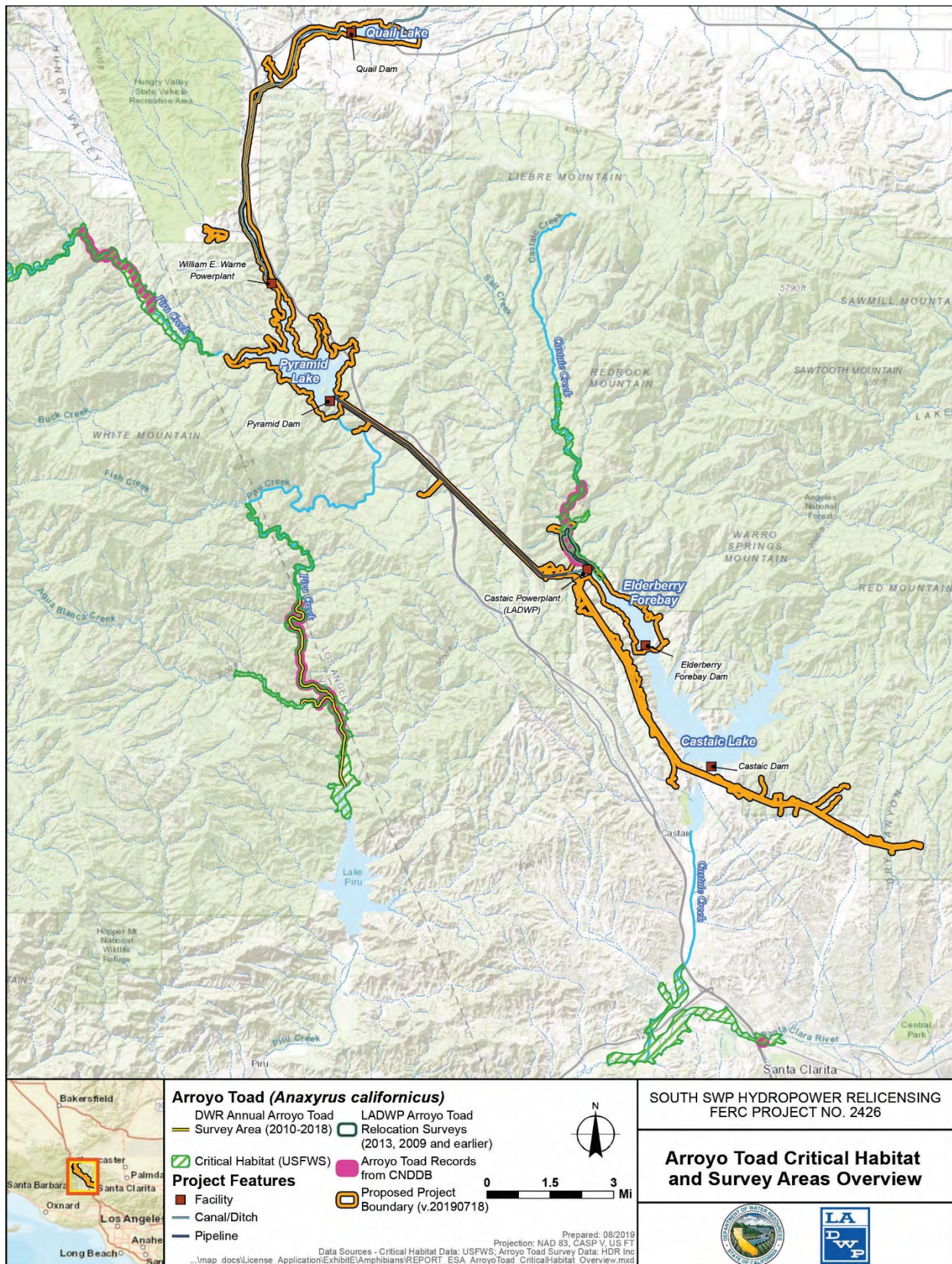


Figure 5.4.3-1a. Arroyo Toad Critical Habitat and Areas Surveyed by Licensees

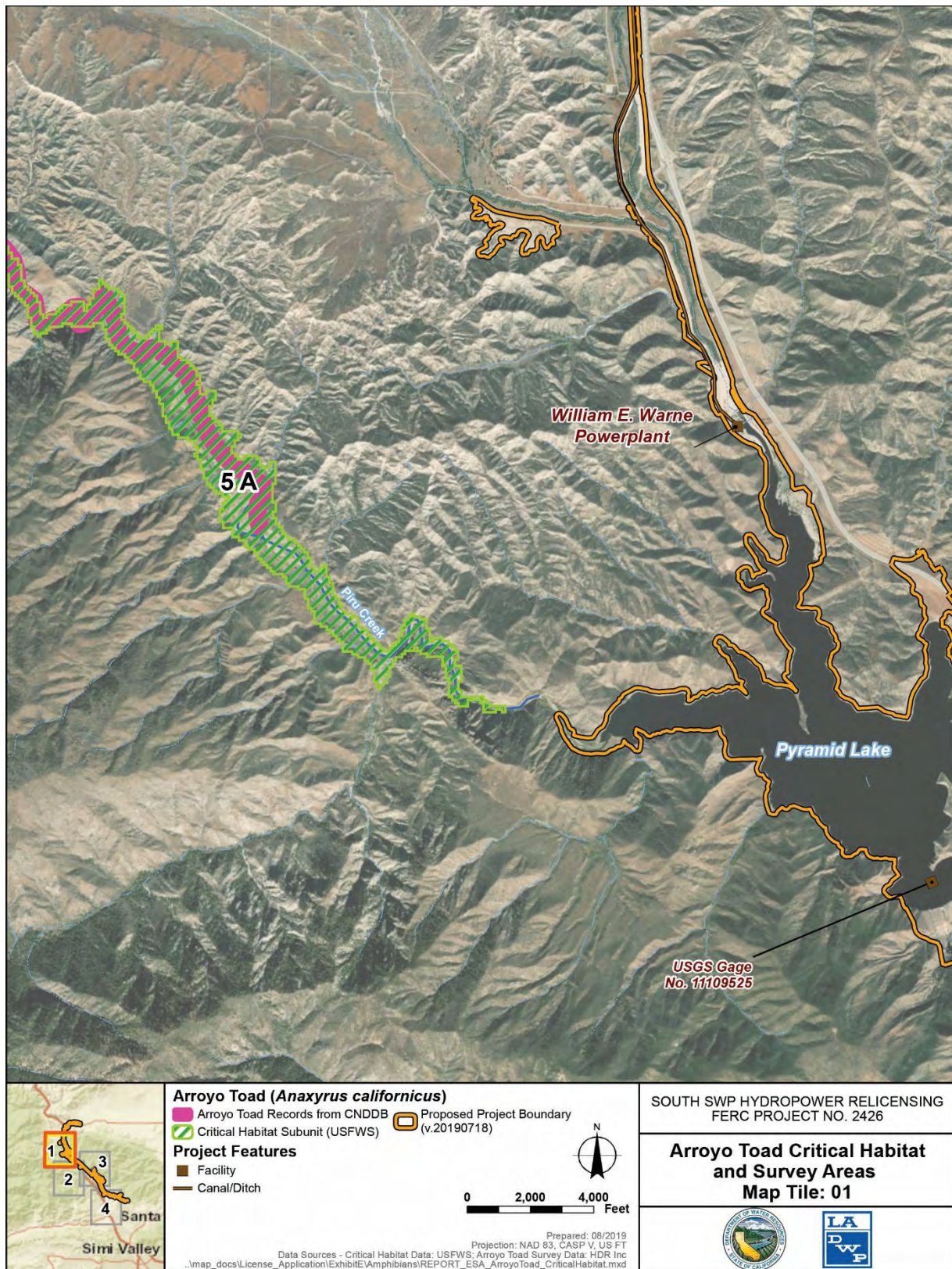


Figure 5.4.3-1b. Arroyo Toad Critical Habitat Unit 5A in Piru Creek Arm Above Pyramid Lake

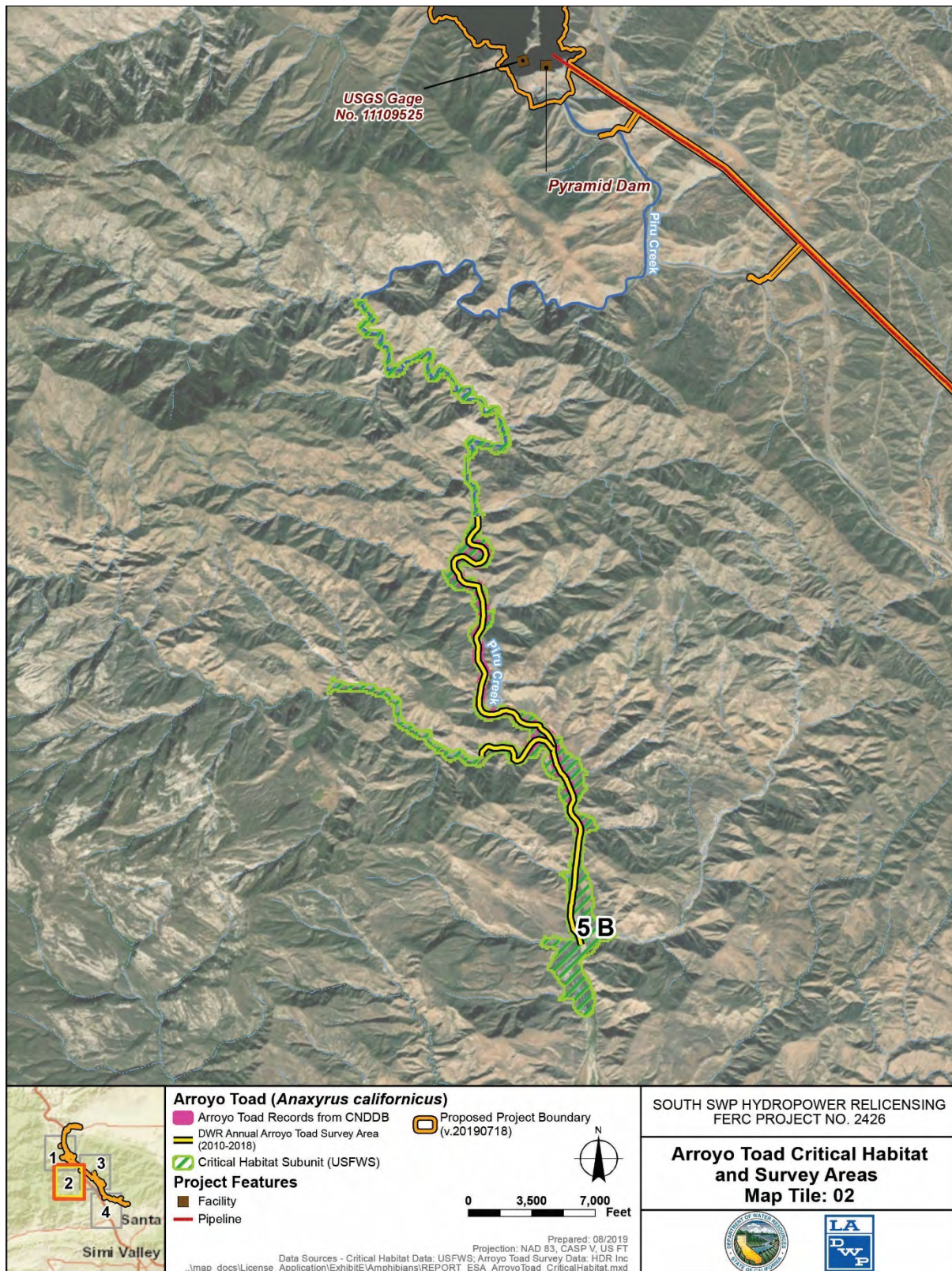


Figure 5.4.3-1c. Arroyo Toad Critical Habitat Unit 5B and Areas Annually Surveyed by Licensees in Pyramid Reach

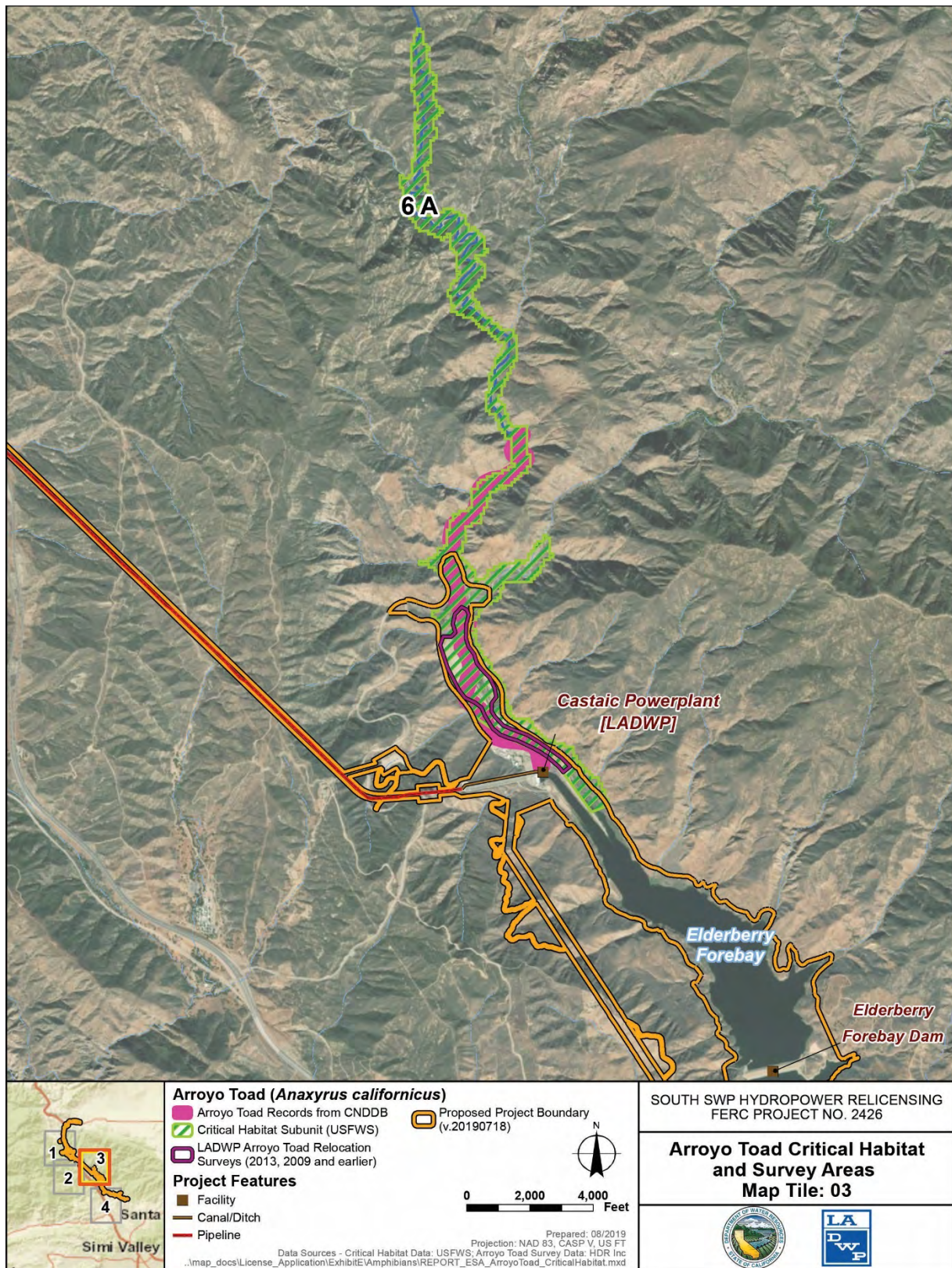


Figure 5.4.3-1d. Arroyo Toad Critical Habitat Unit 6A and Areas Periodically Surveyed by Licensees at Elderberry Forebay and Castaic Creek

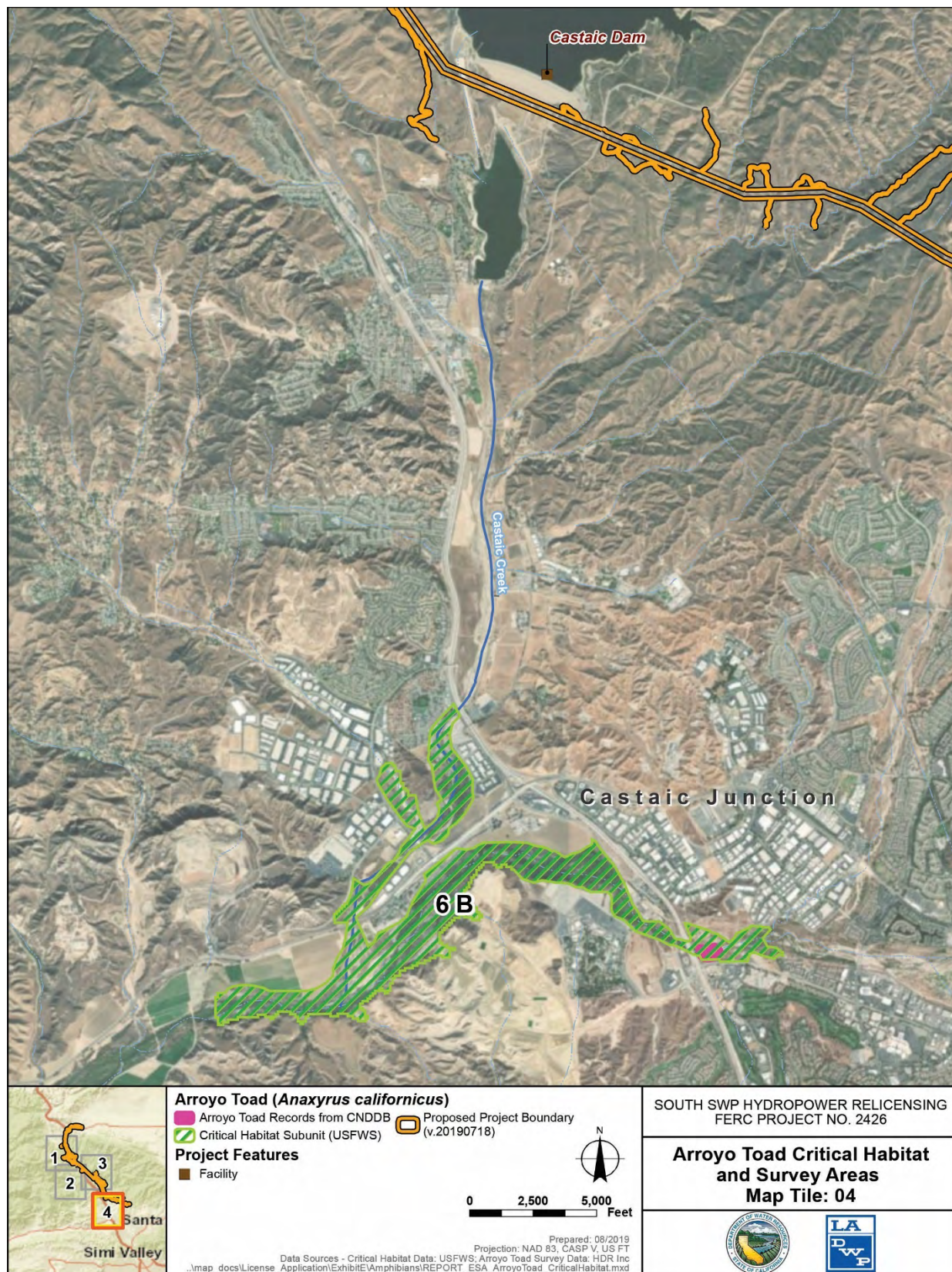


Figure 5.4.3-1e. Arroyo Toad Critical Habitat 6B

Arroyo toads are active from approximately February or March to July or August, and are inactive later in the year. Little is known regarding hibernation behavior. Populations studied by Sweet (1992, 1993, both as cited by Sweet and Sullivan 2005) exhibited high mortality during the hibernation period.

Adult females and large males are relatively sedentary during the active season, whereas smaller adult males and juveniles may undertake longer movements along streams. Daytime and dry period retreats are shallow burrows in the riparian zone usually in areas of sandy or other friable soils, with occasional use of existing small mammal burrows. Metamorphosed arroyo toads less than about 1 inch body length do not burrow, but remain near the stream, often associated with damp substrates (Sweet and Sullivan 2005).

Riparian habitats are important to all post-metamorphic life stages. Favored riparian habitat includes sand bars, alluvial terraces, and sparsely to moderately vegetated streamside benches. Typically, banks are vegetated with willows (*Salix* spp.) and mule fat. Use of upland areas beyond the riparian zone also occurs, although this may vary regionally or by site. Radio-telemetry by Ramirez in the Mojave River Basin found that arroyo toads sometimes ventured as much as 650 feet into uplands, but that most tracked toads remained in riparian areas (Cadre Environmental 2007). Use of upland areas may occur more often in populations near the coast (Sweet and Sullivan 2005).

Eggs and small larvae may experience high mortality from stranding when water levels drop or displacement when flooding occurs. Other sources of larval mortality include predation by introduced fishes. Juvenile arroyo toads are vulnerable to predation by killdeer (*Charadrius vociferus*), and trampling by recreationists and cattle (Sweet 1992, as cited by Sweet and Sullivan 2005). Adult arroyo toads, especially calling males, may experience heavy predation by introduced American bullfrogs (USFWS 1999).

There are four CNDDDB records for arroyo toad in the Project vicinity, including sections of streams with known populations of the species (Figures 5.4.3-1a through 5.4.3-1e). As detailed below, two of the records are entirely outside of the Action Area, whereas the other two records are partly or entirely within the Action Area, and one of these is partly within the proposed Project boundary. The CNDDDB records are from the Black Mountain, Cobblestone Mountain, Whitaker Peak, and Newhall quadrangles (CDFW 2018). The occurrences that are not within the Action Area are located: (1) on the Santa Clara River east of Interstate 5 within designated critical habitat unit 6B, and (2) on Piru Creek upstream of Pyramid Lake within critical habitat unit 5A. The latter is described as “northwest and southeast of Hardluck Campground about 3.25 miles upstream of Pyramid Lake” (CDFW 2018). Note that although the CNDDDB record is outside of the Action Area and proposed Project boundary, the critical habitat encompasses the small area at DWR’s Piru Creek Gaging Station, where inflow to Pyramid Lake is measured.

A third CNDDDB record entirely within the Action Area downstream of the Project is located on a section of Piru Creek and its tributary, Agua Blanca Creek, within the lower portion of Pyramid reach, from Blue Point Campground to just south of Ruby Canyon

north of Lake Piru. The fourth CNDDDB record is located on Castaic Creek upstream of Elderberry Forebay, up to 2 miles north of Castaic Powerplant. This record associated with critical habitat unit 6A is partly within the Action Area, which is also within the proposed Project boundary.

Sandburg (2006) details a long history of surveys for and observations of arroyo toads in Piru Creek, including characterizations of habitat. Arroyo toad surveys were performed for DWR in Pyramid reach in 2005, and annually for nine consecutive years since 2010 under the provisions of FERC's 2009 license amendment order, which required surveys for a minimum of three years, with associated reporting of results (FERC 2009, 2010; Sandburg 2006; Environmental Science Associates 2010, 2011, 2012, 2013, 2014, 2015b, 2016, 2017, 2018) (Figure 5.4.3-1c). FERC stipulated that the monitoring frequency could be reduced, upon consultation with USFWS and the SWRCB, if supported by the survey results. The surveys have indicated that the number and distribution of breeding locations is highly variable, with more egg masses in more locations following winters with above average precipitation, as illustrated by the results in 2017, when 45 egg masses were found in 26 locations following above average precipitation in the winter of 2016-2017 (Environmental Science Associates 2017). In contrast, few arroyo toad egg masses were found in 2012 through 2016, associated with severe drought. A single adult arroyo toad was observed incidentally during the Licensees' *Special-Status Aquatic Amphibians and Semi-Aquatic Snakes Study* field work in Pyramid reach on April 17, 2018, approximately 9.3 miles downstream of Pyramid Dam.

Breeding season surveys were also performed by DWR in Piru Creek over a 2-mile reach upstream of Pyramid Lake in 2009 and 2010, extending from above Hardluck Campground to below the Piru Creek Gaging Station (FH&A 1999; Environmental Science Associates 2015a). These surveys found substantial evidence of breeding in the reach in 1999 (i.e., thousands of tadpoles), but not in 2010. Preconstruction surveys also performed in late September and early October 1999 found one adult and one juvenile arroyo toad near the gaging station weir during the September survey, and the two toads were safely moved out of the construction area (FH&A 1999).

Surveys at multiple sites immediately below Pyramid Dam (summarized in FH&A 1999 and Aspen Environmental Group 2005) did not detect arroyo toad at any of the locations. A single breeding period survey performed for DWR in April 1999 in the vicinity of a gage site and weir on Castaic Creek near Fish Creek upstream of Elderberry Forebay indicated male arroyo toads were present in the area due to aural detections (FH&A 1999).

Arroyo toads have been documented during required clearance surveys as recently as October 2013, utilizing sedimentation basins in the storm bypass channel above Elderberry Forebay in some years (POWER 2013) (Figure 5.4.3-1d). Protocol surveys for arroyo toad in San Francisquito Canyon on the ANF indicated the species did not occur (POWER 2012a). The CWHR identifies a general habitat association of arroyo

toad to the following habitat types occurring within the Action Area: Joshua Tree, Mixed Chaparral, Pinyon-Juniper, and Valley Foothill Riparian (CDFW 2014).

The arroyo toad recovery plan (USFWS 1999) identified one recovery action specific to the Licensees' Proposal, but not Project O&M, and one specific to the Action Area. Task 1.3.2 in the recovery plan is to “determine and maintain a compatible pattern of stream flow downstream from Pyramid Lake.” This recovery action has been implemented by DWR after years of consultation with USFWS and other resource agencies, and in accordance with FERC’s 2009 license amendment order. Task 1.3.3, to “determine and maintain a compatible pattern of stream flow downstream from [non-Project] Castaic Lake,” is not related to the Project, because Project operations do not affect flows in Castaic Creek downstream of Castaic Dam (non-Project facility).

California Red-Legged Frog²⁶



CRLF (*Rana draytonii*) was listed as a threatened species on May 23, 1996 (61 FR 25813). Critical habitat was first designated for this species on March 13, 2001 (66 FR 14626), and was later revised on April 13, 2006 (71 FR 19244) and on March 17, 2010 (75 FR 12816). A final recovery plan was issued on May 28, 2002 (USFWS 2002a), and a five-year review was initiated on May 25, 2011 (76 FR 30377) and on June 18, 2018 (83 FR 28251). No recovery actions specific to the Licensees' Proposal or the Action 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 5,000 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), which was subsequently extirpated, and the other in Ventura County, both with few documented adults. Subsequent discoveries include a population at Whitewater Canyon in Riverside Canyon and Aliso Canyon in the ANF north of Los Angeles (Backlin et al. 2018). A population on Piru Creek and its tributaries is discussed below.

Critical habitat has been designated in 24 counties, including one unit in Los Angeles County (LOS-1, San Francisquito Creek), two in Ventura County (VEN-1, San Antonio Creek, and VEN-3, Upper Las Virgenes Creek), and one straddling both counties (VEN-2, Piru Creek). These three critical habitat units closest to the Project vicinity are within the Ventura River – Santa Clara River Core Area of the Northern Transverse Ranges and Tehachapi Mountain Recovery Unit (USFWS 2002a). Critical habitat unit VEN-2, which is located partially within the Action Area, is more than 4 miles south of Pyramid

²⁶ Photo credit: U.S. Army, California National Guard [public domain], via Wikimedia Commons.

Lake along Pyramid reach, and LOS-1 is along San Francisquito Creek about 0.75 miles upstream of the Castaic Transmission Line crossing (USFWS 2018a).

According to the recovery plan (USFWS 2002a), factors associated with declining populations of CRLF include degradation and loss of its habitat through: (1) agriculture, (2) urbanization, (3) mining, (4) overgrazing, (5) recreation, (6) timber harvesting, (7) the introduction of non-native plants that affect the frog's habitat, (8) impoundments, (9) water diversions, (10) degraded water quality, (11) use of pesticides, and (12) introduced predators (e.g., American bullfrog, crayfish, and non-native predatory fish). Populations may have initially declined in the mid-1800s because of over-harvesting for food. Because populations have been extirpated from large portions of the species' historical range, the continued survival of isolated populations, some of which are not within dispersal distance of other suitable habitats, is uncertain. Another factor that may limit recovery is contamination from agrochemicals, which may become wind-borne over long distances (Davidson et al. 2001).

CRLF is primarily associated with perennial ponds or pools, and slow-moving perennial or seasonal streams or pools within streams where water remains continuously for a minimum of 20 weeks beginning in the spring (i.e., sufficiently long for breeding to occur and larvae to complete development) and water temperatures are below about 73°F (Jennings and Hayes 1994; 71 FR 19244). Dense, shrubby riparian vegetation (e.g. willow and bulrush [*Schoenoplectus*] species), and bank overhangs typically occur in breeding habitat. Emergent vegetation, undercut banks, and semi-submerged root wads may provide hiding cover for larvae. Suitable aquatic habitats include natural and manmade ponds, backwaters within streams and creeks, marshes, lagoons, and dune ponds. As described by USFWS (75 FR 12816), deep lakes and reservoirs 50 acres or larger in size do not represent aquatic breeding habitat or dispersal habitat. Water bodies free of bullfrogs and predatory fish are optimal for CRLF; however, CRLF can sometimes persist in the presence of one or the other (75 FR 12816). At San Francisquito Creek (Los Angeles County), egg laying is estimated to have begun as early as February 5, and eggs hatched as late as March 20 in three years when eggs were found (Alvarez et al. 2013). The latter study also found that breeding occurred slightly later at four stream sites compared to four lotic sites, a behavior which may avoid disruption of breeding by high flows during winter. Egg masses are attached to emergent vegetation such as cattails (*Typha* spp.) and bulrushes. Larvae remain in these aquatic habitats until metamorphosis. Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae typically metamorphose between July and September, and most likely feed on algae (Jennings and Hayes 1994).

Outside of the breeding season, adults may disperse upstream, downstream, or upslope of breeding habitat to forage and seek sheltering habitat, which may consist of small-mammal burrows, leaf litter, and other moist sites in or near (up to 200 feet from) riparian areas (Jennings and Hayes 1994; 71 FR 19244). During wet periods, long-distance dispersal of 1 mile or more may occur between aquatic habitats, including movement through upland habitats or ephemeral drainages (71 FR 19244). Seeps and

springs in open grasslands can function as foraging habitat or refuges for dispersing frogs (USFWS 2005b).

Suitable dispersal habitat consists of all upland and wetland habitat that connect two or more patches of suitable aquatic habitat within 1.25 miles of one another. Dispersal habitat must be at least 500 feet wide and free of barriers, such as heavily traveled roads (roads with more than 30 cars per hour), moderate to high-density urban or industrial developments, and large reservoirs (Allen and Tennant 2000).

There are two CNDDDB records of CRLF in the Project vicinity, both from San Francisquito Creek within designated critical habitat. These records are from 2005 on the Warm Springs Mountain quadrangle at locations 3 to 4.25 miles upstream of the Castaic Transmission Line crossing (CDFW 2018). Alvarez et al. (2013) describes the San Francisquito Creek site as a perennial headwater stream with areas more than 1.5 meters deep, and vegetated with cattail, willow, and watercress. The adjacent habitat is described by Alvarez et al. (2013) as a “200-m [meter] wide riparian willow woodland surrounded by coastal sage scrub”. The numbers of CRLF egg masses reported by Alvarez et al. (2013) for three years were: 13 in 2003, 41 in 2004, and 8 in 2006. POWER (2012a) indicates that CRLF was found at San Francisquito Creek by annual USGS surveys as recently as 2010.

Records for CRLF on Piru Creek include an observation in 1949 about 7.5 miles north of the town of Piru (cited by Sandburg 2006). Davidson et al. (2001) lists other museum records 4.5, 11, and 12 miles north of the town of Piru, which is located approximately 16 miles south of Pyramid Lake. Hubbart and Murphey (2005) did not detect CRLF in Pyramid reach or its tributary, Agua Blanca Creek, about 16.5 miles downstream of Pyramid Lake during surveys performed for the USGS in 1999 to 2000. USFWS (2002a) indicated the presence of CRLF in Piru Creek, and described the population at that time as being “in decline due to changes in flow regimes since the construction of Pyramid Dam in 1973 and the introduction of many predatory fish via the California aqueduct.” However, the flow regimes referenced by the USFWS in the preceding statement included a reduction in winter high flows and supplemental flows in summer, a flow regime discontinued in 2005. Aspen Environmental Group (2004) reported no CRLF were found “during the May 2002 protocol-level surveys conducted by DWR above Frenchmans Flat,” but there was a “possible larval sighting above Bluepoint Campground.” No other details are provided. Sandburg (2006) found larval CRLF in 2005 in a 7-foot-deep pool with cattails in Pyramid reach more than 10 miles downstream of Pyramid Lake, and in a 3-foot-deep pool in Agua Blanca Creek. These occurrences are on the Cobblestone Mountain quadrangle, but are not included in CNDDDB records. Annual sensitive species surveys on Pyramid reach within the designated critical habitat, performed by DWR in concert with annual arroyo toad surveys in 2010 to 2018, have not detected CRLF (Environmental Science Associates 2010, 2011, 2012, 2013, 2014, 2015b, 2016, 2017, 2018). The two nearest critical habitat units are VEN-2, which is located partially within the Action Area more than 4 miles south of Pyramid Lake along Pyramid reach, and LOS-1, which is outside of the Action Area approximately 6 miles from Elderberry Forebay along San Francisquito

Creek (USFWS 2018a). The CWHR identifies a general habitat association of CRLF to the following habitat types occurring within the Action Area: Annual Grassland, Blue Oak-Foothill Pine, Blue Oak Woodland, Coastal Oak Woodland, Coastal Scrub, Fresh Emergent Wetland, Lacustrine, Mixed Chaparral, Montane Hardwood, Montane Hardwood-Conifer, Montane Riparian, Perennial Grassland, Valley Oak Woodland, Wet Meadow, and Valley Foothill Riparian (CDFW 2014).

Habitat site assessments for CRLF were performed by the Licensees in 2018 under their relicensing *ESA-Listed Amphibians, California Red-legged Frog Study*, which followed site assessment methods described in USFWS 2005b. The study area included the area within the proposed Project boundary and the surrounding 1-mile radius area. Prior to conducting a habitat assessment within the study area, known occurrences of CRLF were identified and mapped. In addition, NWI surface water data within the study area were mapped to help characterize locations that may provide suitable habitat for CRLF. The NWI data indicated that most of the streams in the study area are intermittent streams flooded only temporarily (R4SBA), seasonally (R4SBC), or intermittently (i.e., briefly and irregularly at most) (R4SBJ). Other palustrine wetland types in the study area include those flooded only temporarily (e.g., PFOA, PSSA, or PEM1A) or that are only saturated (e.g., PEM1B or PFOB), and are therefore not potential CRLF breeding habitat. However, mapped features also included perennial streams with sections classified as semi-permanently flooded (e.g., R5UBF) or permanently flooded (e.g., R3UBH), and small areas mapped as palustrine emergent wetland, seasonally flooded (PEMC), which could potentially be suitable for CRLF. See Table 5.4.2-1 for definitions of each NWI category according to the Cowardin classification system (Cowardin et al. 1979).

A desktop site assessment was performed to characterize mapped aquatic and surrounding upland habitats and to identify potential locations not mapped as surface waters by the NWI. A total of 18 aquatic locations were identified, including 17 stream locations within the proposed Project boundary and one seasonal stock pond on private property outside of the proposed Project boundary (Table 5.4.3-2 and Figures 5.4.3-2a through 5.4.3-2e). Of these, 12 locations warranted additional investigation and were examined in the field. The combined results of the CRLF habitat assessment indicated that twelve of the sites did not meet the 20-week criterion for persistence of aquatic habitat for successful CRLF breeding and larval rearing, but the remaining six sites likely hold water for at least this minimum period in most years, including locations in the Gorman Bypass Channel (Site 1), Gorman Creek (Sites 3 and 4), Piru Creek arm of Pyramid Lake (Site 6), and Piru Creek below Pyramid Dam (Site 9). The other site that met the criterion is the stock pond on private property, approximately 1.5 miles south-southwest of Elderberry Forebay and 0.46 miles west of the Castaic Transmission Line (Site 15). Introduced aquatic predators were evident at two of these six sites (Sites 1 and 9) and presumably occur at Site 6 when inundated by Pyramid Lake. Young-of-year native amphibians were found at Site 3 (Baja California chorus frog, *Pseudacris hypochondriaca*) and Site 4 (western toad, *Anaxyrus boreas*). The Project impoundments (i.e., Quail Lake, Pyramid Lake, and Elderberry Forebay) are each much larger than 50 acres and are therefore not considered potential habitat for CRLF. There

were no incidental observations of CRLF noted during the Licensees' relicensing field studies.

Table 5.4.3-2. California Red-Legged Frog Aquatic Habitat Site Assessment Summary Results

Site/Date Field Examined	Site Name	Site Type	20-Week Criterion Met?	Additional Notes
1 May 14, 2018	Gorman Bypass Channel	Stream	Yes	Mostly dry when examined, except for a large, deep pool immediately below spillway, where largemouth bass, channel catfish, and bullfrogs were observed.
2 May 14, 2018	Los Alamos Campground	Stream	No	Several shallow swales within a campground; dry when examined, with no hydrophytes or other evidence of persistent water.
3 July 26, 2018	Los Alamos and Gorman Creek confluence	Stream	Yes	Mostly seasonal or possibly perennial at confluence, with riffles and runs, and one shallow pool; shallow banks; and primarily sand/silt substrate. Adjacent riparian habitat is dense. Young-of-year and adult Baja California chorus frogs observed.
4 July 26, 2018	Gorman Creek	Stream	Yes	Perennial (flow-supplemented), with mostly shallow riffles and runs, but occasional pools up to 4 feet deep. Adjacent riparian habitat is dense. Juvenile western toads observed.
5 N/A	Unnamed tributary to Pyramid Lake	Stream	No	Ephemeral drainage (wash) in incised channel and no apparent riparian vegetation (only scrub vegetation and scattered oaks); estimated gradient is less than 1 percent.
6 July 25, 2018	Piru Creek (above Pyramid Lake)	Stream	Yes	Piru Creek arm above Pyramid Lake within proposed Project boundary is frequently inundated by the lake and mostly comprises non-pool habitat or seasonally dry at other times. Riparian vegetation well developed, with willows and cattail.
7 N/A	Liebre Gulch	Stream	No	Ephemeral drainage (wash) in wide sandy channel and no apparent riparian vegetation except at Pyramid Lake, where willows occur; estimated gradient is less than 1 percent.
8 N/A	Posey Canyon	Stream	No	Ephemeral drainage (wash) with incised banks and no apparent riparian vegetation; estimated gradient is 2 percent.

Table 5.4.3-2. California Red-Legged Frog Aquatic Habitat Site Assessment Summary Results (continued)

Site/Date Field Examined	Site Name	Site Type	20-Week Criterion Met?	Additional Notes
9 Sept 24, 2018	Piru Creek at Road 67	Stream	Yes	Perennial, with mostly riffles (cobble/boulder substrate) and a large, separate, 3-foot-deep side channel pool; well-developed riparian vegetation. Bullfrogs and crayfish numerous, along with largemouth bass and other fish.
10 July 27, 2018	Castaic Creek	Stream/ Pond	No	Seasonal drainage in wide, sandy channel, likely dry by April, and mostly not vegetated. Also includes three sedimentation basins upstream of Elderberry Forebay.
11 July 27, 2018	Fish Canyon	Stream	No	Ephemeral drainage (wash), with gravel/cobble substrate, and mostly not vegetated; estimated gradient is 2 percent.
12 July 27, 2018	Tributary to Elderberry Forebay	Stream	No	Ephemeral drainage (wash), with cobble/boulder substrate, and mostly not vegetated, except at Elderberry Forebay; estimated gradient is 2 percent.
13 July 27, 2018	Tributary to Elderberry Forebay	Stream	No	Ephemeral drainage (wash), with cobble/boulder substrate, frequent channel migration, and mostly not vegetated; estimated gradient is 1 percent.
14 July 27, 2018	Tributary to Elderberry Forebay	Stream	No	Ephemeral drainage (wash), with sand/gravel/cobble substrate, and mostly not vegetated; estimated gradient is 1 percent.
15 N/A	Stock pond	Pond	Yes	0.65-acre seasonal impoundment on private property. Western spadefoot larvae were found at this location in June 2003.
16 N/A	Charlie Canyon	Stream	No	Ephemeral drainage (wash) in incised channel; not vegetated; estimated gradient is 4 percent. Off-road vehicle use evident.
17 May 14, 2018	San Francisquito Creek	Stream	No	Ephemeral drainage (wash) in wide, shallow, sparsely vegetated channel; mostly sand/gravel substrate; estimated gradient is less than 1 percent. Downstream of CRLF designated critical habitat unit LOS-1.
18 N/A	Dry Canyon	Stream	No	Ephemeral drainage (wash) in incised channel, not vegetated; estimated gradient is less than 1 percent.

Key:

CRLF = California red-legged frog

LOS-1 = San Francisquito Creek east of Castaic Lake (critical habitat unit)

N/A = not applicable

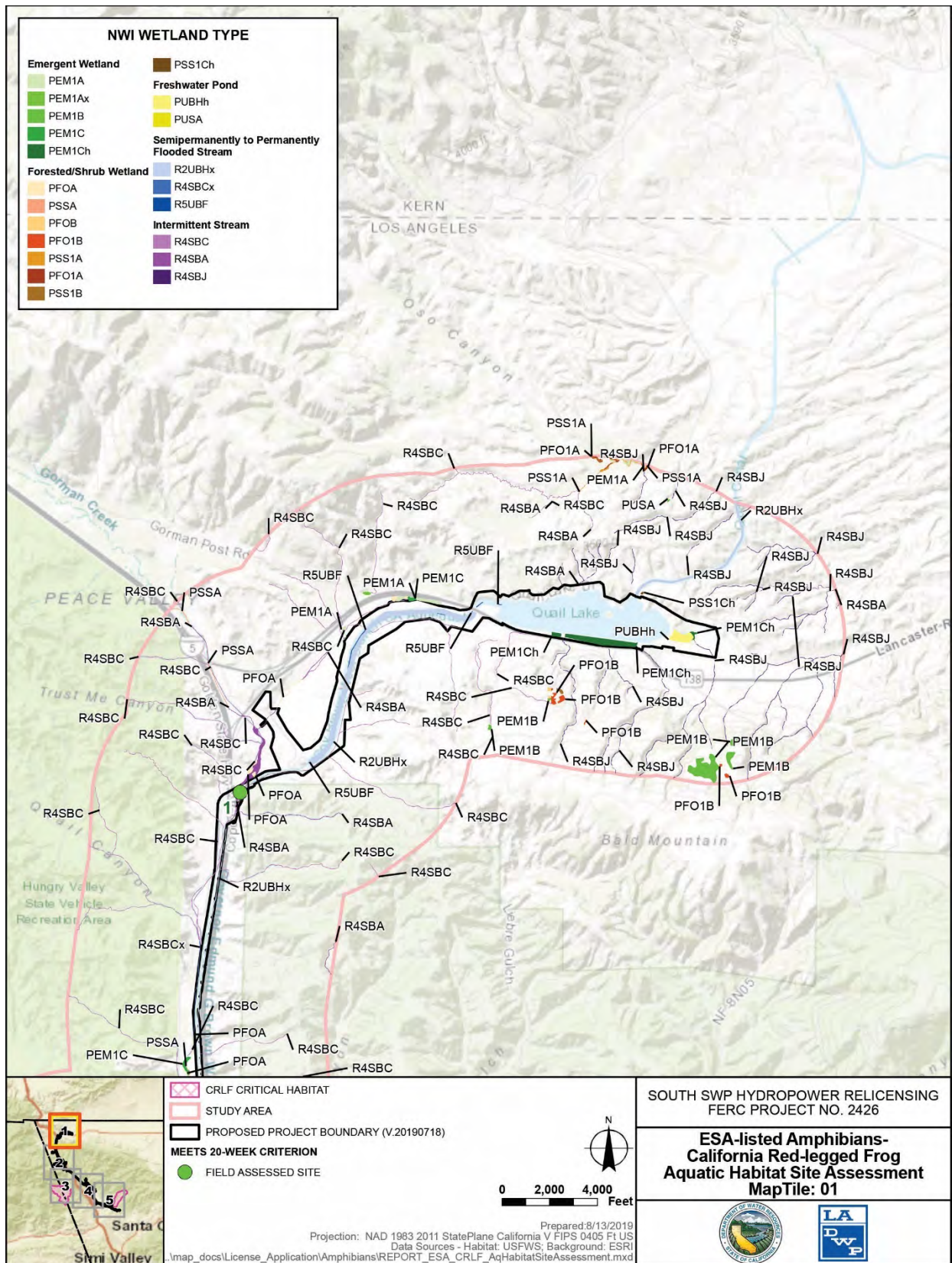


Figure 5.4.3-2a. ESA-Listed Amphibians – CRLF Aquatic Site Assessment Results

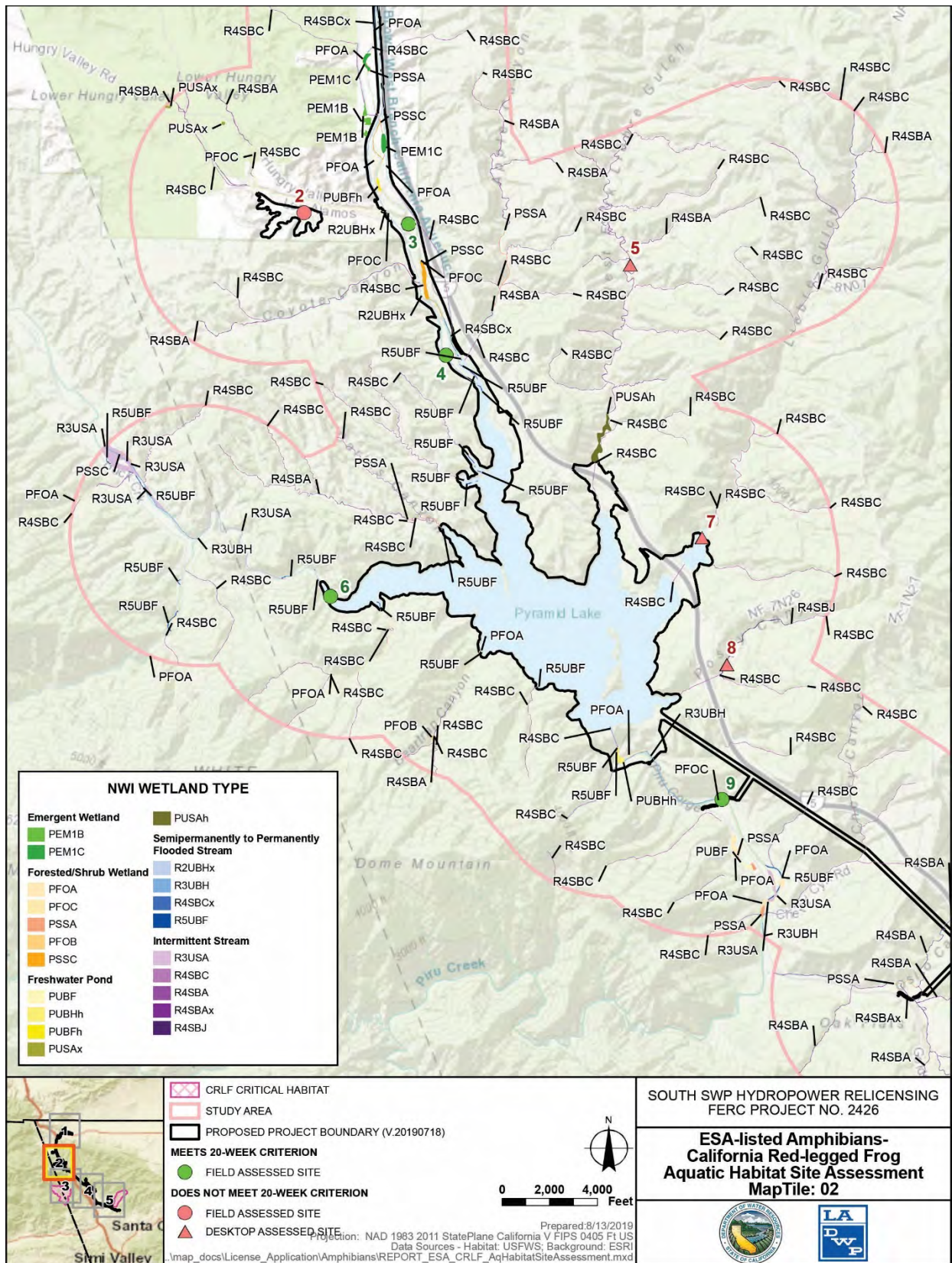
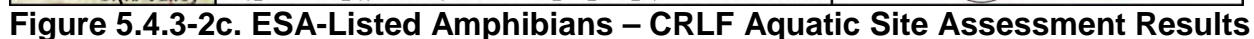


Figure 5.4.3-2b. ESA-Listed Amphibians – CRLF Aquatic Site Assessment Results



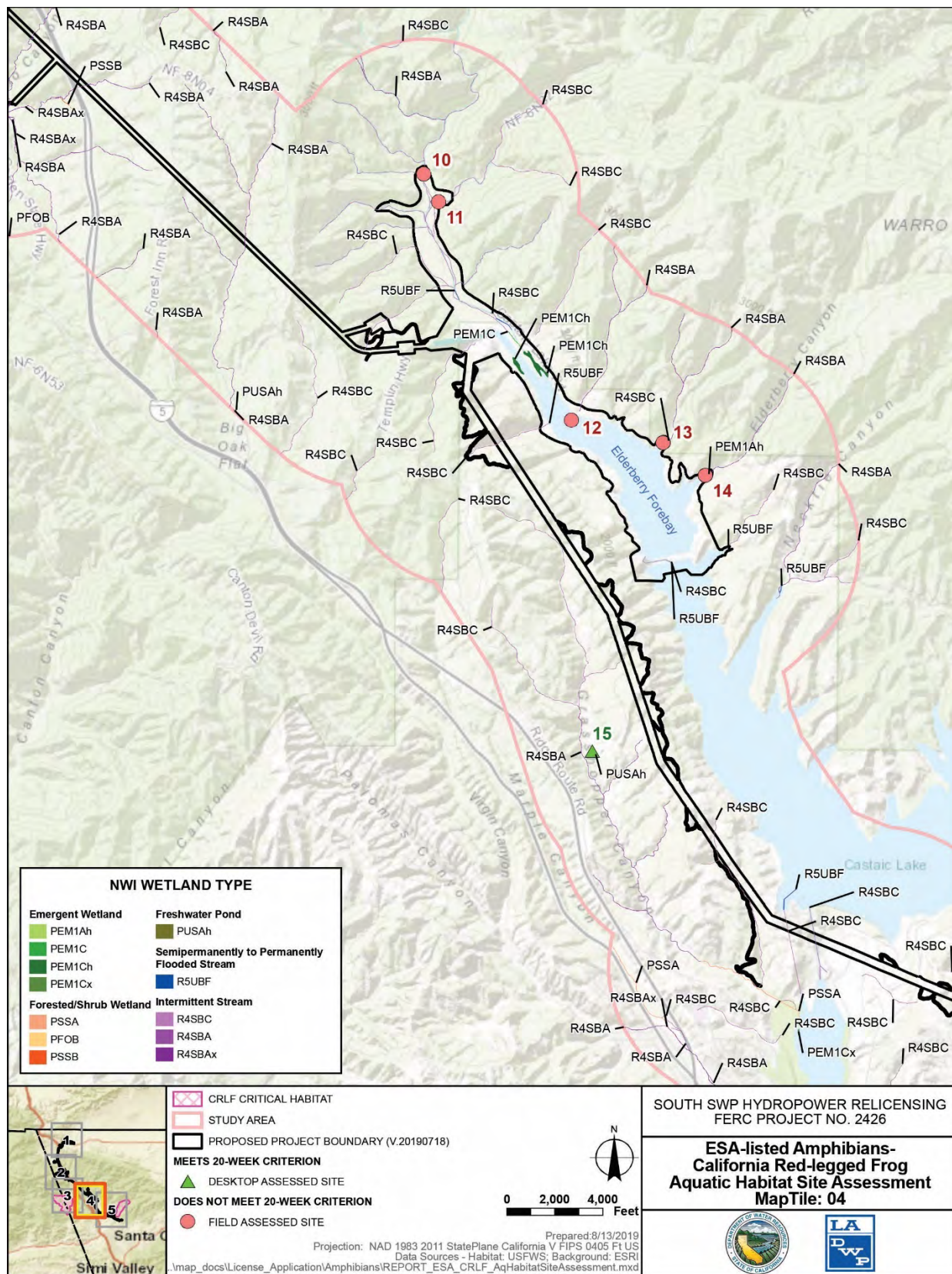


Figure 5.4.3-2d. ESA-Listed Amphibians – CRLF Aquatic Site Assessment Results

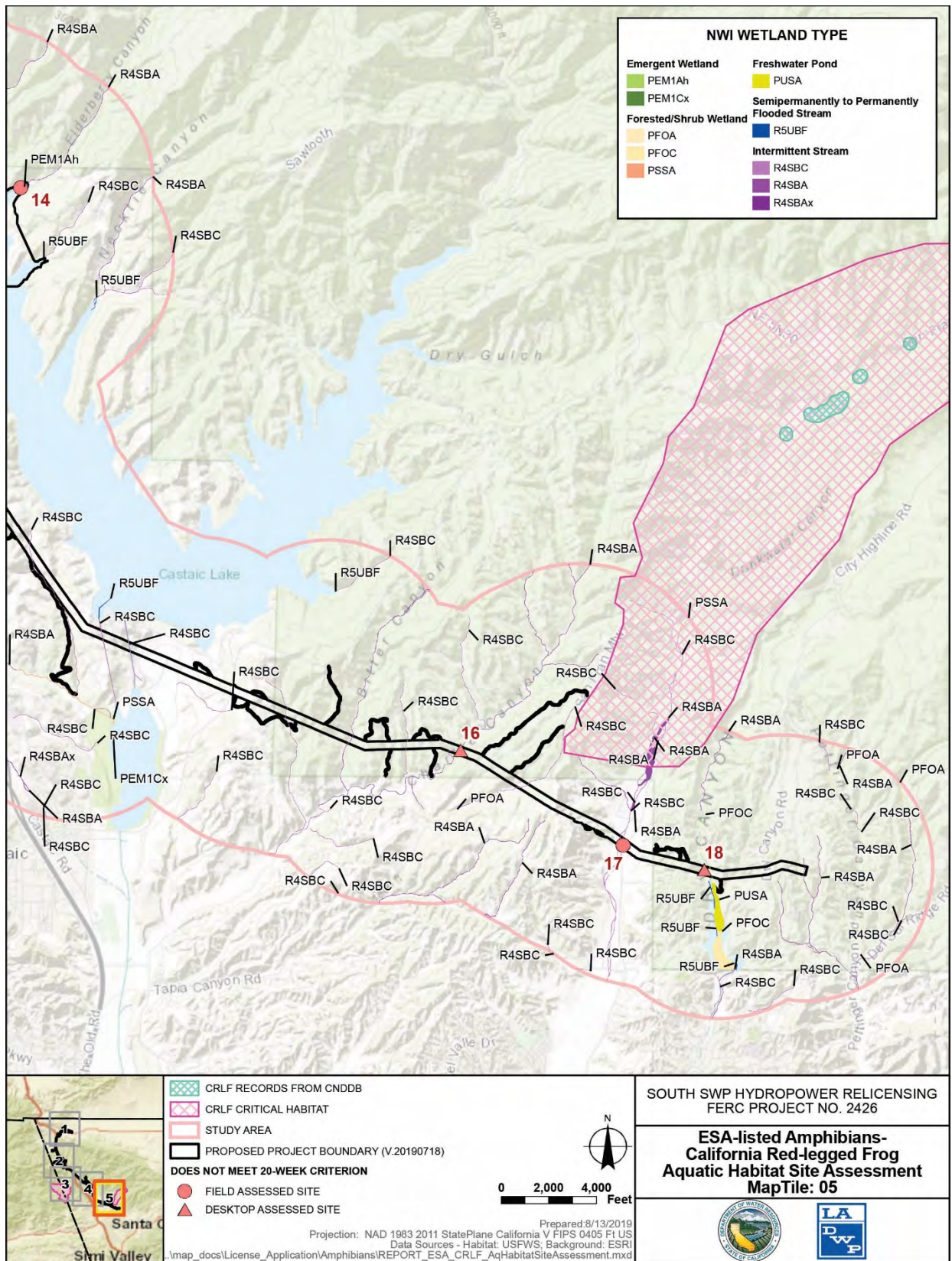


Figure 5.4.3-2e. ESA-Listed Amphibians – CRLF Aquatic Site Assessment Results

California Condor²⁷



The California condor has been listed as an endangered species since 1967 (32 FR 4001). The introduced population in Arizona was categorized as “experimental, non-essential” on October 16, 1996 (61 FR 54044). Critical habitat for California condor was designated in 1976 (41 FR 41914), with a correction in 1977 (42 FR 47840). The most recent revision (third) of the recovery plan was issued on April 25, 1996

(USFWS 1996), and the results of a five-year review on June 4, 2013 (USFWS 2013). No recovery actions specific to the Licensees’ Proposal or the Action Area are identified in the recovery plan or five-year review.

Historically, the California condor occurred from coastal British Columbia, Canada, to Baja California, Mexico, and as far east as the Cascade and Sierra Nevada Ranges, but the species’ range had been reduced by the 1950s to a wishbone-shaped area within parts of the following 10 California counties: Monterey, San Benito, Fresno, Kings, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Kern, and Tulare.

At the time of listing and until the 1980s, the California condor was in steep decline and in imminent danger of extinction due to direct persecution, eggshell thinning as a result of secondary poisoning from the pesticide dichlorodiphenyltrichloroethane (more commonly known as “DDT”) and its derivative dichlorodiphenyldichloroethylene (more commonly known as “DDE”), and possibly other factors. Critical habitat has been designated in Santa Barbara, San Luis Obispo, Ventura, Los Angeles, Kern, and Tulare Counties.

Recovery of the California condor required removing surviving birds from the wild, captive breeding, and subsequent and continued release of captive-reared birds. As a result of these efforts, the free-flying population located in southern California, Arizona, and Baja California, Mexico, had increased to 290 by the end of 2017 (USFWS 2017a). The wild populations are regularly monitored, including periodic trapping of birds lured by supplemental carrion. Natural reproduction remains insufficient to sustain or grow populations without captive breeding, primarily due to exposure to lead from lead ammunition in carrion (USFWS 2013). Ingestion of “microtrash” (i.e., small pieces of plastic, bottle caps, aluminum can tabs, broken glass, and other indigestible materials) is also a threat to the California condor, particularly nestlings fed microtrash brought back to the nest, causing impaction of the digestive tract and often eventual death. Mortality from collisions with powerlines and electrocution of California condors perched on power-poles sometimes occurs (USFWS 2013).

Available information indicates that California condors nested naturally in cavities on escarpments in steep mountainous or canyon terrain, and also utilized burnt-out hollows

²⁷ Photo credit: David Clendenen, USFWS [public domain], via Wikimedia Commons.

of large trees (e.g., old-growth sequoia and coastal redwood), cliff ledges, and rarely the nests of other large birds (USFWS 1996). Nest site selection occurs in winter and a single egg clutch is laid between late January and early April. Eggs hatch within approximately 56 days. Young will fly at approximately five to six months, but are partially dependent on parents for up to a year. California condors become sexually mature at five to eight years, and are potentially long-lived (USFWS 2013). Adults typically leave roosts three to five hours after sunrise, waiting for thermals to develop, and return two to five hours before sunset (San Diego Zoo 2009). California condors forage over open grasslands, foothill oak savannas, and coastal areas where they feed on carrion, including deer, elk, cattle, pronghorn antelope, marine mammals and birds, and fish. Individual California condors have been documented to travel more than 100 miles in a day, assisted by air currents (USFWS 2013).

There are three CNDDDB records of California condor in the Project vicinity, within or near the Sespe-Piru California condor designated critical habitat area (CDFW 2018), which includes parts of the Piru, Black Mountain, and Cobblestone Mountain quadrangles; from near Redrock Mountain east of Pyramid Lake (Liebre Mountain and Whitaker Peak quadrangles); and a 2016 observation of eight individuals drinking at the spillway pool of the Santa Felicia Dam (Piru quadrangle). This critical habitat area for California condor, which is less than 1 mile south of Pyramid Lake, has been a protected area for the species in the LPNF since 1947 (i.e., Sespe California Condor Sanctuary), with some of the last known nests prior to the emergency removal of wild California condors to a captive breeding program. USFS (1977) notes:

The Piru Creek drainage between Frenchmans Flat and Ruby Canyon contains three known condor nest sites and much potential nesting habitat. A condor was fledged from one of these sites in 1967. A second site was used in 1975, the third which is nearest the creek has not been used since the early 1900s, possibly due to disturbance.

Designated critical habitat is also located in Kern County north of Quail Lake. Aspen Environmental Group (2007) indicates California condors are “commonly observed” soaring above the Pyramid Lake vicinity. Sieburth (2018) notes that California condors nested historically at Beartrap Canyon west of Pyramid Lake, but that the species is only infrequently observed at Pyramid Lake. POWER (2012a) describes Lake Piru as a “known feeding ground” for California condor. The CWHR identifies a general habitat association of California condor to the following habitat types occurring within the Action Area: Annual Grassland, Barren, Blue Oak-Foothill Pine, Blue Oak Woodland, Chamise-Redshank Chaparral, Coastal Oak Woodland, Coastal Scrub, Lacustrine, Mixed Chaparral, Montane Hardwood, Montane Hardwood-Conifer, Perennial Grassland, Pinyon-Juniper, Sagebrush, Sierran Mixed Conifer, and Valley Oak Woodland (CDFW 2014).

The Licensees performed California condor surveys as part of their *Special-Status Raptors Study* to identify any active roosts within 0.5 miles of the proposed Project boundary and active nests within 1.5 miles of the proposed Project boundary. California

condor surveys were conducted during the February, May, and June raptor survey periods. The surveys were performed by biologists utilizing spotting scopes and binoculars from a boat on Pyramid Lake and on foot from the Quail Lake Dam, which provided viewing conditions sufficient to observe a California condor in flight, roosting, or at a nest site from a distance. In addition, suitable habitat was scanned for signs of whitewash (i.e., excrement staining) or other indications of a nest or roost. In particular, the western edge of Pyramid Lake was targeted as it contained the best suitable habitat for condor nesting, including rocky crags.

The results of the study included observation of two adult California condors soaring and flying over Pyramid Lake in February 2018, which were followed and tracked by visual observation for as long as possible to determine nesting or roosting status. Neither bird was observed alighting. The study documented no other California condors or any evidence of nesting or roosting.

Separate from the study, the Licensees have recorded incidental observations of California condors in flight over the Project, including two adults over Pyramid Lake on January 30, 2018 and on June 30, 2018; and two adults flying over the Peace Valley Pipeline on April 4, 2018. In addition, the Licensees on two occasions have recorded incidental observations of groups of California condors feeding on the ground outside of the proposed Project boundary, east of Elderberry Forebay along Ridge Route Road: five adults, including two with numbered tags, on April 2, 2019 and six adults at a roadside dump site on June 2, 2015. The nearest active release site for captive-raised condors is the Bitter Creek National Wildlife Refuge in Kern County, more than 30 miles from the proposed Project boundary.

Coastal California Gnatcatcher²⁸



The coastal California gnatcatcher (*Poliioptila californica californica*) was listed as threatened on March 30, 1993 (58 FR 16742). Critical habitat was first designated for this species on October 24, 2000 (65 FR 63680), and revised critical habitat was designated on December 19, 2007 (72 FR 72010). A recovery plan has not been published. The results of a five-year review were issued on September 29, 2010 (USFWS 2010a). No recovery

actions specific to the Licensees' Proposal or the Action Area are identified in the five-year review.

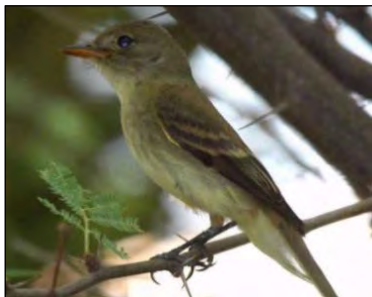
The coastal California gnatcatcher is a small, non-migratory songbird, which occurs almost exclusively in certain sub-associations of coastal sage scrub plant communities and occasionally in chaparral (72 FR 72010). Almost all known occurrences (i.e., 99 percent of records) are below 2,000 feet elevation (USFWS 2010a). Historically found in coastal southern California, from Ventura County south to Baja California, Mexico,

²⁸ Photo credit: USFWS [public domain].

coastal California gnatcatcher has disappeared from much of its historical range because of widespread loss and fragmentation of habitat due to urban and agricultural development (USFWS 2010a). According to the listing rule, only about 30 pairs were believed to occur in Los Angeles County at the time of listing. Critical habitat has been designated in Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties. The nearest critical habitat is south of the Santa Clara River outside of Santa Clarita, approximately 15.7 miles away from Elderberry Forebay (USFWS 2018b).

The coastal California gnatcatcher generally breeds from late February through mid-July (USFWS 2010a). Nests are placed in California sagebrush (*Artemisia californica*) or other shrubs about 3 feet above the ground. The average clutch size is four eggs, and the eggs are incubated by both sexes for about 14 days. The nesting period is approximately 16 days. Breeding territories are between 2 and 14 acres (USFWS 2010a).

There are no known records of coastal California gnatcatcher within the Action Area. There are seven CNDDDB records of this species in the Project vicinity. These are from the Mint Canyon, Newhall, and Lebec quadrangles, including three locations south of the Santa Clara River, three near San Francisquito Creek, and one west of Quail Lake (CDFW 2018). Most of the records were for individual gnatcatchers and not considered to be indicative of breeding occurrences. The two records closest to the Action Area, each about 1.5 miles from the Project, were for a juvenile on July 12, 2006, in Peace Valley west of Quail Lake, and a vocalizing individual on October 25, 2006, near San Francisquito Creek. As indicated above, there is no designated critical habitat within or near the Action Area. The CWHR identifies a strong general habitat association of coastal California gnatcatcher to Coastal Scrub and a weaker association to Chamise-Redshank Chaparral, Mixed Chaparral and Annual Grassland, habitat types which occur within the Action Area. No incidental observations of coastal California gnatcatcher were noted during the Licensees' relicensing field studies.



Southwestern Willow Flycatcher²⁹

The southwestern willow flycatcher (*Empidonax traillii extimus*) was listed as endangered on February 27, 1995 (60 FR 10695). Critical habitat was first designated for this species on July 22, 1997 (62 FR 39129), and was later revised on October 19, 2005 (70 FR 60886), and on January 3, 2013 (78 FR 344). The final recovery plan for southwestern willow flycatcher was issued on August 30, 2002 (USFWS 2002b), and the results of a five-year review was issued on December 29, 2017 (USFWS 2017b). No recovery actions specific to the Licensees' Proposal or the Action Area are identified in the recovery plan or five-year review.

²⁹ Photo credit: Jim Rorabaugh, USFWS [public domain], via Wikimedia Commons.

This migratory, insectivorous songbird is found during the breeding season mostly in dense or patchy (i.e., with openings), riparian habitat associated with low-gradient streams or lentic habitat from Kern County, California, south to northern Baja California, Mexico, east to southwest Colorado to southwest Texas. Historically, suitable riparian habitat within this mostly arid area often occurred in widely dispersed and isolated patches, which were further reduced by water development projects, agriculture, urbanization, and other factors. Nest parasitism by brown-headed cowbirds (*Molothrus ater*) is also considered a moderate threat to southwestern flycatcher (USFWS 2017b). Critical habitat has been designated in New Mexico, Colorado, Utah, Nevada, Arizona, and California. In California, critical habitat is located in Santa Barbara, Inyo, Kern, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties. Designated critical habitat for southwestern willow flycatcher is located within the Action Area on Pyramid reach more than 3 miles downstream of Pyramid Lake to the confluence of the Santa Clara River and outside of the Action Area on lowermost Castaic Creek, downstream of the Interstate 5 bridge to the Santa Clara River (USFWS 2018d).

The southwestern willow flycatcher nests in riparian thickets with the following attributes: canopy height may be as little as 6 feet at high elevation sites dominated by shrubs to as much as 100 feet at lower elevation sites with distinct tree and shrub layers. Foliage is typically dense from the ground to approximately 13 feet high. Nesting habitat usually contains willows or tamarisk (USFWS 2002b). Other characteristic species include boxelder (*Acer negundo*), Russian olive (*Elaeagnus angustifolia*), cottonwood (*Populus* spp.), ash (*Fraxinus* spp.), alder (*Alnus* spp.), and buttonbush (*Cephalanthus occidentalis*). Breeding territories may be as small as 0.25 acres, but most are at least 0.5 acres. Wintering habitat is Neotropical, with lowlands of Costa Rica and other parts of Central America probably most important (USFWS 2017b).

There are no CNDDDB records of southwestern willow flycatcher in the Project vicinity. USFWS (2002b) indicated the presence of one southwestern willow flycatcher site (i.e., an area with one or more southwestern willow flycatcher territories) in the “Santa Clara River – Upper Piru Creek” under the Coastal California recovery unit, located northwest and upstream of the proposed Project boundary and outside of the Action Area. Habitat suitability assessments and protocol surveys for southwestern willow flycatcher performed for USFS in 2002 along Pyramid reach and Liebre Gulch upstream of Pyramid Lake indicated that suitable habitat existed in these areas; however, there were no detections of breeding southwestern willow flycatchers (Jones and Stokes 2002). Non-breeding willow flycatchers (sub-species not determined) were detected during the same surveys, likely using these areas for resting and foraging during migration. Because the other subspecies of willow flycatcher are much more common than southwestern willow flycatcher, detection of willow flycatchers during migration is not significant. No southwestern willow flycatchers were detected during USGS surveys of Pyramid reach in 2006 (Durst et al. 2008).

Surveys for southwestern willow flycatcher were performed by the Licensees under their relicensing ESA-Listed Riparian Bird Species, Southwestern Willow Flycatcher, Least Bell’s Vireo, and Yellow-billed Cuckoo Habitat Evaluations Study. The surveys, which

adhered to accepted protocols for this species (Sogge et al. 2010), covered all potential habitat within the proposed Project boundary. The study was implemented in 2018 as detailed below. Subsequently, the Licensees proposed the inclusion of existing road segments to add to the Project's licensed facilities and proposed Project boundary as Primary Project Roads (PPR). The areas associated with these additional PPRs were evaluated for habitat suitability, and the suitable habitat was surveyed in 2019. The results of the 2018 and 2019 surveys are described separately below.

In 2018, a preliminary identification of potential habitat was first determined by a desktop review of information collected for the Botanical Resources Study in riparian areas and examination of publicly available aerial imagery. This preliminary identification was followed by a pre-survey site visit to confirm habitat suitability on April 5, 2018. The habitat assessment confirmed potential habitat for both southwestern willow flycatcher and least Bell's vireo at multiple locations associated with Quail Lake, Pyramid Lake, Gorman Creek, Piru Creek, Castaic Creek, and Elderberry Forebay (Figures 5.4.3-3a through 5.4.3-3c). Some of these habitat patches were also determined to be potential habitat for yellow-billed cuckoo (see below). The transmission line tie-in southeast of Castaic Lake spans drainages that may support potentially suitable riparian habitat; however, the transmission lines are suspended high over these drainages where the Licensees do not perform any Project O&M activities. Small habitat patches initially identified from the desktop review were determined by the pre-survey site visit to be unsuitable for one or more of the target species because the patches lacked necessary habitat characteristics (e.g., vegetation structure or plant species composition was unsuitable) or were too small in area.



Figure 5.4.3-3a. ESA-Listed Riparian Birds Survey Sites in 2018

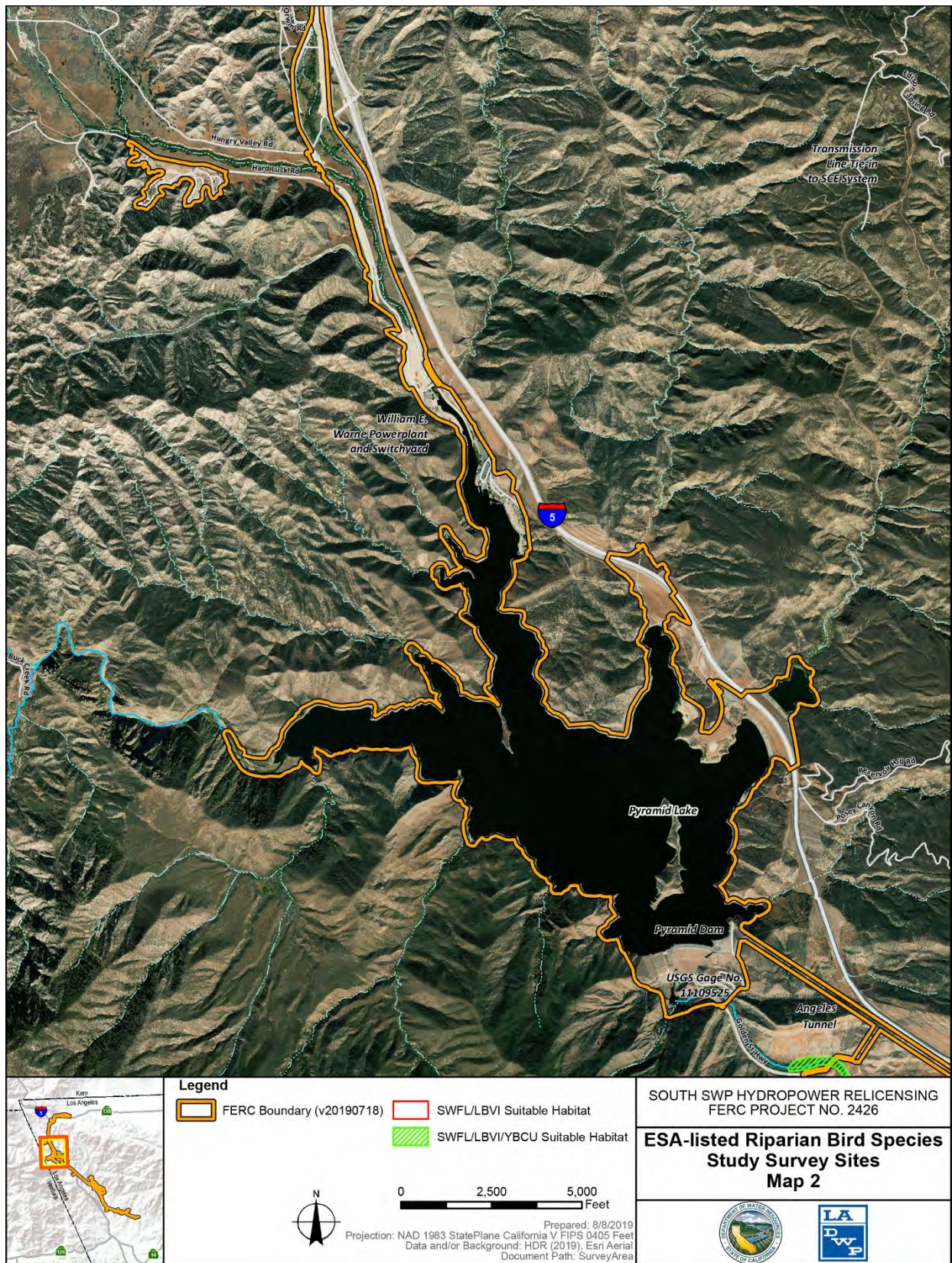


Figure 5.4.3-3b. ESA-Listed Riparian Birds Survey Sites in 2018

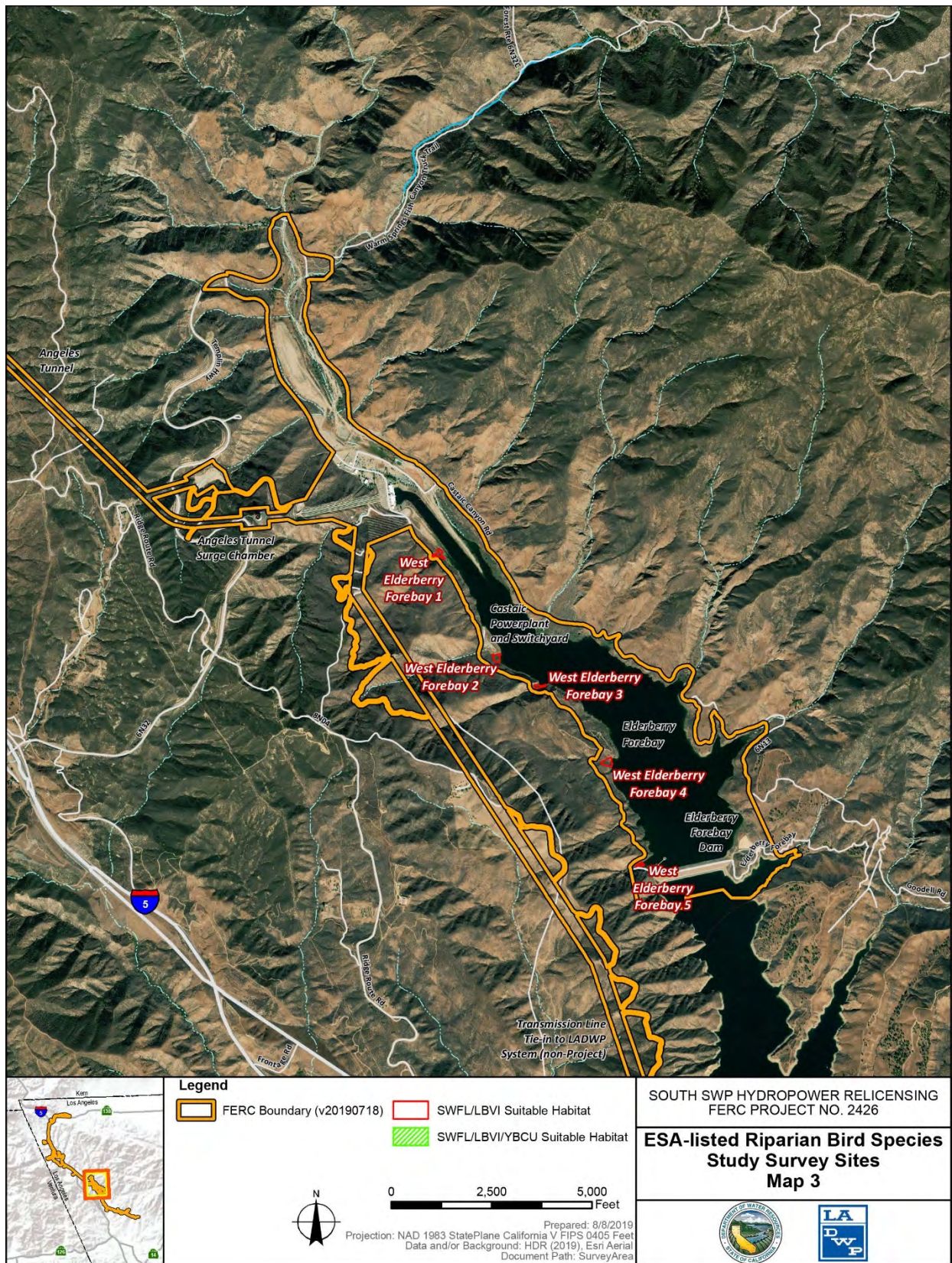


Figure 5.4.3-3c. ESA-Listed Riparian Birds Survey Sites in 2018

Each site was surveyed five times: one visit during Period 1 (May 15 to May 31); two visits during Period 2 (June 1 to June 24); and two visits during Period 3 (June 25 to July 17). Survey visits to each site were at least five days apart. Surveys of the sites were conducted during morning hours (prior to 10:30 a.m.) and when the temperature exceeded 13°C. Less than 3 kilometers (1.86 miles) of habitat were surveyed per day. Methods included playing taped willow flycatcher vocalizations and listening for a response. Other bird species observed or heard during surveys were also noted, including brown-headed cowbird and special-status species, such as yellow warbler (*Setophaga petechia*), which is associated with riparian habitats.

Surveys for southwestern willow flycatcher were completed in 19 separate locations (Figures 5.4.3-3a through 5.4.3-3c). The surveyed areas included:

- Quail Lake 1 – Approximately 1.19 acres along the north shore of Quail Lake. Dominated by a dense sandbar willow (*Salix exigua*) understory and sparse overstory canopy comprising the same species.
- Quail Lake 2 – Approximately 3.08 acres along the south shore of Quail Lake. The overstory is dominated mainly by Fremont cottonwood trees with a willow understory.
- Pyramid Lake, Priest Cove – Approximately 0.58 acres at the mouth of a cove on the western shore of Pyramid Lake. Dominated by sandbar willows, other willow species, and Fremont cottonwood. Riparian habitat occurs at the bottom of a steep ravine that extends away from the lake shore approximately 250 feet.
- Pyramid Lake, Glory Hole – Approximately 2.21 acres at the mouth of a cove on the western shore of Pyramid Lake and extending approximately 700 feet from the lake. Larger willow trees and Fremont cottonwood trees make up the overstory with a thick understory consisting of sandbar willow. A thick patch of California bulrush (*Schoenoplectus californicus*) lines the shore adjacent to the lake and the willows.
- Pyramid Lake, Lost Mine – Approximately 0.82 acres at the mouth of a cove on the western shore of Pyramid Lake and extending approximately 320 feet from the lake. Larger willow trees and Fremont cottonwood trees make up the overstory, with a thick understory consisting of sandbar willow. A thick patch of California bulrush lines the shore adjacent to the lake and the willows.
- Pyramid Lake, Piru Creek – Approximately 24.79 acres where Piru Creek enters Pyramid Lake and extending 1,500 feet beyond the proposed Project boundary. The habitat is characterized by patches of willow and Fremont cottonwood trees, with a dense sandbar willow understory along with patches of open ground and open water. Mule fat, western poison oak (*Toxicodendron diversilobum*), and other typical riparian species occur throughout the site.

- Pyramid Lake, Tin Cup – Approximately 0.26 acres at cove directly adjacent to Piru Creek and extending approximately 250 feet from the lake. Dominated by willow and Fremont cottonwood overstory, with an understory of sandbar willow and western poison oak. There is a large sandbar at the mouth of the canyon that separates the vegetation from the lake shore.
- Pyramid Lake, Bear Trap – Approximately 6.67 acres and extending approximately 2,300 feet from the lake. The overstory composed of willows and Fremont cottonwoods, with scattered western sycamore and a scattered but thick understory of sandbar willow.
- Pyramid Lake, Posey Canyon – Approximately 0.67 acres along the eastern shore and extending approximately 175 feet from the shoreline. Sparse Fremont cottonwood trees make up the overstory, with a thick understory consisting of sandbar willow.
- Pyramid Lake, Liebre Gulch – Approximately 19 acres on the northeast side of Pyramid Lake, separated from the rest of the lake by Interstate 5. The overstory is composed of willow and Fremont cottonwood trees, with a thick understory of sandbar willow. California bulrush lines the shore in between the water and the potentially suitable habitat.
- Gorman Creek – Approximately 88.37 acres extending north from Warne Powerplant approximately 1.6 miles to the proposed Project boundary at Orwin Road. Much of Gorman Creek in this area lies within a steep-sided ravine. Patches of habitat within the ravine are separated by areas of non-native grasses and California sagebrush. The overstory is dominated mostly by Fremont cottonwood, with sparse willow trees. There is a thick understory that consists of willows, tamarisk, western poison oak, and broadleaf cattail (*Typha latifolia*).
- Piru Creek below Pyramid Dam – Approximately 9.68 acres along 1,600 feet of Piru Creek below Pyramid Dam. The overstory is dominated by large Fremont cottonwood and willow trees, with a sparse understory of willows.
- Elderberry Forebay, Forebay Tailings Pile – Approximately 6.1 acres adjacent to Castaic Creek, just upstream of Elderberry Forebay. The overstory is dominated by willow and Fremont cottonwood trees, with a patchy but dense understory of willows.
- Elderberry Forebay, Forebay Peninsula – Approximately 8.31 acres adjacent to the dike and along a finger of water extending into Elderberry Forebay. Overstory is sparse and is composed of willow and Fremont cottonwood trees. The understory is dominated by sandbar willow.

- Elderberry Forebay 1 – Approximately 1.07 acres along the shore of Elderberry Forebay. Overstory is patchy and dominated by Fremont cottonwood trees, with a dense sandbar willow understory.
- Elderberry Forebay 2 – Approximately 1.56 acres, with patchy Fremont cottonwood trees and a thick understory of sandbar willows.
- Elderberry Forebay 3 – Approximately 1.26 acres, with willow and Fremont cottonwood tree overstory and thick sandbar willow understory.
- Elderberry Forebay 4 – Approximately 1.91 acres, with willow and Fremont cottonwood tree overstory and thick sandbar willow and mule fat understory.
- Elderberry Forebay 5 – Approximately 2.27 acres, with willow and Fremont cottonwood tree overstory and thick sandbar willow and mule fat understory.

In total, there were 26 willow flycatcher detections recorded during the surveys, all within the first and second survey periods (May 15 to June 24), but no detections during subsequent surveys at any of the sites (Figures 5.4.3-4a through 5.4.3-4c). These detections occurred at Quail Lake, Pyramid Lake, Gorman Creek, and Elderberry Forebay, as discussed below. No willow flycatcher detections were recorded at the site below Pyramid Dam. Brown-headed cowbirds were also noted at sites on Gorman Creek, Pyramid Lake, and Elderberry Forebay.

- A total of six willow flycatcher detections were recorded at Quail Lake 2: three on May 22, two on June 5, and one on June 19. No nesting behavior was observed and there were no detections on subsequent site visits.
- A total of three willow flycatcher detections were recorded at three different sites at Pyramid Lake: Glory Hole on June 6, Piru Creek on June 6, and Bear Trap on May 24.
- Six willow flycatcher detections were recorded along Gorman Creek, all during one survey pass on June 8. None were detected on following visits.
- A total of 11 willow flycatcher detections were recorded at various sites at Elderberry Forebay on May 8 and June 7, including 7 at Forebay Peninsula.

All of the detections occurred within the normal period of spring migration of willow flycatcher in southern California. Therefore, these birds were migrants, likely the more northerly-nesting subspecies, Great Basin willow flycatcher (*E. t. adastus*) or little willow flycatcher (*E. t. brewsteri*), and not breeding southwestern willow flycatcher (*E. t. extimus*), which would have been indicated by detections at the same sites later during Period 3 of the surveys (Sogge et al. 2010).

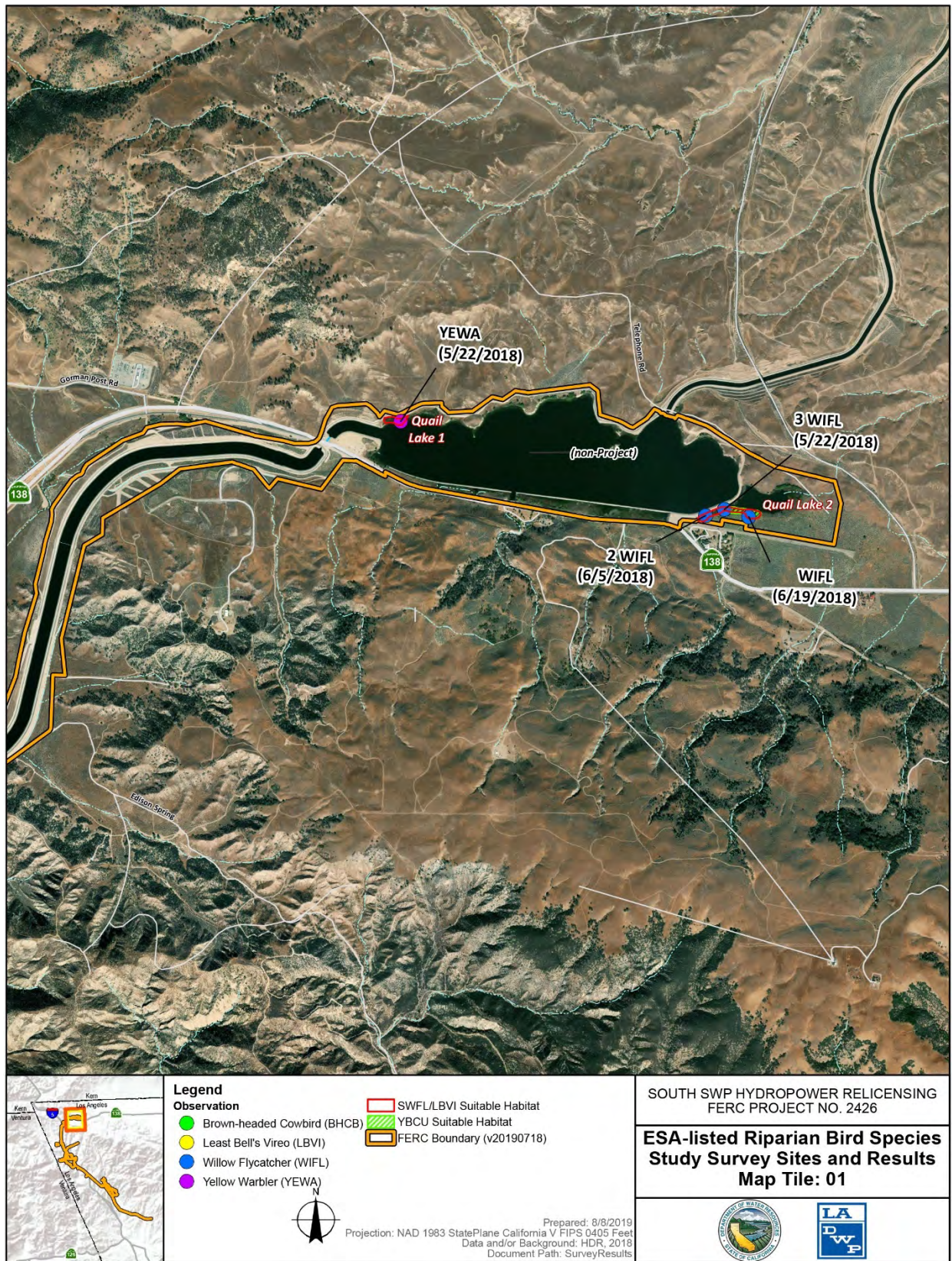


Figure 5.4.3-4a. ESA-Listed Riparian Birds Survey Results in 2018

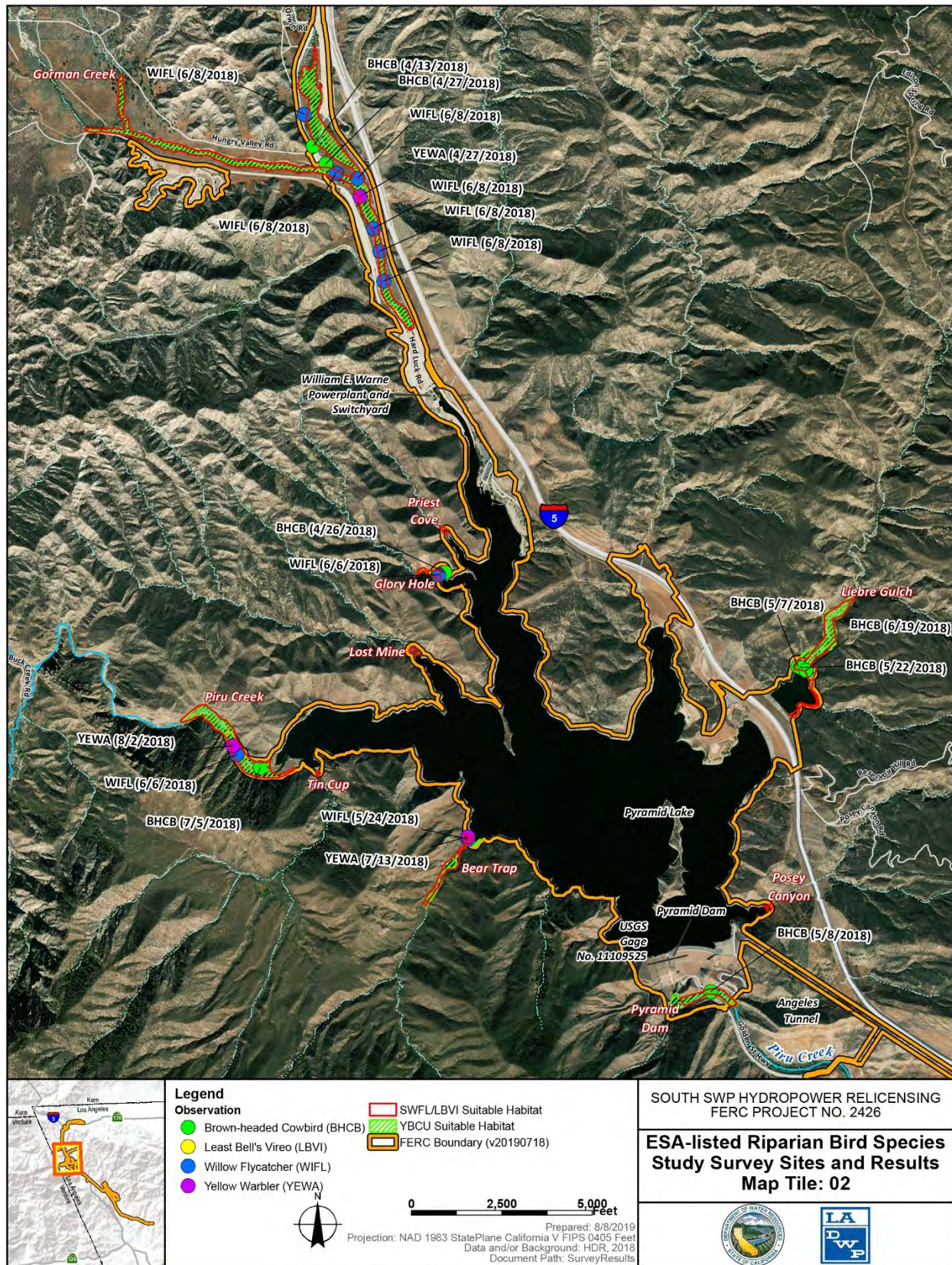


Figure 5.4.3-4b. ESA-Listed Riparian Birds Survey Results in 2018



Figure 5.4.3-4c. ESA-Listed Riparian Birds Survey Results in 2018

In 2019, potential southwestern willow flycatcher habitat associated with additional PPRs was identified at five locations on the west side of Elderberry Forebay and where North Adit Road crosses Piru Creek below Pyramid Dam (Figure 5.4.3-5a and b). A pre-survey site visit on April 10, 2019 confirmed habitat suitability for southwestern willow flyer and least Bell's vireo at all six sites. The North Adit Road site also met the minimum size criterion for potential western yellow-billed cuckoo nesting habitat.

Surveys for southwestern willow flycatcher were completed at the six sites between May 21, 2019 and July 17, 2019, following the same survey protocols as in 2018. The surveyed areas included:

- North Adit Road – Approximately 10.09 acres where North Addit Road, which is gated two miles from the site, crosses Piru Creek. The overstory is dominated by large Fremont cottonwood and willow trees, with a sparse understory of willows.
- West Elderberry Forebay 1 – Approximately 0.63 acres along the western shore of Elderberry Forebay. Overstory is patchy and dominated by tamarisk trees, with a dense sandbar willow understory.
- West Elderberry Forebay 2 – Approximately 0.67 acres of sparse overstory of Fremont cottonwood and tamarisk trees, and a thick understory of sandbar willows.
- West Elderberry Forebay 3 – Approximately 0.38 acres of sparse willow and Fremont cottonwood tree overstory and a thick sandbar willow and bulrush (*Schoenoplectus* sp.) understory.
- West Elderberry Forebay 4 – Approximately 0.89 acres of thick sandbar willow shrub layer and bulrush, with no significant overstory.
- West Elderberry Forebay 5 – Approximately 0.23 acres of thick sandbar willow shrub layer and no significant overstory.

One willow flycatcher was detected at West Elderberry Forebay 1 on May 21, 2019. This detection occurred during the first survey period and no nesting behavior or nests were detected during the survey or in subsequent surveys, indicating that this observation was likely a migrant of an undetermined subspecies.

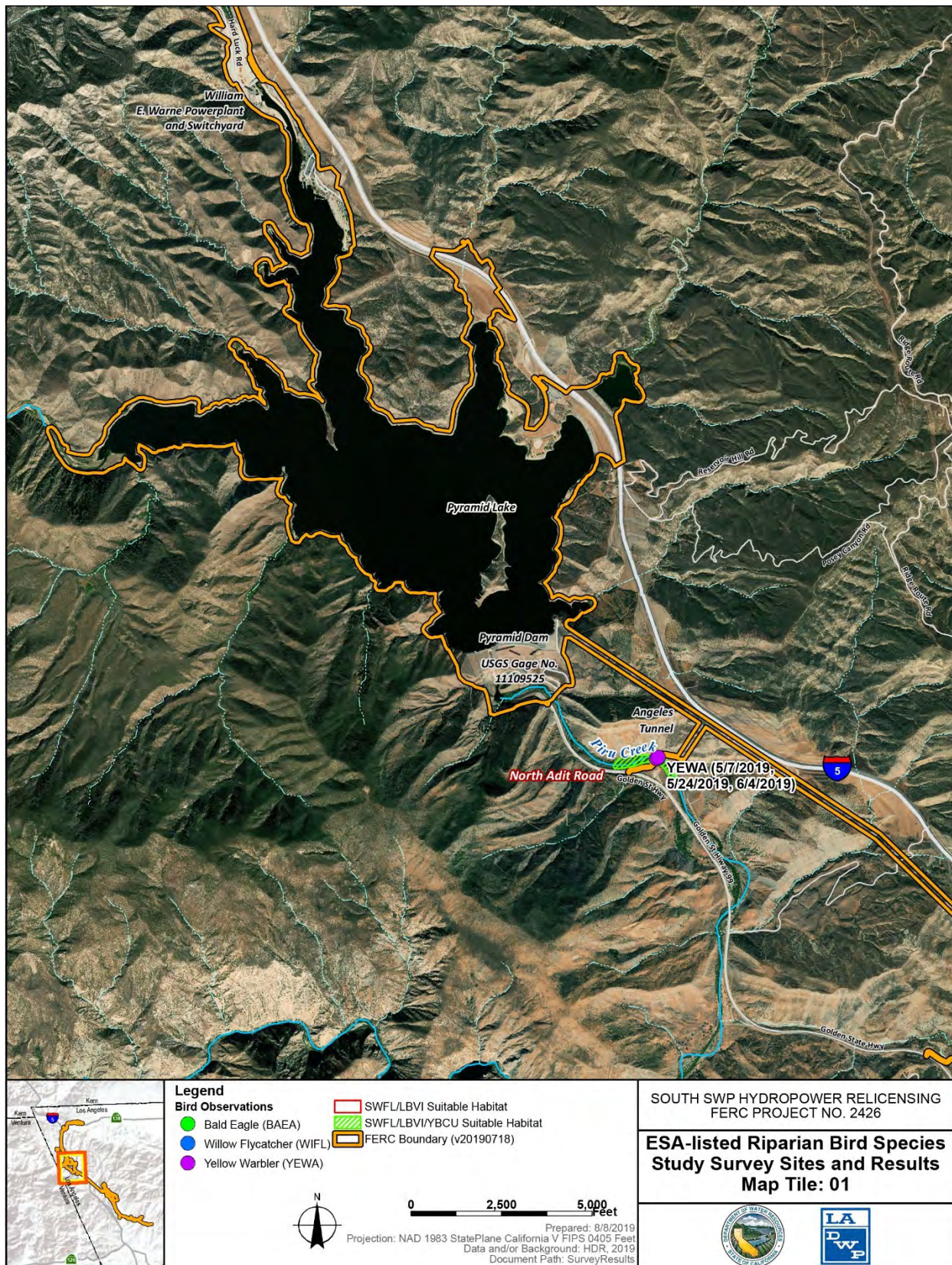


Figure 5.4.3-5a. ESA-Listed Riparian Birds Survey Sites and Results in 2019

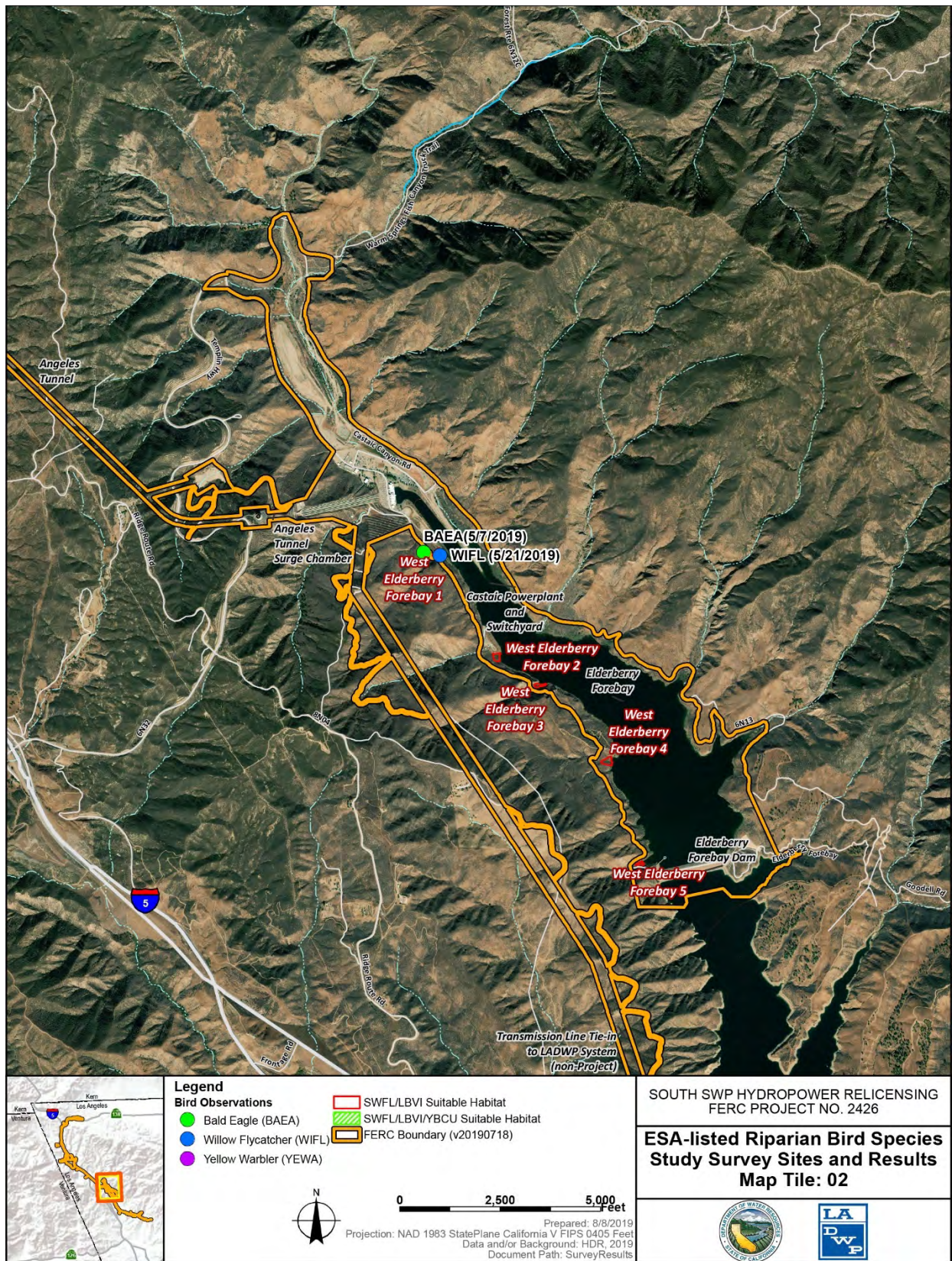


Figure 5.4.3-5b. ESA-Listed Riparian Birds Survey Sites and Results in 2019

Least Bell's Vireo³⁰



The least Bell's vireo (*Vireo bellii pusillus*) was listed as endangered on May 2, 1986 (51 FR 16474). Critical habitat was designated for this species on February 2, 1994 (59 FR 4845). A recovery plan was issued on May 6, 1998 (USFWS 1998a), and the results of a five-year review on September 26, 2006 (USFWS 2006). No recovery actions specific to the Licensees' Proposal or the Action Area are identified in the recovery plan or five-year review.

This small, mostly migratory, insectivorous songbird is closely associated with dense, riparian habitat and adjacent chaparral in river valleys from interior northern California to northwestern Baja California, Mexico (USFWS 2006). Populations from the Sacramento and San Joaquin Valleys were considered extirpated at the time of listing, with almost all remaining occurrences concentrated in southern California (USFWS 2006). Critical habitat has been designated in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties. The nearest designated critical habitat is more than 8 miles from Elderberry Forebay, along the Santa Clara River (USFWS 2018c).

Nesting occurs in dense riparian habitat dominated by willows. Nests are often placed in openings or near habitat edges in understory shrubs, including wild rose (*Rosa californica*) and mule fat beneath willows and cottonwoods (USFWS 1998a). Wintering habitat includes arroyos with scrub vegetation, hedgerows, and other shrubby areas as far south as southern Baja California, Mexico (USFWS 2006). Clutch size is usually three or four eggs, with incubation by both sexes lasting 14 days. Nestlings fledge at 10 to 12 days. Some pairs may produce multiple broods annually; however, young are rarely fledged from more than two nests (USFWS 1998a).

Loss and degradation of nesting habitat was the primary factor in the species decline, and nest parasitism by brown-headed cowbirds threatens existing populations (USFWS 1998a). Since listing, the number of known least Bell's vireo breeding territories has increased 10-fold, which USFWS (2006) attributed to measures to protect and enhance riparian habitat and control brown-headed cowbirds by trapping. In 1998, there were 67 nesting pairs of least Bell's vireo along the Santa Clara River (Kus 2002). The number of breeding pairs detected in the LPNF declined from 50 in 1980 to none in 2013 (Los Padres Forest Watch 2018).

There are eight CNDDB records of least Bell's vireo in the Project vicinity. They are from the Val Verde, Newhall, Warms Springs Mountain, and Piru quadrangles, all associated with the Santa Clara River and tributaries, including Castaic Creek, San Francisquito Creek, and Pole Creek, mostly at locations more than 3 miles from the nearest part of the Action Area (CDFW 2018). The exception is a record of multiple

³⁰ Photo by USFWS [public domain], via Wikimedia Commons.

observations northwest of Castaic Lagoon in Grasshopper Canyon during surveys in April through July 2005, which occurred less than 0.5 miles from the nearest part of the Action Area, the Castaic Transmission Line, but more than 3.4 miles from Elderberry Forebay. The Licensees also noted two least Bell's vireos and heard calls of this species at the same location in April and May 2017. Jones and Stokes (2002) reported no detections on Pyramid reach and Liebre Gulch north of Pyramid Lake. USGS reportedly conducted surveys on Pyramid reach (area not specified) in 2018 and documented three pairs, three single males, and one transient male least Bell's vireo (pers. comm., Taylor 2019). The latter communication also indicated that additional surveys will be conducted in Piru Creek tributaries, including Turtle Canyon, Ruby Canyon, Michael Creek, Agua Blanca Creek, Sharps Canyon, and Canton Canyon. The CWHR identifies a general habitat association of least Bell's vireo to one habitat type occurring within the Action Area, Valley Foothill Riparian (CDFW 2014).

Surveys for least Bell's vireo were performed by the Licensees under their relicensing *ESA-Listed Riparian Bird Species, Southwestern Willow Flycatcher, Least Bell's Vireo, and Yellow-billed Cuckoo Habitat Evaluations Study*. The surveys adhered to accepted protocols for least Bell's vireo (USFWS 2001) and covered all potential habitat within the proposed Project boundary. As described above for southwestern willow flycatcher, the study was implemented in 2018, with a separate evaluation and surveys of areas associated with additional PPRs in 2019. Potential habitat was first identified by a desktop review, followed by a pre-survey visit on April 5, 2018 and April 6, 2018. Surveys were completed in the same 19 locations that were surveyed separately for southwestern willow flycatcher (Figures 5.4.3-3a and 5.4.3-3b). Each site was surveyed eight times during the least Bell's vireo breeding season, with at least 10 days between survey visits for each site. Five sites associated with Elderberry Forebay were not initially identified as potentially suitable habitat and, therefore, were not surveyed during the first two survey events. Upon further scrutiny in the field, these sites were determined to be suitable habitat and were surveyed for the remaining six survey events. At each site, biologists listened for vireo songs, calls, whisper songs, and scolds; looked for adults and juveniles; and were alert for nesting behaviors.

Two least Bell's vireo detections were recorded on the shore of Elderberry Forebay, with detections on May 23 and June 7 (Figure 5.4.3-3c) in closely adjacent (i.e., approximately 900 feet apart) small patches of habitat (i.e., 1.07 and 1.56 acres, respectively). Both sites are characterized by patchy Fremont cottonwoods and dense understory of sandbar willow. The sites were among those not initially surveyed during the first two rounds of survey events, which might otherwise have compromised interpretation of survey results if not for the fact that there were detections during later surveys. Therefore, the number of surveys had no effect on the results. The two detections were likely the same individual moving between the habitat patches. This individual was probably a migrant, because it was not detected again during the final three survey passes at these locations.

In 2019 surveys for least Bell's vireo were performed at the six sites identified as potential habitat for this species and southwestern willow flycatcher (Figure 5.4.3-4a

and b). Survey timing and methods followed USFWS (2001) protocols as described above. There were no detections of least Bell's vireo during these surveys.

Yellow-Billed Cuckoo³¹



The western DPS of yellow-billed cuckoo (*Coccyzus americanus*) was listed as threatened on October 3, 2014 (79 FR 59991). The listing rule applies to the breeding range of yellow-billed cuckoo west of the crest of the Rocky Mountains in the United States, Canada, and Mexico. Critical habitat was designated on December 2, 2014 (79 FR 71373). USFWS has not issued a recovery plan. A petition to delist the western DPS of yellow billed-billed cuckoo on the basis that the population segment is not distinct was received by USFWS on May 4, 2017. USFWS published a 90-day finding that the action proposed in the petition “may be warranted” on June 27, 2018 (83 FR 30091) and will consider issues raised by the petitioner as part of the five-year review that was initiated on June 18, 2018 (83 FR 28251).

The yellow-billed cuckoo is a medium-sized migratory bird, which winters primarily in South America, east of the Andes Mountains. The species is closely associated with open deciduous woodlands where there is dense, low cover and nearby water. Although the species is not regarded as at risk, populations in western North America (i.e., those which historically nested from British Columbia to northern Mexico west of the Continental Divide) have declined or disappeared in much of the range. Nesting occurrences of the western DPS are now largely limited to sites in Arizona, California, and New Mexico. The current status of western DPS yellow billed-cuckoo is largely the result of loss and degradation of riparian habitat, including the increase in non-native vegetation and effects of long droughts. In California, critical habitat is designated in six units, including units in Kern, Inyo, and Riverside Counties, and none in Los Angeles County (79 FR 71373). The nearest of these critical habitat units (Riverside County) is located more than 62 miles from the Action Area.

Western DPS yellow-billed cuckoo nests in low to moderate elevation, riparian woodlands, mostly comprising native broadleaf trees and shrubs of various species in patches that are 50 acres or more in extent within arid to semiarid landscapes (79 FR 78548). Patches smaller than 37 acres are regarded as unsuitable (79 FR 78548), although use of smaller patches has been rarely documented (Halterman et al. 2016), including only rare use of patches less than 325 feet wide. Breeding habitat in California occurs mostly in large patches (i.e., greater than 200 acres in size) of Fremont cottonwood and willows, reflecting the large home ranges characteristic of this species (Halterman et al. 2016).

³¹ Photo credit: Mark Dettling/Blue Point Conservation Science [USFWS public domain image], via Wikimedia Commons.

As summarized by Halterman et al. (2016), nesting has not been documented in small, isolated riparian patches of 2 acres or less, or linear patches less than 30 feet in width, although such patches may be used as stop-over habitat during migration. The general habitat is described as “broad, lower flood-bottoms of larger river systems” and micro-habitats as “riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape” (CDFW 2018).

Primary prey include large insects, especially insects that are periodically abundant, such as caterpillars, cicadas, katydids, and grasshoppers. Other prey include frogs, lizards, and eggs of other birds. Western DPS yellow-billed cuckoo typically do not complete migration to breeding grounds and begin nesting until at least mid-June, with nesting activity sometimes occurring into September. Clutch size typically ranges from two to four eggs, which may be laid asynchronously, with rapid development and growth. The young may fledge in as little as 17 days after eggs were laid, but are still attended to and fed by the parents 28 to 32 days after hatching (Halterman et al. 2016).

There is one CNDDDB record of yellow-billed cuckoo in the Project vicinity reported from the Val Verde quadrangle: an individual bird observed in 1979 along the Santa Clara River between the mouths of Castaic Creek and Piru Creek about 11.8 miles from Elderberry Forebay (CDFW 2018). There are no known records of yellow-billed cuckoo within the Action Area. As indicated above, there is no designated critical habitat within or near the Action Area. As also noted above, western DPS yellow-billed cuckoo was not included in the IPaC Resource Report (USFWS 2018g). The CWHR identifies a general habitat association of yellow-billed cuckoo to one habitat type occurring within the Action Area, Valley Foothill Riparian (CDFW 2014).

Surveys for yellow-billed cuckoo were performed by the Licensees under their relicensing *ESA-Listed Riparian Bird Species, Southwestern Willow Flycatcher, Least Bell's Vireo, and Yellow-billed Cuckoo Habitat Evaluations Study*. The surveys adhered to accepted protocols for yellow-billed cuckoo (Halterman et al. 2016) and covered all potential habitat within the proposed Project boundary. In 2018 potential habitat was first identified by a desktop review, followed by a pre-survey visit to verify the initial assessment from June 4 through June 8, 2018. A minimum patch size for potentially suitable habitat was set at 2 acres, smaller than that considered suitable for nesting territories, in order to detect yellow-billed cuckoo still in migration or early in the nesting season. Four separate surveys were conducted that collectively spanned three protocol-defined survey periods – June 15 through June 30, July 1 through July 30, and July 31 through August 15 – consistent with the protocols to ensure a 95 percent probability of detecting yellow-billed cuckoo when present (Halterman et al. 2016). Because yellow-billed cuckoo exhibits a low unsolicited calling rate, a call-playback technique was used to derive a high degree of confidence regarding presence or absence within the study area (Halterman et al. 2016).

Surveys for yellow-billed cuckoo were completed in nine separate locations in 2018 (Figures 5.4.3-3a through 5.4.3-3c). The surveyed areas included:

- Quail Lake – One habitat patch of 3.08 acres along the south shore
- Pyramid Lake – Four habitat patches associated with coves and seasonal tributaries of Pyramid Lake ranging in size between 2.21 acres and 24.8 acres
- Gorman Creek – One large patch of 88.37 acres from Warne Powerplant to Orwin Road at the proposed Project boundary
- Piru Creek below Pyramid Dam – One patch of 9.68 acres
- Elderberry Forebay – Two patches up to 8.31 acres

In 2019 surveys for yellow-billed cuckoo were performed at the North Adit Road site, the only site that met the minimum size criterion for potential western yellow-billed cuckoo nesting habitat (Figure 5.4.3-4a). Survey timing and methods followed USFWS approved protocols (Halterman et al. 2016) as described above.

There were no detections of yellow-billed cuckoo at any of the survey sites in either year and no incidental observations were noted during the Licensees' other relicensing field studies.

Slender-horned Spineflower³²



The slender-horned spineflower (*Dodecahema leptoceras*) was listed as endangered on September 28, 1987 (52 FR 36265). Critical habitat has not been designated for this species, nor is there a recovery plan. The results of a five-year review were issued on October 1, 2010 (USFWS 2010b). No recovery actions specific to the Licensees' Proposal or the Action Area are identified in the five-year review.

Slender-horned spineflower is a small, rosette-forming annual of the buckwheat family (Polygonaceae) that is found on floodplain terraces and sandy benches, areas that flood infrequently (52 FR 36265). Germination is likely related to rainfall. Occurrences are associated with alluvial fan scrub vegetation. Slender-horned spineflower is a southwestern California endemic species restricted to northern Los Angeles County, east to San Bernardino County, and south to southwestern Riverside County in the foothills of the Transverse and Peninsular Ranges. It has been found at elevations of about 660 to 2,300 feet (USFWS 2010b). At the time of listing, there were only five known extant populations. Current threats include changes in flood regimes from flood-

³² Photo credit: Joe Decruyenaere (DSCN5846) [CC BY-SA 2.0 (<http://creativecommons.org/licenses/by-sa/2.0/>)], via Wikimedia Commons.

control projects, continuing development, gravel-mining, agriculture, off-road vehicle use, and invasive non-native plants (USFWS 2010b).

There are two CNDDDB records of slender-horned spineflower in the Project vicinity. The first record is from the Mint Canyon quadrangle within Mint Canyon in 1937. This occurrence is more than 13 miles from Elderberry Forebay. The other record is from an 1893 collection from an unspecified area with reported accuracy of 5 miles and, therefore, could be within the Mint Canyon, Newhall, Val Verde, or other quadrangles beyond the Project vicinity (i.e., San Fernando, Oat Mountain, or Santa Susana quadrangles). Both records are categorized as “possibly extirpated” (CDFW 2018). There are no records of slender-horned spineflower in the Action Area. As indicated above, no critical habitat has been designated for this species.

Surveys for ESA-listed plants were performed by the Licensees under their relicensing *ESA-Listed Plants Study*. The Licensees’ systematic floristic surveys (i.e., documenting all species encountered) as part of the *Botanical Resources Study* field effort encompassed the proposed Project boundary area, excluding some areas of steep terrain, which could not be surveyed safely on foot, and were completed between March 26 and September 13, 2018. Refer to Section 5.4.1 for a more detailed description of survey methods. No ESA-listed plants were found. Suitable habitat for slender-horned spineflower in the form of alluvial floodplain terrace and alluvial fan scrub vegetation was observed within the proposed Project boundary only along part of the Castaic Transmission Line (the eastern half), where the species was not found during the surveys.

Marsh Sandwort³³



The marsh sandwort (*Arenaria paludicola*) was listed as endangered on August 3, 1993 (58 FR 41378). No critical habitat has been designated for this species. A recovery plan, which also addresses Gambel’s watercress, was issued on September 28, 1998 (USFWS 1998b), and a proposed draft amendment to the plan was issued in September 2018 (USFWS 2018h). The results of a five-year review were issued on July 10, 2008 (USFWS 2008).

No recovery actions specific to the Licensees’ Proposal or the Action Area are identified in the recovery plan or five-year review.

Marsh sandwort is a rhizomatous herb of the pink family (Caryophyllaceae) with long, trailing or clambering stems, which may root at the nodes (USFWS 1998b). Although described as an annual by USFWS (1998b), other sources (USFWS 2008; CalFlora 2018; eFloras 2018) characterize the species as a perennial. Flowering occurs from May to August with fruiting beginning in June. Information summarized in the five-year review (USFWS 2008) indicates the species has been documented from only

³³ Photo credit: Stickpen (Own work) [CC0] [public domain], via Wikimedia Commons.

10 naturally occurring populations in the U.S. in scattered swamps and freshwater marshes near the Pacific Coast, including one site in Washington State and the rest in southern or central California. The species may also occur in central Mexico and Guatemala (eFloras 2018). Elevations of these sites range from near sea level to 1,480 feet; however, USFWS (2008) concluded that “primary habitat consists of boggy areas in freshwater marshes and swamps below 560 feet in elevation.” Habitats are also described as “boggy meadows” (eFloras 2018). At the time of listing, only one declining population was known to be extant. Despite subsequent reintroduction attempts, two of which failed, the current known distribution is limited to two sites in San Luis Obispo County, California, one of which represents an introduced population at Sweet Springs Marsh (USFWS 2008, 2018h). Both of the known populations are more than 100 miles from the Action Area. As indicated above, no critical habitat has been designated for this species. Recent experimental introductions have proven more successful and provide new insights into the species’ habitat requirements, which may be similar to those of a common native plant, water parsley (*Oenanthe sarmentosa*) (Bontrager et al. 2014). The threats to the species include continuing loss and degradation of suitable habitat that might allow for establishment of new populations, changing hydrology of sites, inbreeding and risk of stochastic extinction events because of small population size, and off-road vehicle use (USFWS 1998b, 2008).

There are no CNDDDB records of marsh sandwort in the Project vicinity. However, based on the wide geographic distribution of historically known occurrences and potential for misidentification (USFWS 1998b), the species may be under-reported, as suggested by Baldwin et al. (2012).

Surveys for ESA-listed plants performed by the Licensees under their relicensing *ESA-Listed Plants Study* did not detect marsh sandwort. Broadly suitable habitat for marsh sandwort in the form of freshwater marsh occurs within the proposed Project boundary at Gorman Creek, Quail Lake, and Pyramid Lake, where it is largely concentrated at the mouth of Piru Creek.

Nevin’s Barberry³⁴



Nevin’s barberry (*Berberis nevinii*) was listed as endangered on October 13, 1998 (63 FR 54956). Critical habitat was designated for this species on February 13, 2008 (73 FR 8412). The results of a five-year review were issued on August 14, 2009 (USFWS 2009b). No recovery actions specific to the Licensees’ Proposal or the Action Area are identified in the five-year review. There is no recovery plan for Nevin’s barberry.

³⁴ Photo credit: Stan Shebs [GFDL] (<http://www.gnu.org/copyleft/fdl.html>), CC BY-SA 3.0 (<http://creativecommons.org/licenses/by-sa/3.0>), via Wikimedia Commons.

Nevin's barberry is an evergreen, perennial shrub of the barberry family (Berberidaceae) that grows 3 to 12 feet tall, and flowers in March and April. Individual plants have been reported to live more than 50 years, but may only produce fertile seed sporadically (USFWS 2009b). Endemic to southern California, Nevin's barberry has been documented at scattered locations, each representing small stands of fewer than 10 plants, in Los Angeles, San Bernardino, and Riverside Counties, and possibly San Diego County, at elevations mostly between 1,400 and 1,700 feet (USFWS 2009b). Most occurrences are concentrated near Vail Lake in southwestern Riverside County, where all designated critical habitat is located.

Habitat includes benches, terraces, canyon floors, and steep banks of drainages; margins of washes; and steep, rocky slopes and ridges. Nevin's barberry has been found in alluvial scrub, chaparral, coastal sage scrub, oak woodland, and riparian scrub or woodland (USFWS 2009b). Because Nevin's barberry has been introduced into the horticultural trade, some recent occurrences may not be native.

There are two CNDDDB records for Nevin's barberry in the Project vicinity: one from the Warm Springs Mountain quadrangle, more than 9.5 miles from Elderberry Forebay, and one from the Newhall quadrangle in San Francisquito Canyon, 2.7 miles upstream of the Castaic Transmission Line crossing (CDFW 2018). Both of these occurrences are considered to be non-native (i.e., naturalized from transplants) (USFWS 2009b) and were confirmed by the Licensees to be extant in 2018. There are no records of Nevin's barberry in the Action Area. Designated critical habitat is located more than 110 miles from the proposed Project boundary.

Surveys for ESA-listed plants performed by the Licensees under their relicensing *ESA-Listed Plants Study* did not detect Nevin's barberry. Broadly suitable habitat for Nevin's barberry in the form of chaparral and wash habitat occurs at numerous locations within the proposed Project boundary.

Gambel's Watercress³⁵



Gambel's watercress (*Nasturtium [Rorippa] gambelii*) was listed as endangered on August 3, 1993 (58 FR 41378). No critical habitat has been designated for this species. A recovery plan was issued on September 28, 1998 (USFWS 1998b), and a proposed draft amendment to the plan was issued in September 2018 (USFWS 2018h). The results of a five-year review were issued on November 7, 2011 (USFWS 2011b). No recovery actions specific to the Licensees' Proposal or the Action Area are

identified in the recovery plan or five-year review.

This perennial herb of the mustard family (Brassicaceae) is rhizomatous, sometimes rooting at the nodes, grows up to 6 feet tall, and flowers April to July. Historically,

³⁵ Photo credit: Mark A. Elvin, USFWS [public domain], from (USFWS 2011b).

Gambel's watercress occurred at scattered freshwater marshes, mesic areas near streams, and possibly in brackish marshes in southern California from Los Angeles and San Bernardino Counties southward to Mexico at elevations from near sea level to 1,480 feet (USFWS 1998b, 2011b). Most of the known populations are now considered extirpated. Only three extant populations were known in the U.S. at the time the recovery plan was published: two in San Luis Obispo County and a third at the Vandenburg Air Force Base in Santa Barbara County, each of which are more than 100 miles from the proposed Project boundary. The species has continued to decline since being listed. As indicated above, no critical habitat has been designated for this species.

USFWS (2011b) indicated that the sites in San Luis Obispo County may no longer support genetically pure Gambel's watercress and that detected watercress were all either hybrids with common watercress (*Nasturtium officinale* [*R. nasturtium-aquaticum*]) or were pure common watercress. Pure Gambel's watercress may now occur only at Vandenburg Air Force Base and an introduced population at the Guadalupe-Nipomo Dunes National Wildlife Refuge in San Luis Obispo County. However, based on limited ecological data from historical occurrences and potential for misidentification (USFWS 2011b), undiscovered occurrences are possible.

Threats to the species include continuing loss and degradation of habitat, changing hydrology of sites, risk of stochastic extinction events because of small population size, and genetic swamping from common watercress (USFWS 2011b).

There are no records of Gambel's watercress in the Project vicinity. Surveys for ESA-listed plants performed by the Licensees under their relicensing *ESA-Listed Plants Study* did not detect Gambel's watercress. Broadly suitable habitat for Gambel's watercress in the form of freshwater marsh occurs within the proposed Project boundary at Gorman Creek, Quail Lake, and Pyramid Lake, largely concentrated at the mouth of Piru Creek.

Spreading Navarretia³⁶



Spreading navarretia (*Navarretia fossalis*) was listed as threatened on October 13, 1998 (63 FR 54975). Critical habitat was first designated for this species on October 18, 2005 (70 FR 60658), and was later revised on October 7, 2010 (75 FR 62192). A recovery plan, which also addresses other vernal pool species, was issued on September 3, 1998 (USFWS 1998c), while spreading navarretia was still being proposed for listing, and the results of a five-year review were issued on August 10,

2009 (USFWS 2009c). No recovery actions specific to the Licensees' Proposal or the Action Area are identified in the recovery plan or five-year review.

³⁶ Photo credit: Joe Decruyenaere [CC BY-SA 2.0 (<http://creativecommons.org/licenses/by-sa/2.0>)], via Wikimedia Commons.

Spreading navarretia is a low, spreading or ascending annual herb of the phlox family (Polemoniaceae) that flowers after pools have dried. Other key aspects of the species biology, including pollination ecology and mechanisms of seed dispersal, are not fully understood (USFWS 2009c). The known distribution of this endemic vernal pool species includes parts of southern California south to northwestern Baja California, Mexico, with known sites concentrated in Riverside and San Diego Counties, and fewer sites in Los Angeles County, at elevations between approximately 100 and 2,200 feet. USFWS (2009c) reported 48 extant occurrences in the U.S. from vernal pools and poorly drained, seasonally flooded alkali playas. CDFW (2018) described the microhabitat association of this species as “San Diego hardpan and San Diego claypan vernal pools in swales and vernal pools, often surrounded by other habitat types.” Critical habitat has been designated in Los Angeles, Riverside, and San Diego Counties. Threats to the species include continuing loss and degradation of habitat from urbanization, agriculture, changing hydrology, trash dumping, vandalism, and off-road vehicle use (USFWS 2009c).

There are two CNDDDB records of spreading navarretia in the Project vicinity, both from the Mint Canyon quadrangle at Cruzan Mesa and Plum Canyon (CDFW 2018). There are no records of spreading navarretia in the Action Area. The nearest designated critical habitat is also located at these two sites, which are approximately 15 miles from the Project (USFWS 2018e).

Surveys for ESA-listed plants performed by the Licensees under their relicensing *ESA-Listed Plants Study* did not detect spreading navarretia. Suitable habitat for spreading navarretia (i.e., vernal pools and alkali playa habitat) was not observed during the Licensees’ botanical surveys.

California Orcutt Grass³⁷



California orcutt grass (*Orcuttia californica*) was listed as endangered on August 3, 1993 (58 FR 41384). No critical habitat has been designated for this species. A recovery plan, which also addresses other vernal pool species, was issued on September 3, 1998 (USFWS 1998c), and the results of a five-year review were issued on March 11, 2011 (USFWS 2011a). No recovery actions specific to the Licensees’ Proposal or the Action Area are identified in the recovery plan or five-year review.

California orcutt grass is a small (i.e., 2 to 8 inches tall), tufted, prostrate annual grass (Poaceae) that flowers from April to June, and exhibits increasingly upward growing stems as pools dry. The species is endemic to deep vernal pools in southern California, predominantly in Riverside and San Diego Counties, and a few locations in Ventura and Los Angeles Counties. Known occurrences are scattered at elevations from 45 to 2,000

³⁷ Photo credit: Russell Huddleston [public domain], via CalPhotos.

feet. There are three known extant occurrences in Los Angeles County at Cruzan Mesa, near Newhall and Plum Canyon, and two other occurrences have been extirpated. This species is found in the parts of vernal pools that are wet for the longest period of time (USFWS 2011a). Threats to the species include continuing loss and degradation of habitat from urbanization, agriculture, changing hydrology, and off-road vehicle use (USFWS 1998c, 2011a).

There are three CNDDDB records for California orcutt grass in the Project vicinity, all from the Mint Canyon quadrangle more than 12 miles from Elderberry Forebay (CDFW 2018). There are no records of California orcutt grass in the Action Area. As indicated above, no critical habitat has been designated for this species.

Surveys for ESA-listed plants performed by the Licensees under their relicensing *ESA-Listed Plants Study* did not detect California orcutt grass. Suitable habitat for California orcutt grass (i.e., vernal pools) was not observed during the Licensees' botanical surveys.

5.4.3.2 Effects of the Licensees' Proposal

This section describes potential effects of the Licensees' Proposal (Proposed Action) on ESA-listed and candidate species. For the reasons stated below, the Licensees have proposed the following specific measures related at least in part to ESA-listed species:

- Implement the Erosion and Sediment Control Plan (GS1) - Measure GS1 would include measures to control sedimentation and erosion during Project activities outside Project O&M. This would be a new measure (i.e., not included in the existing license).
- Implement Pyramid Reach Flow Releases (AR1) - Measure AR1 is identical to the Pyramid Lake portion of Article 52 in the existing Project license, with the exception that the multiplier for estimating the ungaged flow into Pyramid Lake has been updated based on current GIS and hydrologic methods, as described in Appendix A to Exhibit E of this Application for New License. Measure AR1 would continue releases of flows from Pyramid Lake into Pyramid reach that mimic the natural hydrograph in Piru Creek in both timing and magnitude for the benefit of arroyo toad, CRLF, and other native aquatic species.
- Develop an Integrated Vegetation Management Plan (TR1) - Measure TR1 is being developed by the Licensees, USFS, and CDFW with the goal of inclusion in the Licensees' FLA. It is anticipated that the plan would include measures for controlling non-native plant species, protecting special-status species during vegetation management activities, providing for the safe application of herbicides and rodenticides, and re-vegetating disturbed areas. This would be a new measure (i.e., not included in the existing license).

Three possible conclusions exist regarding the Proposed Action's effects on listed species under the ESA (USFWS and NMFS 1998). These conclusions are as follows:

- No effect. This conclusion is appropriate when it is determined that a proposed action will not affect a listed species or designated critical habitat.
- May affect, but is not likely to adversely affect. This conclusion is appropriate when effects of a proposed action on ESA protected species are expected to be discountable, insignificant, or completely beneficial. "Insignificant effects relate to the size of the impact, and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur" (USFWS and NMFS 1998).
- May affect, is likely to adversely affect. This conclusion is appropriate if any adverse effect to listed species may occur as a direct or indirect result of the proposed action, or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial.

An important distinction when assessing the Proposed Actions' effects is the Action Agency's (i.e., FERC's) discretionary versus non-discretionary activities. Non-discretionary activities usually include those that are required by law, required for facility or public safety, or water rights, and are binding agreements that cannot be altered by FERC. Discretionary activities include most other Project activities. Where the Licensees have concluded that the effect on the ESA-species is a cumulative effect, the Licensees have attempted to describe the portion of the effect that occurs as a result of the Proposed Action.

Recreation, including OHV use, and road use and maintenance on the LPNF, including recreation on Pyramid reach, represent long-term past and present cumulative actions. These activities can affect water quality and can directly affect arroyo toad where instream recreation occurs and at road crossings. As described above, FERC does not have the authority to regulate these facilities and activities not associated with the Project and outside of the proposed Project boundary. Introductions of non-native fish, including deliberate releases of game fish, escape of bait fish, and American bullfrog, are also cumulative effects which are particularly deleterious to arroyo toad, CRLF, and some native fish, such as unarmored threespine stickleback, a fish historically present in the Piru Creek drainage.

Deconstruction of the Constituent Components of the Proposed Action

The Licensees propose three measure for inclusion in the new license pertinent to ESA-listed species, and continuation of historical O&M as described in Exhibit B of this Application for New License. Development and implementation of an Erosion and Sediment Control Plan and IVMP, while not specific to ESA-listed species, are intended to benefit various sensitive resources, including ESA-listed species in the Action Area, if present.

Under AR1 the Licensees' intend to also continue the flow measures contained in the existing license Article 52, which provides that "stream releases from Pyramid Dam into Piru Creek shall match natural surface inflow into Pyramid Lake to the extent operationally feasible and consistent with safety requirements," and amended Exhibit S, which deleted minimum flow requirements for Pyramid reach (FERC 2009). The amended measures were based on USFWS' (2007a) concurrence that the Project, with the change in operations – on a permanent basis – would improve habitat for arroyo toad and CRLF, with no adverse effect on primary constituent elements of CRLF designated critical habitat, and was not likely to adversely affect the arroyo toad. Related to the measure, DWR has performed annual surveys for arroyo toad and other sensitive species since 2010. FERC's license order required a plan for annual arroyo toad and sensitive species surveys to be performed and results reported for a minimum of three years. The order, which incorporated the SWRCB's CWA 401 Water Quality Certification, provided that the monitoring frequency could be modified, upon consultation with USFWS and the SWRCB, if the results show improvement in the arroyo toad population under the flow modifications. The Licensees' Proposal does not include continued annual arroyo toad surveys, because there is sufficient information to demonstrate that the population will naturally fluctuate and benefits from periodic, naturally occurring winter high flows that scour encroaching riparian and emergent vegetation, provide the natural fluvial processes for redistributing sediments, increase stream terraces and sand bars, and depress populations of introduced aquatic predators, especially American bullfrog. The flow measures in amended Article 52 are part of the environmental baseline and must be continued in the new license to avoid take of listed arroyo toads and comply with the ESA. There will be no effect on listed arroyo toads from continuing these flow measures.

This section identifies and geographically distinguishes the individual constituent components of the Proposed Action, distinguishing between: (1) constituent components that will have no effect to ESA-listed species or their designated critical habitats; and (2) constituent components that may affect, but is not likely to adversely affect ESA-listed species or their designated critical habitats.

Proposed Action constituent components that will have no effect on ESA-Listed species or their designated critical habitats are generally legal (e.g., comply with a law) or administrative (e.g., filing of a plan), and those that require monitoring but do not include adaptive management (i.e., the plan does not include a change in Project operations that would be triggered by the monitoring results). In particular, the Licensees' Proposal would have no effect on flow in Piru Creek downstream of Pyramid Dam – natural inflow into Pyramid Lake is released into Piru Creek consistent with water supply agreements (see Exhibit B). FERC is not required to consult with USFWS under Section 7 of the ESA on Proposed Action constituent components that FERC determines will have no effect.

Proposed Action constituent components that may affect ESA-listed species or their critical habitats are primarily related to ground-disturbing activities, vegetation management, access, and recreation. FERC is required to consult with USFWS under

Section 7 of the ESA on Proposed Action constituent components that FERC determines may affect ESA-listed species. These constituent components are discussed below.

Fish Stocking in Pyramid Lake

The Proposed Action will continue stocking fish through agreements with CDFW and private hatcheries for a recreational fishery at Pyramid Lake. Some of these fish may move downstream into Piru Creek from releases and water transfers. Downstream passage of stocked hatchery fish from releases or water transfers contributes to introduced fish populations in Piru Creek. Generally, continued reservoir fish stocking has the potential to affect ESA-listed fish or other aquatic or semi-aquatic species from predation or competition. However, Pyramid Lake is unlikely to support any ESA-listed species, and no ESA-listed fish species are known to occur in Pyramid reach downstream of Pyramid Dam.

Fish Stocking in Pyramid Reach

Fish stocking in Pyramid reach by CDFW was temporarily discontinued since 2008 as a result of litigation that requires CDFW to consult with USFWS and NMFS to obtain a BO for their fish stocking and hatchery operations that could affect water bodies with ESA-listed species. Because continuing stocking fish in Pyramid reach has the potential to result in negative impacts to arroyo toad populations and other native species there, the Licensees' Proposal does not include this provision.

Normal O&M of Dams and Powerhouses, including Access for O&M

Normal O&M of Project facilities will continue to occur, including required O&M access to these facilities by Project personnel. Generally, the potential for normal O&M of such constructed facilities devoid of vegetation to affect ESA-listed species is limited. O&M-related access on Project roads could be a source of disturbance if ESA-listed species occur near these roads.

Vegetation Management

Vegetation management, including control of non-native invasive species and trimming or removing unwanted vegetation around Project facilities, will continue to occur under the Licensees' IVMP. Vegetation management has the potential to affect ESA-listed plants and terrestrial wildlife, if these species occur in vegetation management locations. In general, vegetation management under current operations is implemented within approximately 75 feet of the powerhouse and switchyard; within approximately 15 feet on either side of roads and trails to Project facilities; and within and adjacent to recreation areas. Trimming includes cutting grasses and forbs using string trimmers, and removing or trimming overhanging shrubs and tree limbs using a chain saw or other handheld saw or clippers. These management activities are conducted as needed in conjunction with facility inspections. Herbicides, in combination with surfactants, are used in combination with hand trimming vegetation management activities on an annual

basis at Project facilities located on Licensee-owned property. Herbicide application typically occurs twice annually, at a minimum. These applications typically occur between December 1 and March 31, as determined by PCAs for pre-emergent herbicides. Follow-up visits to apply post-emergent herbicides and/or additional treatments (as needed) are seasonally dependent, and typically occur between April 1 and June 30. A third cycle, if required, would typically be completed between July 1 and October 14.

Hazard trees are removed as needed with a chainsaw, handheld saw, or other equipment. Smaller diameter debris from felled hazard trees is either chipped, or lopped and scattered. Downed logs are typically left onsite and are moved only if needed for safety reasons.

Vegetation management includes provisions to avoid sensitive resources, and such provisions eliminate or significantly reduce the likelihood of adverse effects to ESA-listed species. Refer to the Licensees' proposed IVMP for a detailed discussion of vegetation control, including use of herbicides and revegetation management.

Use of Algaecides and Aquatic Herbicides

In compliance with existing law as part of the SWP monitoring program, the Licensees will continue to control infestations of aquatic weeds and algal blooms at Pyramid Lake and Quail Lake, which if left untreated could interfere with recreational activities and result in degradation of water quality standards through elevated taste and odor problems, and production of elevated algal toxins. Invasive aquatic weeds are also treated at Elderberry Forebay. In each of these areas, herbicides will continue to be used in compliance with State and federal laws that herbicides be applied only by personnel licensed by the State of California Department of Pesticide Regulation, in accordance with label requirements, and in a manner that avoids potential adverse effects. Pretreatment or preconstruction surveys are done prior to any invasive species removal to check for sensitive species that may be affected. In addition, treatments to address blooms of cyanobacteria will continue as needed. No adverse effects to ESA-listed species or other non-target aquatic species have ever been reported or suggested, including no bioaccumulation effect, and such effects are unlikely to occur.

Ongoing Recreational Use

Recreational use at Project recreational facilities at Pyramid Lake, Quail Lake, and Los Alamos Campground will continue to occur. Recreational activities include shoreline fishing, hiking and trail use at Quail Lake; and fishing, boating, waterskiing, swimming, picnic day use, trail hiking, and nature/wildlife viewing at Pyramid Lake. Such activities have the potential to affect ESA-listed species by increased human presence (e.g., disturbance of nesting birds, aquatic species, or trampling vegetation) or inadvertent or illegal introduction of invasive species (e.g., escape of bait fish). General measures to limit effects of recreational use on sensitive resources (e.g., signage, trail designations, and boat inspections for invasive species) would also be protective of ESA-listed

species, if present within the proposed Project boundary and areas downstream of Pyramid Dam that could be affected by water releases or spills.

Capture of Sediment and Large Woody Material in Pyramid Lake

Pyramid Lake will continue to store water and capture sediment and large woody material that would otherwise move downstream. The general effects of reduced sediment and large woody debris in streams below other impoundments include changes in instream habitat structure, such as fewer pools and loss of spawning gravel, and indirect effects on riparian vegetation. However, there is no evidence that these general and indirect effects documented elsewhere are applicable to Piru Creek or are pertinent to ESA-listed species downstream of the Project. Reduction of instream large woody debris is unlikely to affect arroyo toad, a species not associated with deep, stable pools. Geomorphic processes associated with high flows that occur under amended Article 52 are beneficial to arroyo toad by periodically “providing the scouring needed to reduce riparian and emergent vegetation, increasing stream terraces and sand bars, and providing the natural fluvial process to redistribute sediments” (FERC 2009).

Passage of Water through Pyramid Lake

Water will continue to pass through Pyramid Lake to Piru Creek, which could affect aquatic organisms downstream of Pyramid Dam if water temperatures or water quality are impaired. While the Project operates to pass natural inflows from Piru Creek, the water temperature is influenced by the Project as the outflow releases are coming out of the low level outlet valves in Pyramid Dam, providing cooler water than the natural inflows from Piru Creek and other tributaries. However, there is no evidence that water temperature or water quality are significantly affected, and no effects to ESA-listed species downstream of the Project related to water temperature or water quality are known to occur. Refer to Section 5.2 for a detailed discussion of water quality in releases to Pyramid reach.

Conclusions Regarding the Effects of the Proposed Action on the Species

Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp has not been documented to occur within the Action Area and there are no known Project effects to this species or its designated critical habitat. Vernal pool fairy shrimp does not occur in perennial waters or in streams; therefore, there is no potential that the species could be affected by O&M of any of the Project reservoirs. In addition, no vernal pools potentially suitable for this species have been found within the proposed Project boundary. Therefore, the Proposed Action would have no effect on vernal pool fairy shrimp or its designated critical habitat.

Unarmored Threespine Stickleback

Unarmored threespine stickleback is not known to occur within the Action Area and there are no known Project effects to this species or its designated critical habitat.

Threespine sticklebacks within Piru Creek are believed to be limited to the partially armored form (Swift et al. 1993), as expected, because of the presence of other introduced predaceous fish species. The Proposed Action will have no effect on unarmored threespine stickleback or its designated critical habitat.

Southern California Steelhead DPS

SC steelhead and its designated critical habitat does not occur within the Action Area and there are no known Project effects to this species or its designated critical habitat. In its final EA for an amendment to the FERC license for Project No. 2426-197, FERC (2008) stated the following, specifically as it pertains to the Pyramid reach of Piru Creek and the flow regime proposed therein to protect the arroyo toad and its designated critical habitat:

The federally endangered southern California steelhead and its designated critical habitat do not occur in the project or action areas because Santa Felicia Dam blocks all upstream steelhead migration into the project reach (letter from Rodney R. McInnis, Regional Administrator, NMFS, Longbeach, CA to Kimberly D. Bose, Secretary, FERC, Washington, D.C. dated May 3, 2007). Therefore, the proposed project would have no effect on southern California steelhead or its designated critical habitat.

The nearest occurrence of SC steelhead is in the Santa Clara River. Although Project water flows through the Action Area into the Santa Clara River by way of Piru Creek and Castaic Creek, these movements of water are not a part of the Project or the Proposed Action. Water releases and associated potential impacts downstream of Santa Felicia Dam and Castaic Dam are also not part of the Proposed Action.

The Proposed Action would continue Project O&M activities for which FERC already made a determination of no effect regarding SC steelhead in Pyramid reach. The Proposed Action also does not include water releases outside of the Action Area or the potential effects on SC steelhead downstream. Therefore, the Licensees conclude that the Proposed Action would have no effect on SC steelhead or its designated critical habitat.

Arroyo Toad

The Proposed Action has the potential to affect arroyo toad. Arroyo toad and its associated designated critical habitat occurs in the following four areas, discussed separately below: (1) Piru Creek upstream of Pyramid Lake, which includes critical habitat Sub-unit 5a; (2) Piru Creek downstream of Pyramid Lake (Sub-unit 5b); (3) Castaic Creek upstream of Elderberry Forebay (Sub-unit 6a); and (4) Castaic Creek downstream of Castaic Lake (Sub-unit 6b in the lowermost 2.6 miles of Castaic Creek to the confluence with the Santa Clara River).

USFWS has engaged in ESA consultation and issued a BO pertaining to arroyo toad specific to the Project upstream of Elderberry Forebay, and a letter of concurrence to

FERC pertaining to arroyo toad downstream of Pyramid Lake. Pyramid Lake is likely an impediment to movement of arroyo toads between the populations upstream and downstream of the reservoir. However, the upper watershed reportedly contains a substantial arroyo toad population and extensive habitat (76 FR 7245). The Licensees operate and maintain the Piru Creek Gaging Station approximately 1.5 miles upstream of Pyramid Lake to meet the conditions of amended Article 52 in the existing license. The BE/BA for a USFS Special Use Permit to continue to access and maintain the gage concluded that these activities would have no effect on arroyo toad or other USFS sensitive species (Environmental Science Associates 2015a). The gage location itself does not contain suitable arroyo toad breeding habitat, although limited areas suitable for foraging or aestivation occur near the access trail and arroyo toad breeding occurs upstream of the gage location (Environmental Science Associates 2015a). With the exception of O&M associated with the stream gage, the Licensees perform no O&M activities on Piru Creek upstream of Pyramid Lake. The Licensees conclude that the Proposed Action will have no effect on arroyo toad or its designated critical habitat upstream of Pyramid Lake.

Other factors affecting arroyo toad in this part of Piru Creek include stream recreation, on-road and off-road vehicles, and attraction to pools that form at road crossings (Sandburg 2006), all impacts unrelated to the Project.

The arroyo toad population on Piru Creek downstream of Pyramid Lake was generally in decline under Project license flow schedule operations up until 2005, a decline largely attributed to summer, supplemental flow releases to maintain a downstream trout fishery (with unintended benefits for non-native American bullfrog), and winter flood flows that were less frequent than natural flows. Flow release schedules since 2005 are designed to simulate natural hydrology and allow for drier conditions in summer and passage of greater flows during the rainy season to scour encroaching vegetation and redistribute sediments, all to benefit arroyo toad and other sensitive species. Flow releases at Pyramid Dam follow the timing and magnitude of natural inflow within safe limits of approximately 18,000 cfs. The Licensees applied for and received an amendment to the FERC license governing the changes in operation, which was approved by FERC (2009). The amended Article 52 was designed to “benefit arroyo toads by increasing geomorphic processes, providing the scouring needed to reduce riparian and emergent vegetation, increasing stream terraces and sand bars, and providing the natural fluvial process to redistribute sediments” (FERC 2009).

The changes in operation have been evaluated by FERC (2008, 2009, 2012), USFWS (2007a, 2009d), and the SWRCB (2009), all concluding that the changes have been beneficial to the arroyo toad and other sensitive species. The USFWS consultation letter of concurrence to FERC dated August 22, 2007 (USFWS 2007a) stated:

Based, in part, on the 2006 report by Sandberg that indicates improved breeding success of arroyo toads, a significant reduction in exotic predators, and improvement in the habitat since the natural flow regime was implemented in 2005, we concur with your determination that the proposed project is not likely to

adversely affect the arroyo toad. Our concurrence is also based upon the assumption that by continuing to simulate the natural flow regime, this management action will assist in the improvement of habitat for both the arroyo toad and the California red-legged frog in Piru Creek. We also concur that your proposed flow regime will not adversely affect the primary constituent elements of California red-legged frog critical habitat for the same reasons.

USFWS' written comments to the SWRCB on February 17, 2009 (USFWS 2009d) stated that adoption of the alternative flow regime suggested by California Trout, Inc. and Friends of the River would likely result in take of arroyo toads because it would continue supplemental flows.

We are concerned that by maintaining summer flows at 15 cfs scouring would increase in middle Piru Creek, thereby changing the channel morphology resulting in less suitable habitat for native species, including arroyo toads and California red-legged frogs. Maintaining summer flows at 15 cfs would channelize segments of Piru Creek that would otherwise be shallow pools and open sand and gravel flooded terraces. The steady release of water would create entrenched channels with encroaching vegetation and would give opportunities for non-native predators (e.g., largemouth bass [*Micropterus salmoides*], green sunfish [*Lepomis cyanellus*], crayfish [*Procambarus clarkii*], and bullfrogs [*Rana catesbeiana*]) to proliferate by expanding habitat for those species within Piru Creek.

Approval of the license amendment included provisions for monitoring arroyo toad and other sensitive species in Piru Creek downstream of Pyramid Lake for at least three years. As described above, the Proposed Action does not include continued annual arroyo toad surveys because existing information from prior surveys is sufficient.

Since 2010, monitoring of arroyo toad by the Licensees in Piru Creek, downstream of Pyramid Lake, has shown considerable variation in arroyo toad breeding activity. Survey data indicates that breeding activity (i.e., the number of clutches) follows the WY, tending to be low during drought years, and higher following wet years. Generally poor breeding performance in drought years was observed when pools dried early (Environmental Science Associates 2010, 2011, 2012, 2013, 2014, 2015b, 2018). However, 145 to 165 clutches, the largest number recorded, were found in 2005 following a winter flood (Sandburg 2006). That winter flood scoured vegetation and formed suitable pools after summer supplemental flow releases were discontinued. No breeding was observed in 2013; however, limited breeding occurred and was documented in 2014 and 2015, despite continuing severe drought conditions. Above average precipitation during the winter of 2016-2017 again scoured encroaching vegetation, restoring pool habitat for breeding. The results of the surveys in 2017 included 45 egg masses in 26 locations in Piru Creek (Environmental Science Associates 2017). With below average precipitation in winter 2017-2018, breeding was reduced to six egg masses in only three locations (Environmental Science Associates

2018). Continuing the release schedule required by current Article 52 will have no effect on arroyo toad or its designated critical habitat in Pyramid reach.

Castaic Creek, upstream of Elderberry Forebay, supports a smaller, but still substantial arroyo toad population that is largely unaffected by the Project. Ongoing maintenance of the storm bypass channel above Elderberry Forebay requires that accumulated silt and debris be cleared from three sedimentation basins, and any needed repairs are made to the basin check dams approximately every five years. In order to perform this work, the Licensees operate under appropriate permits from federal and State resource agencies, including CWA Section 401 Water Quality certification and USACE individual Section 404 permit, and adhere to terms and conditions stipulated in a USFWS Final BO (1-8-96-F-55) dated March 7, 1997 (USFWS 1997). The 1997 BO identified two reasonable and prudent measures to minimize incidental take:

Worker education programs and well defined operational procedures shall be implemented, with the cooperation of the qualified biologist, to avoid or minimize the take of arroyo toads during project activities.

Take of arroyo toads, through injury or death, found within the proposed project areas shall be reduced through the capture and removal of these animals to suitable upstream habitat prior to the proposed actions.

Within the conditions of this BO and permits, surveys for arroyo toad are performed by qualified biologists in advance of the work and any arroyo toads found within planned work areas are moved to safe areas. Work is typically performed after October 1 and before March 1. LADWP has performed additional mitigation activities associated with the permit, including removing tamarisk and other invasive plants, and adhering to all BMPs. Based on accumulated information from the clearance surveys that suggested greater use of sedimentation basins in some years than anticipated by the original BO, the USACE on April 1, 2010 determined that the BO was no longer valid and that formal ESA Section 7 consultation would be reinitiated, and therefore requested LADWP to prepare a BA (USACE 2010). The BA summarized information from arroyo toad surveys and described appropriate procedures whereby Project effects would be temporary and potential adverse effects would be minimized. The BA concluded that the Project may affect, but is not likely to adversely affect, arroyo toad or its designated critical habitat (POWER 2012b). In 2013, the Licensees received an emergency USACE permit to perform the work pending issuance of a new BO.

Sediment removal from the sedimentation basins has been performed within the conditions of existing permits in September or October 1998, 2005, 2009, 2011, and 2013. Any arroyo toads found by surveys in the basins or other work areas were removed and carefully relocated upstream of the work. The numbers and life stages of arroyo toads found during these clearance surveys have varied each year, ranging from none in 2013 under drought conditions to as many as 300 late-stage larvae or completely metamorphosed arroyo toads in 2005 (POWER 2013). Most of these animals have been found in Basin 1. Adult arroyo toads were found only in the 1998

survey. In 2007, focused surveys were conducted in Castaic Creek with LADWP, USFS, and USFWS biologists, when three adult arroyo toads were found (Aspen Environmental Group 2007). The Licensees conclude that the Proposed Action may affect, but is not likely to adversely affect, arroyo toad or its designated critical habitat upstream of Elderberry Forebay.

The Licensees' Proposal will have no effect on arroyo toad or its designated critical habitat downstream of Castaic Lake. Flow releases to Castaic Creek under contracted water deliveries are not a part of the Project.

Arroyo toad is not known to occur on San Francisquito Creek and surveys within the proposed Barren Ridge Renewable Transmission Project (BRRTP) area at San Francisquito Creek did not detect the species at the Castaic Transmission Line crossing. The BO for the BRRTP, dated September 17, 2012 (USFWS 2012), concluded that arroyo toad was unlikely to be adversely affected by reconductoring the Castaic Transmission Line and subsequent O&M, which includes protective measures that avoid potential adverse effects of herbicides.

In summary, the Licensees conclude that the Proposed Action may affect, but is not likely to adversely affect, arroyo toad or its designated critical habitat within the Action Area, specifically downstream of Pyramid Lake and upstream of Elderberry Forebay, where designated critical habitat occurs in both areas.

California Red-legged Frog

There are known historical occurrences of CRLF from Piru Creek upstream and downstream of the Project location and designated critical habitat on Piru Creek downstream of Pyramid Lake (unit VEN-2), with the most recent known detection on Piru Creek (i.e., an unreported number of larvae in a deep pool) in 2005 (Sandburg 2006). The species has not been detected during annual sensitive species surveys performed since 2010 along a 5.5-mile section of Piru Creek and a 1.3-mile, contiguous section of its tributary, Agua Blanca Creek (Environmental Science Associates 2018), which encompasses the entire reach of Piru Creek within critical habitat unit VEN-2 (i.e., from the Los Angeles County/Ventura County line downstream to Lake Piru), and a portion of the same critical habitat unit along Agua Blanca Creek. This suggests that any surviving population may be small, and/or utilizing areas that have not been surveyed, including other tributaries and springs. A CRLF population has been documented on San Francisquito Creek, east of Castaic Lake, where another critical habitat unit (LOS-1) is designated. POWER (2012a) states that USGS surveys found CRLF at San Francisquito Creek as recently as 2010. There are no known records of CRLF from Castaic Creek.

Operations of the Project since 2005 have included winter flow releases at Pyramid Dam that follow the timing and magnitude of natural inflow within safe limits of approximately 18,000 cfs, and do not provide supplemental flow releases. Taken together, this flow schedule simulates a natural flow regime likely to benefit native

species adapted for these conditions. The USFWS consultation letter to FERC dated August 22, 2007, concurred with FERC's determination that the proposed license amendment may affect, but is not likely to adversely affect, CRLF and its designated critical habitat on Piru Creek (USFWS 2007a). USFWS also addressed written comments to FERC on February 17, 2009, regarding an alternative flow regime suggested by California Trout, Inc. and Friends of the River that would have continued supplemental flows in summer, concluding that supplemental flows were detrimental to maintaining habitat for CRLF and thus would result in take of CRLF (USFWS 2009d). In the same letter, USFWS stated that the simulated natural flow regime is "the best strategy for long-term conservation" of CRLF. CRLF is more aquatic than arroyo toad and utilizes areas of deeper water, which are also favored by introduced fish and American bullfrogs. However, unlike these introduced species, CRLF is adapted to survive dry periods by aestivating, and larvae may survive to metamorphosis before aquatic habitat dries seasonally. Therefore, allowing parts of Piru Creek to seasonally dry or be reduced to shallow pools should benefit CRLF by reducing or eliminating introduced fish and American bullfrogs. Fish and overwintering bullfrog larvae may also be periodically reduced or eliminated in parts of Piru Creek by scouring flows in winters with above average precipitation. Pyramid Lake, Elderberry Forebay, and Quail Lake are each much larger than 50 acres and therefore do not represent breeding or dispersal habitat (75 FR 12816). Continuing the Article 52 flow regime in the new license will have no effect on CRLF.

The Proposed Action will have no effect on CRLF or its designated critical habitat associated with San Francisquito Creek. The existing Castaic Transmission Line crosses San Francisquito Creek and terminates at Haskell Canyon, approximately 4 miles downstream of the known CRLF breeding site and outside of CRLF critical habitat. At the crossing, the stream is shallow and dries intermittently (USFWS 2012; Licensees' relicensing study in 2018). Protocol surveys for CRLF within the proposed BR RTP area at San Francisquito Creek did not detect the species at the Castaic Transmission Line crossing. The September 17, 2012 BO for the BR RTP (USFWS 2012) concluded that CRLF was unlikely to be adversely affected by reconductoring the Castaic Transmission Line and subsequent O&M, provided that: (1) surveys for CRLF would be performed prior to the start of construction, (2) work would be suspended and consultation engaged if CRLF were found, and (3) herbicides would be used only with appropriate protective measures.

The results of the Licensees' CRLF habitat assessment indicated that locations in the Gorman Bypass Channel, Gorman Creek, the Piru Creek arm of Pyramid Lake, and Piru Creek below Pyramid Lake may represent potential CRLF habitat in that these areas likely hold water for at least the 20-week period required by CRLF for successful breeding and larval rearing. Potential habitat in the Gorman Bypass Channel includes only the short section that is not confined to a concrete channel and holds water perennially, whereas the rest of the channel is concrete-lined and does not hold water, except when the channel is in operation (i.e., during Peace Valley Pipeline outages or when scheduled SWP water flows exceed pipeline capacity). Because releases to the Gorman Bypass Channel vary greatly year to year (e.g., no releases in 2000 to 2006)

and within each year, habitat suitability documented during the Licensees' 2018 relicensing study may not be typical. The presence of predatory fish, including largemouth bass, observed in the aforementioned section of the Gorman Bypass Channel and in perennial sections of Pyramid reach, and likely presence of fish in Piru Creek arm of Pyramid Lake, limit potential suitability of these areas. American bullfrog and crayfish also occur in Pyramid reach. CRLF may be more likely to occur in aquatic habitats that are seasonally dry, such as in the Pyramid reach of Piru Creek as discussed above. Gorman Creek, a seasonal stream which flows into Pyramid Lake, is not otherwise affected by Project O&M. However, Gorman Creek is situated adjacent to the Gorman Bypass Channel, as well as Interstate 5, which may represent dispersal barriers for amphibians. The Licensees conclude that the Proposed Action may affect, but is not likely to adversely affect, CRLF and its designated critical habitat associated with Piru Creek below Pyramid Lake.

California Condor

California condors are known to fly high over the Project area, reflecting the proximity of the Sespe California Condor Sanctuary and Sespe-Piru designated critical habitat, and the wide-ranging nature of this species associated with the search for carrion. There are no known effects of the Project on California condor. The September 17, 2012 BO for the BRRTP (USFWS 2012) concluded that California condor was unlikely to be adversely affected by reconductoring the Castaic Transmission Line and subsequent O&M, which include proper application of herbicides. No California condor nests or roosts are known to occur within the proposed Project boundary, including no observations of nests or roosts during the Licensees' relicensing *Special-Status Raptor Study*. However, locations of natural foraging are unpredictable and could occur in open areas near the Project. The primary threats to California condors feeding on carrion include ingestion of lead ammunition, the use of which is illegal in California in areas occupied by California condor, and ingestion of microtrash. These threats are unrelated to the Proposed Action. Concessionaires are required to keep the Pyramid Lake Recreation Area clean of trash. The Licensees conclude that the Proposed Action will have no effect on California condor or its designated critical habitat.

Coastal California Gnatcatcher

Coastal California gnatcatcher has not been documented to occur in the Action Area, and there are no known Project effects to this species. Vegetation mapping along parts of the Piru Creek arm of Pyramid Lake and Castaic Creek inside and outside of the proposed Project boundary, areas where Licensees perform no vegetation management activities, indicated the presence of patches of coastal sage scrub and chaparral that might be suitable habitat; however, coastal California gnatcatcher was not detected during the Licensees' relicensing studies or by prior avian surveys (Aspen Environmental Group 2005; POWER 2010). The species also was not detected by avian habitat assessment surveys in 2008 along the existing Castaic Transmission Line on the ANF, where suitable habitat occurs, to evaluate the proposed BRRTP (POWER 2012a). If present within the proposed Project boundary, coastal California gnatcatcher

could be affected by Project vegetation control or disturbance near breeding territories. Work performed between September and February (i.e., outside of the breeding season) would generally avoid impacts. The September 17, 2012 BO for the BR RTP concluded that coastal California gnatcatcher was unlikely to be adversely affected by the BR RTP, which included a section of existing transmission line within designated critical habitat (USFWS 2012), but that it is not within the Action Area. Routine maintenance of the existing Castaic Transmission Line includes inspections on the ground and by air patrols several times per year, tree trimming to maintain the required 10-foot minimum clearance from conductors to vegetation, clearing flammable brush vegetation within a 10-foot radius at the base of transmission line towers, and clearance immediately adjacent to access roads, as needed (POWER 2012a). Emergency operations include briefing crews and adherence to sensitive species procedures.

The Licensees conclude that the Proposed Action will have no effect on coastal California gnatcatcher or its designated critical habitat.

Southwestern Willow Flycatcher, Least Bell's Vireo, and Yellow-billed Cuckoo

The three species of ESA-listed, riparian associated birds are discussed together because of substantial similarities in habitat use, particularly regarding southwestern willow flycatcher and least Bell's vireo. Designated critical habitat for southwestern willow flycatcher occurs along Piru Creek downstream of Pyramid Lake, which is likely affected by Project flow releases. USFWS (2007a, 2009d) did not address southwestern willow flycatcher or least Bell's vireo when it made its determination regarding effects of Project operation changes instituted as part of the amendment to license Articles 51 and 52. However, FERC (2008) concluded that operations were likely to diminish dense riparian vegetation along Piru Creek comparable to natural conditions (i.e., occasional vegetation scouring by passage of greater flows during the rainy season and withdrawal of summer supplemental flow releases).

None of these three riparian bird species were detected during avian habitat assessment surveys along the existing Castaic Transmission Line on the ANF in 2008 to evaluate the proposed BR RTP (POWER 2012a). The September 17, 2012 BO for the BR RTP concluded that least Bell's vireo and southwestern willow flycatcher were not likely to be adversely affected (USFWS 2012). Routine maintenance of the existing Castaic Transmission Line includes inspections on the ground and by air patrols several times per year, tree trimming, and necessary vegetation clearing as described above. Emergency operations include briefing crews on sensitive species procedures and protective measures for herbicide use. The transmission line is suspended high over drainages and thereby does not require Project O&M activities within the associated riparian areas.

The Licensees' relicensing study documented potential habitat for all three riparian-associated ESA-listed bird species within the proposed Project boundary. Non-breeding willow flycatchers, probably representing northern subspecies of willow flycatchers in migration, were detected at multiple locations during the migratory period in riparian

habitats within the Action Area. The same study detected least Bell's vireo twice, most likely the same bird, at Elderberry Forebay during the migration period of this species. Yellow-billed cuckoo was not detected during the study at any site. The survey results cannot predict whether or not these species might nest in the Action Area in the future at any time during a new license period, particularly if any of these species increase in abundance or distribution, or if habitat conditions change over time. However, because most of the potential habitat for these species within the proposed Project boundary consists of relatively small, isolated patches, particularly at Quail Lake and Elderberry Forebay, occurrences may continue to be limited to non-breeding willow flycatchers and least Bell's vireos. The larger patches of riparian habitat along Gorman Creek, the Piru Creek arm upstream of Pyramid Lake, and Liebre Gulch are in areas where the Licensees perform no vegetation maintenance or other activities that could disturb migrating or nesting birds.

With regard to species, the Licensees conclude that the Proposed Action may affect, but is not likely to adversely affect, southwestern willow flycatcher or least Bell's vireo, and will have no effect on the western DPS yellow-billed cuckoo. In addition, the Licensees conclude that the Proposed Action may affect, but is not likely to adversely affect, designated critical habitat for southwestern willow flycatcher, and will have no effect on designated critical habitat for least Bell's vireo or the western DPS yellow-billed cuckoo.

ESA-listed Plants

No ESA-listed or candidate plant species have ever been documented to occur in the Action Area, and there are no known Project effects to ESA-listed or candidate plants. There are no historical records of these species within the Action Area, and no ESA-listed or candidate plants were observed during surveys performed by the Licensees. Critical habitat has been designated for Nevin's barberry and spreading navarretia outside of the Action Area. No critical habitat has been designated for slender-horned spineflower, marsh sandwort, Gambel's watercress, or California orcutt grass. The Licensees conclude that the Proposed Action, including the proposed IVMP, will have no effect on slender-horned spineflower, marsh sandwort, Nevin's barberry, Gambel's watercress, spreading navarretia, and California orcutt grass or designated critical habitat for Nevin's barberry and spreading navarretia.

Cumulative Effects

The geographic extent of cumulative effects includes the area within the proposed Project boundary. But, as defined by FERC in SD2 pertaining to aquatic and semi-aquatic ESA-listed species, the geographic extent of cumulative effects also encompasses the Piru Creek Basin from Pyramid Lake to the confluence of Piru Creek with the Santa Clara River, and from Pyramid Lake to the Elderberry Forebay within the Castaic Creek drainage. Past and present cumulative actions are primarily associated with the construction and operation of the SWP, including Pyramid Lake and Castaic Lake, as a water delivery project. This large project representing 700 miles of canals

and aqueducts, 34 storage facilities, and 21 dams is outside of the discretion of FERC, with the exception of hydropower generating facilities associated with the SWP. Contracted water deliveries associated with the SWP include those to Santa Clarita Valley Water Agency, MWD, and UWCD on behalf of VCWPD. In addition, the operation of Pyramid Lake is influenced by the SWP, due to its connectivity with transferred water from the Sacramento-San Joaquin Delta through aqueducts.

Introduced species from the Sacramento-San Joaquin Delta, such as the shimofuri goby (*Tridentiger bifasciatus*) and inland silverside (*Menidia beryllina*), if established, represent long-term changes in fish communities. Introduced fish may alter predator-prey relationships or increase competition for native species of fish and other aquatic organisms. In addition, die-offs of inland silversides can degrade water quality. Passage of introduced fish downstream of Pyramid Dam could affect aquatic resources in Pyramid reach, including the arroyo toad and CRLF.

The introduction of the non-native American bullfrog to California beginning early in the twentieth century as a food source has affected a wide variety of native species, including aquatic amphibians. Historically, commercial bullfrog farms and unintended releases of tadpoles from fish hatcheries during fish stocking have contributed to the rapid spread of the American bullfrog. Sandburg (2005) noted that a commercial bullfrog farm existed on the Santa Clara River in 1950 before bullfrogs occurred in Piru Creek.

Construction of the Santa Felicia Dam on Piru Creek downstream of Pyramid Dam and the Vern Freeman Diversion Dam on the Santa Clara River effectively blocked upstream passage of anadromous fish to the extent they may have been historically present. As discussed above, the Project releases have no adverse effect on water quality in Pyramid reach; the releases are generally cooler, do not adversely affect dissolved oxygen, and mimic the timing and magnitude of the natural hydrograph. In addition, the release of SWP water deliveries to UWCD in the winter would have no effect on aquatic resources downstream of Santa Felicia Dam because the water is stored by UWCD.

Recreation, including OHV use, and road use and maintenance on the LPNF, including recreation on Pyramid reach, represent long-term past and present cumulative actions. These activities can disturb wildlife, including ESA-listed species, in areas near recreation facilities, trails, and roads; affect water quality; and can directly affect arroyo toad where instream recreation occurs and at road crossings. As described above, FERC does not have the authority to regulate these facilities and activities. Introductions of non-native fish, including deliberate releases of game fish and escape of bait fish are also cumulative effects which are particularly deleterious to arroyo toad, CRLF, and some native fish, such as unarmored threespine stickleback, a fish historically present in the Piru Creek drainage.

The proposed Centennial development also may have cumulative effects on ESA-listed species. The Centennial development is a 12,323-acre, master-planned community on the Tejon Ranch, located in the northwestern portion of the Antelope Valley and

immediately north and east of Quail Lake and the proposed Project boundary. This development may reduce habitat for California condor and other wide-ranging species that may also utilize habitats within the proposed Project boundary. In addition, the development is expected to accommodate a population of more than 57,000 persons by completion and may increase demand for regional recreation to some extent, including use of the Project recreation facilities during the term of the new license. This increase in demand for recreation is not attributed to the Project or the Licensees' Proposal, but rather, the cumulative effects of population growth during continued operation of the recreation facilities under the new license.

Overall, the Licensees' Proposal will not significantly add to these described cumulative effects on ESA-listed species.

5.5 RECREATION RESOURCES

This recreation resources section is divided into four subsections. Section 5.5.1 describes the existing Project environment and provides relevant information about recreation opportunities in the Project region, Project recreation facilities, and Project recreation demand and use in the Project region. Section 5.5.2 addresses the effects of the Licensees' Proposal. Section 5.5.3 addresses cumulative effects on recreation resources, and Section 5.5.4 describes unavoidable adverse effects of the Licensees' Proposal.

The Licensees augmented existing, relevant, and reasonably available information relative to recreation resources by conducting two studies: Study 4.1.11, Recreation Facilities Demand Analysis and Condition Assessment, and Study 4.1.19, Whitewater Boating. The studies are complete, and the results are included in the USR and this section. Refer to Appendix B of this Exhibit E or to the South SWP Hydropower relicensing website (<http://south-swp-hydropower-relicensing.com/>) for the detailed study approaches, study summaries, and detailed study data.

5.5.1 Existing Environment

The Project, which offers extensive recreation opportunities primarily related to flat-water uses and overnight camping, is one of many recreation destinations in the region that experiences high annual recreation use. Pyramid Lake is an important regional recreation resource. The area surrounding Pyramid Lake includes NFS lands within the boundaries of the ANF and LPNF, and State lands that are managed by the Licensees for Project operations. Additional State lands in the area are used for recreation as part of the non-Project Hungry Valley SVRA (Figure 5.5-1). The Project is located within the northeast section of Los Angeles County and is situated adjacent to Interstate 5, a major north-south transportation corridor (see Figure 5.5-1).

There are a total of 111 developed recreation sites on the LPNF, with 67 sites in family campgrounds. Of the 1.5 million visitors a year, approximately 17 percent were engaged in camping (USFS 2005b). The ANF, LPNF, San Bernardino National Forest, and Cleveland National Forest combined currently offer 376 major developed recreation sites, including 158 family campgrounds, 38 group campgrounds, 4 equestrian campgrounds, 3 boating sites, 73 picnic areas, and 74 trailheads.

In the Project vicinity, the major recreation uses center on water-oriented activities at Pyramid Lake, and OHV use in and around Hungry Valley SVRA. Additionally, hunting, dispersed camping, hiking, sightseeing, picnicking, birding, and wildflower viewing occur in the area. Other than use at Pyramid Lake day use facilities, the use levels on the adjoining NFS lands and at Hungry Valley SVRA can be characterized as generally low most of the year, with some moderate use levels on weekends and holidays during spring and summer.

The Los Alamos Campground and Los Alamos Group Campground, as well as 11 other Project-developed recreation areas around Pyramid Lake, are all located on NFS lands managed by the ANF. The national forest boundary separating the ANF and LPNF runs through the middle of Pyramid Lake, but the ANF manages this part of the LPNF (ANF 2008). Policies and programs associated with the ANF and LPNF apply only to NFS lands within the Project area.

5.5.1.1 Recreation Opportunities in the Project Region

There are several nationally-significant, recreation-designated areas in the region. The Sespe Wilderness is located about 1 to 2 miles west of Pyramid Lake. The 219,468-acre wilderness offers a variety of unique back-country opportunities for recreationists. Downstream of Pyramid Dam, approximately 7.3 miles of Pyramid reach were included in the National Wild and Scenic River System by the U.S. Congress in 2009 (Figure 5.5-1). Of this, approximately 4.3 miles are designated as a “wild river” and 3 miles (nearest to Pyramid Dam) are designated as a “recreational river” (16 U.S.C. 1274a). Along this 7.3-mile stretch of the river, geological values were determined to be outstandingly remarkable, including scenic tilted layers of sedimentary rocks, and faults and rock formations with features crucial to the understanding of geological formations on the west coast of North America (USFS 2005c). Currently, there is no draft or final river management plan for this designated Wild and Scenic River.

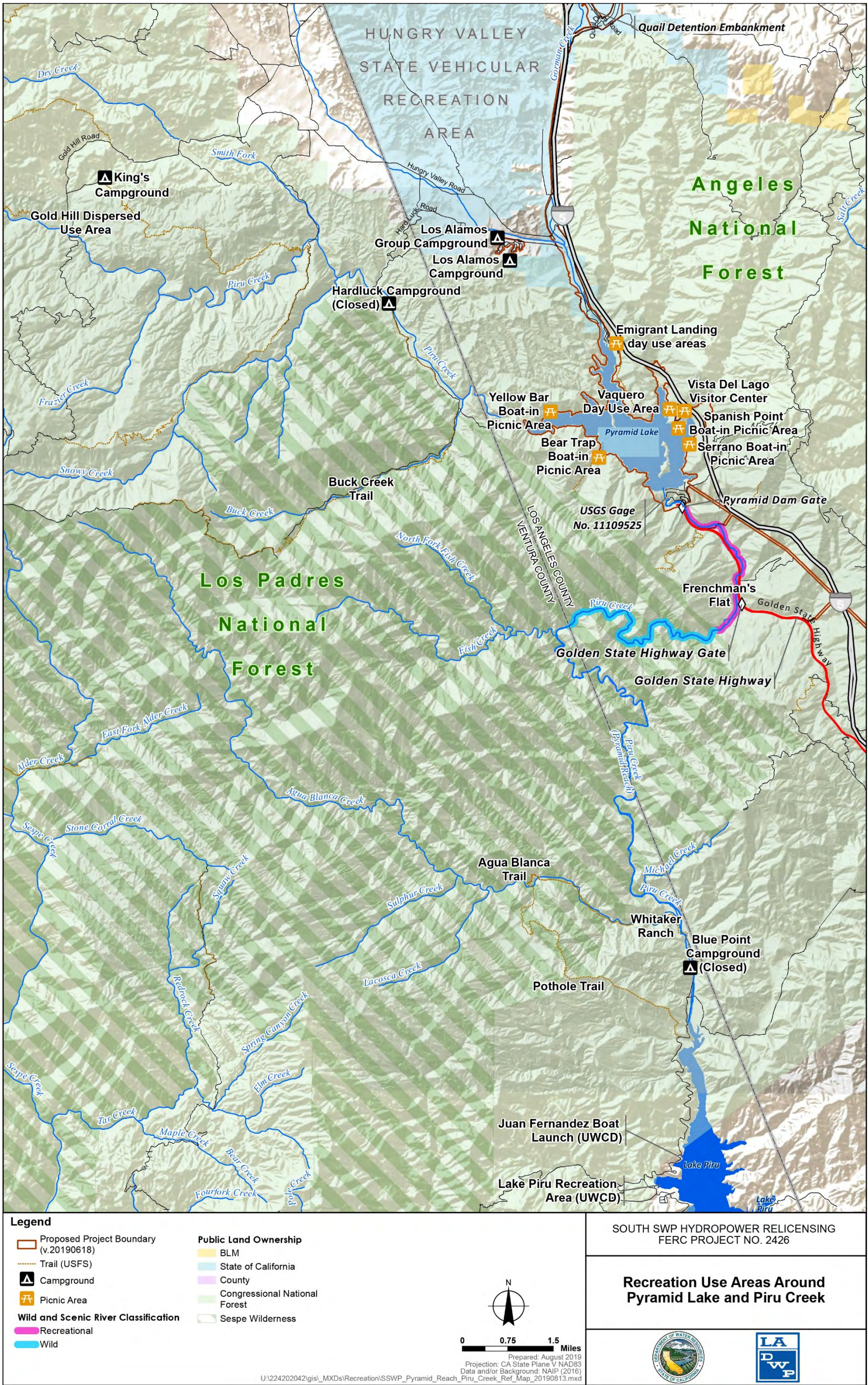


Figure 5.5-1. Recreation Use Areas Around Pyramid Lake and Piru Creek

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Angeles and Los Padres National Forests

Recreation is currently the predominant use of the national forests in southern California. For year-round use, these urban national forests rank among the top in the nation. Almost all visitations to southern California national forests are local in origin. These forests represent very popular local day use attractions, often for large, diverse urban groups of extended family and friends engaging in relaxing activities. (USFS 2005c).

While some level of recreation activity occurs almost everywhere on the southern California national forests, the majority is concentrated in a relatively small number of popular areas. These areas are often associated with developed facilities and are easily accessible by road. (Stephenson and Calcarone 1999; USFS 2005a).

Visitors to the ANF and LPNF generally choose specific settings for their activities to enjoy desired experiences. These settings vary by place and are further refined by the recreation opportunity spectrum (ROS), a classification system that describes different settings across the national forests using five classes that range from highly modified and developed settings to primitive, undeveloped settings (USFS 2005c). These designations, which only apply to NFS lands, consist of:

- **Primitive:** Characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free of evidence of human-induced restrictions and controls. Motorized use within the area is not permitted. There are no developed facilities.
- **Semi-primitive Non-motorized:** Characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction among users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but would be subtle. Motorized recreation is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreation experience opportunities. A minimum of developed facilities (if any) are provided.
- **Semi-primitive Motorized:** Characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but would be subtle. Motorized use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motorbikes is permitted. Developed facilities are present but are more rustic in nature.
- **Roaded, Natural:** Characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of people. Such

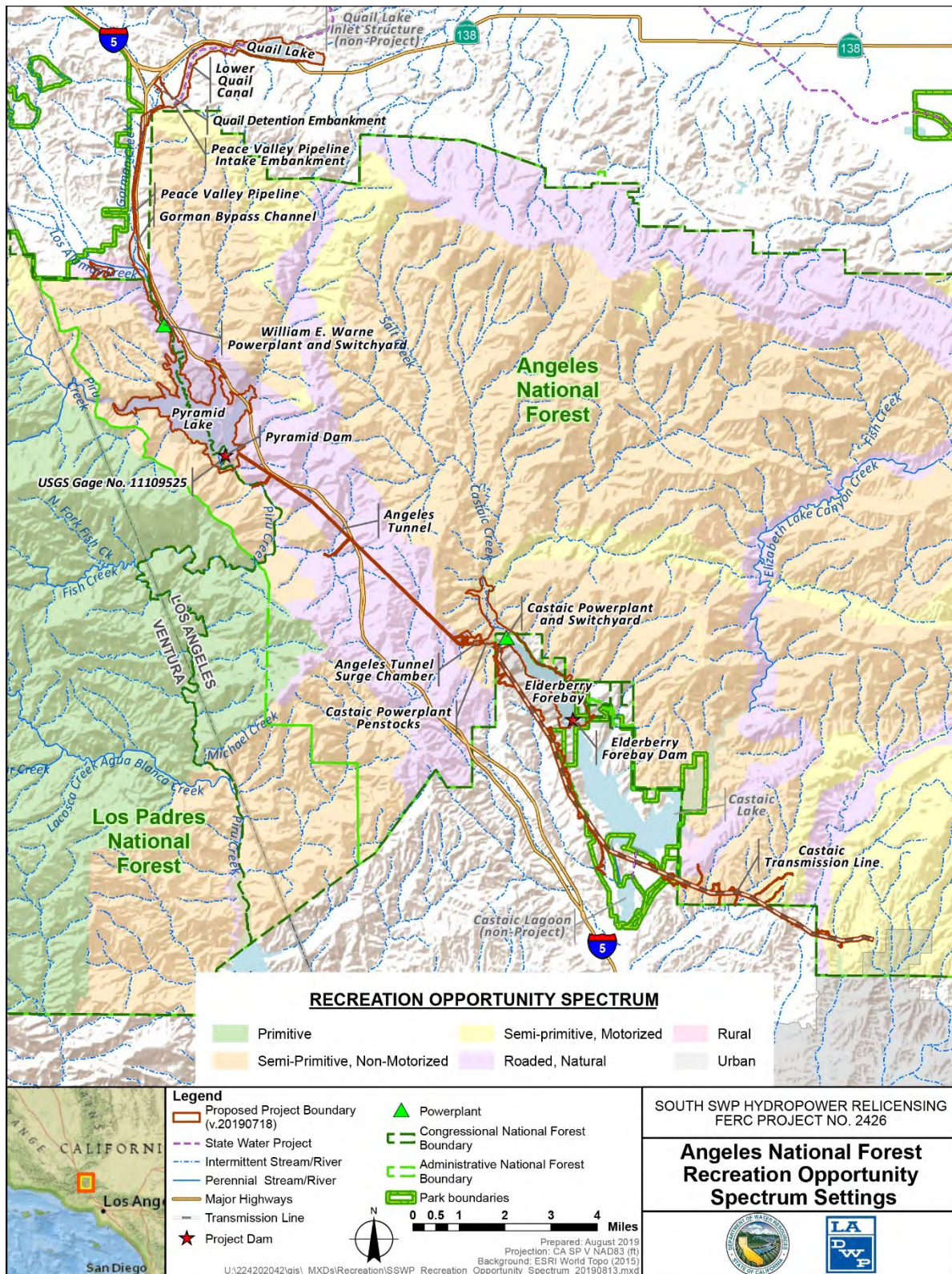
evidence usually harmonizes with the natural environment. Interaction among users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities, which are present and well defined.

- Rural: Characterized by a substantially developed environment and a background with natural-appearing elements. Moderate to high social encounters and interaction between users is typical. Renewable resource modification and utilization practices are used to enhance specific recreation activities. Sights and sounds of humans are predominant on the site and roads and motorized use is extensive. Facilities are more highly developed for user comfort with ample parking” (USFS 2005c).

The ROS can also be used to plan how NFS lands should be managed for recreation in the future (USFS 1986 in USFS 2005c). As shown in Figure 5.5-2, the ROS settings for NFS lands in and around Pyramid Lake, Los Alamos Campground, and Pyramid Dam are “Semi-primitive Non-motorized” and “Roaded, Natural.”

Hungry Valley State Vehicular Recreation Area

Hungry Valley SVRA is located just west of the Project’s Peace Valley Pipeline (outside of the proposed Project boundary; see Figure 5.5-2). Hungry Valley SVRA is the third largest unit of the California State Park’s Off-Highway Motor Vehicle Recreation Division. Located in the Tejon Pass north of Los Angeles and along the Interstate 5 corridor, Hungry Valley SVRA offers 19,000 acres and more than 130 miles of scenic trails for motorcycle, all-terrain vehicles, and 4x4 recreation vehicles. Hungry Valley SVRA offers a wide variety of terrain and trails for all levels of OHV operator skills. Additionally, Hungry Valley SVRA has 200 campsites spread across 11 developed campgrounds that receive low to moderate use throughout the year (pers. comm., Hon 2016).



Source: USFS 2005b

Figure 5.5-2. Angeles National Forest Recreation Opportunity Spectrum Settings in the Project Vicinity

Los Angeles County

The Project is located entirely within Los Angeles County, which is part of the Los Angeles Planning Region. This planning region also includes Ventura County. Recreation planning considerations of the county, including those in the subarea plans, are important in terms of understanding the potential needs and recreation demand for Project recreation resources. However, county policies do not directly pertain to the Licensees' or national forest management, as the Project is on State and federal lands, and the county land planning policies are directed at private and county/municipal lands.

As described in the 1980 Los Angeles County General Plan, Conservation and Open Space Element (Los Angeles County Department of Regional Planning 1980), national forests and Santa Catalina Island represent the largest recreational resources in the county. A system of regional parks has been developed through county and city efforts. A local park system complements the regional park system, and is designed to meet neighborhood and community outdoor recreation needs.

According to the 2015 Los Angeles County General Plan, the county's park system, including facilities that are owned, operated, and maintained by the county, totals approximately 70,000 acres. As noted in the 2015 General Plan, the county's goals include 4 acres of local parkland per 1,000 residents in the unincorporated areas, and 6 acres of regional parkland per 1,000 residents in incorporated areas. A gap analysis discussed in the General Plan shows that the unincorporated areas face a significant deficit in local parkland; however, the 2015 General Plan provides a framework to remedy the shortage. (Los Angeles County Department of Regional Planning 2015).

This is similar to the situation in 1980 when it was found the number of acres of protected land per resident in the Los Angeles Planning Region is the second lowest among regions. Accessibility to protected land (measured by the percentage of residents living within 0.25 miles of such land) is slightly lower than the statewide average. The number of miles of highway in the National Scenic Byways Program per 100 square miles is slightly higher than the statewide average. The region has numerous trails in the California Recreational Trails System.

Serving residents' needs and improving access to recreation were ranked as the "highest priority" in the Los Angeles Planning Region. Specifically, funding outdoor recreation opportunities that meet the activity preferences of Hispanic participants is encouraged in the Plan policies.

Encouraged in the 2015 General Plan is a call for funding incorporated area recreation facilities, such as ball fields, basketball courts, campgrounds, community centers, playgrounds, skate parks, and tennis/racquet courts.

The Los Angeles County Park System currently has 87 regional parks and recreational facilities, totaling 63,000 acres. These facilities are owned, operated, and maintained by the county. (Los Angeles County 2019).

Antelope Valley

The Antelope Valley Area Plan (Los Angeles County Department of Regional Planning 2015) is a component of the Los Angeles County General Plan. The Project's Quail Lake, Lower Quail Canal, Peace Valley Pipeline, and most of Pyramid Lake are within the planning boundaries of the Antelope Valley Planning Area. Currently, there is a total of 3,870 acres of regional parkland (not including Quail Lake or Pyramid Lake) in the Antelope Valley Area Plan and adjacent cities. For every 1,000 residents, there are approximately 10 acres of regional parkland. Based on Los Angeles County's goal of 6 acres of regional parkland per 1,000 people, there is a 1,573-acre surplus of regional parkland under existing conditions within the Antelope Valley Planning Area (Los Angeles County Department of Regional Planning 2015). The considerable amount of regional parkland (see Figure 5.5-3), State parks, trails, and private recreational facilities available to the residents of the Antelope Valley Area Plan substantially reduces the demand for local park facilities (Los Angeles County Department of Regional Planning 2015).

Santa Clarita Valley

Outside of NFS lands, parts of the southern portion of the Project are on lands geographically included in the Santa Clarita Valley Area Plan (Los Angeles County Department of Regional Planning 2012). The Santa Clarita Valley Area Plan is a component of the Los Angeles County General Plan, and is intended to provide county-focused goals, policies, and maps to guide the regulation of development within the unincorporated portions of the Santa Clarita Valley.

Los Angeles County owns and operates 13 parks in the Santa Clarita Valley Planning Area, totaling 578 acres and serving various communities throughout the valley (see Figure 5.5-4). County parks are classified as follows:

- Neighborhood parks, generally from 5 to 10 acres in area, provide active recreational areas intended to serve a population of up to 5,000 within a 0.5-mile radius. There are seven county-owned neighborhood parks in the planning area (Chesebrough, Del Valle, Hasley Canyon, Jake Kuredjian, Pico Canyon, Plum Canyon/David March, and Northbridge).
- Community parks are generally 10 to 40 acres, provide both passive and active recreation facilities, and are intended to serve a population of up to 20,000 within a 2-mile radius. There is one county-owned community park in the planning area (Richard Rioux Park).
- Regional parks are generally more than 50 acres, and offer a wide range of specialized recreational activities to serve the population within a one hour drive. There are two county regional parks in the planning area: Val Verde Park and William S. Hart Park.

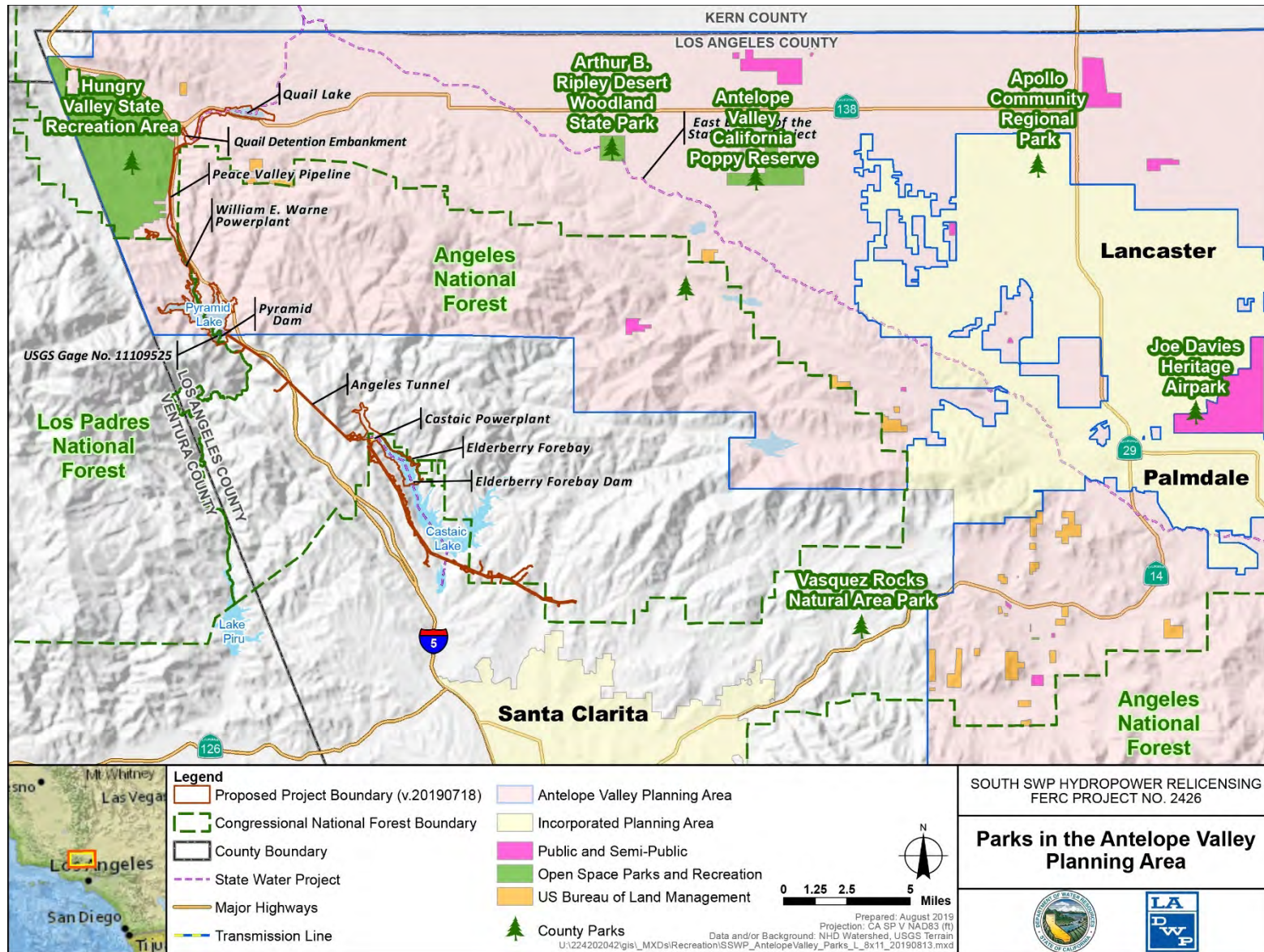


Figure 5.5-3. County Parks in the Antelope Valley Area Planning Area

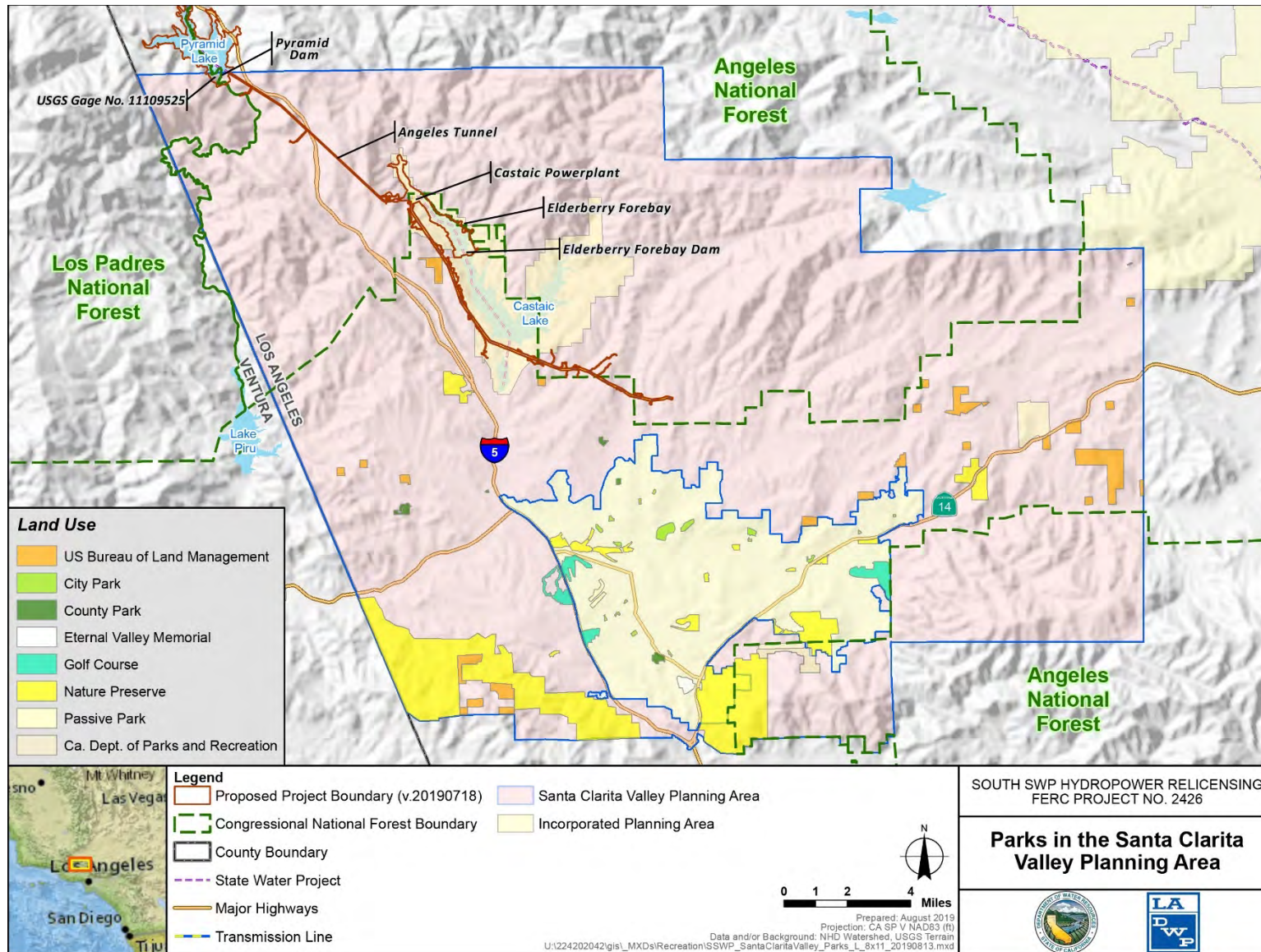


Figure 5.5-4. Parks in the Santa Clarita Valley Planning Area

City of Santa Clarita

The City of Santa Clarita Recreation, and Community Services Department operates 20 city parks totaling 246 acres. The parks, which provide a wide range of recreational facilities, range in area from about 0.5 to 80 acres. City standards for neighborhood and community parks are similar to the categories used by the county, described above. Based on these categories, there are 12 neighborhood parks within the city and five community parks. Special use and passive parks are also included in the City Master Plan, and are generally used for open space greenbelts and vista points. There are dozens of passive and special use parks in the city. The city's Central Park is a multi-use park intended to serve the entire Santa Clarita Valley, and is classified as a regional park.

Regional Uniqueness and Significance of Project Recreation Opportunities

Many visitors to Pyramid Lake and Los Alamos Campground participate in reservoir-related activities, including motorized and non-motorized boating, waterskiing/wake boarding, camping, swimming, fishing, and picnicking. As part of Study 4.1.11, the Licensees conducted an inventory and assessment of water-based recreation opportunities in the Project region to help understand the context and uniqueness of Pyramid Lake recreation opportunities (see Section 5.5.1.3, Recreation Provider Interviews, for additional information on recreation opportunities and management of use at other lakes in the Project region).

The focus of the assessment was to identify and evaluate large water-based recreation areas in the region that offer recreation opportunities similar to Pyramid Lake. Lakes and reservoirs with some similarity to the scale and type of recreation opportunities at Pyramid Lake include the following:

- Lake Piru
- Castaic Lake and Castaic Lagoon
- Lake Evans and Lake Webb, as part of the Buena Vista Aquatic Recreation Area (BVARA)
- Lake Casitas
- Lake Cachuma

Table 5.5-1 compares Pyramid Lake to the above listed regional water-based recreation areas.

Table 5.5-1. Pyramid Lake and Other Regional Lakes Recreation Offering Characteristics

Reservoir	Surface Water Acres (full pool)	Developed Individual Campsites	Developed Boat Launches	Developed Picnic Areas	Recreation Similar to Pyramid Lake	Estimated Annual Visits
Pyramid Lake	1,300	93	2	8	Not applicable	100,000 to 150,000
Castaic Lake and Castaic Lagoon	2,230	60	3	3	Yes	160,000 to Castaic Lagoon
Lake Piru	1,200	238	3	3	Yes	45,000 to 55,000 in last 10 years
Lakes Evans and Webb	959	112	2	7	Yes	200,000
Lake Casitas	2,240	446	2	8	Yes - but no human water contact allowed	500,000 to 700,000
Lake Cachuma	3,250	500	1	3	Yes - but no human water contact allowed	400,000 to 500,000

Source: DWR 2018

Pyramid Lake falls in the middle of the six lakes in terms of water surface area available for recreation. Pyramid Lake's close proximity to Interstate 5 allows easy access for millions of potential users in Los Angeles and Kern Counties. In addition, unique to Pyramid Lake are consistently high lake levels, and that all personal watercraft (PWC) and motorized boats are allowed to access most parts of the lake. Similar to other national forest recreation areas, Pyramid Lake recreation use policies do not prohibit visitors from bringing alcoholic beverages into the Pyramid Lake recreation areas – something that most State and county park areas prohibit. This factor has been noted by the Los Angeles County Sheriff's office as making Pyramid Lake more unique in attracting visitors who might prefer to have alcohol during their outdoor recreation experiences.

In contrast to Pyramid Lake, Lake Piru offers more camping opportunities as a destination recreation area, and its setting provides the opportunity for a relatively quiet and remote experience. Castaic Lake attracts a high number of day users, like Pyramid Lake, and also hosts more sporting and group events than the other lakes, except perhaps Lake Evans and Lake Webb. Larger than Pyramid Lake, Castaic Lake accommodates more boats and PWC with daily capacity limits of 500 and 150, respectively. However, on Castaic Lake, PWC are confined to a small area on the west

side of the reservoir. Lake Evans and Lake Webb are part of the BVARA, and have similar recreation opportunities and offerings as Pyramid Lake, but do not have the quagga mussel restrictions on watercraft. Lake Evans and Lake Webb also are the only other reservoirs evaluated, besides Pyramid Lake, that do not experience significant seasonal drawdowns or prolonged drawdowns during drought conditions.

Casitas and Cachuma Lakes offer hookups for recreational vehicles (RV) at numerous campsites, attracting more overnight users. Pyramid Lake's Los Alamos Campground is the only campground that does not offer shower facilities. Neither Casitas nor Cachuma Lakes allow bodily water contact; only sailing, fishing, and general boating are allowed, and no PWC are permitted. Lake Casitas has a unique water adventure park inside the main recreation area. The water park includes water slides and moving water features as a separate off-lake attraction.

Whitewater Boating

Whitewater boating use of Pyramid reach is a known past use of the approximately 18.1-mile-long reach from Pyramid Dam to Lake Piru in Ventura County. This reach can be characterized as having extremely low whitewater boating use that is generally limited to those years with higher than average precipitation and resulting higher river flows to support boating. Study 4.1.19 found that the reach can be further characterized as a limited whitewater resource for kayakers due to the limited and infrequent higher flow regime that is needed to support boating, the constricted nature of the channel, and the lack of access out of the reach once a trip begins at Frenchmans Flat (non-Project facility). Once users enter the Pyramid reach canyon from Frenchmans Flat, there is no practical way out other than proceeding approximately 15 RM through the river canyon to the closed Blue Point Campground and Lake Piru Canyon Road (Figure 5.5-1). Blue Point Campground was closed by the USFS in 2000 to help protect the endangered arroyo toad. Whitewater boating opportunities in lower Piru Creek, below Lake Piru, are also very limited, and in the past have been primarily associated with conservation releases when water is released from Santa Felicia Dam by UWCD, and advance notifications are given to whitewater boaters (FERC Order Modifying and Approving Whitewater Boating Access Plan, P-2153, February 21, 2012).

The Licensees' Study 4.1.19 comprised the following elements:

- Literature search and internet review to document information about the whitewater boating resources, and insights into existing and past recreation activities and opportunities in Pyramid reach
- Hydrology assessment to identify recent years of flow data to understand the timing and frequency of flows necessary to support potential whitewater boating
- Interviews with whitewater boaters who have run the reach in the past

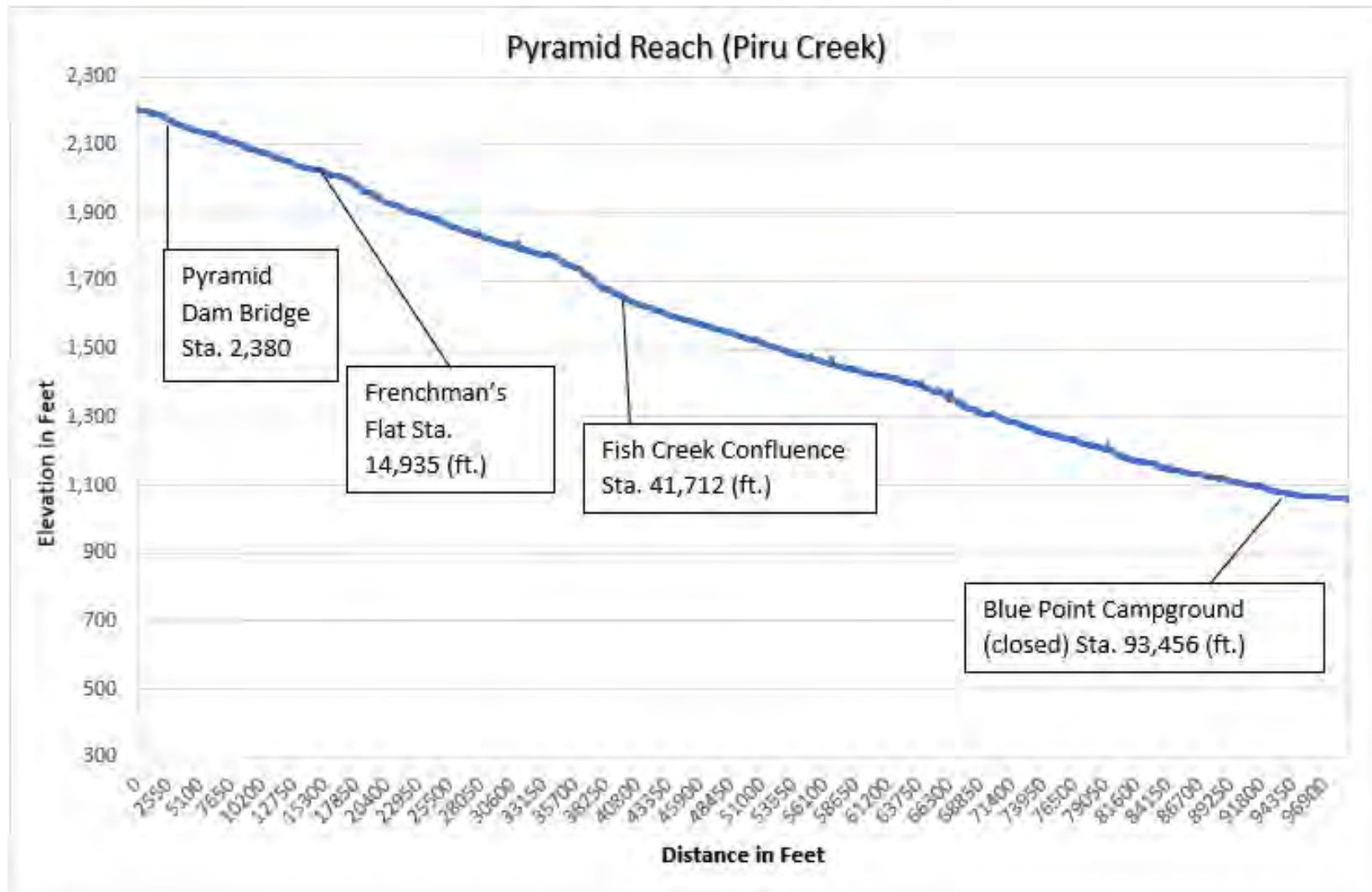
- A field reconnaissance and a separate controlled-flow test to observe flows, flow channel conditions, and access considerations in Pyramid reach

Pyramid reach downstream of the Project provides whitewater boating opportunities during periods of higher flows (generally flows higher than about 200 cfs), as found through interviews and in the limited literature and internet resources evaluated. Whitewater boating opportunities using natural flows are not influenced by Project operations, since the Project operates to pass all natural inflow as outflow (see Section 5.2.1.1); rather, whitewater boating opportunities are influenced by regional hydrology and the frequency of storm events. According to AW, Pyramid reach flows around 200 cfs are considered “barely runnable,” as they do not achieve the minimum flows necessary to support boating activities. However, in interviews with experienced boaters, most thought flows around 200 cfs at Frenchmans Flat (non-Project facility) were a good flow level for boating, particularly during storm periods when tributaries downstream contribute additional flows. The study did not identify any potential upper limit on flows for boating Pyramid reach or lower Piru Creek.

As part of Study 4.1.19, the Licensees mapped Pyramid reach to help characterize the known distances and overall gradient of the reach. Figure 5.5-5 provides a transect of the 18.1-mile reach from Pyramid Dam to the NMWSE of Lake Piru, and shows the creek drops in elevation about 1,145 feet, from elevation 2,200 feet to about elevation 1,055 feet. This represents a gradient of roughly 58 feet per mile.

The first 3 miles of Pyramid reach downstream of Pyramid Dam run alongside the old Golden State Highway, which is a county road closed to public vehicular traffic north of Frenchmans Flat (non-Project facility about 2.7 miles downstream of Pyramid Dam). This section of the reach, with the adjacent paved, closed highway running closely to its shoreline, offers boating access and the potential for multiple whitewater boating runs in one day. There are multiple good put-in and take-out sites in the upper 3-mile reach. The 15-mile reach below Frenchmans Flat is isolated and not accessible, other than from entering the river channel at Frenchmans Flat and proceeding downstream with occasional portages along informal angler trails on the shoreline. The first 7.3 miles of Pyramid reach downstream of Pyramid Dam has been designated by the U.S. Congress as a Wild and Scenic River. The first 3 miles from just below the dam to just after Frenchmans Flat have been given a “recreation river” designation. Downstream of that segment, after entering the Sespe Wilderness, the reach is designated a “wild river” leading to the Ventura County line (16 U.S.C. 1274[a]).

Pyramid reach remains in a deep incised canyon in the Sespe Wilderness to the confluence of Michael Creek, about 16 miles downstream of Pyramid Dam. The closed Blue Point Campground is about 18 miles downstream from Pyramid Dam and where Piru Canyon Road terminates after winding up from Lake Piru (Figure 5.5-1).



Note: Elevation in feet on X axis, with distance downstream from Pyramid Dam in feet on Y axis

Key:

ft. = feet

Sta. = Station

Figure 5.5-5. Pyramid Reach Gradient from Pyramid Dam to Lake Piru

Whitewater Boating Literature

As part of Study 4.1.19, a literature search and internet review were completed to document known whitewater boating characteristics and opportunities on Pyramid reach. A summary of each resource with information on whitewater recreation on Pyramid reach is below. This information is useful in helping to characterize the whitewater resource.

- California Whitewater: A Guide to the Rivers by Jim Cassady (1995). This is a comprehensive guidebook that provides detailed information on whitewater rivers throughout California. However, Pyramid reach is not included in the guidebook, which is likely indicative of the sporadic nature of use or knowledge of the boating potential on Pyramid reach as compared to the major whitewater boating rivers in California.
- Best Whitewater in California: The Guide to 180 Runs by Lars Holbeck (3rd edition, 1998). This is a comprehensive guidebook that includes information about Piru Creek including author's estimate of average gradients. The book describes Piru Creek as a Class III-IV level, or intermediate to advanced level of difficulty, with optimum flow of 1,100 cfs for running the reach (16 miles from Frenchmans Flat [non-Project facility] to Lake Piru). The guidebook describes Piru Creek as runnable for a few days after heavy winter storms. The book notes that the flow as released from Pyramid Lake is usually similar to the flow on upper Piru Creek, but that during boating (through Pyramid reach), by the time one reaches the take-out, the flow levels may double after heavy rains. This is due to the contribution of inflows from tributaries that feed into Piru Creek and then increase the flow throughout the run. The book warns potential boaters that if there is more than a few hundred cfs at the put-in and it is after heavy rains, there may be too much water to navigate or portage (go around) at "the big rapids 2/3 of the way down the run."
- The AW website describes Pyramid reach as a Class IV, advanced difficulty level (for normal flows). The average gradient is stated as 67 feet per mile, and the maximum gradient is estimated at 100 feet per mile. AW states that the reach "can be runnable for a few days immediately during and after large winter rain storms, or for longer periods during wet winters." Suggested put-in access is at non-Project Frenchmans Flat and take-out is at Lake Piru boat ramp. The AW website warns that there may be barbed wire across the creek at about 2 miles before the creek flows into Lake Piru. The website also states that at the end of the run, the river gets shallow and braided, which may require paddlers to drag their boat in places. The AW website is available at:
<https://www.americanwhitewater.org/content/River/detail/id/3154/>.
- There is a link on AW's website to a write-up by Gary Valle that describes Piru Creek from a kayaker's perspective. Valle describes a boat trip on March 9, 2005. The flow on that day was reported to have been 235 cfs below Pyramid

Dam and 335 cfs upstream of Lake Piru. The link is available at: <http://www.sierraphotography.com/creeking/piru02.htm>. The website describes the reach as boatable for a few days in February and March, in WYs with average or above average precipitation. The website also provides a link to the USGS gage above non-Project Frenchmans Flat (provides stage in real time): https://waterdata.usgs.gov/ca/nwis/uv/?site_no=11109550 and a link to USGS recent daily mean flow above Frenchmans Flat: https://waterdata.usgs.gov/ca/nwis/dv?referred_module=sw&format=html&period=31&site_no=11109550.

- Dreamflows.com lists information on boatable rivers and creeks with flow information. Middle Piru Creek is listed and categorized as “yellow,” which represents that flow is generally considered “Low”, however with higher flows evaluated Dreamflows provides other flow range categories that could also apply depending on the flows boated. The “Low” rating does not necessarily mean too low to run safely; many reaches are routinely run at flows that are generally considered “Low.” The website is available at: <http://www.dreamflows.com/alphaReaches.php?st=ca>. Additionally, reach maps are available on the website with put-in/take-out locations, gage locations, and rapid locations. This information is available at: <http://www.dreamflows.com/reachMap/index.php?rid=488&num=A>.
- California Wilderness Coalition website describes Piru Creek and states that Frenchmans Flat (non-Project facility) is a popular destination for anglers, picnickers, and families. The site also mentions that when seasonal flows are available, kayakers run the creek through the Sespe Wilderness. The website is available at: <https://www.calwild.org/portfolio/fact-sheet-piru-creek-wild-scenic-river/>.
- A website called BRT Insights – WW Kayaking & Hiking, includes Piru Creek as a whitewater boating location. The reach is described as Class IV, miles with the put-in at non-Project Frenchmans Flat and the take-out at Lake Piru. The website is available at: <http://brt-insights.blogspot.com/search?q=Piru>. In addition there is a link on the website that references a book called California River Maps – Atlas & Gazetteer by Delorme, 2008, which includes Piru Creek: <http://brt-insights.blogspot.com/2009/08/california-river-maps-atlas-gazetteer.html>.

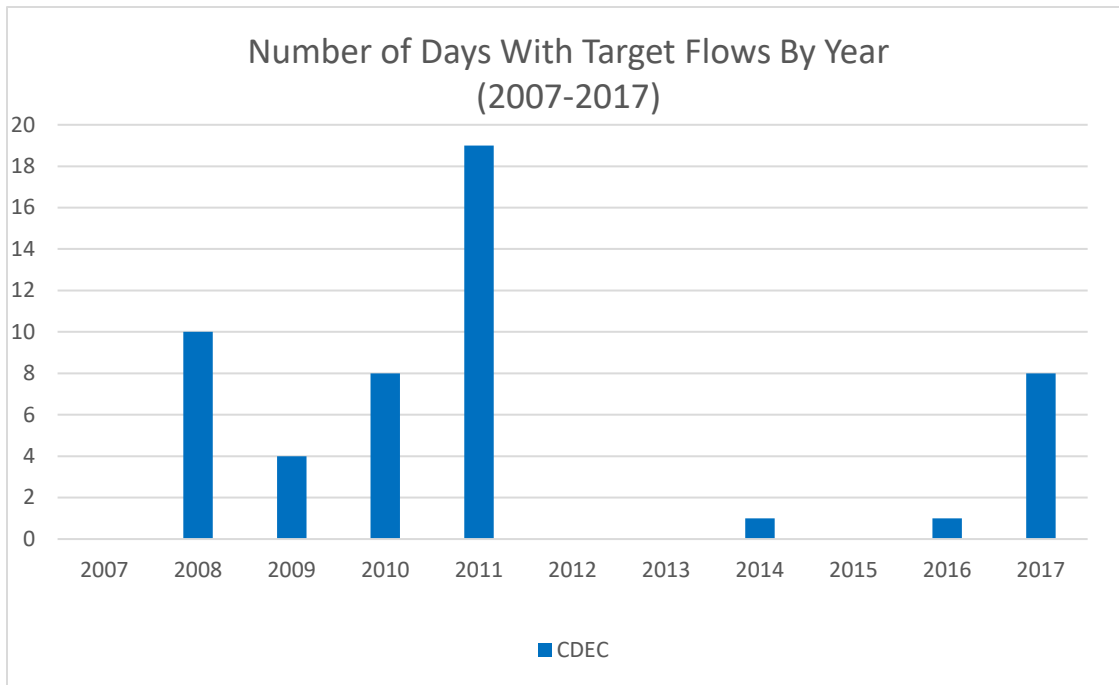
Hydrologic Analysis for Boating

Whitewater boating opportunities, described as “usable days” or “boatable days,” can be defined by the number of days that flows meet recreational needs. The Licensees used USGS streamflow gages (USGS11190550, near Frenchmans Flat and USGS11109600 near Blue Point Campground), and the CDEC gaging system, to determine the amount of boatable days that are generally available in upper Pyramid reach (Figure 5.5-6). According to the USGS, gage USGS11109600 has a drainage area of 372 square miles, and gage 11109525 (Piru Creek below Pyramid Lake) has a drainage area of 295

square miles, indicating there are an additional 77 square miles more drainage area contributing flows at the lower gage. The additional drainage areas add flows to Pyramid reach with the major downstream tributaries being Fish Creek (approximately 8 miles downstream of Pyramid Dam) and Michael and Agua Blanca Creeks near to end of the 18-mile boatable reach with confluences about 16 and 16.5 miles respectively, downstream from Pyramid Dam. An estimate of 200 cfs as released from Pyramid Dam (based on information provided by AW and the boaters interviewed) was set as a minimum flow used to evaluate the number of days boating might be possible and as boaters interviewed indicated, the downstream tributaries generally contribute additional flows on one passes further downstream. An upper limit on boating was not identified, but likely there are limits that would diminish the number of possible boating days identified in this theoretical analysis. As presented in Figure 5.5-6, some years present no opportunities for boating; and in other years, as many as 19 days may have been possible in the period between 2007 and 2017.

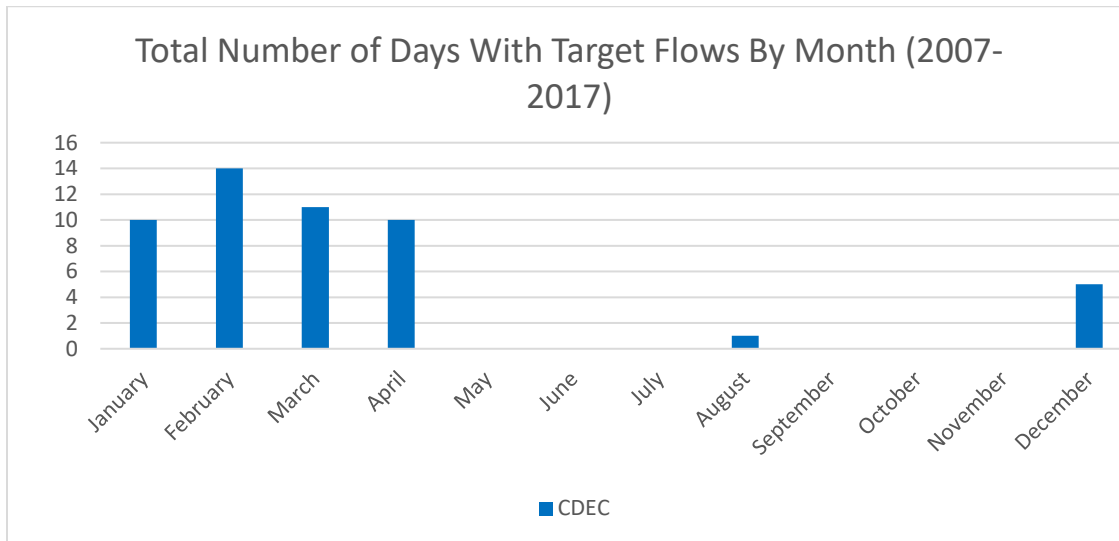
Figure 5.5-7 presents the distribution of potentially boatable days by month for the period 2007 through 2017. These flows mostly represent natural flows stemming from the upper Piru Creek basin that are released by the Licensees as part of existing License Article 52, which requires Pyramid Lake inflows and outflows to be equal to the extent operationally feasible and consistent with safety requirements. Flows released from Pyramid Dam below 1,200 cfs are generally accomplished through a low-level outlet structure that is monitored hourly. On an hourly basis, Project operations slightly affect the timing of releases of natural inflows (Figure 5.5-8), however the pattern of actual releases can also be monitored by boaters using the CDEC gauge. Flow information is available to the public in real time via CDEC's gaging website at the gage designated "PYM," at: <http://cdec.water.ca.gov/dynamicapp/QueryF?s=PYM>. Additional information on how the Project passes inflows on a daily basis is provided in Section 5.2.1.1. As noted in Section 5.2.2, Licensees' operations currently and in the future will continue to mimic the natural hydrograph of Piru Creek in both timing and magnitude to the extent operationally feasible and consistent with safety requirements under Article 52 of the existing license. Therefore the Project is not adversely affecting the current and future boating opportunities during typical operations, particularly during storm events when boating is possible.

In addition to natural flow, supplemental flows are provided in Pyramid reach in most years as part of a water delivery release to UWCD.



Source: CDEC PYM gauge records

Figure 5.5-6. Pyramid Reach Boatable Days by Year (2007 through 2017)



Source: CDEC PYM gauge records

Figure 5.5-7. Pyramid Reach Boatable Days by Month (2007 through 2017)

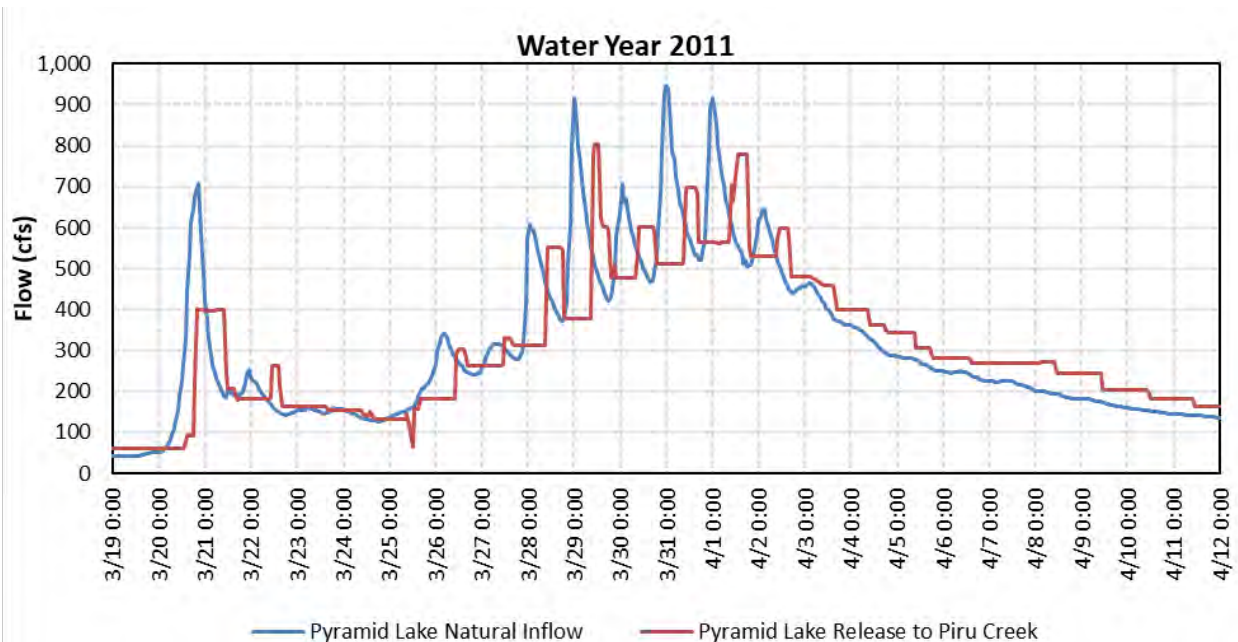


Figure 5.5-8. Hourly Inflow-Outflow Example of Pyramid Dam Operations During a Typical Storm Period from March 19, 2011 through April 12, 2011

UWCD receives water as part of the VCWPD's long-term water supply contract with DWR. VCWPD's long-term water supply contract entitles VCWPD to a maximum annual Table A amount of 20,000 AF, and VCWPD assigned that entitlement to Casitas Municipal Water District. As part of an agreement with Casitas Municipal Water District, UWCD is contracted to receive a maximum of 5,000 AF/year of VCWPD's maximum annual Table A water. UWCD receives up to 3,150 AF/year of SWP water through releases to Pyramid reach. Annual water deliveries are based on the amount of SWP water available each year, and water deliveries are determined based on a proportional share divided among all SWP water contractors up to the maximum amount specified in the contract.

Since 2009, when Article 52 was amended, SWP water deliveries have been carried out between the first of November and the end of February each WY to prevent releases from interfering with the breeding habits of the arroyo toad. During this timeframe, water deliveries may be made over a period of a few days, ramping flows up and down to simulate the hydrograph of a typical storm event, or they may be released more gradually over a longer period.

Table 5.5-2 shows the amount of water delivered to UWCD for the period 2004 through 2014. Additional information on hydrology and flows can be found in Section 5.2.1.1.

Table 5.5-2. Annual Deliveries to United Water Conservation District, 2004 through 2014

Year	Deliveries to United Water Conservation District (AF)	Months During Which Releases Occurred	Maximum Single-Day Release (cfs)	Average Single-Day Release (cfs)
2004	2,431	August, September	53	46.8
2005	0	--	--	--
2006	0	--	--	--
2007	1,890	November	182	90
2008	1,980	November, December	109	55
2009	3,150	November, December	200	112.5
2010	3,150	November	158	108.6
2011	2,520	November, December	120	93.3
2012	3,150	November	169	108.6
2013	2,258	March, June, November	103	53.8
2014	0	--	--	--

Key:

AF = acre-feet

cfs = cubic feet per second

Generally, deliveries to UWCD begin in early November. The releases usually follow a rough bell-curve shape, in which they begin at a low or moderate rate, gradually ramp up through mid-November, and then are reduced through the end of November or December. No scheduled deliveries occurred during January or February for the years analyzed.

SWP water is generally delivered to UWCD in flows averaging between 40 and 110 cfs per day to accommodate some private land owners' wet crossings of lower Pyramid reach. UWCD has reported to DWR that these land owners can have difficulty accessing their property if flows in Pyramid reach are greater than 100 cfs. Although such flows do occur naturally, UWCD has scheduled delivery of their SWP contract water to keep flows low and not impede downstream land owners' access.

Whitewater Boater Interviews

As part of Study 4.1.19, the Licensees identified a dozen boaters who indicated they had boated Pyramid reach at least once in the past. Interviews (including email correspondence) were held with those willing and available to participate. Of the 10 boaters interviewed, most had boated the reach more than 10 years ago. Most noted that their float trips followed storm events, and all indicated they started at non-Project Frenchmans Flat, running about six to 10 hours to get through to Blue Point

Campground or beyond, taking out in Lake Piru. Some boaters discussed several short portages, including some large boulder fields, log jams, and areas of brush extending heavily into the moving channel. Several noted the geologic setting as extremely interesting, enhancing their trip experience. In terms of flow levels, most described entering Pyramid reach at non-Project Frenchmans Flat between 200 and 400 cfs, but in most storms, Fish Creek, Michael Creek, and particularly Agua Blanca Creek contributed substantial inflows, leading some to have thought they entered Lake Piru on flows of 700 cfs or above. Many described the need to put-in at non-Project Frenchmans Flat at flows no higher than about 200 cfs to avoid being overwhelmed by the tributary inflow contributions downstream. Most found the reach to be a Class III and Class IV level of difficulty, with a leaning toward the Class IV designation due to the one-way committed nature of the venture. All boaters indicated hiking out of the canyon was not something they would want to undertake; rather, each felt it was better to pass through the whole canyon to Lake Piru once entering the creek at non-Project Frenchmans Flat.

Field Reconnaissance

After boater interviews, mapping, and literature review were conducted, the Licensees performed field reconnaissance on three separate dates to better assess current channel conditions and potential put-in and take-out areas. Whitewater boating experts, including those that were interviewed, participated in the reconnaissance. On August 25, 2018, a small group consisting of one experienced boater who had boated Pyramid reach twice in the past, an experienced boater representative from AW, and the Licensees scouted the upper Pyramid reach section from Frenchmans Flat (non-Project facility) to Pyramid Dam. The August 25 field reconnaissance resulted in some observations by the boater and AW representative. First, the findings showed that the upper reach would likely be a good local boating resource, when flows are high enough and boaters have some advanced or real-time knowledge of the flow levels. Second, the upper Pyramid reach section is likely less known as a potential boating resource prior to this trip. It was also discussed that boaters can access real-time flow information under current conditions through the CDEC gaging system and website.

After viewing the creek channel and access conditions, the AW representative and experienced boater concluded that the upper reach (alongside the old Golden State Highway) is a good potential boating resource under current conditions when natural flows are high enough. Interest was expressed in the feasibility of boating on the scheduled water delivery flows that are typically released in fall periods. However, after viewing the densely vegetated creek channel and learning of potential channel vegetation from other relicensing studies conducted further downstream in Pyramid reach, the group expressed further interest in some additional reconnaissance.

As a result of the initial field reconnaissance, a controlled flow test was scheduled and field visit arranged with seven experienced boaters, which included boaters from the Los Angeles Kayak Club. No actual boating was undertaken as this test was arranged in coordination with AW only to observe the conditions related to the potential for

boating. The controlled flow test coincided with a release of 1,100 AF to UWCD that had been scheduled for late November and early December 2018. On December 2, 2018, DWR began gradually ramping up flow releases to Pyramid reach in order to sustain a peak flow of about 200 cfs for four hours between 10:00 a.m. and 2:00 p.m. for the controlled flow test on December 7, 2018. During the controlled flow test, participants were taken to five pre-arranged shoreline locations to evaluate the upper Pyramid reach from Pyramid Dam to Frenchmans Flat (non-Project facility) in terms of its boating condition and potential (for more information on this evaluation, see the Whitewater Boating Study Summary report as provided in Appendix B of this Exhibit E, and posted on the relicensing website: <http://south-swp-hydropower-relicensing.com/>). As a result of the controlled flow test, boaters unanimously concluded that boating in the upper reach is feasible with only a few portages, and in particular they noted the potential for multiple runs and training opportunities if the flows could be scheduled in advance and released at a rate of between 200 and 250 cfs for several hours during weekend daylight periods.

Subsequent to the December 7, 2018 controlled flow test, a second and third field reconnaissance was conducted on January 9 and 10, 2019, respectively, with an experienced boater. These reconnaissance visits were conducted on Pyramid reach from Frenchmans Flat (non-Project facility) to the middle of the canyon on the first day, and from Blue Point Campground to the middle of the canyon on the second day. During these field excursions, several areas of channel obstructions were noted; however, the overall assessment was generally positive regarding whether advanced/expert boaters would be able to boat the reach when flows were above 200 cfs from non-Project Frenchman's Flat to Lake Piru.

Overall, Study 4.1.19 found that there is opportunity for some enhancement of boating use by potentially shaping future SWP water deliveries to UWCD to offer additional boating opportunities. The ability to put-in and take-out along the creek was found to be generally acceptable, and no other facilities are likely needed since access points are well established and available. However, the amount of water available each year is limited and can vary in volume. Any releases need to be made with ramping outflows up and down to simulate the hydrograph of a typical storm event. Also, the takeout for an on-water boating evaluation would be in and around the site of the closed Blue Point Campground, which is within the critical habitat and potential presence of the ESA-listed arroyo toad as well as within designated critical habitat of the California red-legged frog, southwestern willow flycatcher, and California condor. The continued operation of the Project was also found to not impact whitewater boating use as the current operations do not restrict natural flows, boater access, or use of Pyramid reach.

5.5.1.2 Project Recreation Facilities

Project recreation resources are found on Quail Lake and Pyramid Lake. As part of Study 4.1.11, the Licensees inventoried Project recreation facilities as well as buildings and roads within the Project recreation areas. The inventory included a count of facilities and amenities, and a categorization of the type of facility or amenity present. As part of the inventory, accessibility evaluations assessed the recreation facilities for the

presence of amenities developed following the Architectural Barriers Act Accessibility Standards (ABAAS) and the Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) on NFS lands, as well as the Americans with Disabilities Act (ADA) on other lands. The results of the recreation facilities inventory are discussed below; the roads and building inventory information can be found in the South SWP Hydropower, Recreation Facilities Demand Analysis and Condition Assessment Study Field Results and Data Summary Report provided in Appendix B of this exhibit, and on the relicensing website (<http://south-swp-hydropower-relicensing.com/>).

Impounded by Pyramid Dam, Pyramid Lake is popular with boaters and anglers. In addition, the lake, its surrounding shoreline, and adjacent areas are popular with swimmers, hikers, and picnickers, particularly during the summer months. As described in Table 5.5-3 and shown in Figure 5.5-9, recreation facilities on and around Pyramid Lake include: the Los Alamos Campground, boat-in sites, a visitor center, picnic areas, boat launches with public docks, and swim beaches. The Pyramid Lake facilities located on NFS lands are owned by the federal government, while dock and floating restroom facilities on the water are owned by the Licensees. All of the facilities are operated and maintained by the Licensees through administration of a concessionaire contract. The concessionaire operates the recreation area on a daily basis and does minor repairs. Large repair and maintenance projects are conducted by the Licensees. An April 2010 amendment to the MOU between USFS and DWR outlines the responsibilities regarding management of recreation facilities at Pyramid Lake.

Quail Lake is popular with anglers. Day use parking and shoreline fishing are available at Quail Lake. The facilities are operated and maintained by DWR.

Appendix P provides detailed maps of the 14 developed Project recreation facilities, which include:

- Emigrant Landing Entrance Area
- Emigrant Landing Boat Launch
- Emigrant Landing Picnic and Fishing Area One
- Emigrant Landing Picnic and Fishing Area Two
- Emigrant Landing Swim and Picnic Area
- Vista Del Lago Visitor Center
- Vaquero Day Use Area
- Spanish Point Boat-in Picnic Area
- Serrano Boat-in Picnic Area

- Bear Trap Boat-in Picnic Area
- Yellow Bar Boat-in Picnic Area
- Los Alamos Group Campground
- Los Alamos Campground
- Quail Lake Day Use Area

Table 5.5-3. Project Recreation Facilities

Recreation Area	Developed Facilities
Emigrant Landing Entrance Area	2 entrance station kiosks; boat inspection station; and approximately 24 parking spaces
Emigrant Landing Boat Launch	8-lane boat launch ramp; 2 boat docks; 1 signed accessible unisex restroom with flush toilets; 2 floating restrooms that are deployed on the lake as needed; and parking for approximately 73 vehicles with boat trailers, with 3 other standard parking spaces and 5 additional signed accessible parking spaces (2 van accessible)
Emigrant Landing, Picnic and Fishing Area One	22 picnic sites (2 are labeled accessible sites), with approximately 22 grills, 21 shade ramadas, and 34 standard tables; shoreline accessible fishing platform/walkways; 2 unisex restrooms with flush toilets; 1 drinking fountain; parking for approximately 90 vehicles (5 signed accessible parking spaces); 1 fish cleaning station
Emigrant Landing Swim and Picnic Area	Swim beach with lifeguard tower; approximately 31 picnic sites with 52 standard tables (8 are accessible), 34 grills, 31 shade ramadas, 5 water spigots, and 2 drinking fountains; 2 unisex restrooms with flush toilets; parking for approximately 135 vehicles (2 signed accessible parking spaces)
Emigrant Landing, Picnic and Fishing Area Two	Approximately 5 picnic sites with tables, 5 shade ramadas (1 has 3 combined shade ramadas counted as 1), 14 standard tables, 7 grills; pedestrian overlook structure connected to accessible walkway; 1 unisex restroom with flush toilets; water spigots and 3 drinking fountains; parking for approximately 80 vehicles (2 signed accessible parking spaces)
Vista Del Lago Visitor Center	18,500-square-foot visitor building with interpretive exhibits, auditorium, potable water and accessible restrooms; parking for 159 vehicles (6 signed accessible parking spaces, 2 designated for vans); 1 FERC informational sign, 2 other informational signs; approximately 11 trash receptacles, 2 telescopes, 1 overview lookout structure (1 bench, 1 information sign), and multiple standard parking lot lights
Vaquero Day Use Area	Swim beach with lifeguard tower; 2-lane non-motorized watercraft launch ramp with courtesy dock; approximately 14 picnic sites with 13 standard tables, 14 grills, and shade ramadas (1 site is accessible); 2 accessible unisex restrooms with flush toilets; approximately 5 water spigots and 1 drinking fountain, 1 fire pit, parking for approximately 146 vehicles (8 signed accessible parking spaces, with 3 designated for vans); 2 restroom buildings (unisex, accessible)
Spanish Point Boat-in Picnic Area	Boat-in or walk-in area with approximately 12 picnic sites, each with shade structure; approximately 9 grills and 1 group barbeque site with 3 grills; 1 restroom with vault toilet; 4 portable restrooms with portable sinks

Table 5.5-3. Project Recreation Facilities (continued)

Recreation Area	Developed Facilities
Serrano Boat-in Picnic Area	6 picnic sites with tables, grills, and shade ramadas; 1 unisex restroom with vault toilets; boat dock
Bear Trap Boat-in Picnic Area	Approximately 2 picnic sites with 3 tables, 2 grills, and 3 shade ramadas; 2 unisex restrooms with vault toilets; boat dock
Yellow Bar Boat-in Picnic Area	Approximately 10 picnic sites with tables and shade ramadas (3 sites are accessible); 2 accessible restrooms with vault toilets; accessible boat dock and paths with shoreline fishing
Los Alamos Group Campground	Approximately 3 group camping sites with maximum occupancy of 40 people and parking for typically 8 to 10 vehicles per site; each site includes a large shade ramada containing barbeque grills, fire pits, approximately 5 picnic tables, and water spigot; 1 unisex restroom with flush toilets, water spigot and outdoor sink
Los Alamos Campground	Approximately 93 campsites with typically 1 or 2 picnic tables, parking spur, and 1 fire ring per site (3 sites are labeled accessible); 4 signed accessible restrooms with flush toilets; trailer dump station; potable water spigots, 4 of which have sinks; approximately 5 shade ramadas; 2 lane recreational vehicle/trailer dump station
Quail Lake Day Use Area	Day use area with shoreline access paths on both sides of lake; gravel parking area; and 3 portable restrooms

Source: DWR 2019

Accessible = facility or amenity has features compatible with Americans with Disabilities Act of 1990 and for National Forest System lands compatible with the Architectural Barriers Act Accessibility Standards and the Forest Service Outdoor Recreation Accessibility Guidelines

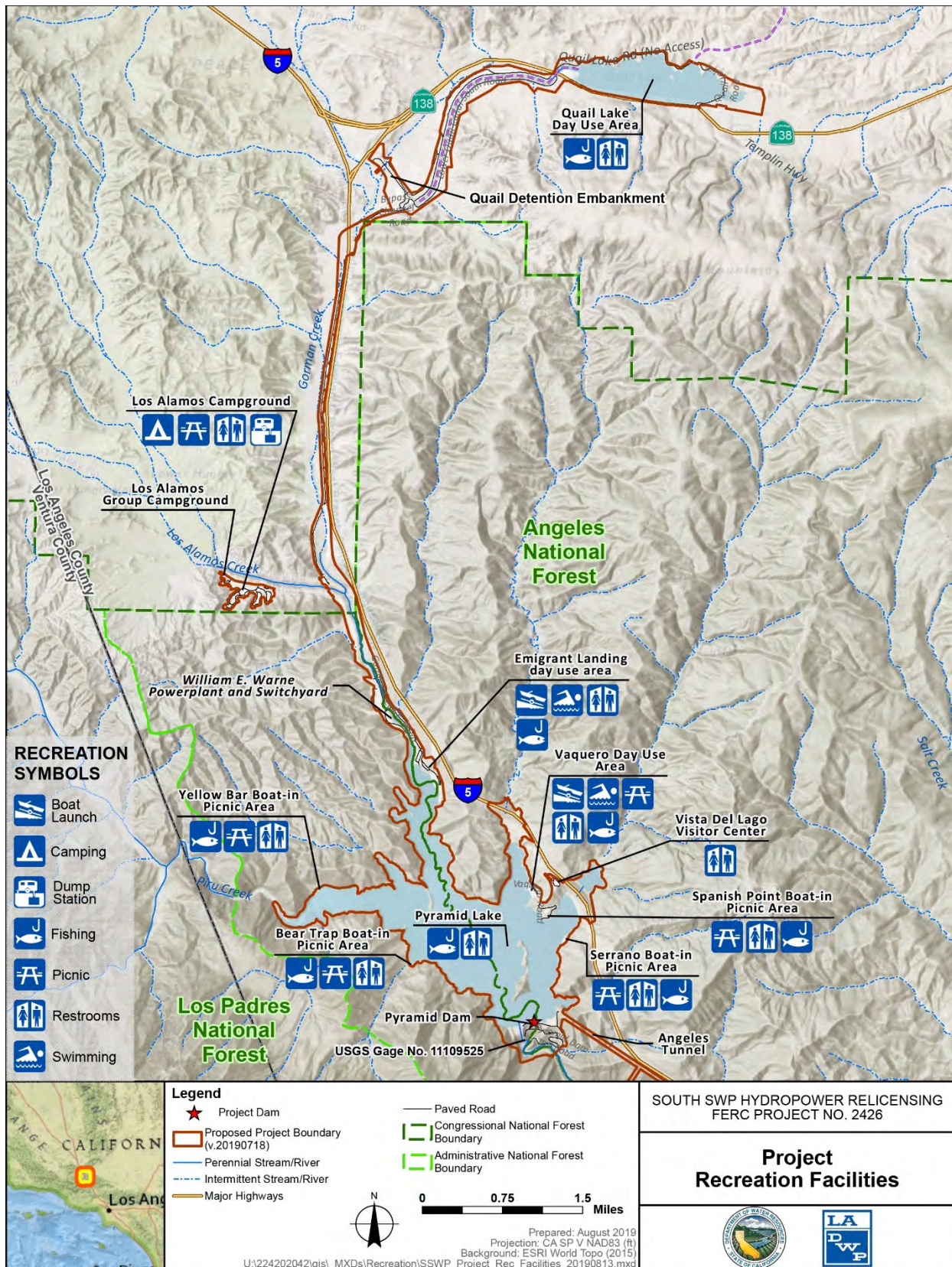


Figure 5.5-9. Pyramid Lake Recreation Area

The Emigrant Landing day use areas are located at the north end of Pyramid Lake, just south (downstream) of the Warne Powerplant. This area includes an entry station, four parking areas, a fishing platform, fish cleaning station, shade ramadas, restrooms, a boat launch, one administrative and two public boat docks, a swim beach and picnic tables/grills (Appendix P, Figures 4 through 8 of 15). Recreation facility fee collection at this location, daily operations, and routine maintenance activities are carried out by a concessionaire under contract to DWR.

The 18,500 square-foot Vista Del Lago Visitor Center (Appendix P, Figure 9 of 15) is located on the east side of Pyramid Lake, immediately adjacent to and easily accessible from Interstate 5. The Vista Del Lago Visitor Center overlooks Pyramid Lake and has a surrounding outdoor balcony. Educational exhibits about California's water, the SWP, ancient civilizations, natural habitats in the area, and water treatment operations are presented inside the visitor center. A large theater, reception desk, offices, restrooms, and parking for cars and buses are also included. The Vista Del Lago Visitor Center offers free admission and is open daily from 9 a.m. to 5 p.m., except Thanksgiving, Christmas, and New Year's Day.

The Vaquero Day Use Area is located just southwest of the Vista Del Lago Visitor Center. This area, which is easily accessible from Interstate 5, includes a parking area, picnic tables and grills, shade ramadas, comfort stations, a boat launch, and a swim beach (Appendix P, Figure 10 of 15).

The Spanish Point Boat-in Picnic Area is located just south of the Vista Del Lago Visitor Center, but accessible to the general public only by boat. This picnic area includes tables, grills, shade ramadas, a beach, and a restroom (Appendix P, Figure 11 of 15).

The Serrano Boat-in Picnic Area is located south of Spanish Point, along the east shore of Pyramid Lake. Accessible by the general public only by boat, this area includes picnic tables, grills, shade ramadas, a restroom, and a boat dock (Appendix P, Figure 12 of 15).

Located along the southwest shore of Pyramid Lake and reachable only by boat is the Bear Trap Boat-in Picnic Area. In addition to picnic tables, this area includes grills, shade ramadas, a restroom, and a boat dock (Appendix P, Figure 14 of 15).

Located just northwest of Bear Trap Boat-in Picnic Area is the Yellow Bar Boat-in Picnic Area. This area includes picnic tables, shade ramadas, a comfort station, a boat dock, and a beach (Appendix P, Figure 13 of 15).

Along the Pyramid Lake shoreline, boaters may access the undeveloped and dispersed recreational use areas in the coves and arms of the lake.

The Los Alamos Campground (Appendix P, Figures 2 and 3 of 15) is located approximately 2 miles northwest of the Warne Powerplant and accessible via Hardluck Road. While located on NFS lands, not within the existing Project boundary, the individual and group campgrounds are Project recreation facilities included in the

proposed Project boundary. Los Alamos Campground offers family campsites, group campsites, restrooms, potable water, a trailer dump station, and campground hosts and facilities. Fee collection, daily operations, and routine maintenance activities are carried out by a recreation concessionaire under contract with DWR.

Recreational facilities at Quail Lake are on State lands, and are owned and operated by DWR. A large, graveled parking area with portable restrooms, signage, and trash receptacles is located at the west end of the lake, adjacent to State Highway 138 (Appendix P, Figure 1 of 15). Project lands surrounding Quail Lake are fenced and recreational access to the lake is walk-in only. Surface trails lead to the lake from the parking area. A graveled service road surrounds the lake. The road is closed to public vehicles, but open to hikers and fishermen. Quail Lake recreation includes shoreline fishing, bird watching, and hiking. However, no water contact uses are allowed such as boating or swimming. Additional information concerning Quail Lake recreational facilities and amenities, and other Project recreational facilities and amenities, was identified as part of the Licensees' Study 4.1.11 and is described in Table 5.5-3.

Dispersed recreation within the proposed Project boundary takes place predominately at and around Quail Lake and Pyramid Lake, with some dispersed hiking near and adjacent to the Castaic Transmission Line.

No recreation takes place within the existing or proposed Project boundary surrounding the Warne Powerplant, Castaic Powerplant, or Elderberry Forebay. The water level regularly fluctuates in Elderberry Forebay by up to 25 feet due to operation of the Castaic Powerplant; therefore Elderberry Forebay is closed for public safety and security. These facilities are fenced, gated, and signed "no trespassing."

While roads are located along the west (Los Angeles City Water and Power Road) and east (Goodell Fire Road/Castaic Canyon Road - 6N13) of the Elderberry Forebay, public vehicular access on these roadways is prohibited. Pedestrian use is available on the east shoreline road outside the proposed Project boundary, and such use is not affected by Project O&M.

As part of the relicensing studies, the Licensees performed a condition assessment of recreation facilities. Table 5.5-4 presents a summary of the condition issues for recreation facilities at the Project based on a 2018 condition assessment survey.

Table 5.5-4. Project Recreation Facility Condition Issues

Recreation Facility	2018 Condition Summary
Emigrant Landing Entrance Area	Good – all buildings and signs found to be in excellent/good condition.
Emigrant Landing Boat Launch	Good – all recreation amenities and buildings found to be in good condition.
Emigrant Landing Picnic and Fishing Area One	Excellent/good – almost all picnic sites, recreation amenities, and buildings were found to be in excellent or good condition. One picnic site is in poor condition.
Emigrant Landing Picnic and Fishing Area Two	Fair – boat dock, drinking fountain, spigot, and signs were found to be in poor condition. Other recreation amenities found to be in good/excellent condition.
Emigrant Landing Swim and Picnic Area	Good – all buildings and recreation amenities were found to be good/excellent condition.
Vista Del Lago Visitor Center	Good – all recreation amenities were found to be in good condition.
Vaquero Day Use Area	Good – all buildings and recreation amenities were found to be in good condition.
Spanish Point Boat-in Picnic Area	Good – all facilities were found to be in good working condition.
Serrano Boat-in Picnic Area	Good – all facilities were found to be in good condition.
Bear Trap Boat-in Picnic Area	Good – all facilities were found to be in good condition.
Yellow Bar Boat-in Picnic Area	Good – all recreation facilities were found to be in good condition; however, one picnic site was found to be in fair condition. Also, a shade ramada was found to be badly chipped, with worn out supports.
Quail Lake Day Use Area	Good – all facilities were found to be in good condition.
Los Alamos Group Campground	Good – one faucet was found to be in poor condition; all other campsites and buildings were found to be in good condition.
Los Alamos Campground	Fair – some sites were in poor/fair condition. Roads need resurfacing. Parking spurs also need some surface treatments and readjusting of dimensions. Restroom in loop 2 was found to be in poor condition. Accessible camping sites are not fully compliant.

Source: DWR 2019

Note: This represents the condition of the facilities as observed during the 2018 site visits. Ongoing maintenance, improvements, and wear may result in conditions differing from those represented here.

Project Recreation Area Management and Public Safety

Effective January 1, 2011, DWR assumed responsibility from USFS for routine O&M of recreation sites located on NFS lands and management of public recreation activities at these sites and on Pyramid Lake itself, in accordance with Amendment No. 2 to the MOU between USFS and DWR.

Pyramid Lake is primarily a warm-water fishery consisting of largemouth bass, smallmouth bass, channel catfish, striped bass, bluegill, white catfish and black crappie. A cold-water fishery is maintained by stocking hatchery-raised trout. A valid fishing license is required and all CDFW regulations (www.wildlife.ca.gov/regulations) apply and are enforced (USFS 2015).

For recreation purposes, DWR has a fish stocking program at Pyramid Lake. The fish stocking is undertaken for the purposes of:

- Establishing a self-sustaining warm water fishery
- Supporting a put-and-take trout stocking program at Pyramid Lake (DWR 2014)

Since 1982, CDFW has been contracted by DWR to stock rainbow trout in Pyramid Lake at a variety of levels under several management plans. The existing license Exhibit S requires the annual stocking of 20,000 pounds of catchable rainbow trout at Pyramid Lake (DWR 2014). Since 2000, stocking status and annual creel survey data have been reported to FERC on a biennial schedule.

Boating speed limits differ across parts of Pyramid Lake. The Los Angeles County Sheriff's Department is under contract with DWR to enforce Pyramid Lake boating laws and operates from a non-Project office located at Emigrant Landing Marina. In the canyons where non-motorized crafts such as canoes and rafts are popular, power boats are restricted to low speeds (5 miles per hour [mph], no wake). Higher speeds for waterskiing are allowed on the lake's main body. The direction of boat travel on the lake is counterclockwise.

The Los Angeles County Sheriff's Department has set a maximum number of boats that can be safely launched on Pyramid Lake at any one time. These limits are 50 PWC and 150 boats, although the limits do not include the concessionaire rentals, which add a small number of watercraft to the totals allowed. The Sheriff's Department can make exceptions to the limits, but typically has not changed these capacities as the limit has been successfully implemented over the last 10 years or more on Pyramid Lake. Once these lake limits are reached, which can occur very early on busy weekends, boats and PWC are only allowed to enter Emigrant Landing when a boat or PWC leaves. The current water and boating regulations are posted and noted as follows:

- Ride inside the boat, never on the bow or sides.

- Carry at least one life preserver for each person on board, and one U.S. Coast Guard approved throwable cushion. Always wear a life preserver when around water if you cannot swim.
- Reduce speeds to 5 mph when within 50 feet of the shore or in areas restricted to 5 mph by buoys.
- Display a red flag whenever a skier is down or a towrope is in the water.
- Wear an approved flotation device whenever skiing.
- PWC and boats should provide a safety zone for each other.
- All internal combustion engines must be equipped with adequate mufflers and spark arresters.
- Boats must have current registration and vessel numbers must be displayed properly.
- All inboards must have a fire extinguisher on board.
- Swimming is prohibited outside designated swim beaches.

5.5.1.3 Recreation Demand and Use

Recreation Provider Interviews

As part of Study 4.1.11, the Licensees conducted interviews with recreation managers and staff from USFS, the Los Angeles Sheriff's Department, DWR's concessionaire (Rocky Mountain Recreation Company [RMR]), Castaic Lake State Recreation Area (SRA), Santa Felica Hydroelectric Project, Lake Piru Recreation Area, Lake Casitas Recreation Area (LCRA), BVARA, and California Department of Parks and Recreation (DPR). Those interviewed typically represented user groups or were heavily involved in day-to-day management of recreation use. The interviews were conducted to gather information about recreation user needs, use levels, user patterns and trends, and issues and potential solutions related to recreation management in peak and non-peak seasons. The interviews also helped inform the recreation study uniqueness study analysis.

The recreation provider interviews were undertaken as small focus group type meetings, where possible, to allow open exchange about a variety of recreation topics. The interviews provided important insight into use patterns within the Project vicinity and yielded considerable information regarding existing and potential future recreation needs and management improvement information based on the interviewees' experiences.

Angeles National Forest

The ANF staff were interviewed with regard to recreation trends and needs in the area based on their local knowledge of recreation use patterns and management experiences of lands and resources in the Pyramid Lake area. Information provided by USFS staff is summarized as follows:

- The area around the non-Project Frenchmans Flat is used by a variety of users, including anglers, general day users, and some mining prospectors, as well as some overnight campers. Frenchmans Flat is considered a dispersed use site, although restroom facilities are provided and some picnic tables have been provided in the area.
- In the non-Project Frenchmans Flat area, USFS staff have seen in some December and January months cases of hypothermia in recreationists due to the cold-water conditions. Because the creek channel is so confined, once the water rises, the likelihood of water contact is high, which is somewhat problematic given the lack of easy access in and out of the Pyramid reach canyon.
- If there are supplemental flow releases, particularly at the 200 cfs level for a whitewater boating observation test, some form of advance notice approximately three days prior would be prudent to allow recreationists who are taking a multiple day long hike in the Pyramid reach canyon to be aware on their way in. Pyramid reach can have a lot of log jams, particularly downstream from the closed Blue Point Campground.
- Pyramid reach has an informal angler and hiking trail, but often it is within the creek channel itself.
- There is a variety of hunting activity in fall in the area around non-Project Frenchmans Flat, and that includes some bow and rifle hunting, normally from September through December each year.
- The non-Project Frenchmans Flat area is important as it provides unique recreation opportunities; it is a free use site, easily accessible to a variety of recreationists. It offers some solitude and a strong feeling of being away from the urban areas. Having the road gate closed allows families and others to wander up the old remnants of the Golden State Highway along Pyramid reach without the hazards and noise of vehicles. USFS staff noted it was beneficial to keep the existing USFS-DWR maintained gate closed to vehicular traffic at Frenchmans Flat to allow the unique and safe recreation to continue in the upper 3 miles of Pyramid reach canyon.
- When asked more specifically about Project recreation developments, USFS noted there is an increase in the demand for camping with more amenities, like electric power, showers or “glamping.”

- The USFS staff also noted that Los Alamos Campground is well maintained but has some deferred maintenance needs. At Emigrant Landing, USFS staff thought there were some shade ramadas that are aging and possibly in need of replacement. It was stated that Los Alamos Campground has limited capacity. Thus, with Hardluck Campground closed, where do overflow visitors go?
- The USFS staff opined that the Gold Hill site (9 linear miles north and west of Pyramid Lake) would be well suited for recreation development, and it was felt families and other users, including OHV users, would make use of the site as it is a popular dispersed site along upper Piru Creek.

Los Angeles County Sheriff's Department, Pyramid Lake

The Sheriff's Department officers have conducted patrols at Pyramid Lake for several years, responding to needs at the Los Alamos Campground and the Hungry Valley SVRA. They also have developed some insight into user preferences based on interacting with the public and other recreation providers in the area, and from such interactions can help identify what the recreating public is looking for and what has worked and not worked in the past. A summary of their observations are as follows based on a small focus group interview.

- In the past, the Sheriff's Department operated at Pyramid Lake completely funded by the Los Angeles County Sheriff's Office. Since July 2018, they have a contract with DWR to help fund their patrol activities on Pyramid Lake.
- Flyboard uses of PWC are allowed, but the department staff have not seen much activity in flyboarding in 2018. The department staff have not seen any real problems with PWC and boats mixing, and they think it is a unique offering at Pyramid Lake as compared to Castaic Lake; thus, they feel Pyramid Lake attracts more PWC than Castaic Lake.
- Recreation use was down considerably in 2018 because the blue-green algae warnings kept visitors away. Since it was more widely covered in the media in 2017, and with a warning level at Pyramid Lake being in place from June 15 through October 5, they saw a clear drop in the number of visitors on weekdays, weekends, and holidays.
- In a discussion regarding traffic and recreationists queuing to enter Emigrant Landing, Sheriff's Department staff noted that, on busy weekends in the past years, vehicles have been backed up along Pyramid Lake Road to the Smokey Bear Road highway interchange, but never has the backup extended on the ramps to and from Interstate 5. When the recreation areas or lake is reaching capacity or crowded with incoming recreationists, there are several lanes marked on Pyramid Lake Road that are for lining up and separating day users, vehicles with boats, vehicles with PWC, and general traffic as the road connects to Hardluck/Los Alamos Road.

- The Sheriff routinely provides help to boaters whose boats break down and need a tow. They also have had to issue some citations, but have had few problems with public safety. It was noted Pyramid Lake is a “wet” lake recreation area, meaning alcohol is allowed. This is different than State parks and many county parks in the region. Allowing alcohol can increase visitation, as users will choose between sites sometimes based on the ability to bring alcohol.
- The Santa Clarita Valley Station (within the Los Angeles County Sheriff's Department) patrols and responds to crimes and needs at Frenchmans Flat (non-Project facility) and in the areas below Pyramid Dam. They also are first responders for search and rescue needs along Pyramid reach.
- On weekends outside of the Memorial Day through Labor Day prime season, they typically see 15 to 20 boats a day on Pyramid Lake; less on weekdays. Easter weekend sees more visitation in recent years, and a warm weather weekend might bring 25 boats to the lake. During the busy summer season, Pyramid Lake can approach the 150-boat limit. The department staff have seen more kayaks and canoes on the lake in recent years, and since 2017, paddleboards are rented and used along the shorelines leading to the Emigrant Landing swim beach.
- No watercraft are allowed on the water after dusk, and they have never had requests for such use.
- DWR provides two floating restroom structures, which are important for boaters and PWC users on Pyramid Lake.
- Shoreline fishing is generally confined to the areas around Emigrant Landing extending to the swim beach area.
- They see a very diverse crowd of users from across Los Angeles to Bakersfield, and a lot of ethnic diversity as well.
- The Sheriff's Department maintains a firefighting vessel at Emigrant Landing, with more than 200 feet of hose, so they can help USFS and DWR in the event of a fire by tapping lake water and extending hoses inland.

Rocky Mountain Recreation Company

RMR became DWR's concessionaire to maintain and operate Pyramid Lake and Los Alamos Campground in April 2017. The previous concessionaire, Parks Management Company, ran the recreation area prior to that. The following information summarizes an interview with staff from RMR.

- The most important influence on recreation use at Pyramid Lake in the past two years has been the outbreaks of blue-green algae. DWR tests the waters and will

issue notices if levels are high enough to warrant a warning to the public. The first level of warning is “Caution,” and a Spanish and English language yellow-colored flyer is handed out to each vehicle entering Emigrant Landing. The yellow flyer notes swimming is allowed, but to stay away from algae and scum in the water. The second higher level of warning is the “Warning” flyer that is orange-colored and explains no swimming is allowed. The highest level of warning is “Danger” handed out as a red-colored flyer that notes all users are to stay out of the water until further notice.

- Even with the Caution flyer, many recreationists choose not to enter the park once they are handed a flyer at the entrance kiosk. RMR staff stated that the flyers and warnings are impeding recreation use, and use levels have dropped from the normal patterns in past years due to the blue-green algae concern by the recreating public.
- In 2018, the blue-green algae warnings started on June 15 with a “Caution” warning issued, which was upgraded to “Danger” on July 13, and then reduced to “Warning” on July 27. That level was then downgraded to “Caution” on August 17. The Caution warning continued until October 5, when all advisories were lifted. Because the notices were in effect from June 15 through October 5, the majority of the main recreation season was adversely affected by the blue-green algae levels.
- DWR requires the swimming beach to be closed if no lifeguard is on duty and also when the Warning or Caution levels are in place for blue-green algae.
- The Vaquero Day Use Area is open Friday through Sunday, but RMR would like to only operate it just on Saturdays and Sundays, as RMR experiences very low use on Fridays.
- The summer holiday weekends are the busiest periods for use, but the line up to get into Emigrant Landing never goes as far as Smokey Bear interchange, and there are well-marked lanes for queuing, which most visitors follow. Most visitors come from the Los Angeles basin, but there is a good number of boaters who come from Lancaster and surrounding high desert areas.
- In general, more of the PWC users come from the Los Angeles area and more fishermen come from the Bakersfield/Lancaster area. Most fishing at Pyramid Lake takes place around the shorelines of Emigrant Landing and Vaquero.
- At Los Alamos Campground, there is a consistent and growing demand for RV spaces, more so than traditional car camping.
- There currently are no showers at Los Alamos Campground, but having showers and electrical plug-in outlets would be a great benefit to users.

- The use of paddleboards and kayaks is increasing. RMR rents them, and a few people bring their own. The paddleboards can only be on the lake in the slow-boat zones (less than 5 mph).
- There is no running water in the Spanish Point Boat-in Picnic Area restrooms, and it has been noted by visitors that they would prefer to have running water at the popular day use site.
- RMR routinely cleans all bathrooms on Mondays, Wednesdays, Fridays, and Sundays. They have not seen any major litter problems and feel their signs work well to prevent littering.
- Spanish Point Boat-in Picnic Area offers a unique experience. Many boaters and PWC users will come with a large group who set up for picnicking at that location. They can bring a few PWCs or boats to the shoreline to share use of the equipment with the larger group.

Castaic Lake State Recreation Area (Non-Project Facility)

The Los Angeles County Department of Parks and Recreation maintains and operates Castaic Lake SRA, under contract with DPR. The SRA consists of Castaic Lake, with two boat launching ramps and a PWC area along the west shore, a lagoon south of Castaic Lake that serves as a recreation area and recharge basin with overnight camping, sandy beaches, and picnic areas. Boating at Castaic Lagoon is limited to non-power boats. The following points summarize the observations regarding recreation use and trends at Castaic Lake SRA and in the region as well as an interview with staff from Castaic Lake SRA.

- In past years when the lake level has been low, visitation was also low. In 2017, the lake level came up and remained high through the summer and since that time use has greatly increased.
- Because of recent water quality concerns at Pyramid Lake and associated negative press coverage regarding the dangers of blue-green algae outbreaks, the SRA has received more use than it might have otherwise.
- There is a 500-boat daily limit on Castaic Lake, with accommodation for 250 boat launches each at the east and west boat ramps. Additionally, up to 150 PWC are allowed in a cordoned off area near the west ramp, so these PWC do not interact with the other motor boats on the lake. Fly boarding is not allowed (as it is on Pyramid Lake).
- Many of the incoming boats are failing the quagga mussel inspection at Castaic Lake. Unless boaters have been away from the known, quagga-infested lakes for more than 8 days, they are not allowed into Castaic Lake. Castaic Lake SRA will

allow boats to enter that come from a recent visit at Silverwood Lake, but will not allow boats coming off Piru or Pyramid Lakes in the last 8 days.

- There are 57 campsites at Castaic Lake SRA, but none have electrical or water hookups.
- In 2019, the 50-year operating agreement Los Angeles County Department of Parks and Recreation has with DPR to operate the facility will expire and will need to be renewed.
- In the recent past they have been able to upgrade restroom facilities in the park. Other projects involved repaving roads using a grant from DPR's Division of Boating and Waterways and further improvements to the lagoon docks.
- The Castaic Lagoon beach usage can be as high as 500 to 600 users a weekend; however, in 2017, they often received about 2,000 users per weekend.
- Castaic Lake SRA receives most of its annual use between Memorial and Labor Days, but in the fall, special events bring in larger crowds, including sporting and competition events like the Santa Clarita Color Run, the Spartan Race, and Rugged Maniac races. Special event use is a growing trend, and increases park revenues and off-season use of the park. Additionally, Castaic Lake SRA stand-up paddle board clinics on weekends are popular.
- Castaic Lake fishing opportunities benefit from annual trout stocking by CDFW, under contract with DWR (unlike Lake Piru, where stocking is no longer authorized).

Santa Felicia Hydroelectric Project, Lake Piru Recreation Area

UWCD staff were interviewed about recreation management and user trends as their user base is likely similar to that of Pyramid Lake, and the supply of recreation opportunities in the region affects the need or demand for facilities and amenities at Pyramid Lake. As managers implementing and complying with FERC license conditions for the Santa Felicia Hydroelectric Project, they have extensive knowledge of recent, past, and present recreation use patterns and influencing factors. The following points summarize recreation resource management and use considerations for Lake Piru that could inform the supply and demand analysis for Pyramid Lake.

- Lake Piru is located about 50 miles north of Los Angeles in Ventura County, California. The town of Piru (population 2,165 in 2017) is 5 miles south of the lake and is the closest community to the lake. The Santa Felicia project is located on Piru Creek and occupies approximately 140 acres of United States land that is administered by USFS in the ANF and LPNF.

- Lake Piru itself is the primary attraction of the area for recreation users. When lake levels are at or above 1,025 feet elevation, the coves in the lake become of size and depth adequate for boating. In the 1990s and 2000s, annual visitation was reportedly much higher than today. In the last five years, annual recreation visits have totaled between 45,000 and 55,000. In the 1990s and 2000s, reported visitation was consistently over 150,000 recreationists a year as the lake regularly filled up to capacity in the early summer.
- The Santa Felicia project received a new 40-year operating license from FERC in September 2008 with conditions regarding recreation management and improvements over the term of the new license, including provision for whitewater boating following Santa Felicia project dam releases of more than 200 cfs.
- Developed sites at Lake Piru include a marina, several boat launches, 236 developed campsites, two group campgrounds, primitive overflow camping, restroom facilities, picnic areas, dog park, and one large day use area. Most of the facilities are located in this core area and have associated parking areas, with informal trails interconnecting most of the sites for pedestrians. The Juan Fernandez Boat Launch is north of the core area and offers picnic sites and a large boat launch facility that is usable when lake levels reach at least 990 feet and greater. Additionally, UWCD maintains two floating restroom facilities for boaters on Lake Piru.
- Given the recent drought, Lake Piru has experienced lower than normal lake levels, which have shrunk the shoreline area and impeded shoreline access. This, in turn, has led to decreased visitor use, particularly boating and recreationists looking for flatwater recreation opportunities, including swimming. Lake levels greatly influence visitation, operability, and use of several recreation facilities at Lake Piru. UWCD has five boat ramps to provide water access for boaters. The boat ramps are designed to operate at varying lake levels, with some overlap in serviceability.
- In looking at past use beyond lake level influences, it is important to consider the visitation effects of: (1) not allowing alcohol in the park in the 2010 to 2014 period; (2) allowing PWC on Lake Piru (started allowing PWC in June 2015); (3) when CDFW stopped planting trout (2010); (4) first identification of quagga mussel presence (December 2013); and (5) other problems dampening use, including the 2008 mortgage crisis (people got rid of their boats) and rising gas prices during that era.
- Prior to 2010, when CDFW still planted trout, Lake Piru would get an increase in usage as more than 40,000 trout were planted and fishermen came out in numbers to catch them.

- Swimming is a primary recreation activity at Lake Piru. As such, additional swim facility enhancements are important. Staff at Lake Piru have worked hard in the last several years to maintain designated swim areas near the boat ramp at varying lake levels. They often have to move swim buoys and create beaches by placing sand in various locations depending on the lake level.
- Olive Grove Campground is open year-round and has several RV hook up sites with 35 amp service. Two of the campgrounds have coin-operated showers, which are in high demand. Oak Lane and Lower Oaks campgrounds are generally closed on weekdays, but group campsites can be open by reservation. Oak Lane and Lower Oaks are generally closed in low season from October through April.
- Several movie and film crews have been on site in the last several years. The HBO television show “Westworld,” and the production of other television shows have provided further business and activity at Lake Piru recreation area. Filming events can greatly help the revenues for the recreation area.

Lake Casitas Recreation Area

LCRA is operated by the Casitas Municipal Water District in eastern Ventura County. When full, Lake Casitas has about 2,700 acres of surface area (254,000 AF storage capacity) and over 35 miles of shoreline. LCRA is situated along a 5-mile strip of shoreline on the north end of the lake. A variety of recreation activities, including camping, boating, fishing and hiking, are allowed, but no body contact with the water is permitted since it is a drinking water supply reservoir. In the early 2000s, the water district developed the Casitas Water Adventure, a water park inside LCRA. Information provided by LCRA staff that could help inform recreation management planning considerations for Pyramid Lake is summarized as follows.

- LCRA receives more than 600,000 visits a year, but these levels were higher in the 1980s and 1990s.
- In 2018, the reservoir was down at about 43 percent of capacity, and this limited the number of boaters (anglers). The lake is popular for fishing and does not have quagga mussel infestations. Because other reservoirs in the region have quagga mussel infestations, LCRA strictly screens boats coming into the park, which has greatly limited the number of boats as compared to years past.
- Since about 2008, the number of boaters in the region has fallen because they lost the freedom to frequent whatever lake they wanted due to the quagga mussel containment procedures. Those procedures can make for long quarantine times, and boats cannot easily frequent a variety of lakes if boats coming to Lake Casitas have been on Lake Piru, Castaic Lake, or Pyramid Lake. In those cases, they must wait 40 days or more to decontaminate before boating on Lake Casitas.

- The Casitas Water Adventure park is open from Memorial Day through Labor Day, has a capacity of 1,200 persons, and typically fills up on Saturdays and holiday weekends. The remainder of the park fills to capacity for camping on holiday weekends.
- LCRA has more than 400 campsites, and 26 of them have full hookups. A third-party company will rent trailers for campers if arranged through them. LCRA does have an overflow area and some group campgrounds for larger groups.
- LCRA offers a “Snowbird Program” in winter to allow stays longer than 14 days. Users can reserve and use the full hookup sites after Thanksgiving.
- In recent years, there is a trend that Easter Sunday is now consistently a big use day. In 2018, LCRA had more than 2,600 visitors on Easter Sunday, and it was their single busiest day in years.
- In the last 20 years, LCRA has had more sheriff and park rangers serve as peace officers, since they do experience a variety of crimes and problems with crowds.

Buena Vista Aquatic Recreation Area

BVARA is located about 60 miles north of Pyramid Lake in Kern County. The recreation area has a total of 1,585 acres and receives approximately 210,000 visitors annually. Lake Evans and Lake Webb are the park’s main attractions. BVARA staff provided the following information related to recreation use and demand that could be useful in informing recreation needs at Pyramid Lake; some of the same recreation uses occur at BVARA and information on how BVARA staff manage recreation could help inform a recreation plan for the Project.

- Lake Webb has 873 surface acres open to fishing, boating, and jet skiing, with two boat launches. Lake Webb has separate areas for waterskiing (125 acres) and PWC. Lake Webb has a limit of 300 boats and 125 PWCs at one time on the lake, and limits speeds to 45 mph; however, rarely are these limits reached.
- The adjoining Lake Evans is available for boating, sailing, and fishing, and encompasses less than 90 acres, with a boat speed limit of 5 mph. There are two boat launches on this lake.
- Lake Webb and Lake Evans are connected water bodies that have waters derived from wells and are used for agricultural uses. The lake levels stay constant year-round, and the drought has not greatly affected the water levels or quality. These lakes have not had outbreaks of blue-green algae or quagga mussel infestation problems.
- The park has four boat ramps and paved roadways that are wide enough to accommodate motor vehicles and bicycles. Surrounding the lakes are day use

areas equipped with barbecue grills and picnic tables. The park also features three picnic pavilions that can accommodate 100 to 400 people, depending on the site.

- The Buena Vista Campground is the main campground in the recreation area on the banks of Lake Webb. There are 112 campsites for use by tent and RVs, but only a limited number of sites have electric hookups (no full hookups). The campground is equipped with a dump station, six bathrooms, and two bathhouses with showers. An additional group camp is located on the northwest shoreline of Lake Webb, adjacent to large group day use areas that do have some electrical service for patrons.
- Campers can stay up to 14 days maximum during the peak recreation season, but outside the peak season they can stay for 31 days.
- The recreation area has never had to close because of reaching capacity; however, at Easter they often get the largest day use crowds. They do get backups queuing to the entrance kiosk, but have reduced the wait by having attendants go to vehicles in line to collect day use fees and allow patrons to move into the park in separate lanes once paid. To better manage crowds and wait times at the entrance, they separate the kiosk lanes into one for camping, one for credit cards, and one for cash.
- Most of the BVARA visitation originates from Bakersfield and other areas of the Central Valley. They get many national and international visitors, including those traveling the western United States by RV.
- The lakes are stocked with trout and the key fishing season is March through October. There are up to eight plants of trout per year in Lake Evans.
- The recreation area has not experienced much of a litter or trash issue, and they attribute that in part to the proliferation of available trash bags for personal and family use. Besides trash receptacles scattered about the park, they hand out trash bags at the kiosk, and all park staff carry bags and walk around handing them out as needed during busy periods. They have found people are very receptive to using the litter bag if it is provided.
- There has been a trend in more sports and play activities, and soccer, basketball, and play equipment is highly desirable for the day and overnight users.
- Swimming beaches at Lake Evans and Lake Webb have no lifeguards; however, warning signs and enclosed swimming areas are provided to keep boats away from swimmers. BVARA staff stated that not having lifeguards has not led to any safety incidents that they could recall.

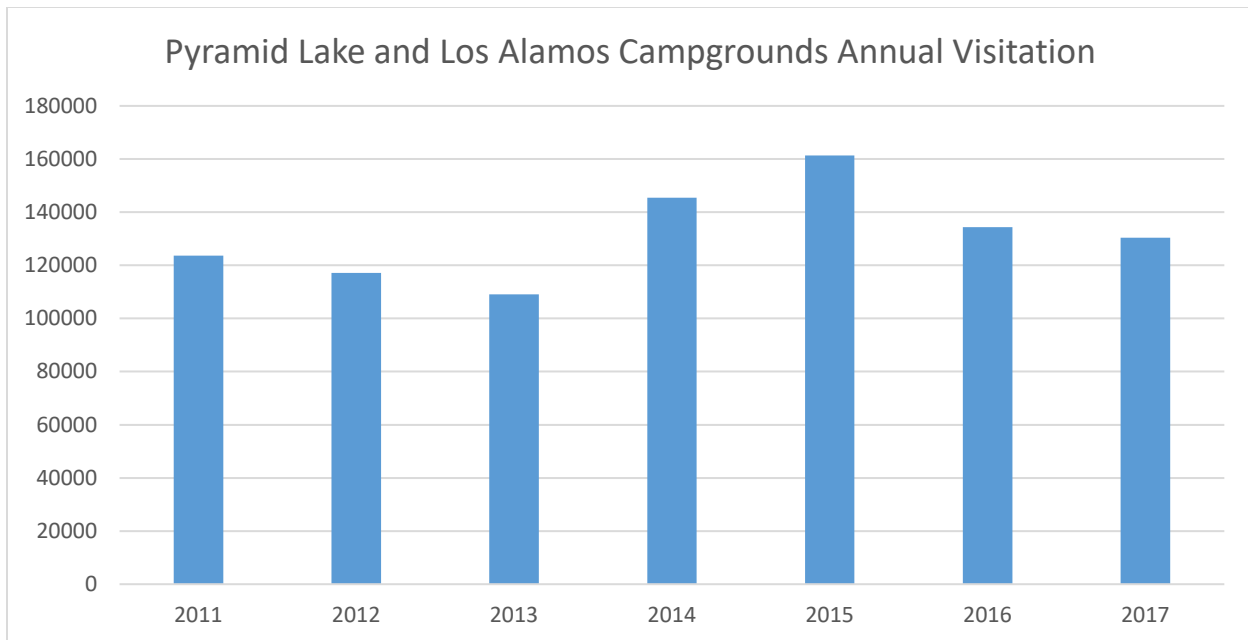
California Department of Parks and Recreation

As a major provider of recreation opportunities, DPR Los Angeles District staff offered the following observations in an interview regarding recreation needs and management that could inform an updated recreation plan for the Project.

- Lake levels at southern California reservoirs are probably the most fundamental factor in terms of visitation and attracting users. The lake with the highest lake levels is often where users will try to go first; and most users, particularly boaters, tend to keep their destination options open, and consider current or recent conditions at lakes such as Pyramid, Castaic, Casitas, and Piru.
- Pyramid Lake is less isolated than the other regional lakes and will often get more consistent use, as compared to other lakes with recreation offerings.
- Social media can greatly influence the choices of recreation destinations among users in today's world.
- There have not been any new campgrounds in the area in 20 years and DPR experiences a solid demand for camping sites along the coast, particularly between Memorial Day and Labor Day. The State Park reservation system for camping often fills sites seven months in advance. Group camps are a particularly important growth area.
- Installing sidewalks, paved trails, and structures for camping, such as yurts or huts, is very costly, as compared to the revenue such facilities could generate. However, adding electrical upgrades or service can pay for itself easier than most improvements. It is important to keep improving the offerings for RV camping and promote group campsites that have potable water and some basic electrical service.

Recreation Uses and Visitation

The Licensees researched visitation records and were able to find records from 2011 through 2018, since the time DWR took over operations of the Pyramid Lake recreation facilities from USFS. These visitor records provide user counts in the form of recreation visitor days. A recreation visitor day is a count or estimation of each visit by a person to a recreation development for recreational purposes during any portion of a 24-hour period. When compiled, the visitation records provide insight into recreation use trends and are an indicator of recent demand for recreation facilities. Annual visitation at Pyramid Lake day use sites and Los Alamos Campground has remained fairly steady over the last seven years, with a low of 109,105 visits in 2013, and a high of 161,297 annual visits in 2015 (Figure 5.5-10). One summary record of visitation was found for 1996 through 2001, when annual visitation was consistently reported at more than 140,000 a year, with 1996 and 1998 visitation more than 180,000 each year (DWR letter to FERC, follow-up to June 8, 2001 Environmental Inspection, filed October 9, 2001).



Source: DWR annual compilations of visitor days by month, 2011 through 2017

Figure 5.5-10. Total Number of Recreation Visits at Pyramid Lake and Los Alamos Campground, 2011 through 2017

Based on the last eight years of records, about 87 percent of all use is day use, and 13 percent is overnight use. Monthly visitation records since 2011 show a similar steady use pattern for day users (Figure 5.5-11) and overnight use (Figure 5.5-12). Records for boating indicated by the number of boat launches (Figure 5.5-13) and PWC launches (Figure 5.5-14) show a fairly steady pattern, with 2015 being a big year for boat launches, while monthly PWC launches appear to be trending downward (Figure 5-5-14).

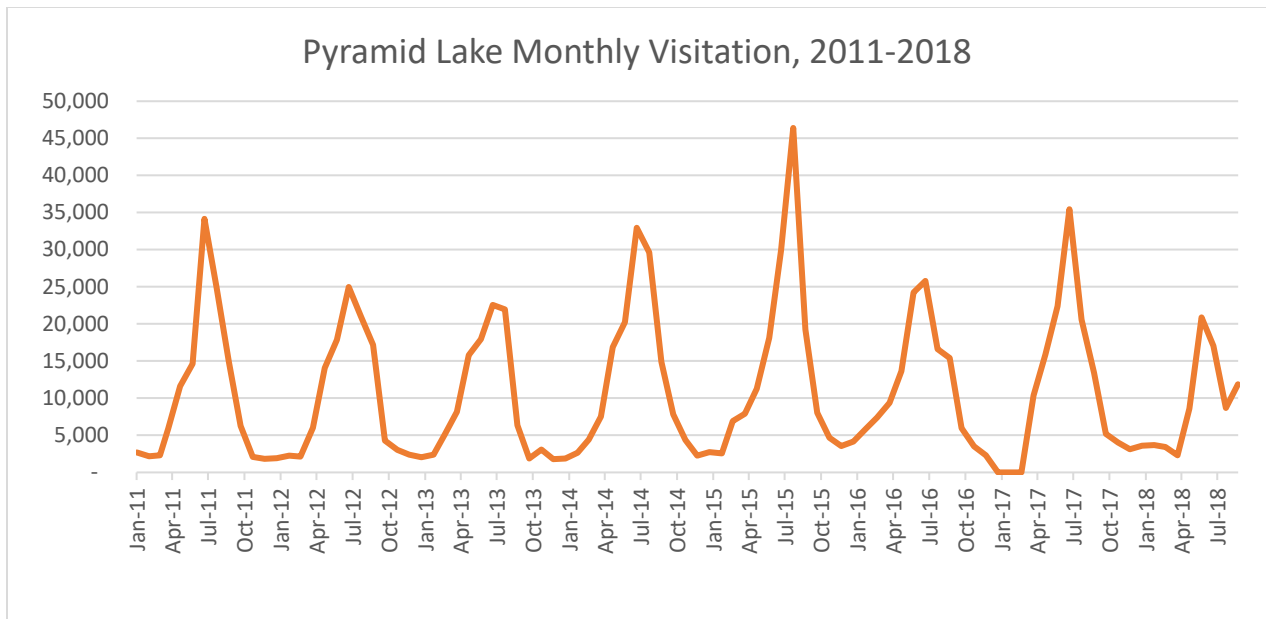


Figure 5-5-11. Day Use Visitation by Month at Pyramid Lake Since 2011

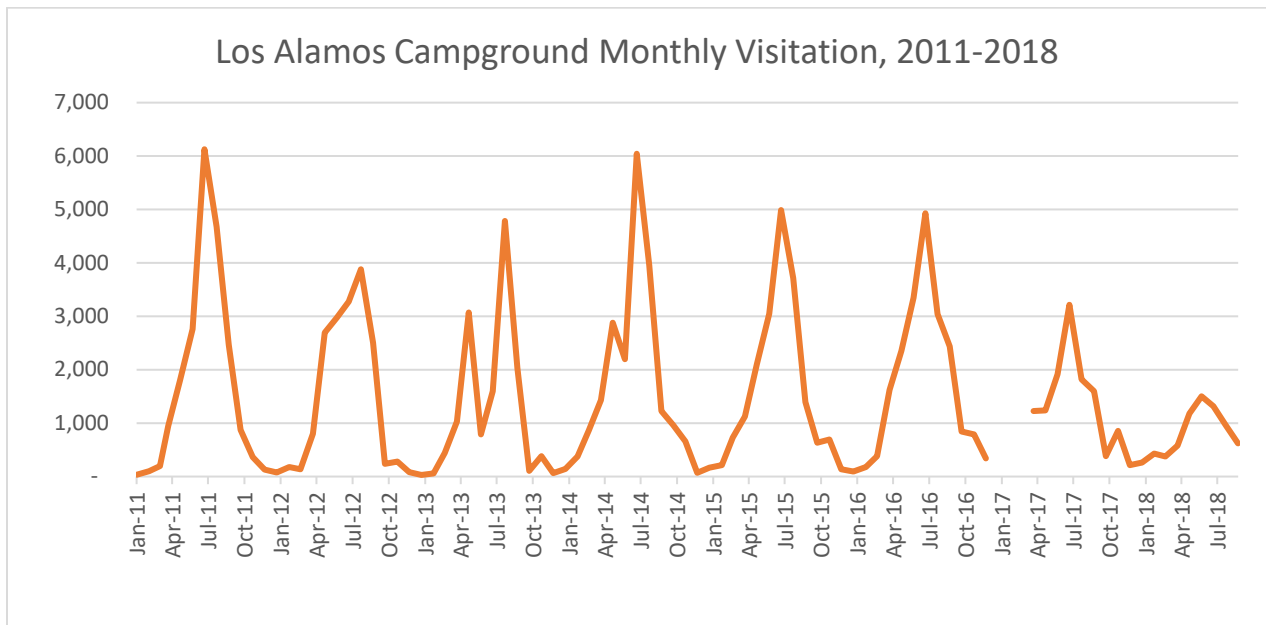


Figure 5-5-12. Overnight Use Visitation by Month at Los Alamos Campground Since 2011

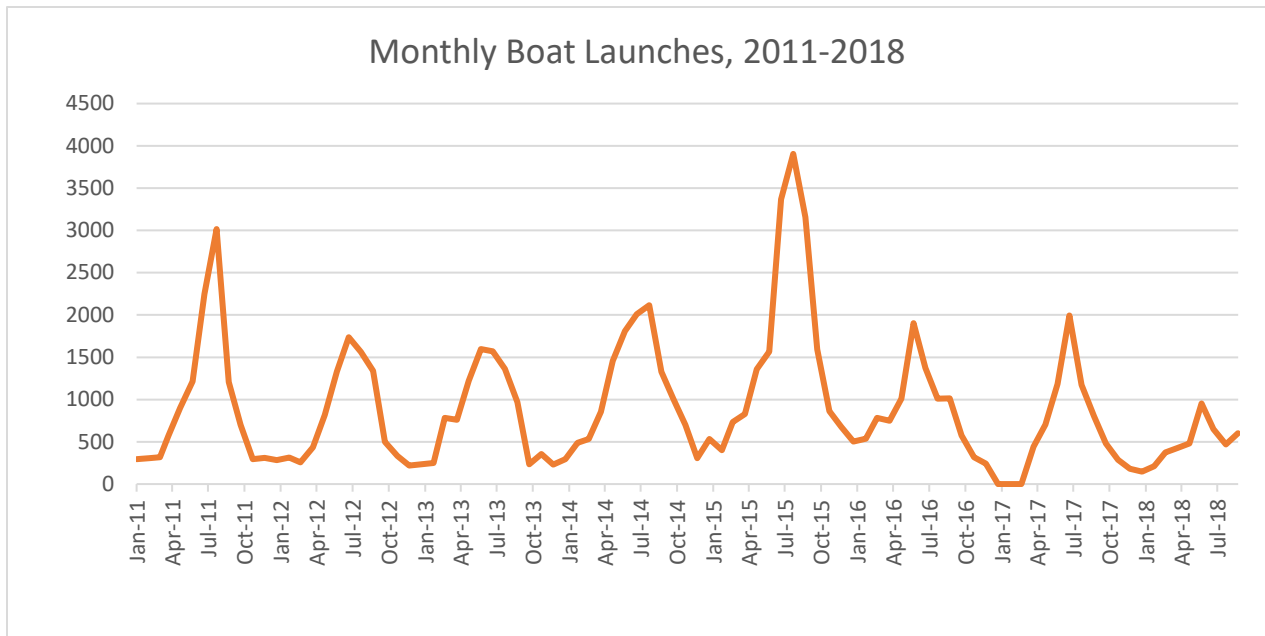


Figure 5.5-13. Number of Boat Launches by Month at Pyramid Lake Since 2011

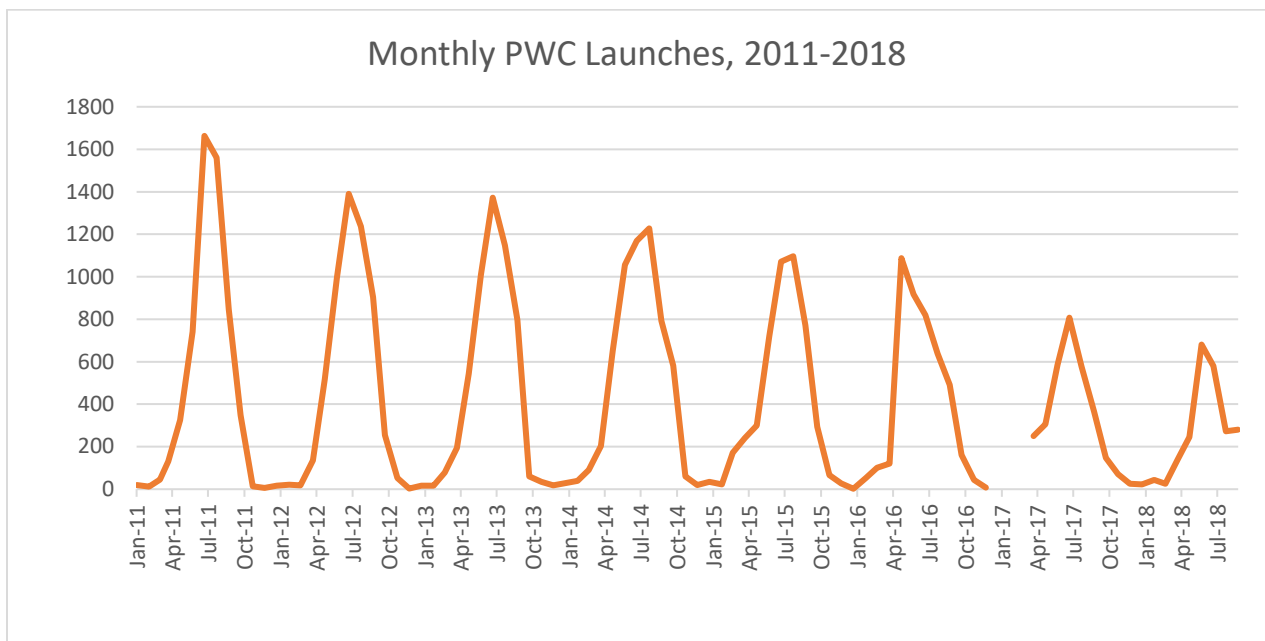


Figure 5.5-14. Number of Personal Watercraft Launches by Month at Pyramid Lake Since 2011

Pyramid Lake and Quail Lake Creel Surveys

Pyramid Lake creel surveys are conducted as a requirement under Exhibit S of the existing license. The Licensees conducted a series of creel surveys at Pyramid Lake; one spanning March 2014 to July 2014, and the other from October 2014 to July 2015. These creel surveys were based on roving survey methods with sampling days selected

by stratified random sampling on weekend and weekday days. Both surveys were conducted on an average of 10 days a month, with seven weekday surveys and three weekend day surveys. The roving survey consisted of angler interviews at shoreline areas where fishing effort was observed and accessible. Boat anglers were interviewed when they returned to the launch ramp. On average, three hours per survey day were required to conduct the angler interviews. In general, the majority of visible shoreline anglers were interviewed during the three-hour period. (Environmental Science Associates 2014, 2015; DWR 2014). Table 5.5-5 provides a summary and comparison of the two creel survey periods.

Table 5.5-5. Summary Results of 2014 and 2015 Creel Surveys on Pyramid Lake

Survey Factor	March – July 2014 Survey	October 2014 – July 2015 Survey
Angler Demographics and Travel Distances (expressed as percent of those surveyed)		
Male Anglers	94	92
Between 16 and 55 Years in Age	71	57
Greater than 55 Years in Age	22	37
Less than 16 Years in Age	7	6
Traveled between 20 and 50 Miles to Pyramid Lake	52	42
Traveled Less than 20 Miles to Pyramid Lake	9	7
Traveled More than 50 Miles to Pyramid Lake	51	39
Satisfaction Rating on Scale 1 to 4 (1=poor, 2=fair, 3=good, 4=excellent)		
Overall Satisfaction	2.58	2.28
Satisfaction with Number of Fish Caught	1.89	1.69
Satisfaction with Size of Fish Caught	1.88	1.72

Sources: Environmental Science Associates 2014, 2015

As part of Study 4.1.2, the Licensees conducted creel surveys at Quail Lake in 2017 and 2018. Recreational anglers at Quail Lake were surveyed through a randomly stratified active creel design to gather information on fishing pressure and impact to game fish species. A total of 50 surveys were conducted from October 1, 2017, to July 31, 2018, representing 16 high use days (weekends and major holidays) and 34 low use days (weekdays) that were randomly selected. A total of 85 angler parties were interviewed, representing 175 individual anglers. These anglers had a combined 854.6 angling hours, catching a total of 58 fish. Most angler parties interviewed traveled from nearby counties, primarily Los Angeles (72 percent), and most were satisfied with their

fishing experiences (see Section 5.3.1.3). Additional information concerning Pyramid Lake creel surveys is described in Section 5.3, Fish and Aquatic Resources.

Observation Survey

Observation surveys and in-person intercept surveys were conducted between May 26, 2018 and April 6, 2019 for the Project. The following summarizes the results of this survey work.

Nine recreation sites were identified to serve as places where observation surveys could be conducted by field researchers. These locations were selected based on consultation with the Licensees' staff and USFS. Below is a list of the selected sites:

1. Emigrant Landing Boat Launch
2. Emigrant Landing Picnic and Fishing Area One
3. Emigrant Landing Picnic and Fishing Area Two
4. Emigrant Landing Swim and Picnic Area
5. Frenchmans Flat (non-Project facility downstream of Pyramid reach)
6. Los Alamos Campground
7. Quail Lake Day Use area
8. Vaquero Day Use Area
9. Vista Del Lago Visitor Center

Recreation monitoring forms were developed to document recreation use at these identified sites. The data collected included site, weather, time, number of people observed, activities observed, number of cars and boats observed, number of groups, average group size, perceived crowding, observed or perceived user conflicts, languages observed, number of pets observed, and any additional notes.

During the study period, three random weekends, three random weekdays, and two holiday weekend days (Memorial Day) were surveyed for a total of nine survey days:

- May 26 and May 27, 2018 – Holiday (weekend)
- June 28, 2018 (weekday)
- July 30, 2018 (weekday)
- August 24, 2018 (weekday)

- August 25, 2018 (weekend)
- October 20 and 21, 2018 (weekend)
- April 6, 2019 (weekend)

Observations of People, Vehicles, and Boats at One Time

Measures used as part of this assessment included People At One Time (PAOT), Vehicles At One Time (VAOT), and Boats At One Time (BAOT). Table 5.5-6 presents the greatest number of observed PAOT, VAOT, and BAOT during the 2018 observation survey study effort. As shown in Table 5.5-6, Emigrant Landing Picnic and Fishing Area One consistently showed signs of having the highest level of use, with Vaquero Day Use Area on Holiday weekends showing high use as well. Vaquero serves as an important facility on weekends, helping disperse use on peak recreation use days.

Table 5.5-6. Observation Survey Results of People, Vehicles, and Boats at One Time

Site	Highest Number Recorded (Date Observed)	Second Highest Number Recorded (Date Observed)	Third Highest Number Recorded (Date Observed)
People at One Time			
Emigrant Landing Picnic and Fishing Area One	264 (Sunday, 5/27/2018 – Memorial Day Weekend)	103 (Saturday, 8/25/2018 – Labor Day Weekend)	90 (Saturday, May 26, 2018 – Memorial Day Weekend)
Vaquero Day Use Area	-	-	90 (Sunday, May 27, 2018 – Memorial Day Weekend)
Vehicles at One Time			
Emigrant Landing Picnic and Fishing Area One	79 (Sunday, 5/27/2018 – Memorial Day Weekend)	55 (Saturday, 8/25/2018 – Labor Day Weekend)	-
Vaquero Day Use Area	-	-	45 (Sunday, 5/27/2018 – Memorial Day Weekend)
Boats on Water Observed at One Time			
Emigrant Landing Picnic and Fishing Area Two	21 (Thursday, June 28, 2018)	20 (Saturday, May 26, 2018 – Memorial Day Weekend)	-
Emigrant Landing Boat Launch	-	-	6 (Sunday, 5/27/2018 – Memorial Day Weekend)

Activity Participation for Project Area Sites

Visitors to Pyramid Lake were involved in a range of activities, including swimming, picnicking, biking, fishing, walking/jogging/hiking/site seeing, camping, jet skiing, and non-motorized and motorized boating. As part of the observation survey, activities were recorded in which visitors were involved. On observation dates in the study area, picnicking was the most popular activity, followed by fishing and motorized boating. In comparison, the most popular activity documented in the 2014 LPNF Visitor Use Monitoring survey was Hiking/Walking (63 percent), followed by Viewing Natural Features (46 percent) and relaxing (34 percent).

Activities by Project Area Site

Table 5.5-7 below details the activities observed by site, organized by the greatest diversity of activities. The site with the greatest diversity of activities was Emigrant Landing Swim and Picnic Area, followed by Emigrant Landing Picnic and Fishing Area Two and Emigrant Landing Boat Launch. The sites with the least diversity of activities were Frenchmans Flat (non-Project facility) and Vista Del Lago Visitor Center.

Perceived Crowding

In addition to activities observed by site, the survey captured information based on the observers' perceptions of crowding, where there was some evidence of parking space scarcity, people scouting for available sites, high density or concentration of use, and boat ramp lines. The most crowding observations took place on weekends and included the following sites:

- Emigrant Landing Boat Launch
- Emigrant Landing Picnic and Fishing Area One
- Emigrant Landing Swim and Picnic Area
- Frenchmans Flat (non-Project facility)
- Quail Lake Day Use Area
- Vaquero Day Use Area

Table 5.5-7. Observed Recreation Activities by Facility

Site	Boat & Personal Watercraft	Motorized Boating	Jet Skiing	Non-motorized Boating	Picnicking	Fishing	Biking	Walking/Jogging/Hiking/Sightseeing	Swimming	Camping
Quail Lake Day Use Area					■	■	■	■		■
Emigrant Landing Boat Launch	■	■	■	■	■	■	■			
Emigrant Landing Swim and Picnic Area	■	■	■	■	■	■	■	■	■	
Emigrant Landing Picnic and Fishing Area One	■	■	■		■	■	■			
Emigrant Landing Picnic and Fishing Area Two	■	■	■	■	■	■	■	■		
Vista Del Lago Visitor Center								■		
Vaquero Day Use Area	■	■	■	■	■	■		■		
Los Alamos Campground					■		■	■		■
Frenchmans Flat (non-Project facility)					■	■	■	■	■	■

Key:

■ = Activity was observed taking place during the surveys.

Table 5.5-8 presents information regarding the type of perceived crowding by date and site.

Table 5.5-8. Observation Survey – Perceived Crowding by Site

Date	Location	Observed Crowding Notes (e.g., Parking lot crowding, recreation site competition, boat ramp lines)
5/27/2018	Emigrant Landing Boat Launch	80% of lot in use; boat launch busy
8/25/2018	Emigrant Landing Boat Launch	High density of use at boat launch with number of boats/personal watercraft coming in and out
5/27/2018	Emigrant Landing Picnic and Fishing Area One	60% of picnic tables utilized
8/25/2018	Emigrant Landing Picnic and Fishing Area One	High density of use appearing in fishing area
5/27/2018	Emigrant Landing Swim and Picnic Area	Beach crowding, 11+ pop-up tents on beach, very little space left
8/25/2018	Emigrant Landing Swim and Picnic Area	High density of use appearing on the beach
8/24/2018	Frenchmans Flat (non-Project facility)	High density of use appearance, but all in one group
8/25/2018	Frenchmans Flat (non-Project facility)	Morning - High density of use at campsites – large groups
8/25/2018	Frenchmans Flat (non-Project facility)	Afternoon - High density of use at campsites – large groups
5/27/2018	Los Alamos Campground	High density of use/full campsite
10/20/2018	Quail Lake Day Use Area	Parking lot full
10/21/2018	Quail Lake Day Use Area	Parking lot full
10/21/2018	Quail Lake Day Use Area	Parking lot full
5/27/2018	Vaquero Day Use Area	70% of parking lot in use; all picnic shelters in use

Key:
% = percent

Observed or Perceived User Conflicts

Observed misuse of facilities or disorderly conduct that could be a sign of perceived user conflicts were noted during the observational surveys. These included non-conformance with parking lines for parked vehicles; visible, heated exchanges between user groups; and alcohol-related conflicts. The few user conflicts that were observed are as follows:

- Emigrant Landing Boat Launch – Trailers parked across lanes, in wrong direction in parking lot

- Emigrant Landing Boat Launch – Some of the boat/vehicle spots were not long enough for the trailers
- Frenchmans Flat (non-Project facility) – Loud shouting at a campsite, and the area smelled like cannabis was potentially being used, with other user groups nearby

Visitor Intercept Survey

A visitor use intercept questionnaire was developed and deployed to collect information about recreation users visiting Pyramid and Quail Lakes. A copy of the questionnaire used in this study is provided in Appendix Q (*Pyramid and Quail Lake Visitor Use Summary 2018*). Survey questions were developed based on the 2005 satisfaction “gold” survey form from the USFS National Visitor Use Monitoring program and feedback from USFS and DWR. Some of the same or similar questions were used to form this questionnaire to allow benchmark comparison between the studies to help understand any shifts in visitor experience and desires for Pyramid Lake.

Survey Data Collection

The observation survey sampling days and date ranges were chosen for the intercept surveys, which included three random weekends, three random weekdays, and two holiday weekend days (Memorial Day), for a total of nine survey days:

- May 26 and May 27, 2018 – Holiday (weekend)
- June 28, 2018 (weekday)
- July 30, 2018 (weekday)
- August 24, 2018 (weekday)
- August 25, 2018 (weekend)
- October 20 and 21, 2018 (weekend)
- April 6, 2019 (weekend)

The in-person intercept survey was conducted at the same or in similar key locations as the observation surveys, with the following results for 2018 and 2019 shown in Table 5.5-9, below.

Table 5.5-9. Visitor Intercept Survey Totals by Date

Site Locations	26-May-2018	27-May-2018	28-Jun-2018	30 Jul-1 Aug 2018	23-25 Aug 2018	20-21 Oct 2018	6-Apr-2019	Total by Location
Emigrant Landing Boat Launch	4	1	4	4				13
Emigrant Landing Picnic and Fishing Area One	6		1	1	5	1		14
Emigrant Landing Picnic and Fishing Area Two	1		3					4
Emigrant Landing Swim and Picnic Area	8	5	7	1	3	4		28
Frenchmans Flat (non-Project facility)	1	4			1			6
Los Alamos Group Campground							1	1
Los Alamos Campground	1	4		2	4		1	12
Other/Not Listed	6	2	1					9
Quail Lake Day Use Area	1	1	1		2	3		8
Spanish Point Boat-in Picnic Area	1							1
Vaquero Day Use Area	3	3						6
Vista Del Lago Visitor Center	8							8
Total by date	40	20	17	8	15	8	2	110

Nine additional surveys were completed at several of the above listed sites; but at the time of the surveys (initial surveying efforts), the exact location was not indicated. These other nine are marked “Not Indicated.”

Survey Results

In total, 110 people were willing to be surveyed and thus 110 intercept surveys were completed. Emigrant Landing Swim and Picnic Area received the most responses at 28 surveys, followed by Emigrant Landing Boat Launch, with 13 surveys completed and Emigrant Landing Picnic and Fishing Area One, with 14 surveys completed (Figure 5.5-15).

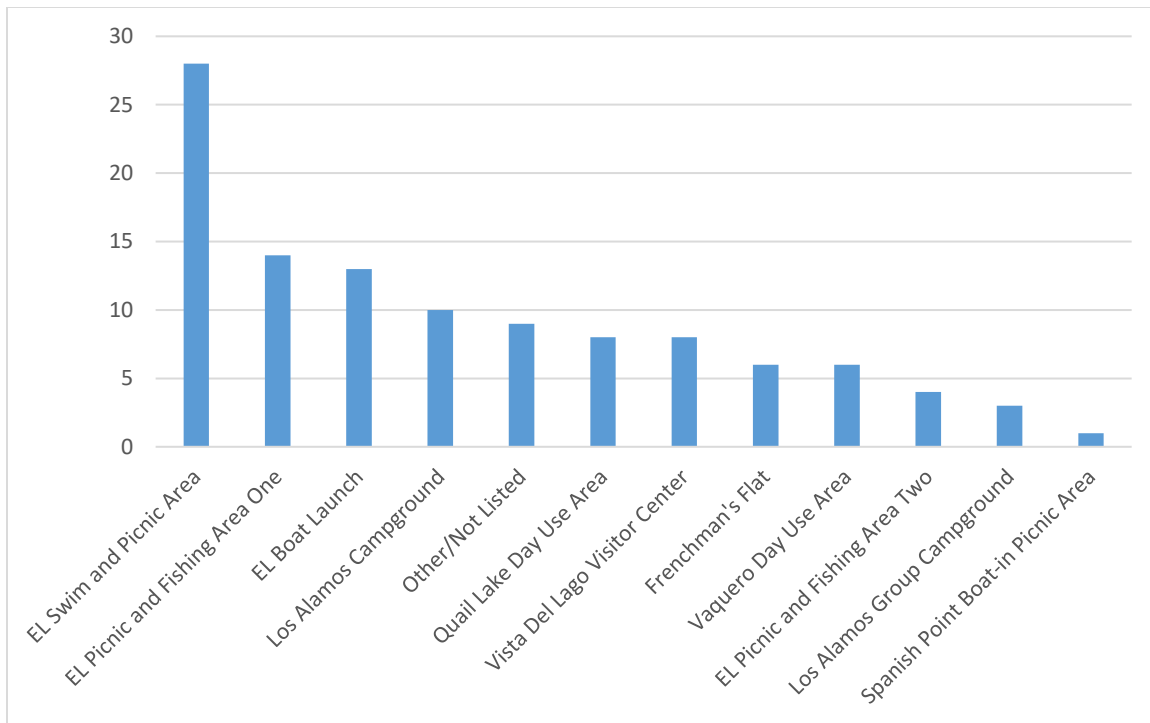


Figure 5.5-15. Survey Responses by Location

The primary purpose of the visit of those surveyed was recreation at 92 percent. Two percent of respondents were only stopping in to use the restroom and 6 percent were only passing through and going somewhere else. The following section summarizes the remainder of the results of the intercept survey.

Recreation Activities

Several survey questions asked respondents to provide information about their recreation activities at Pyramid and Quail Lakes (Figure 5.5-16). The questions were crafted to collect information from recreationists about recreation, activity participation, accessibility needs, areas visited, group size, user conflicts, perceived crowding, visitor profile (i.e. male/female, age, race) and preferences, visual impressions, and satisfaction with or desire for recreational opportunities and facilities in the Project area. The following paragraphs provide a summary of some of the questions asked of the recreationists and their responses.

Question 7 asked respondents **“Which of the following activities have you participated in, or plan to participate in, during this visit to this area?”** (n=102 total responses). “Fishing (from shore)” was identified as the most popular activity (55 percent), and “picnicking” as the second most popular activity (53 percent). “Swimming” was identified as the third most popular activity in the Project area. In comparison to the 2014 LPNF Visitor Use Monitoring survey, “hiking/walking” (63 percent) was the most popular activity on the forest, followed by “picnicking” and “relaxing.”

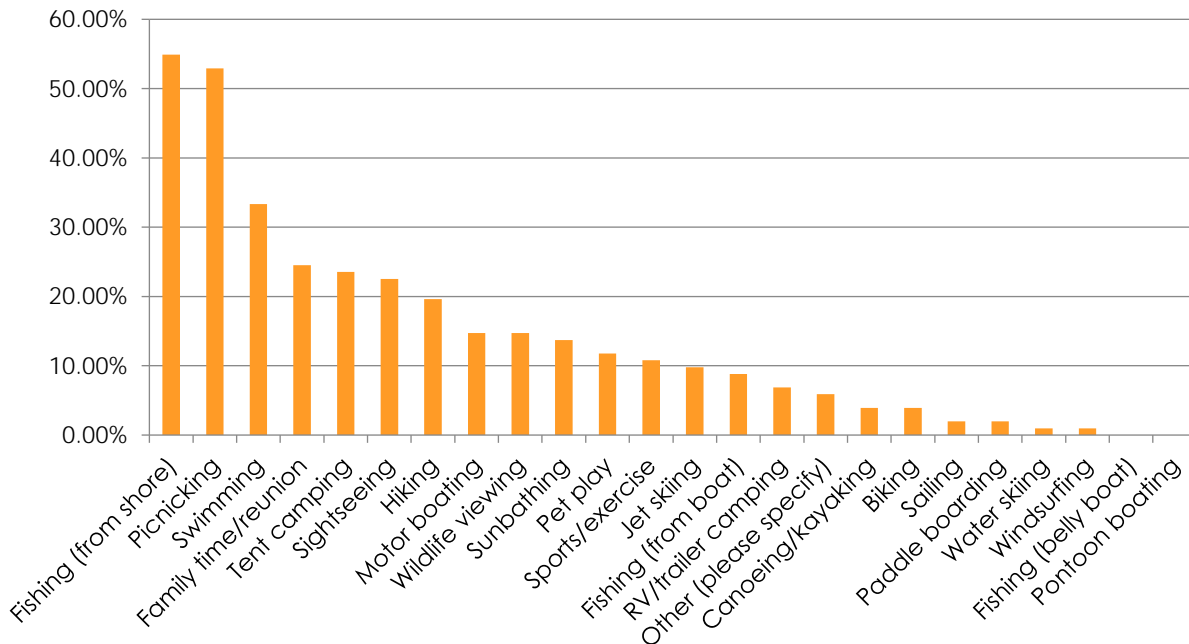


Figure 5.5-16. Question 7 Responses: Recreation Activities by Popularity

The other category consisted of write-in responses, including:

- Relaxing
- Tubing
- Wakeboarding

Question 8 asked respondents: **“Which of the above activities is your primary activity for this recreation visit?”** (n=88 total responses). The two most popular were the same as Question 7 – both “fishing (from shore)” and “picnicking,” followed by “tent camping” as the third most popular primary activity (Figure 5.5-17).

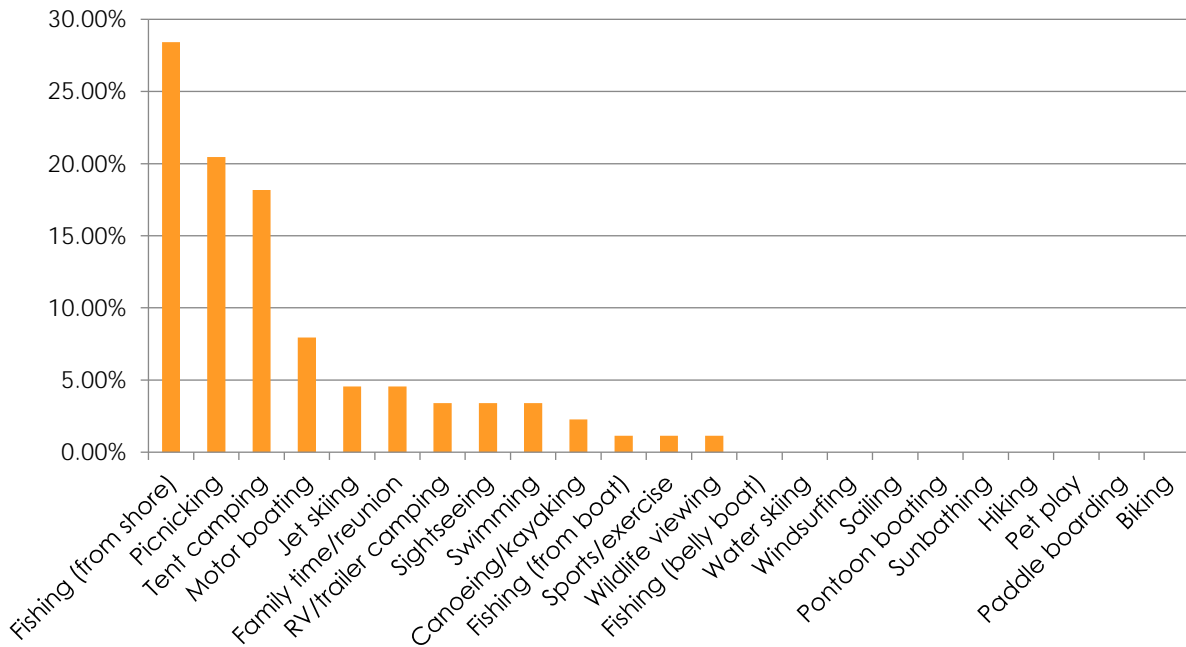


Figure 5.5-17. Question 8 Responses: Primary Activity for Recreation Visit by Popularity

Question 10 asked respondents: **“Are you interested in a remote stream based camping experience?”** (n=95 total responses). Sixty-three percent of respondents answered yes and 37 percent answered no (Figure 5.5-18). This was followed up with Question 11: **If yes to the above question, would you like more of this type of experience available near Pyramid and/or Quail Lake?** (n=64 total responses). The majority, 83 percent of respondents, answered yes, and 17 percent answered no.

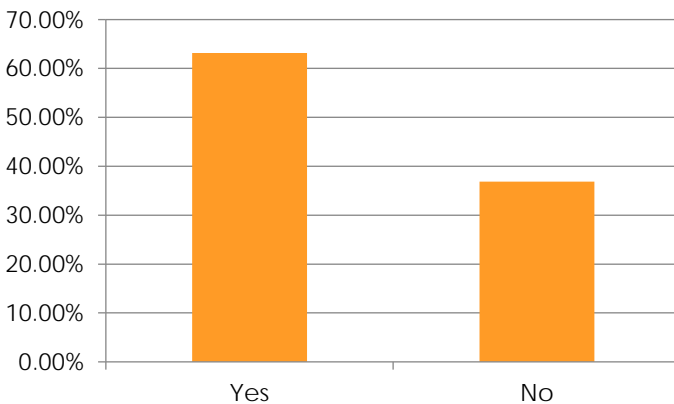


Figure 5.5-18. Question 10 Responses: Interest in Remote Stream-Based Camping Experience

Question 12 asked respondents: **“Overall, how satisfied are you with this visit to Pyramid Lake, Los Alamos Campground, Frenchmans Flat, and/or Quail Lake?”** (n=99 total responses). The majority of respondents were very satisfied (62 percent), 29 percent were somewhat satisfied, 6 percent were neither satisfied nor dissatisfied, 2 percent were somewhat dissatisfied, and 1 percent were very dissatisfied (Figure 5.5-19).

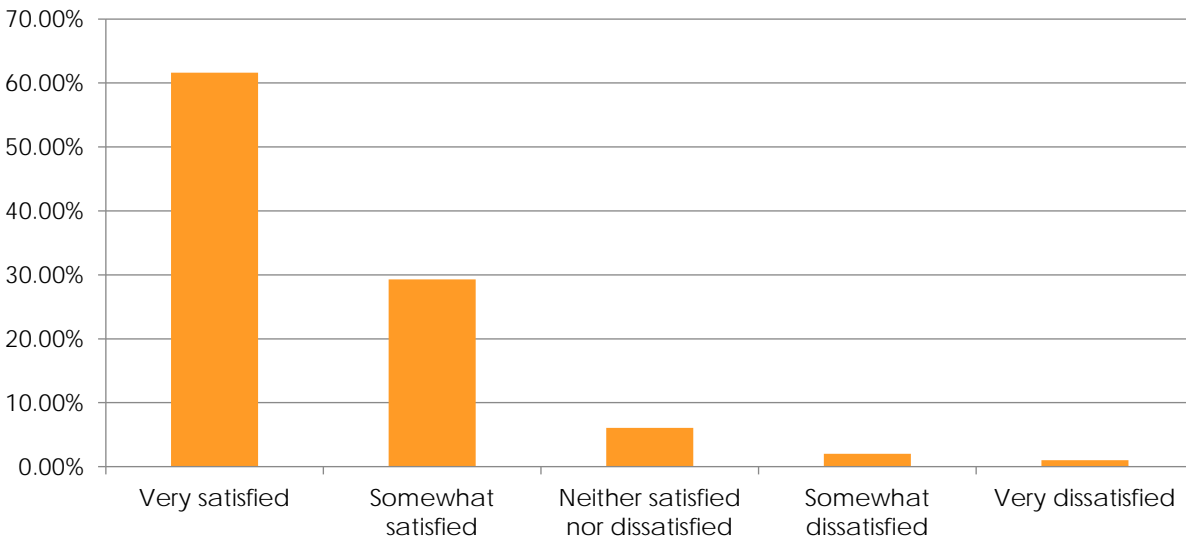


Figure 5.5-19. Question 12 Responses: Overall Satisfaction with Visit to Pyramid Lake, Los Alamos Campground, Frenchmans Flat, and/or Quail Lake

Question 13 asked respondents: **“What is the number one improvement you would like to see at Pyramid Lake, Quail Lake, or Los Alamos Campground?”** (n=88 total responses). The top three responses were:

- More fish
- More and cleaner water (the amount of algae is a concern)
- Increase the opportunities for shade

Question 14 asked respondents: **“The following section lists things you may or may not have experienced at Pyramid Lake, Quail Lake, Frenchmans Flat, and/or Los Alamos Campground. Please rate the following amenities or conditions.”** (n=100 total responses) (Figure 5.5-20). The top three largest problems identified were “availability of shaded areas” (6.1 percent), “quality of fishing” (6.1 percent) and “condition of restrooms” (6.0 percent). Other problems noted in the “Other” category include: “Parking - A big problem. Perceived safety is low. From Quail Lake fishing spots, cannot see parking visitors. Cannot see incoming cars or people or watch personal vehicle to ensure personal security. Expressed major concern for this issue” and “Too much smoking – a big problem.”

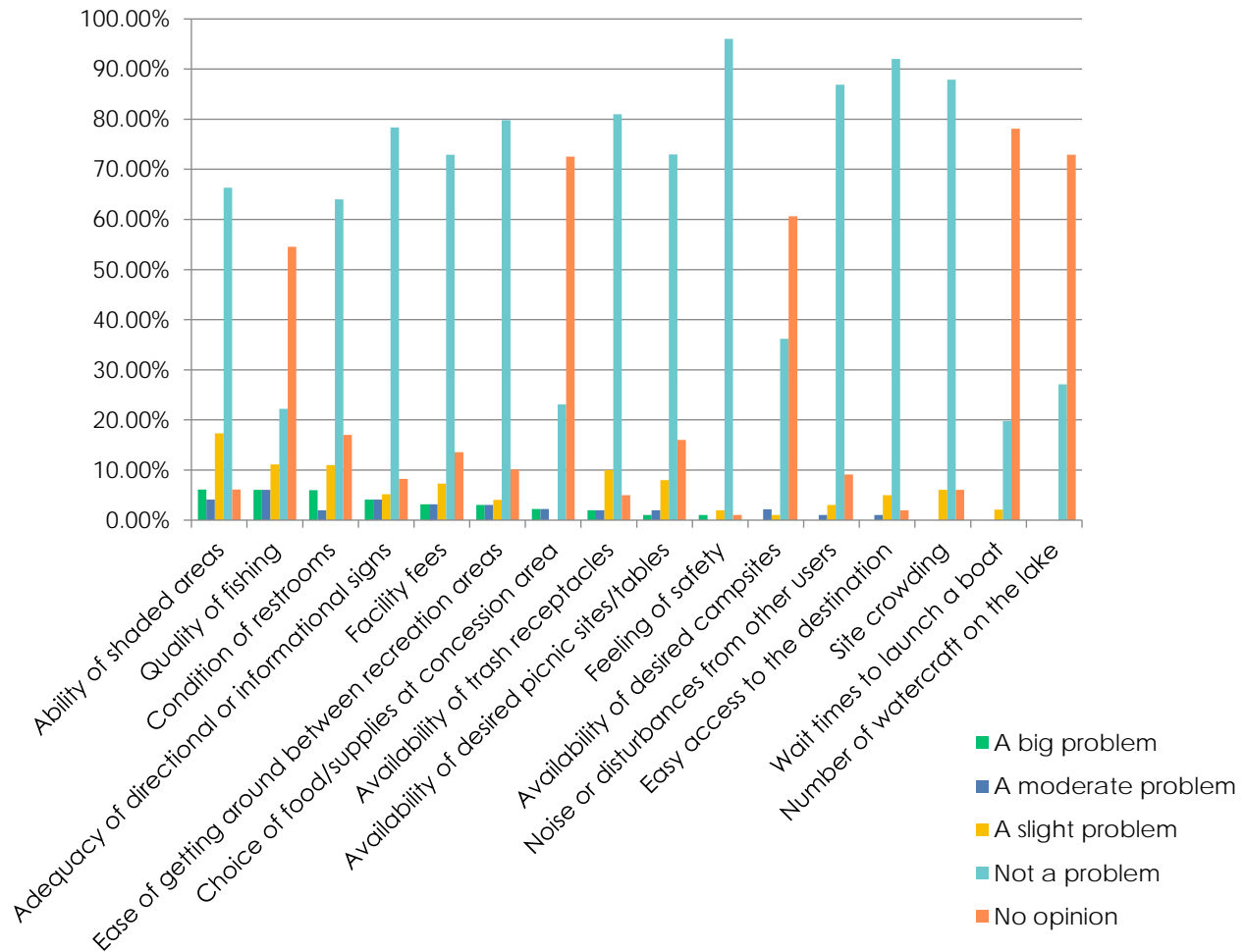


Figure 5.5-20. Question 14 Responses: Rating of Amenities and Conditions Experienced at Pyramid Lake, Quail Lake, Frenchmans Flat, and/or Los Alamos Campground

Question 15 asked respondents: **“How do you feel about the following amenities and services:”** Figure 5.5-21 presents the responses regarding amenities and services by weighted averages. The top three amenities and services that respondents felt were “too low” include: “availability of cell phone service” at 49 percent, “amount of educational signs and information” at 25 percent, and “availability of electric power sources” at 23 percent.

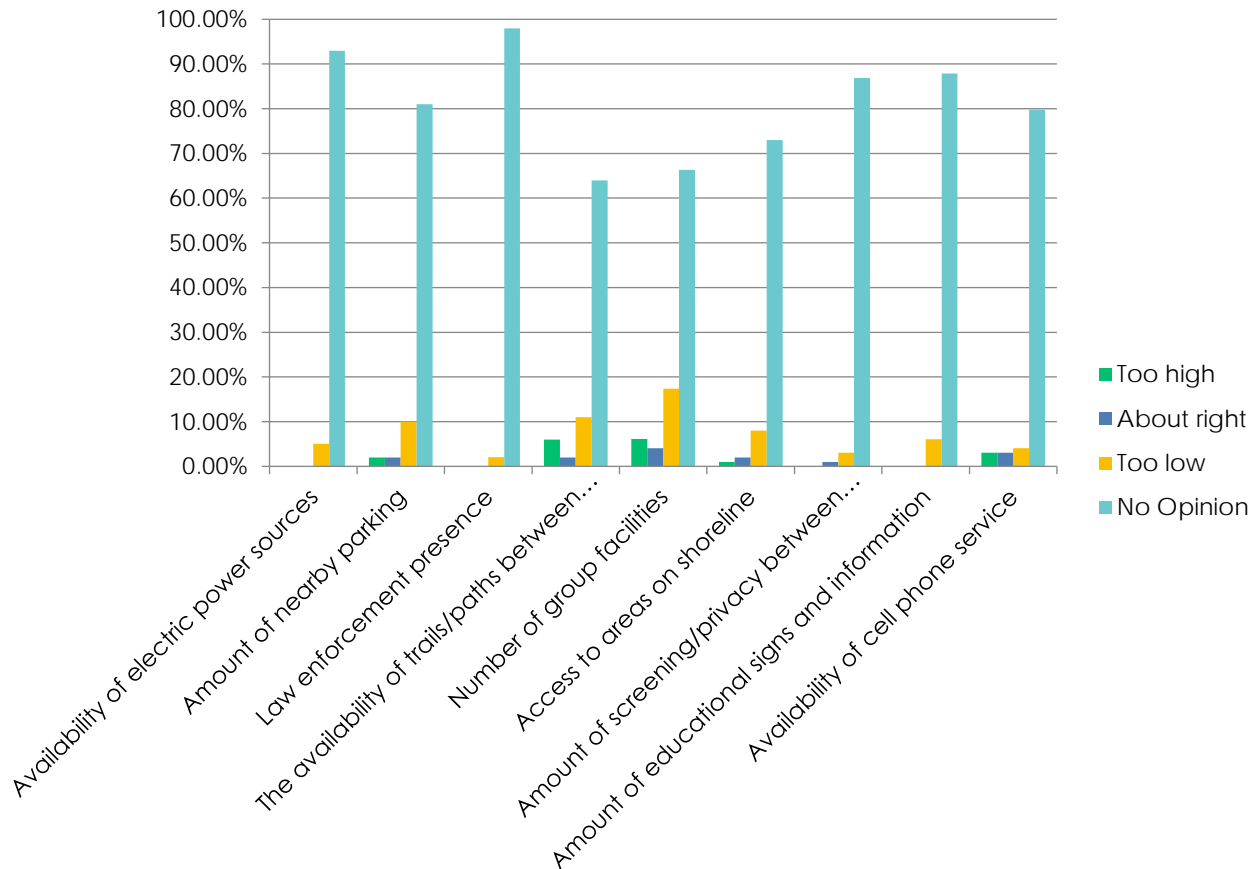


Figure 5.5-21. Question 15 Responses: Feelings About Amenities and Services By Weighted Average

Question 16 asked respondents: **“Other amenity or service you would like to comment on?”** Only three of the surveyed respondents answered this question with the following comments:

- Interest in having access to a cabin (camping)
- More green area and desire for more shade structures at swim and picnic area
- Parking safety is a concern
- Algae in swim area
- Would like an emergency cell station

Question 17 asked respondents: **“What, if anything, enhanced your recreation experience today?”** (n=63 total responses). The top three responses were:

- Fishing (either it was good, people caught fish, or they wanted to catch more)

- The scenery (including the wildlife)
- Time spent with family

Group and Trip Characteristics

The last five survey questions asked visitors to provide information about the characteristics of their group and trip.

Question 18 asked respondents: **“How many people, including yourself, traveled here in the same vehicle as you?”** (n=101 total responses). The greatest number of respondents indicated they were part of a group of two (35 responses). The second greatest number of responses was groups of four people (18 responses), and the third was groups of five people (14 responses).

Question 19 asked respondents: **“How many of those people (from the above question) are children (aged 16 and under)?”** (n=78 total responses). The greatest number of respondents indicated they arrived with two children (18 responses). The second greatest number of responses indicated they arrived with one child (12 responses), and the third respondents indicated they arrived with three children (9 responses).

Question 20 asked respondents: **“What is your age group?”** (n=101 total responses) (Figure 5.5-22). The greatest number of respondents, 46 percent, indicated their age group was 25 to 40 years old, followed by the age group 40 to 60 years old; next was 11 percent of respondents in the 6 to 25 age group, and finally the least represented age group at 4 percent was the 60 years or older age group.

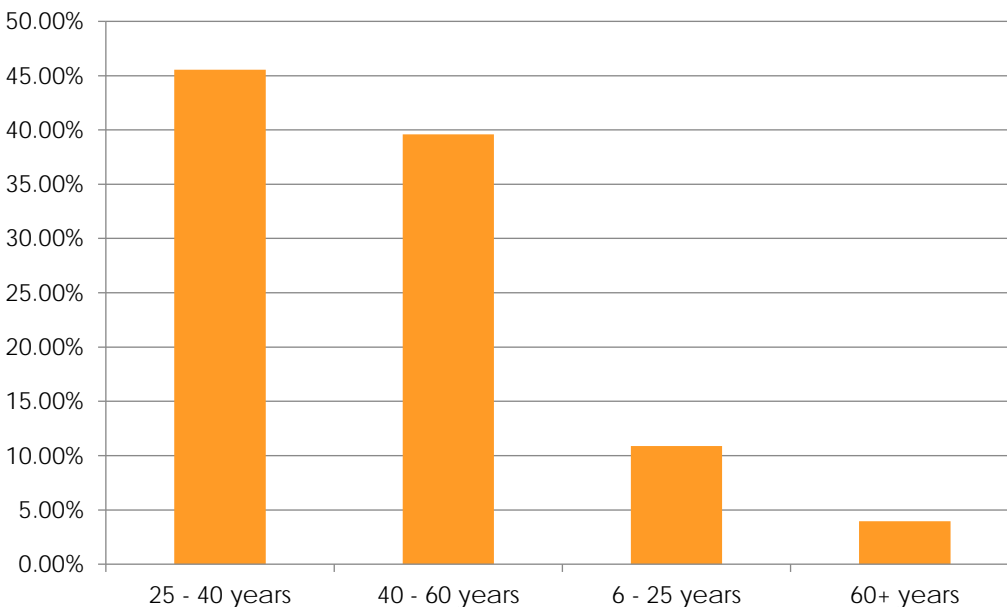


Figure 5.5-22. Question 20 Responses: Age Group

Question 21 asked respondents: **“Do you (or anyone in your group) have a disability?”** (n=99 total responses). Thirteen percent of respondents stated that they did have someone in their group with a disability, and 87 percent responded that they did not (Figure 5.5-23).

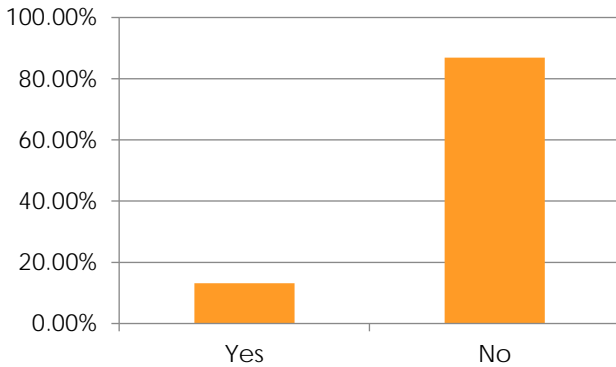


Figure 5.5-23. Question 21 Responses: Disability Within the Group

Question 22 asked respondents: **“If yes to the above, were the facilities and/or areas you visited accessible? (The Department of Water Resources wants to ensure it provides recreational opportunities for everyone, including those with disabilities)”** (n=11 total responses). The majority of respondents, 82 percent, stated that yes, the facilities/areas visited were accessible, and 18 percent noted that the facilities/areas visited were not accessible.

Carrying Capacity

As part of Study 4.1.11, the Licensees developed an overall assessment of the types and levels of recreational use to determine if use levels are compatible with the capacity of existing Project recreation facilities. Maintaining use levels within a recreation site’s capacity is important for the purposes of protecting natural, cultural, and recreation resources, as well as helping to promote public safety, providing predictability, and helping to assess management alternatives.

The concept of recreation carrying capacity was originally developed out of biological models that attempted to determine the capability of a given environment (e.g., range and pasture) to sustain a specific number of animals over time. While density-related information is an important factor in capacity, many management issues regarding recreation carrying capacity decision-making are not necessarily density dependent. Rather, recreation carrying capacity issues are also related to the ecological, social, and managerial aspects of recreational opportunities.

Recreation carrying capacity can be evaluated by considering several factors together to estimate a level of use beyond which impacts exceed common recreation industry and standards. Three types of capacity were evaluated: (1) biophysical/ecological; (2) social; and (3) physical/spatial aspects, including management components. As outlined in Study 4.1.11, these primarily qualitative analyses focused on the capacity of existing

developed recreation facilities and involved evaluating each developed site with respect to:

- Biophysical/Ecological Capacity – Relative impacts on the ecosystem, such as impacts to wetlands or riparian communities, observed soil erosion, vegetation damage, and observed trash accumulation and sanitary problems, among others. By design, developed/hardened recreation sites typically have fewer ecological concerns compared to dispersed use areas. The relative level of this factor can be noted and elaborated on in the condition assessment component.
- Social Capacity – Reported social impacts of recent and past visitor's recreation experience, such as perceived crowding, actual and/or perceived conflict, and overall satisfaction.
- Physical/Spatial Capacity – Identification of the number of units from the inventory component combined with recreation management considerations (including law enforcement) that will inform physical capacity (the number of people who can typically use a site at one time), and includes a spatial capacity component that accounts for periodic problems, parking, traffic flow or backups at entrances.

Recreation carrying capacity types were assessed at each developed recreation site at the Project. For each developed site, qualitative and quantitative data were used to identify a comparative and general status with respect to likely ecological, social, and/or management capacity impacts, and to establish an existing capacity parameter (expressed in qualitative terms, including “below,” “approaching,” “at,” or “exceeding” capacity).

In preparation for its 2015 FERC Form 80 (Recreation Report) filing, DWR conducted a user count and capacity utilization study for Project recreation facilities in 2014. DWR found that capacity utilization ranged from a low of 3 percent for Quail Lake to a high of 70 percent for Pyramid Lake picnic areas. In no case was the use demand above maximum capacity, which suggested that existing facilities and use areas are adequately accommodating the existing recreation demand.

Based upon the findings of the Licensees' Study 4.1.11, a qualitative and quantitative analysis of carrying capacity of each developed facility was undertaken, and the results are summarized by recreation site in Table 5.5-10.

Table 5.5-10. Estimated Carrying Capacity by Recreation Facility

Recreational Facility	Bio/Eco Capacity	Social Capacity	Physical Capacity ¹	Overall Capacity Assessment
Emigrant Landing Entrance Area	No known issues; site is fairly small, highly developed, and well hardened	Line queuing, especially during closures, could lead to some conflicts, but no known issues	2 vehicles at a time, less than 2 minutes likely per vehicle in normal flow	At capacity on many summer and holiday weekends
Emigrant Landing Boat Launch	No known issues; site is well hardened; oil and grease runoff from vehicles in parking areas can add pollutants to the lake during rain events	No known problems; big spaces allow room even at full use; however, site can be full and conflicts between users on launch and in line are always a possibility	337 persons at 3.7 per vehicle, 81 total spaces with 73 of them accommodating boat trailers. USFS in its July 12, 2019 USR comment letter noted that law enforcement officers have observed situations where concessionaire allows overflow parking in areas not designated for parking at times.	Approaching capacity and at or near capacity on most summer weekends. Capacity controls are needed to establish an area that does not exceed designated capacity.
Emigrant Landing Picnic and Fishing Area One	Has very little vegetation trampling and few disturbed soil areas	No known problems; big spaces allow room even at full use; however, site is one of the first to fill to capacity; crowding or perceived over-crowding is likely an issue for some users; the possibility of user conflicts rises	333 persons at 3.7 per vehicle and 90 total parking spaces; picnic sites could accommodate about 168 persons at 8 persons per site	Approaching capacity and at or near capacity on most summer weekends
Emigrant Landing Picnic and Fishing Area Two	Has very little vegetation trampling and few disturbed soil areas.	Because the facility reaches capacity on holiday weekends, crowding or perceived over-crowding is likely an issue for some users; the possibility of user conflicts rises	296 persons at 3.7 per vehicle and 80 total parking spaces; picnic sites could accommodate about 83 persons at 8 persons per site	Approaching capacity on some summer and at least one day of each summer holiday weekend
Emigrant Landing Swim and Picnic Area	Few user-created trails, but some vegetation trampling on margins; exposed soils compacted	Because the facility reaches capacity on holiday weekends, crowding or perceived over-crowding is likely an issue for some users; the possibility of user conflicts rises	500 persons at 3.7 per vehicle and 135 parking spaces; picnic sites could accommodate about 248 persons at 8 persons per site	Approaching capacity and at or near capacity on most summer weekends
Vista Del Lago Visitor Center	Few user-created trails, but some vegetation trampling on margins; exposed soils compacted	No known problems; low use and large capacity visitor center and parking area leaves few likely encounters	588 persons at 3.7 per vehicle and 159 parking spaces	Below capacity
Vaquero Day Use Area	Few user-created trails, but some vegetation trampling on margins; exposed soils compacted	Because the facility can reach capacity on some holiday weekends, crowding or perceived over-crowding is likely an issue for some users; the possibility of user conflicts rises	540 persons at 3.7 per vehicle and 146 parking spaces	Approaching capacity on most summer weekends
Spanish Point Boat-in Picnic Area	Several user-created shoreline and walk-in trails, with some vegetation trampling on margins; exposed soils compacted	Since the site receives some walk-in use and larger groups are known to use the site for access to shoreline and personal watercraft equipment, there is possibility of competition for shoreline sites, but no reports have indicated any problems	Approximately 72 persons at 8 persons per picnic site	Approaching capacity on summer weekends
Serrano Boat-in Picnic Area	Exposed soils somewhat compacted	No known problems; often a “first-come” so there is some competition for site occupancy on holidays and some weekends, so the possibility of user conflict rises during these periods	On dock with 6 picnic sites and adjoining areas estimated to hold approximately 30 persons, with dock space for boat mooring a limiting factor	Below capacity
Bear Trap Boat-in Picnic Area	Few user-created trails, but some vegetation trampling on margins; exposed soils compacted	No known problems; often a “first-come” so there is some competition for site occupancy on holidays and some weekends, so the possibility of user conflict rises during these periods	2 picnic sites, 3 shade ramadas and adjoining areas and facilities estimated to hold approximately 25 persons	Approaching capacity and near capacity on some summer weekends

Table 5.5-10. Estimated Carrying Capacity by Recreation Facility (continued)

Recreational Facility	Bio/Eco Capacity	Social Capacity	Physical Capacity ¹	Overall Capacity Assessment
Yellow Bar Boat-in Picnic Area	Few user-created trails, but some vegetation trampling on margins; exposed soils compacted	No known problems; often a “first-come” so there is some competition for site occupancy on holidays and some weekends, so the possibility of user conflict rises during these periods	20 picnic tables and 10 shade ramadas and adjoining areas and facilities estimated to hold approximately 50 persons with dock space for boat mooring a limiting factor	Approaching capacity on some summer weekends
Quail Lake Day Use Area	Some shoreline user-created trails with some vegetation trampling on margins; exposed soils slightly compacted	Because the facility reaches capacity on holiday weekends, crowding or perceived over-crowding is likely an issue for some users; the possibility of user conflicts rises	130 persons at 3.7 per vehicle and approximately 37 total parking spaces	Approaching capacity and at or near capacity on some summer weekends
Los Alamos Group Campground	Few user-created trails, but some vegetation trampling on margins; exposed soils compacted	Because the facility approaches capacity on some holiday weekends, crowding or perceived over-crowding is likely an issue for some users; the possibility of user conflicts rises	120 person capacity based on limit of 40 person per site, with 3 group sites total; parking for approximately 45 cars	Approaching capacity on some summer weekends
Los Alamos Campground	Few user-created trails, but some vegetation trampling on margins; exposed soils compacted	Because the facility approaches capacity on some holiday weekends, crowding or perceived over-crowding is likely an issue for some users on those weekends; the possibility of user conflicts rises	744 persons theoretical capacity at maximum 8 person per site with 93 sites; parking for 186 cars at the allowed 2 vehicles per site	Approaching capacity on some summer weekends

Note:
¹An average of 3.7 persons per vehicle is an estimated average.

5.5.1.4 Recreation Demand and Needs in the Project Region

The Project is located in an area where the primary recreation opportunities are associated with the national forests, State parks, and parks within Los Angeles County and its cities. This section describes relevant regional recreation demand, trends and demographics based on existing literature.

USFS

Southern California national forest (i.e., ANF, Cleveland, LPNF, and San Bernardino National Forest) visitation has increased over the past two decades because of the area's population growth. Driving for pleasure and viewing scenery have become some of the more popular national forest activities. Visitors expect a certain level of 'naturalness' in the recreation and tourism settings they pursue. Even individuals who have never visited these national forests expect a certain level of 'natural intactness' in these landscapes. This natural beauty contributes to their sense of well-being and quality of life. (USFS 2005a).

Almost all visitation to southern California national forests is local in origin. These forests and their recreational amenities serve as very popular local day use attractions, often for large, diverse urban groups of extended family and friends engaging in relaxing activities. (USFS 2005a).

While some level of recreation activity occurs throughout southern California national forests, the majority of use is concentrated in a relatively small number of popular areas. These areas are often associated with developed facilities and are easily accessible by road. (Stephenson and Calcarone 1999 in USFS 2005a).

The LPNF received an estimated 938,000 million visits in 2016, up from an estimated 635,000 visits in 2009 (USFS 2018a). The ANF received an estimated 2.8 million visits in 2016, down from an estimated 3.6 million visits in 2011 (USFS 2018b). USFS' forest plans note that visitor use is changing and there will be inevitable growth in many activities, including OHV trail use (USFS 2005a).

Recreation in southern California is a complex social activity, and constantly changing preferences and interest levels create increased challenges for agency land managers. Some unique factors that affect the sustainability of recreation management within the southern California national forests are as follows (USFS 2005c):

- The national forests offer a unique niche of nature-based, day use mountain recreation in southern California. Key attractions include scenic vistas, green forests, cool temperatures, lake and stream-based waterplay, picnicking, winter sports, wilderness areas, and hundreds of miles of trail systems and motorized backcountry recreation routes. Visitors want to escape the stress of urban life, traffic, and smog, and relax in nearby mountain refuges.

- Intensive, all-season recreation uses can lead to resource and habitat impacts and a struggle for USFS to maintain environmentally sustainable recreation opportunities. Competition for space, visitor group and community conflicts, and deterioration of facilities and areas occur in many parts of the southern California national forests.
- There is no off-season in southern California. Use is year-round, often spontaneous (for example, snowplay after major winter storms), and the daily site turnover rate is often high at some facilities.
- There is a lack of room to expand recreation facilities at some popular areas due to steep topography and limiting land boundaries.
- Rapid urban development is occurring adjacent to and within national forest boundaries, leading to use pressures (such as "social" trails) and resource impacts. Urban social problems are migrating to this nearby open space, leading to public safety concerns.
- Demographics are rapidly changing. Complex public information strategies are needed, based on urban orientations and many languages, cultures, and class diversities.
- Visitor expectations are higher than in some parts of the country. More amenities are expected, such as RV utility hook-ups, flush toilets, and hot showers.
- Many new recreation activities originate or become popular in southern California and are first practiced in these urban national forests. They include mountain biking, hang-gliding, radio-controlled airplanes, geocaching, and paintball gaming. Development of these new technologies often changes or increases visitors' ability to access and use the national forests.
- There are increased opportunities for recreation and conservation education partnerships between USFS and non-profit organizations, volunteers, and businesses.
- Recreation facilities, areas, and programs on national forests influence local economies by prompting tourism, business and residential sectors.

Statewide Comprehensive Outdoor Recreation Plan

DPR authors the California State Comprehensive Outdoor Recreation Plan (SCORP), which serves as a statewide master plan for State and local parks, and outdoor recreational open space areas. The SCORP also offers policy guidance to all outdoor recreation providers, including federal, State, local, and special district agencies throughout California.

The current (2015) SCORP is summarized below, along with the following key supporting documents: Survey on Public Opinions and Attitudes (SOPA) on Outdoor Recreation in California 2012 (DPR 2014) and Outdoor Recreation in California's Regions 2013 (DPR 2013). California State Parks' 2015 SCORP reflects the current and projected changes in California's population, trends, and economy. This edition of the SCORP provides a strategy for statewide outdoor recreation leadership and action to meet the State's identified outdoor recreation needs. This SCORP establishes the following actions to address California's park and recreation needs:

Statewide Actions

1. Inform decision-makers and communities of the importance of parks.
2. Improve the use, safety, and condition of existing parks.
3. Use GIS mapping technology to identify park deficient communities and neighborhoods.
4. Increase park access for Californians including residents in underserved communities.
5. Share and distribute success stories to advance park and recreation services.

As part of the SCORP, the SOPA continues a process in place for over 25 years: to utilize applied research as a critical component of developing the SCORP. An understanding of the outdoor recreation demands, patterns, preferences, and behaviors of California residents is essential to develop policies, programs, services, access, and projections of future use.

The 2012 survey study included an adult telephone survey, adult online/mail-back survey, and online/mail-back youth survey to provide a comprehensive perspective of the outdoor recreation opinions and attitudes of Californians. Consistent with earlier studies, the 2012 adult surveys measured participation, latent demand, willingness to pay, importance and use of facilities, motivation, and opinions regarding privatization of services. The 2012 adult surveys, as in the 2008 survey, include measurements of physical activity in parks and constraints to physical activity. A new area of study for the current survey is an analysis of quality of life relating to parks and communities. Comparisons on several variables by region and differences and similarities between Hispanics and non-Hispanics have been continued as a focus of investigation.

The survey findings from the 2012 adult surveys are provided below. While the survey is seven years old, it likely retains a high degree of relevancy.

Park Visitation and Activity Participation

- Nearly all respondents (91.6 percent) had visited a park within the past 12 months. The majority (71.5 percent) had visited a park within the past month.

- In the past 12 months, a majority of respondents visited highly developed parks and recreation areas, developed nature-oriented parks and recreation areas, historic or cultural buildings, sites, or areas, and natural and undeveloped areas.
- About three quarters of Californians traveled to parks with family (52.5 percent) and friends (23.5 percent), while almost one-third went to parks with both family and friends.
- More than two-thirds of Californians reported spending the same (33.2 percent) or more time (35.2 percent) in outdoor recreation activities compared to five years ago.
- Californians who spend less time in outdoor activities than they did five years ago do so because of time/work (25.7 percent), age (22.7 percent), and health/disability (16.4 percent).
- The majority of respondents participated in moderate (40.6 percent) to light levels (37.8 percent) of physical activity during park visits, and spent less than three hours of time (46.1 percent) physically active in parks.
- During the past 12 months, Californians mostly participated in picnicking (70.4 percent), walking (63.8 percent), beach activities (52.8 percent), shopping at farmers' markets (49.5 percent), and swimming in a pool (48.2 percent).
- The respondents would like to participate more often in picnicking (55.1 percent), walking (37.4 percent), camping (35.1 percent), and beach activities (34.6 percent).
- Park companions under the age of 18 mostly play (54.8 percent) and participate in sports (27.7 percent) when at parks.
- More than half of respondents utilized community facilities/buildings (65.4 percent), unpaved multiuse trails (60.2 percent), and picnic table/pavilion (56.6 percent) during their last park visit.
- More than a third (34.7 percent) of respondents reported utilizing an unpaved trail for hiking, biking, or horseback riding at least once or twice a month or more during the last 12 months. At the same time, 31 percent of respondents reported never using an unpaved trail.
- Few (7.9 percent) of the respondents reported engaging in off-road motor vehicle use once a month or more. A total of 18.2 percent of respondents reported using an off-road vehicle in the last 12 months.

- The most prevalent reasons the respondents participate in their favorite outdoor recreation activities included: to have fun, relax, view scenic beauty, be with family and friends, and keep fit and healthy.

Preferences and Priorities

- The most important facilities were wilderness type areas with no vehicles or development, play areas for children, areas for environmental and outdoor education, large group picnic sites, recreation facilities at lakes/rivers/reservoirs, and single-use trails.
- More than 60 percent of Californians surveyed thought more emphasis should be placed on protecting natural resources, maintaining park and recreation areas, protecting historic resources, and cleaning up pollution of oceans, lakes, rivers, and streams in park and recreation areas. About one-third of respondents felt less emphasis should be placed on providing opportunities for motorized vehicle operation on dirt trails and roads.
- Most respondents strongly agreed or agreed that fees should be spent on the area where they are collected: recreation programs improve health; rules and regulations need enforcement; the availability of recreation areas and facilities attract tourists; and recreation programs help reduce crime and juvenile delinquency.

Satisfaction with Park Facilities

- Most respondents (72.8 percent) reported being satisfied or very satisfied with current facilities or outdoor recreation areas' conditions. Approximately 26 percent of the respondents answered that parks were better than five years ago, and 26 percent answered that they were not as good as five years ago.

Park Fees

- The respondents were more willing to pay between \$11 to \$50 to picnic and camp than other activities.

Privatization Preferences

- The respondents more strongly supported privatization of food and beverage and rental services, sponsorships of events, and general maintenance. Respondents were less supportive of privatizing total operations, law enforcement, and educational activities.

Constraints to Park Use

- Fear of gang activity, use of alcohol and drugs, and poor maintenance were the biggest factors limiting the respondents' ability to engage in physical activities in parks.

Travel Times

- A majority of respondents (55.2 percent) reported spending between 5 and 10 minutes walking to the place they most often go for recreation. Meanwhile, a majority of respondents (54.5 percent) reported spending between 11 and 60 minutes driving there.

Quality of Life and Communities

- Californians rated clean air and water, prevention of crime, feeling safe, and having enough good jobs for residents as the most important factors for their personal quality of life. Respondents were not entirely satisfied with these factors in their community.
- Residents rated preservation of natural areas, the beauty of their community, and preservation of wildlife habitats as the community conditions most increased by parks and recreation in their community. Residents did not rate traffic control, a stable political environment, fair prices for goods and services, and good public transportation as being increased or decreased by parks and recreation. (DPR 2014).

As described in Outdoor Recreation in California's Regions 2013 (DPR 2013), California's diverse geography, demography, and economy present both opportunities and challenges to the State's outdoor recreation providers. A regional approach, which recognizes regional differences and divides regions along county lines, can aid both State and local planning efforts.

5.5.2 Effects of the Licensees' Proposal

This section discusses the effects of the Licensees' Proposal on recreation resources, as described in Section 2.0 of this Exhibit E. The Licensees, USFS and CDFW are in the process of developing a Recreation Management Plan (RMP) as a proposed measure to be included in the Licensees' FLA. The RMP would describe the actions the Licensees would take to operate and maintain the Project recreational facilities during the term of the new license.

Additionally, continuing the fish stocking measure (AR2) at Pyramid Lake would ensure that one of the primary recreation offerings at Pyramid Lake would continue to help meet angler needs through the term of the new license. Measure WR1 would help maintain lake levels at a high level, which would help enhance recreation use and opportunities throughout the year. Measure GS1 would implement the Erosion and

Sediment Control Plan with enhancements and measures potentially applicable and beneficial to recreation facilities management. Continuing to have outflows from Pyramid Dam to Pyramid reach match the natural inflow into Pyramid Lake will further enhance recreational opportunities related to fishing and other stream-side uses, as well as the scenic and recreational values associated with the Wild and Scenic River designation.

Effects on recreation include those related to Project operations, and those derived from the use and provision of recreation facilities and amenities. Project operations, particularly water level fluctuations, can affect the quality and type of recreation on reservoirs; although Pyramid Lake typically maintains a high reservoir level with limited fluctuation. Other recreation effects described in this section are those that are related to supply and demand for recreation uses at the Project.

The effect of Project power generation on recreation at Pyramid Lake is driven to a minor degree by how the Castaic Powerplant is operated and used to convey SWP water supply. Pyramid Lake is generally operated between 2,560 feet and 2,578 feet (Exhibit B, Section 4.2.2.2) based largely on pumpback operations when lake elevation is changed by adding or removing up to a maximum of 10,000 AF of water daily. However, as noted in Section 4.1.2 of Exhibit B, various agreements affect Project operations, including the 1969 MOU between DWR and USFS. According to Amendment 1 to the DWR-USFS MOU, during normal operation conditions, water surface level variations in Pyramid Lake may not exceed 14 feet during each 7-day period beginning midnight each Sunday and may not exceed 8 feet each day. In addition, the water surface of Pyramid Lake may not be lowered below an elevation of 2,560 feet without taking additional safety precautions and making appropriate notifications. These lake level management considerations are part of measure WR1 to be carried forward in the new license.

At full pool, Pyramid Lake provides 1,300 surface acres that can be used by all types of watercraft for recreation, and is often used to its capacity of 150 boats and 50 PWC. Since the reservoir does not fluctuate significantly, both daily and seasonally, it provides a consistent and dependable recreation resource for boaters that is typically not available with other southern California reservoirs. Within this few feet of typical fluctuation, the boat ramps and marina are fully serviceable, and the 21 miles of shoreline areas are generally useful and attractive to recreationists; however, the rocky nature of most areas means there are few beach areas whether the lake is at full pool or 10 feet below full pool.

The developable areas at Pyramid Lake for recreation facilities are mostly built out based on the comprehensive planning and analysis in the three phases of planning in the 1970s and 1980s. Currently, not all Pyramid Lake recreation facilities comply with the Architectural Barriers Act (ABA) which applies to the National Forest recreation facilities. The discussions with recreation providers indicate recreation needs are being met, and the facilities that have been developed are generally meeting the needs of the recreating public. However, the facility parking, camping, and picnic site spacing and

amenities offered can influence use patterns and be more or less favored by some users. When the facilities are at or near capacity on certain holiday weekends, campers can seek out other lakes in the region (Piru and Castaic). There are no records of the day use facilities at Pyramid Lake reaching full capacity; and when the facilities are approaching capacity, users distribute across Vaquero Day Use Area, Spanish Point Boat-in Picnic Area, and the Emigrant Landing day use areas. There also is no indication that traffic ever has backed up past the Smokey Bear interchange on Interstate 5. Rather, the Licensees have provided special lanes on Pyramid Lake Road entering Emigrant Landing to allow those waiting in line to enter the recreation areas without blocking the road during peak use weekends and holidays. The current capacity limits at Pyramid Lake are set by the number of parking spaces (with a limit of 532 spaces) and on-water boating limits (150 boats and 50 PWC at one time). Vista Del Lago Visitor Center has a capacity set by the 159 parking spaces available. As found in interviews with the Los Angeles County Sheriff's staff, based on their experience managing the facilities, capacity limits represent a managed capacity level that helps maintain (and not worsen) environmental conditions, without degrading facilities or causing public safety problems.

5.5.2.1 *Hardluck Campground*

As part of FERC's June 14, 2017 Study Plan Determination, FERC concluded that the need for recreational opportunities previously provided at the closed Hardluck Campground should be explored within the context of the relicensing process. Prior to 2015, the Hardluck Campground, situated alongside upper Piru Creek and located about 4 road miles west of Los Alamos Campground, was a part of the Project recreation facilities (Figure 5.5-1). However, this 25-unit campground was closed by USFS beginning in 2001 after critical habitat was established in this area for the endangered arroyo toad.

The original Hardluck Campground was developed by USFS as a five-unit campground located alongside upper Piru Creek near the confluence of Piru Creek and Bucks Creek, about 1 mile upstream of what later became Pyramid Lake. The original five-unit campground was, however, closed by USFS in 1978 due to concerns over impacts to the endangered California condor (USFS 1978). In this same period, DWR continued to work with USFS regarding the planning for Phase II of recreation development of Pyramid Lake. The Phase I recreation development had been completed by this time and resulted in the development of the Emigrant Landing day use areas and the Yellow Bar, Bear Trap, and Spanish Point Boat-in Picnic Areas.

Phase II involved the development of the Los Alamos Campgrounds and a new Hardluck Campground to provide overnight camping for recreationists visiting Pyramid Lake (DWR 1979). The recreation opportunities provided at the new Hardluck Campground were developed as part of the Phase II plan to "provide overnight camping, picnicking, and related day use activities for recreationists visiting [Pyramid Lake]" (DWR 1979). In 1985, with completion of DWR's Phase II recreation developments, camping use commenced at Los Alamos Campground and the new 25-

unit Hardluck Campground, which was relocated 2.5 miles northwest of the original Hardluck Campground.

After the 2001 closure of the Hardluck Campground, USFS asserted a need to replace the campground in an alternative location (USFS Notice of Intervention, August 22, 2016). In its August 22, 2016 Notice of Intervention, USFS indicated that the closed 25-unit Hardluck Campground “was developed to provide the public with riverine based recreational opportunities along the creek and mitigate those that were lost as a result of creation of Pyramid Lake.” USFS also indicated in its August 22, 2016 filing that the motivations of visitors to a campground like Hardluck could be very different than those at other campgrounds due to the remoteness, proximity to a riverine environment, absence of electric and water hook-ups, distance from OHV areas, and/or proximity to a trailhead for access to a wilderness area. Also in its August 22, 2016 letter, USFS expressed interest in evaluating the possibility of developing a campground at the Gold Hill area, an existing dispersed use area along upper Piru Creek, about 13 road miles northwest of the Emigrant Landing day use areas. The concept put forward by USFS was that this site, if developed, could serve as a possible alternative site to Hardluck Campground, since arroyo toad was not thought to occupy the area.

As noted above, the Phase II planning documents clearly indicate that Hardluck and Los Alamos Campgrounds were developed to provide overnight camping for recreationists visiting Pyramid Lake. Both campgrounds were developed at the same time, both have very similar configurations and spacings, and neither have electrical or water hookups or facility offerings that are different enough to have influenced the choices the public might make in choosing a campground (Figures 5.5-24 and 5.5-25).



Figure 5.5-24. Typical Campsite at Los Alamos Campground (2016)



Figure 5.5-25. Typical Campsite at the Closed Hardluck Campground (2016)

In the course of performing the recreation studies for relicensing, analysis of camping use and visitor needs was explored. The recreation study found that the Los Alamos Campground (individual and group sites) is well utilized on some weekends and holidays during the summer recreation season. However, at most times, the campgrounds are not fully utilized or anywhere near capacity. Importantly, the visitor intercept survey found that the most popular activities recreationists participate in or plan to participate in during visits to the area were fishing, followed by picnicking and swimming. It was found that there is strong demand for the provision of more amenities at campgrounds, such as showers, electric service, and RV hookups.

As part of the recreation intercept survey, participants were asked if they were “interested in a remote and less developed camping experience near a stream, lake, or reservoir.” A total of 63 percent of the 95 persons who responded expressed interest in remote stream-based camping experiences, while 37 percent indicated they were not interested in such opportunities. The Licensees are considering these recreation intercept survey results in the context of the other study results. For example, other than the interview with the USFS recreation provider indicating a need within the ANF or LPNF for stream-based recreation opportunities, no other interviewed provider or other published recreation demand study provided evidence of such demand. Rather, the

greatest user needs that were consistently identified had more to do with additional provision of services, such as electrical hookups, sports fields, and more modern camping amenities than remote stream-based camping experiences. Accordingly, the Licensees do not believe that this expression of interest by approximately two-thirds of a small sample (i.e., 95) of intercepted recreationists expresses a level of sufficient demand by itself to warrant development of a new campground. However, the Licensees are in discussions with USFS in an effort to address this expressed interest as is reasonably practicable.

Additionally, as noted in DWR's 2016 Hardluck Campground Demand Analysis (DWR 2016), there is sufficient similar and available developed camping facilities in the area, many in remote locations, and many along or close to streams such as Cañada de Los Alamos and Piru Creek. Also, as found in the 2016 demand analysis, Los Angeles County Sheriff's Department staff found and reiterated in 2018 interviews that there are public safety concerns about any new offerings of remote developed campgrounds accessible by vehicle (i.e., remote campgrounds re-opened or developed as new facilities). Additionally, the continued environmental protection needs associated with the endangered arroyo toad have precluded the continued use of upper Piru Creek shorelines in and around the closed Hardluck Campground site. Specifically, upper Piru Creek has about 4.5 miles of critical habitat for arroyo toad in those sections that are below 3,600 feet in elevation. In addition, the LPNF Plan noted that historic nest sites for the California condor are located near Hardluck Campground and upper Piru Creek above Hardluck Campground, and that this area is considered a refugium for native aquatic and semi-aquatic wildlife species (USFS 2005b). As further noted in the Southern California Forest Plans, USFS directs that "improved recreation infrastructure is designed to direct use away from sensitive areas or, where this is not possible, minimize adverse effects" (USFS 2005a).

As noted in DWR's July 29, 2016 Recreation Demand Analysis for Hardluck Campground, the Gold Hill area shows excessive signs of recreational use given the extensive expanse of barren land denuded of vegetation by vehicular use. There are no developed facilities in the area other than King's Campground and the Snowy Trail trailhead, each located along a side road that offshoots from the Gold Hill access road less than a mile from the road's end at Piru Creek. The Gold Hill road terminates in a large, user-defined area consisting of loops of informal dirt paths and dirt parking areas, along with a depression that forms a pond with evidence of considerable OHV use. The recreation use in the area appears highly influenced by its proximity to the Hungry Valley SVRA. A Project nexus to this location is not apparent as the use and use levels known for this area would occur regardless of the Project's existence. Because OHV use is allowed in the Gold Hill area, it receives use from those at Hungry Valley and particularly those familiar with Hungry Valley SVRA but wanting to try different areas. OHV users, particularly motorized dirt bikes going to Gold Hill, make use of the water courses as part of their trail use.

Hardluck Campground and the Gold Hill area are located in Ventura County, where the Los Angeles County Sheriff does not have jurisdiction, so law enforcement involving

public safety needs, including public nuisance reports in these areas, have to be called in to the Ventura County Sheriff's offices (unless there is an emergency and Ventura County Sheriff's officers request assistance). Ventura County Sheriff's officers are only as close as Fillmore (42 miles) and cannot respond quickly (they estimated up to two hours for officers to respond to these back country locations).

Because of the lack of nexus to recreation demand and use at the Project's reservoirs, the predominant use by OHV users unrelated to water-based recreation at the Project, and the potential safety considerations, the potential for Project development of recreation facilities in the Gold Hill area by the Licensees is not reasonable.

Considering the ample capacity of Los Alamos Campground and other campgrounds in the Project vicinity, the sensitive wildlife resources along Pyramid reach near Pyramid Lake, and lack of a nexus to the Project recreation uses related to flat-water recreation opportunities, the Licensees conclude there is not sufficient demand that would warrant development of a new campground. However, as noted previously, the Licensees are in discussions with USFS in an effort to address this expressed interest as is reasonably practicable.

5.5.2.2 Carrying Capacity of Pyramid Lake

The safe and practical carrying capacity for use on Pyramid Lake has been identified by the Licensees and Los Angeles County Sheriff's Department. This carrying capacity limit has been verified by observing and experiencing use for more than a decade. The boating limit effectively regulates related shoreline use levels, helping keep use related to boating at a level that is currently meeting visitor needs. An exceedance of those use levels could have adverse effects on the ecology, habitats, and, importantly, the quality of the environment that recreationists value. Adding or enlarging recreation facilities on the Pyramid Lake shoreline could attract hundreds of additional recreationists, which could potentially degrade the experience for all users; whereas the current shore-based capacity limit for Pyramid Lake (i.e., when the 532 parking spaces are filled) and the boating limits (150 boat launches) allow enough space and distribution of users as to not degrade the quality of recreation experience that users desire. While the capacity is adequate for most periods of the year, during holiday weekends in summer when the campgrounds and park reach capacity, there are some displaced users as is similar to most outdoor recreation areas in southern California. Expanding the facilities to always meet the peak demand is not warranted and would degrade the quality of the recreation experience that users desire.

Based on visitation numbers, interviews with recreation providers, and observational surveys, the Project recreation facilities appear to be accommodating most Project visitor use, providing boating and shoreline access to the main Project reservoir (Pyramid Lake), providing for public safety, and protecting natural and cultural resources. The suitable flat areas for recreation development along the shorelines have been developed and there are few other possible areas for potential expansion. Recreation use records indicate that, in the last seven years, both overnight and day

use visitation is stable. For weekday periods and weekends outside the primary recreation season (May through September), the facilities are adequately meeting current demand and recreation needs. The analysis also confirmed that there are predictable times on summer weekends, and on Saturdays and Sundays of holiday weekends, when demand exceeds the capacity of facilities, and the park reaches capacity and thereby limits the number of vehicles and watercraft. This condition is carefully managed by Licensee staff, with concessionaire staff and enforcement officers helping recreationists with information on open areas, hours of operation, and wait times. The Licensees have provided special lanes on Pyramid Lake Road entering Emigrant Landing to allow those waiting in line to enter the recreation areas without blocking the road during peak use weekends and holidays. This road configuration allows for efficient capacity control on those peak summer weekend and holiday weekend days that allow the Licensees to manage the recreation use to avoid overcrowding or exceeding the capacity of the recreation facilities.

5.5.2.3 *Proposed Recreation Measures*

The Licensees' Proposal to continue providing Project recreation opportunities at Pyramid and Quail lakes will offer unique and highly beneficial recreation opportunities for the public now and over the term of the new license. Continuing the prohibition on public recreation use at Elderberry Forebay will continue to protect the public from safety hazards; and given the supply of water and fishing opportunities at the Project and at nearby recreation lakes, is not expected to result in any adverse effects. Continuing fish stocking in Pyramid Lake will benefit anglers in the region who will continue to participate in fishing activities over the term of the new license.

To enhance current recreation use and address current and future recreation needs and management, the Licensees, USFS and CDFW are in the process of developing a RMP for inclusion as a proposed measure in the Licensees' FLA. Specific components of the RMP to address current and future recreation needs will be developed in consultation with Relicensing Participants but will include facility improvement measures, accessibility improvement measures (and program), a litter control program, a visitor services and sign management program, and a monitoring and evaluation program. As part of the recreation plan, the Licensees propose undertaking a Recreation Facilities Accessibility Improvement Program that would evaluate the feasibility of making improvements at all facilities and would identify priorities to retrofit and improve the offering of accessible site amenities at all developed Project recreation facilities in close coordination with USFS. Other types of potential impacts to recreation resources can occur based on the effects of routine O&M activities and the implementation of PM&E measures, including the modification and rehabilitation of existing recreation facilities. However, the improvements outlined for recreation include measures that will enhance Project recreation opportunities and, thus, will represent a long-term beneficial effect. Implementation of the PM&E measures as part of the Licensees' Proposal will maintain and enhance recreation opportunities associated with NFS lands. The Licensees' proposed measures, including facility upgrades, will help protect existing resources in the future, while serving the changing needs of Project visitors and ensuring long-term

benefits for recreation users. These measures will be addressed in more detail in the proposed RMP for the Project, which will be included in the Licensees' FLA.

5.5.3 Cumulative Effects on Recreation

Continuing the provision of recreation facilities and opportunities contributes positively to the ongoing upstream and downstream recreation offerings provided by the ANF and LPNF. As found in the relicensing visitor use survey, the Project primarily attracts uses such as fishing, picnicking, swimming, family gatherings, and tent camping. The national forest visitor use surveys indicate the most popular activities across the ANF and LPNF, which include Pyramid reach areas, are hiking and sightseeing. By providing fishing, swimming, and developed camping and picnicking, the Project is contributing to the mix of uses visitors in the area seek, while the adjoining upstream and downstream areas are continuing to attract a different type of use – one not necessarily related to a flat-water recreation setting such as Pyramid Lake. Recreation use at Project recreation facilities has remained steady over the last seven years and is reported to be less than it was in the 1990s and 2000s. The annual visitation to the ANF and LPNF shows a mixed trend in use, but generally it can be expected that recreation use will grow with regional population growth.

The Licensees' Proposal, in combination with residential development activities associated with the Tejon Ranch Company's Centennial Development in the Antelope Valley just north of Quail Lake, has the potential to cumulatively affect recreation resources in the Project region. Build-out or partial build-out of the Centennial housing areas could bring as many as 57,000 new residents that will require new park and recreation facilities based on the approved general development plan. The influx of new residents would increase the demand for recreation facilities and opportunities both near the housing areas and in the region, which would include Quail and Pyramid Lake water-based opportunities and the variety of recreation opportunities on the ANF and LPNF. This increase in demand for recreation is not attributed to the Licensees' Proposal, but rather the cumulative effects of population growth in the Project area during continued operation of the recreation facilities under the new license.

The Centennial Development will include the provision of 163 acres of public parks and an extensive trail system for hiking, biking, and equestrian use in the area north of Quail Lake. The development of an extensive park and trail system in the Centennial Development will, on one hand, help disperse recreation uses within the region to help meet demand, while potentially not leading to a decrease in quality of experience or lead to further environmental degradation at and around recreation facilities in the region. However, the new residents will not be provided with water or mountain-based recreation opportunities, and there is expected to be increased demands on facilities at Quail and Pyramid Lakes and the LPNF and ANF. Quail Lake and Pyramid Lake are already nearing capacity on several weekends each year, including holiday weekends in the peak summer use season. Adding further local demand for lake-related recreation uses could result in adverse effects to park users and environmental conditions in and around Quail and Pyramid Lakes. It is anticipated that, by improving and hardening the

facilities at Quail Lake, there could be a slight increase in capacity without diminishing the quality of the experience for users at the lake.

5.5.4 Unavoidable Adverse Effects

The Licensees are unaware of any recreation-related unavoidable adverse effects due to the Licensees' Proposal.

5.6 LAND USE AND MANAGEMENT

This discussion of land use and management is divided into three sections. Section 5.6.1 discusses existing conditions relative to land use and management in the region and within the proposed Project boundary. The nearest designated Wild and Scenic River, Wilderness Area, Heritage Site, nationally significant recreation area, river segment listed in the NPS' National Rivers Inventory, and other special land use designations are also discussed in Section 5.6.1. In addition, Federal Emergency Management Agency (FEMA) floodplains are identified. Section 5.6.2 addresses potential effects of the Licensees' Proposal and Section 5.6.3 discusses unavoidable adverse effects of the Licensees' Proposal.

The Licensees found that existing, relevant, and reasonably available information was adequate to address potential Project effects on land use and management. Thus, no specific studies for land use and management were needed.

5.6.1 Existing Environment

This section discusses existing conditions, including land use plans applicable to the Project and the surrounding area, including the proposed Centennial development. A discussion of the Centennial development has been included in this section because the mixed-use project requires off-site roadway improvements and upgrades to existing off-site utility systems within the proposed Project boundary.

The proposed Project boundary encompasses 4,563.8 acres of land, including 2,000.5 acres of NFS lands within the ANF and LPNF, and 6.5 acres of land administered by BLM.

5.6.1.1 *Los Angeles County General Plan*

The Los Angeles County General Plan (Los Angeles County Department of Regional Planning 2015b) consists of two major components: (1) the countywide chapters and elements that set the countywide policy framework; and (2) the areawide and community plans that deal with local issues. This plan (and the area plans described below) applies only to privately owned lands in Los Angeles County and not to lands owned by other jurisdictions, such as USFS, DWR, or LADWP.

The Project is located within the Antelope Valley and Santa Clarita Valley planning areas. The Antelope Valley Area Plan: Town & Country (Los Angeles County

Department of Regional Planning 2015a) planning area surrounds the Project's Quail Lake and Pyramid Lake. The purpose of the Antelope Valley Area Plan is to achieve the communities' shared vision of the future through the development of specific goals, policies, land use and zoning maps, and other planning instruments.

5.6.1.2 Antelope Valley Area Plan

The Antelope Valley Area Plan includes 21 land use types (7 Public and Semi-Public, 5 Rural, 5 Residential, Commercial, Mixed Use, Light Industrial, and Heavy Industrial) and 5 Overlays (Special Management Area, Agricultural Resource Area, Mineral Resource Zone, Significant Ecological Area, and Specific Plan). Land uses in the Project vicinity, shown in Figure 5.6-1, include:

- RL 20 (rural land, maximum density of 1 residential unit for each 20 gross acres³⁸ of land) areas immediately surrounding Quail Lake; immediately east of Quail Lake is the Quail Lake Sky Park (small airport)
- RL 1 (rural land, maximum density of 1 residential unit for each 1 gross acre of land) areas to the north of Quail Lake
- OSC (open space, conservation), RL 20, and CR (rural commercial) areas to the west of Quail Lake
- OSC and H 5 (residential, maximum density of 5 units for each 1 net acre of land) areas to the east of Quail Lake
- OS-NF (open space, national forest) areas surrounding Pyramid Lake

In addition, areas in the Quail Lake vicinity are included in the "West Economic Opportunity Area." According to the Southern California Association of Governments forecasts, concentrated population and employment growth is anticipated in the Quail Lake region near the State Highway 138/Interstate 5 interchange (Caltrans 2017).

³⁸ "Gross acres" is defined as the total number of acres within a parcel of land before public streets, easements, rights-of-way, or other areas to be dedicated or reserved for public uses are deducted from the parcel. Conversely, net acreage is the portion of the parcel that can be built upon.

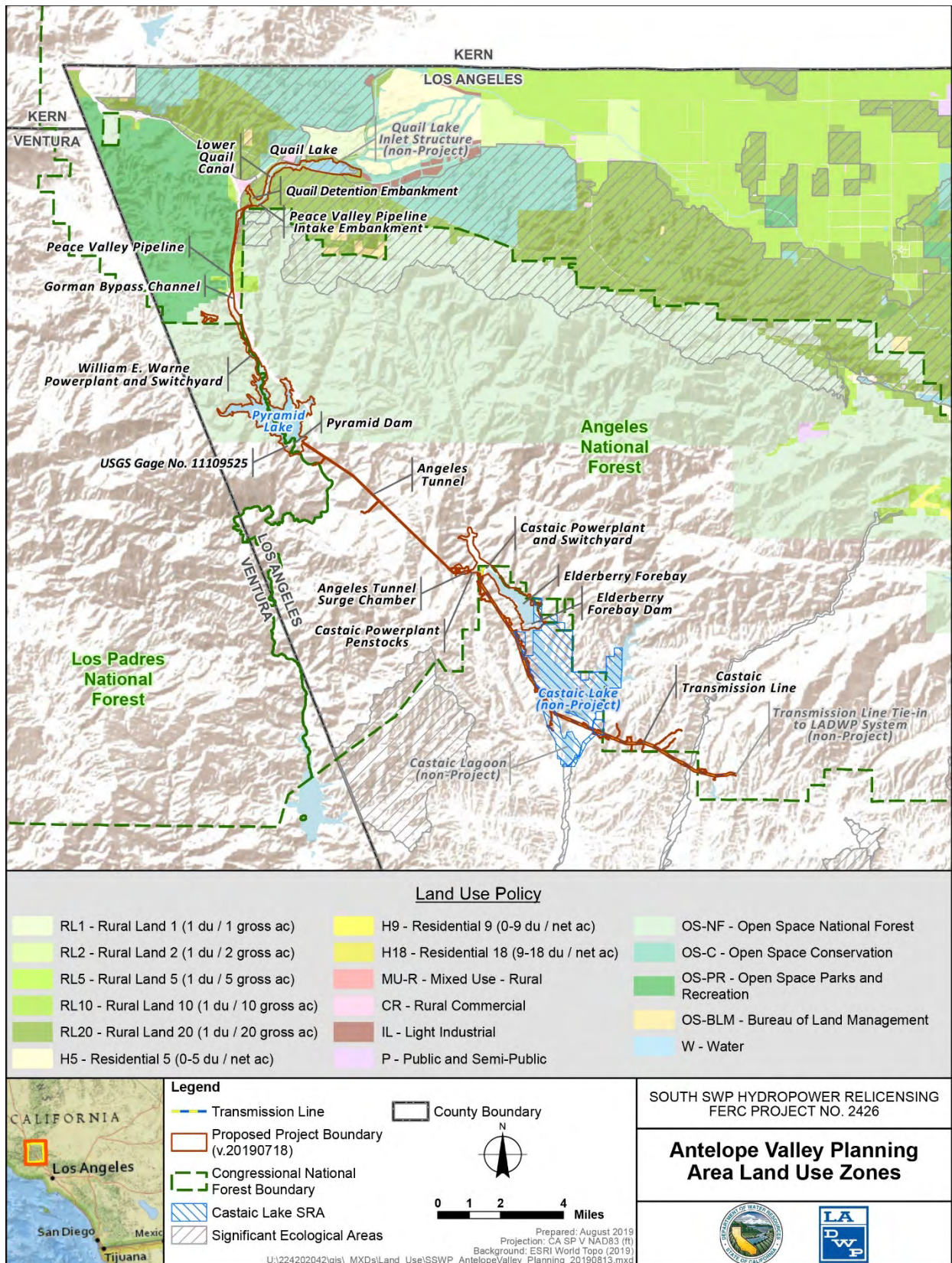


Figure 5.6-1. Antelope Valley Area Plan Land Uses

The Northwest Highway 138 Corridor Improvement Project being implemented by the Los Angeles County Metropolitan Transportation Authority and the California Department of Transportation (Caltrans) has the potential to bring increased growth and economic development to the region. The Northwest Highway 138 Corridor Improvement Project is “...based on an assessment of the future transportation demands...” and “...historic accident data, existing non-standard roadway features, present and future social demands, and forecasted economic development.” All Northwest Highway 138 Corridor Improvement Project alternatives are consistent with the Los Angeles County General Plan, and impacts to land use and development in the region are expected to be less than significant (Caltrans 2017).

The Project’s Angeles Tunnel, Castaic Powerplant, Elderberry Forebay, Elderberry Forebay Dam, and Castaic Transmission Line are surrounded by the Santa Clarita Valley Area Plan: One Valley One Vision (Los Angeles County Department of Regional Planning 2012). The Santa Clarita Valley Area Plan is a component of the Los Angeles County General Plan, and is intended to provide focused goals, policies, and maps to guide the regulation of development within the unincorporated portions of the Santa Clarita Valley.

5.6.1.3 Santa Clarita Valley Area Plan

The Santa Clarita Valley Area Plan’s Land Use Element contains descriptions of the designations applied to land within the Santa Clarita Valley to guide the type, intensity, and density of future uses. The Plan contains 21 land use types (5 Rural, 5 Open Space, 4 Residential, 2 Commercial, 2 Industrial, Community Serving, Transportation Facilities, , and Specific Plan). Not all of the land use types are within the proposed Project boundary. Land uses in the Project vicinity, shown in Figure 5.6-2, include:

- OS-NF (open space-national forest) areas surrounding the Angeles Tunnel, Castaic Powerplant, Elderberry Forebay, and Elderberry Forebay Dam
- OS-PR (open space-parks and recreation) areas immediately adjacent to the Castaic Powerplant, Elderberry Forebay, and Elderberry Forebay Dam
- OS-BLM (open space owned by BLM) areas immediately adjacent to the Castaic Powerplant, Elderberry Forebay, and Elderberry Forebay Dam
- RL 5 (rural land, maximum density of 1 residential unit for each 5 gross acre of land) land to the west of the Elderberry Forebay and Elderberry Dam
- RL 10 (rural land, maximum density of 1 residential unit for each 10 gross acre of land) land to the west of the Elderberry Forebay and Elderberry Dam

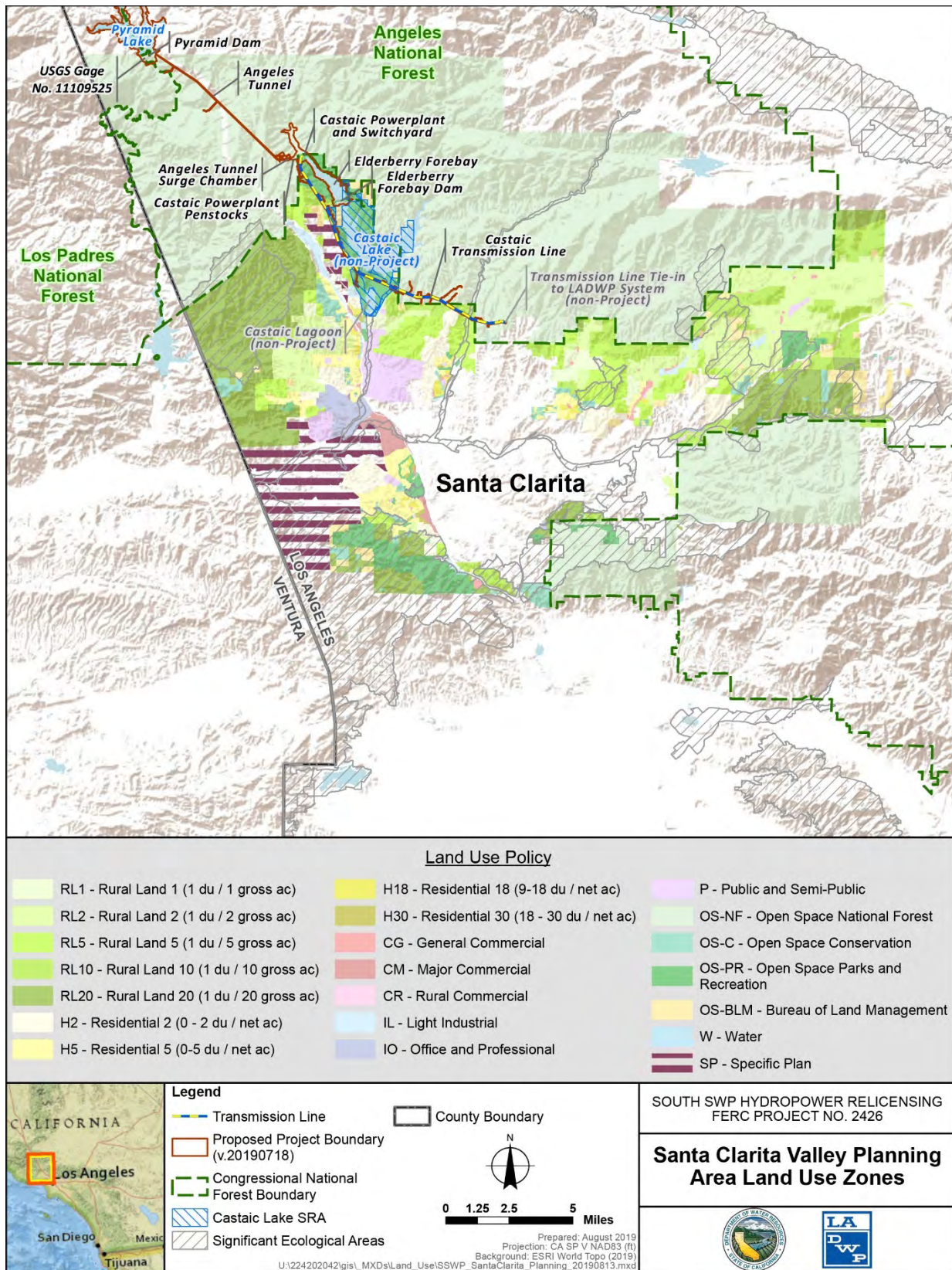


Figure 5.6-2. Santa Clarita Valley Area Plan Land Uses

5.6.1.4 Centennial Development

The Centennial development is a proposed 12,323-acre, master-planned community on the Tejon Ranch, located in the northwestern portion of the Antelope Valley and immediately north and east of Quail Lake and the Project. The development would allow up to: 19,333 dwelling units; approximately 7,363,818 square feet of business park uses (office, research and development, warehousing or light manufacturing uses); approximately 1,034,550 square feet of commercial uses; approximately 1,568,160 square feet of institutional/civic uses (schools for higher education, medical facilities, libraries); approximately 130,680 square feet of recreation/entertainment uses (clubhouse, farmers market, childcare facilities, health clubs); and approximately 5,624 acres of open space for natural resources protection and greenways. In addition, the development would have schools, utilities, and infrastructure to support the proposed land uses and future residents, including a wastewater reclamation facility, water treatment facility, water bank, materials recovery facility, and Kindergarten through 12th grade schools (Los Angeles County Department of Regional Planning 2017).

The Centennial development also requires off-site components consisting of roadway improvements, and connections and upgrades to existing off-site utility systems. Improvements to utilities within State Highway 138 include the roadway crossing of the Lower Quail Canal within the proposed Project boundary. In addition, along the aqueduct upstream of Quail Lake and outside of the proposed Project boundary, a new bridge would be constructed and an existing bridge expanded (Los Angeles County Department of Regional Planning 2017). On December 11, 2018, the Los Angeles County Board of Supervisors approved the Centennial development project, including the final CEQA document, general plan amendment, parcel map, and conditional use permit for the development. See Figure 5.6-3 for land uses in the Centennial development.

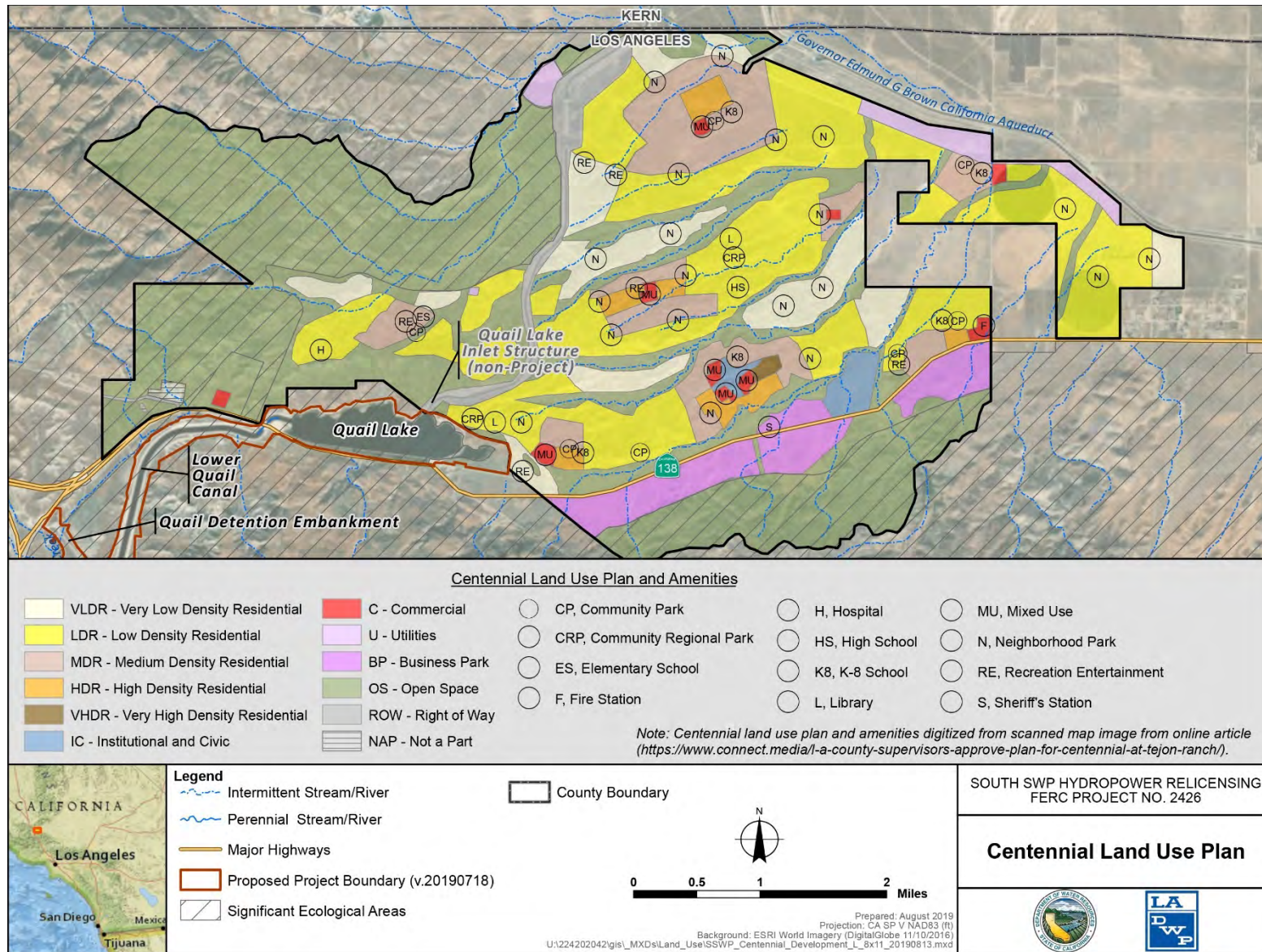


Figure 5.6-3. Land Uses Within the Proposed Centennial Development

5.6.1.5 Significant Ecological Area

Surrounding Quail Lake on the northwest and southeast sides for approximately 5 miles is the Significant Ecological Area (SEA) 17 (Figure 5.6-3). The objective within the SEA zone is to conserve biodiversity within Los Angeles County. This area contains rare plant and animal resources that need to be protected for research, educational, and outdoor uses. According to the Los Angeles County General Plan, resources within the SEA also include habitat zones and connect diverse biomes with wildlife corridors (Los Angeles County Department of Regional Planning 2017).

Future project development within the SEA 17 zone requires designated open space to be preserved and maintained in its natural and undeveloped condition. Projects proposed within SEA 17 must analyze loss to SEA resources and provide mitigation measures to offset such losses. Any proposed development must require distance setbacks from existing protection natural open space (LA County Department of Regional Planning 2017).

The Licensees continue to operate and maintain Quail Lake in a manner compatible with the plan policies and direction of the Los Angeles County General Plan amendments.

In addition, as described in Section 5.4.1 of this Exhibit E, the proposed Project boundary abuts a designated special ecological area: a USFS Critical Biological Land Use Zone for arroyo toad on Piru Creek, just west of Pyramid Lake. Other Critical Biological Land Use Zones for arroyo toad that abut the proposed Project boundary include Fish Creek and Castaic Creek, north of Elderberry Forebay. Critical Biological Land Use Zones are areas managed by USFS for the protection of rare species. Human activities and land modifications are restricted, but are not excluded, to prevent any adverse effects to the protected species within the land use zone (USFS 2005d).

5.6.1.6 Angeles National Forest

The national forests in southern California include the Angeles, Cleveland, Los Padres, and San Bernardino National Forests. Some areas of the Project are situated within the Congressional boundary of the ANF, and other portions are situated within the areas of the LPNF that are administered by the ANF. The revised land and resource management plans (forest plans) for the southern California national forests describe the strategic direction at the broad program level for managing the land and its resources over the next 10 to 15 years.

USFS used an interdisciplinary process to develop several alternatives for its strategic direction; the development of alternatives is required under NEPA regulations. Public comments were received during the scoping phase of the process and were used to develop six different alternatives, each of which was designed to respond to comments and significant issues in a different way, thereby providing a range of potential management approaches from which to choose.

The selected alternative adopted in the final revised forest plans was a seventh alternative, Alternative 4a. As described by the FEIS for the forest plans:

Alternative 4a is focused on the maintenance of healthy forests, community protection, managed, sustainable recreation setting and uses, and the management of threatened and endangered species. The alternative theme includes the opportunity for a low level of growth of recreation activities and the facilities to support increased use. Managed sustainable use of the national forests is compatible with the maintenance of long-term biological diversity and ecological integrity. (USFS 2005a).

The FEIS describes the analysis used in formulating the revised forest plans (USFS 2005b). A summary of this analysis follows.

Habitat linkages between forests were identified as an issue during scoping for the forest plan revision. The Missing Linkages Project document was submitted during the initial scoping process for those groups interested in seeing the plan implemented within national forests. “Two processes were used to propose land use zoning that promoted habitat and landscape linkages for wildlife and plant movement within and across the four southern California national forests.” The first process used the Missing Linkages Project information and maps to propose revised land use zoning to provide pertinent habitat linkages between mountain ranges within the four southern California national forests and between the national forests. “The second process involved use of the existing Wildlife Emphasis Area maps located in the current San Bernardino National Forest Land Management Plan and local knowledge of interdisciplinary team specialists and national forest biologists and botanists.” This process used the land use zoning of the Wildlife Emphasis Area locations to cross-reference and inform proposed zoning revisions. (USFS 2005b).

Following this scoping process and review, public and internal comments received from individuals, groups, the State, and local governments identified some weaknesses related to landscape linkages and wildlife corridors. Using this information, the individual Forest Leadership Teams and the interdisciplinary team designed the selected alternative (Alternative 4a) by making modifications to the land use zoning found within the preferred alternatives and incorporating favorable aspects from the other alternatives. New information derived from specific linkage design reports and multi-species habitat conservation plans were used to complete the FEIS, which outlines the preferred alternative (Alternative 4a). (USFS 2005b).

Via this collaboration, “The Forest Service defined a commitment to providing for these regionally significant corridors and linkages through a combination of land use zoning, special designations (recommended wilderness, research natural areas and special interest areas), and strengthened desired conditions, standards, and Place descriptions” (USFS 2005b).

As noted above, 2,000.5 acres (43.8 percent) of the area within the proposed Project boundary is on NFS lands. Policies and programs associated with the ANF apply only to those NFS lands within the administrative boundary of the ANF.

Seven land use zones have been identified for the ANF. The zones, in order of decreasing land use intensity, are:

- Developed Area Interface
- Back Country
- Back Country Motorized Use Restricted
- Back Country Non-Motorized
- Critical Biological
- Recommended Wilderness
- Existing Wilderness

Developed Area Interface, Back Country Motorized Use Restricted, and Back Country Non-Motorized land use zones dominate NFS lands in and around the Project (Figure 5.6-4), and are discussed below.

The Back Country Motorized Use Restricted land use zone includes areas of the national forest that are generally undeveloped with few roads. Few facilities are found in this zone, but some may occur in remote locations. The level of human use and infrastructure is low to moderate. The zone is managed for non-motorized (mechanized, equestrian, and pedestrian) public access. Motorized use is restricted to administrative purposes only, which includes USFS, other agency, or tribal government needs, as well as access needed to private land or authorized special uses. Administrative access is intermittent and generally limited to existing roads or to temporary roads needed for resource management purposes. The intent is to use temporary roads or gated permanent roads while management is occurring, and then gate the permanent roads or remove the temporary routes when done.

The Back Country Non-Motorized zone generally includes areas of the ANF that are undeveloped with few, if any roads. The level of human use and infrastructure is low. The zone is managed for a range of non-motorized uses that include mechanized, equestrian and pedestrian public access. Administrative access (usually for community protection) is allowed by exception for emergency situations and for short duration management purposes (e.g., fuel treatment).

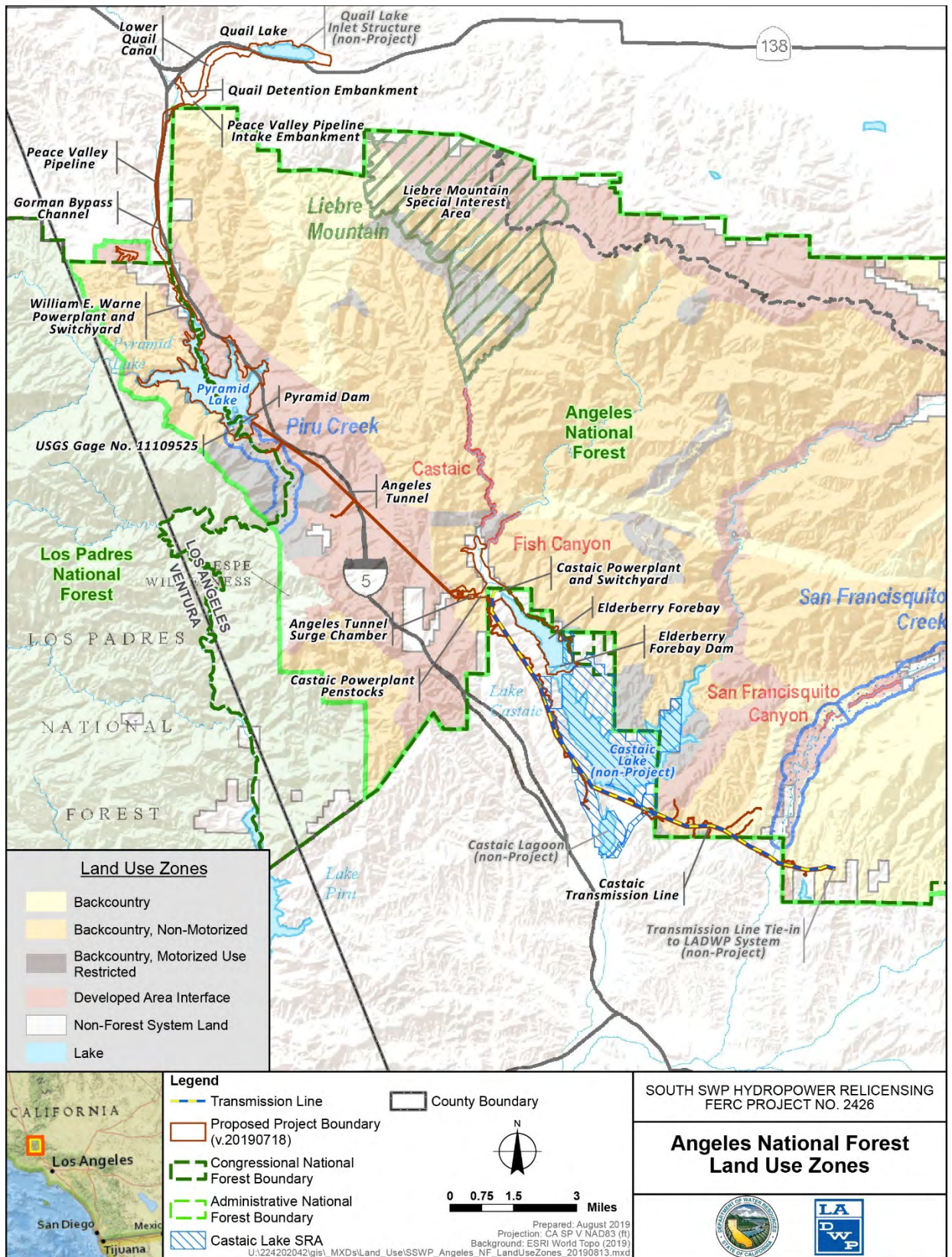


Figure 5.6-4. Angeles National Forest Land Use Zones in the Project Vicinity

5.6.1.7 Wild and Scenic River, and Other Designations

Congress enacted the Wild and Scenic Rivers Act (WSRA) in 1968, in order to “...preserve select rivers’ free-flowing condition, water quality and outstandingly remarkable values (ORVs).” Eligibility is determined by whether a river is “...free-flowing and possesses one or more ORVs including scenery, recreation, geology, fish and wildlife, history, and cultural (prehistoric), or similar values.” Once eligibility is determined, a suitability analysis must be performed. Rivers authorized for study by Congress are protected under the WSRA, and protections last throughout the study process until rivers are added to the NFS by act of Congress, or by the Secretary of the Interior. (USFS 2005b).

Approximately 7.3 miles of Pyramid reach were included in the National Wild and Scenic River System in 2009 (see Figure 5.6-5). Of this, approximately 4.3 miles were designated as a “wild river” and 3 miles (nearest to Pyramid Dam) were designated as a “recreational river” (16 U.S.C. 1274a). For the 7.3-mile reach of the creek, geological values were determined to be outstandingly remarkable, including scenic tilted layers of sedimentary rocks, as well as faults and rock formations with features crucial to the understanding of geological formation on the west coast of North America (USFS 2005b). This fits the criterion for geological ORVs, which indicates that “the river or the area within the river corridor contains an example(s) of a geological feature, process, or phenomena that is rare, unusual, or unique to the region of comparison” (USFS 2005b).

“The feature(s) may be in an unusually active stage of development, represent a ‘textbook’ example and/or represent a unique or rare combination of geologic features (erosional, volcanic, glacial and other geological structures)” (USFS 2005b).

Approximately 5 miles northeast of Pyramid Lake is the Liebre Mountain Special Interest Area. This 9,521-acre area offers an interesting mix of plant communities. On northerly slopes, black oak woodland grades into mixed oak, canyon live oak, and bigcone Douglas-fir woodland, while on the southerly slopes it generally gives way to chaparral dominated by shrub species of oak. Another unique feature of the area is the occurrence of the California spotted owl, a Region 5 sensitive species.

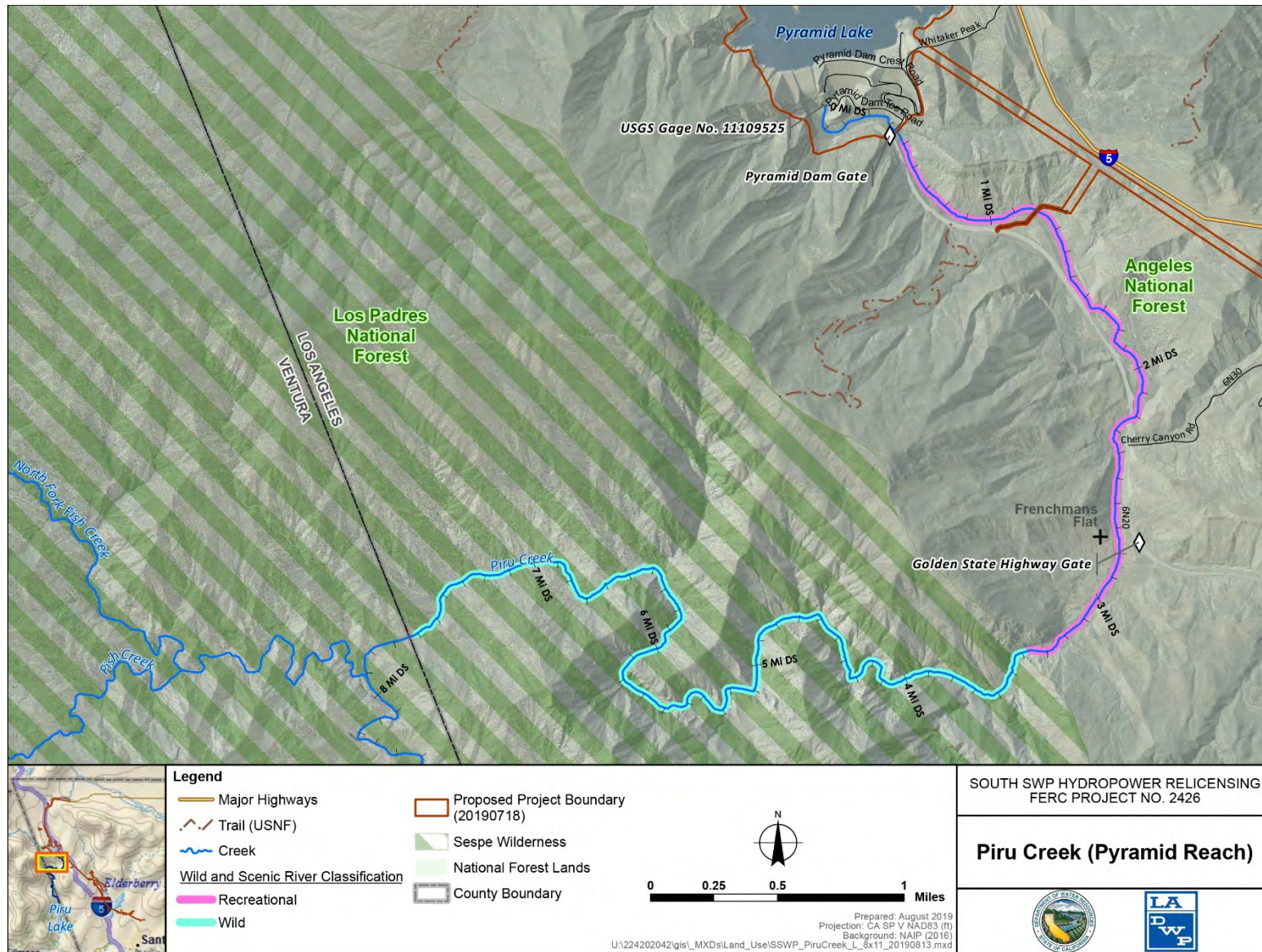


Figure 5.6-5. Piru Creek (Pyramid Reach) Wild and Scenic River

5.6.1.8 Floodplains

A search of the FEMA flood hazard mapping website (FEMA 2019a) indicates that lands immediately adjacent to Quail Lake; lands adjacent to Warne Powerplant, Pyramid Lake, Pyramid Dam, and Piru Creek (upstream of Pyramid Lake and downstream of Pyramid Dam); and lands immediately adjacent to Castaic Powerplant, Elderberry Forebay, and Elderberry Forebay Dam are Special Flood Hazard Areas (SFHA) subject to inundation by the 1 percent annual chance flood (see Figures 5.6-6, 5.6-7, and 5.6-8). On its website (<https://www.fema.gov/flood-zones>), FEMA defines SFHA as the area that will be inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year; the 1 percent annual chance flood is also referred to as the base flood or 100-year flood. (FEMA 2019b).

Zone “A” indicates areas subject to the 100-year annual flood chance, where no base flood elevations have been determined. Zone “X” indicates areas determined to be outside the 0.2 percent annual chance floodplain. Zone “D” indicates areas in which flood hazards are undetermined, but possible.

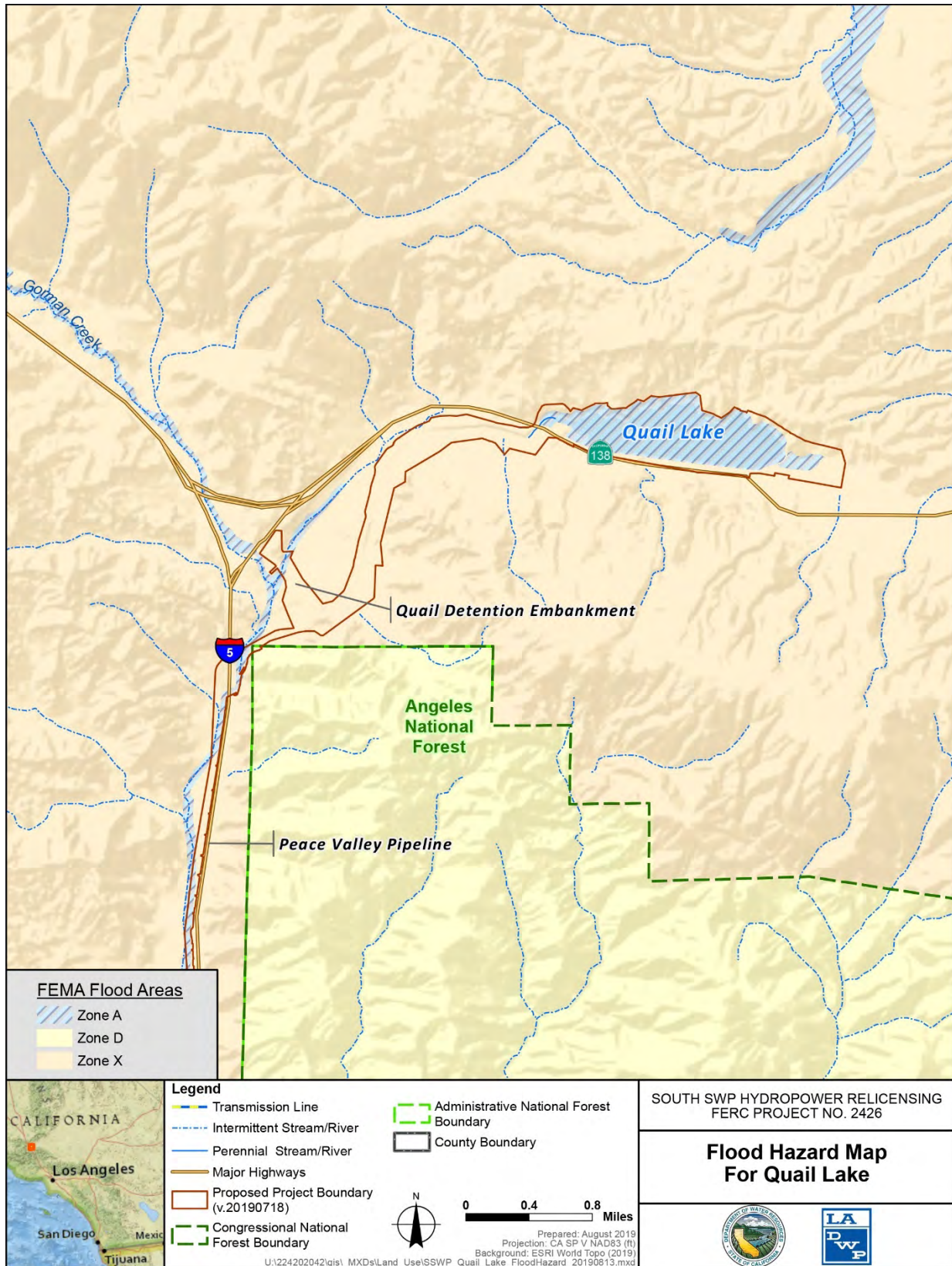


Figure 5.6-6. Flood Hazard Map for Quail Lake and Vicinity

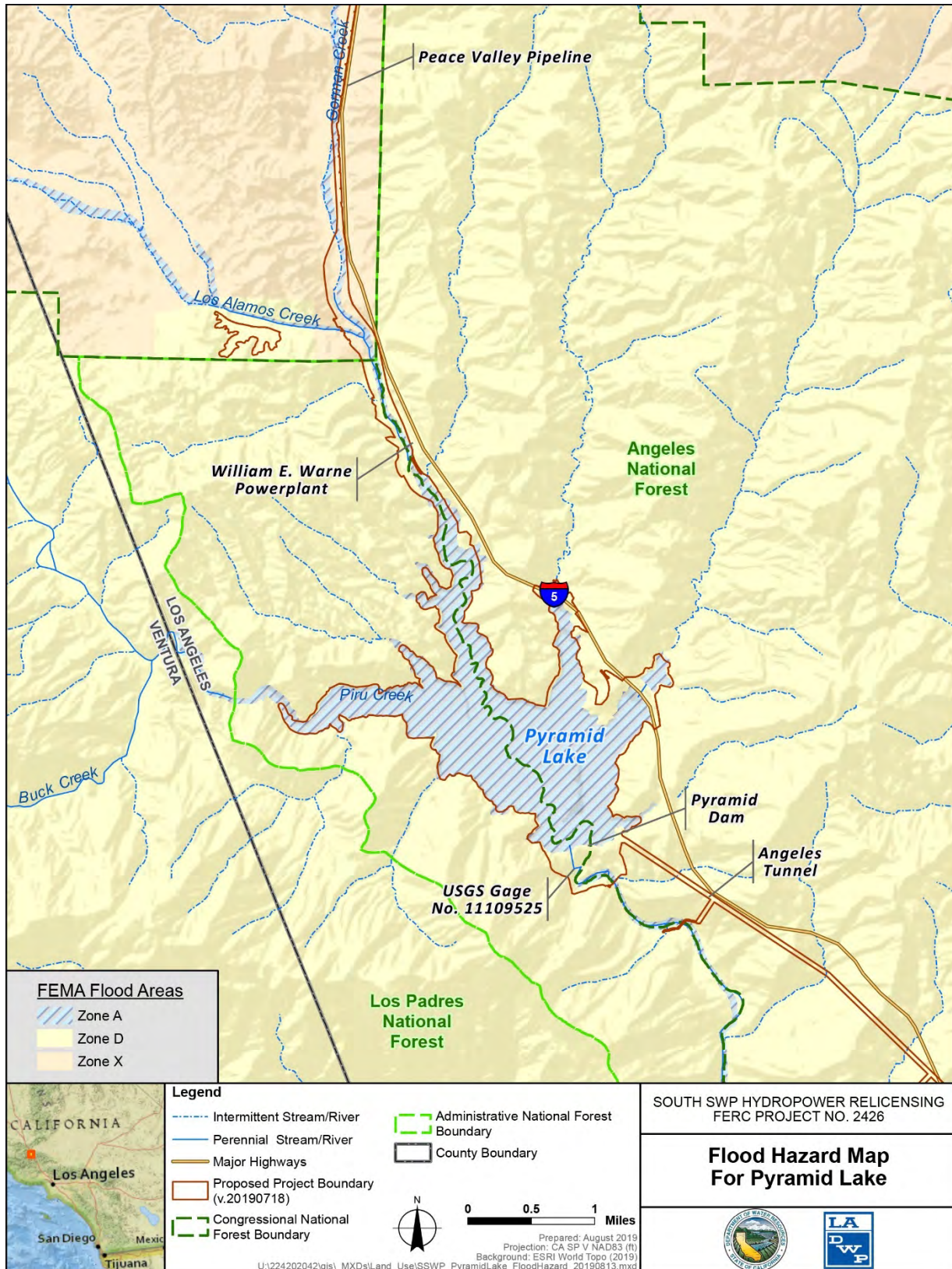


Figure 5.6-7. Flood Hazard Map for Pyramid Lake and Vicinity

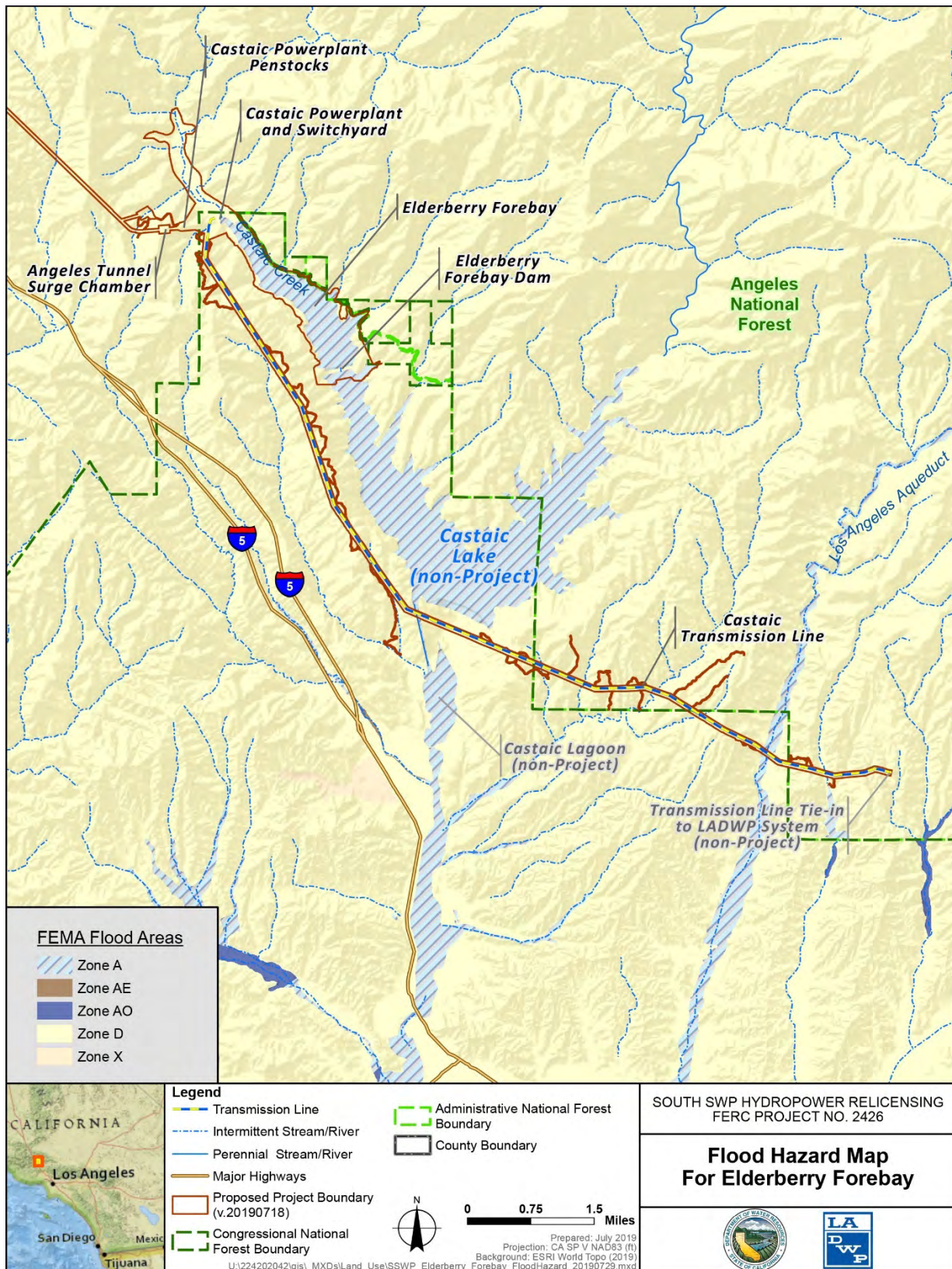


Figure 5.6-8. Flood Hazard Map for Elderberry Forebay and Vicinity

5.6.1.9 Land Use Within the Proposed Project Boundary

Land ownership within the proposed Project boundary is summarized in Table 5.6-1 and shown in Figure 5.6-9.

Table 5.6-1. Land Ownership Within the Proposed Project Boundary

Ownership	Acres	Percent of Total
State of California	2,366.7	51.9
NFS	2,000.5	43.8
BLM	6.5	0.1
LADWP	171.8	3.8
Los Angeles County	2.8	0.1
Private	15.5	0.3
Total	4,563.8	100

Source: DWR 2019

Key:

BLM = U.S. Department of the Interior, Bureau of Land Management

LADWP = Los Angeles Department of Water and Power

NFS = National Forest System

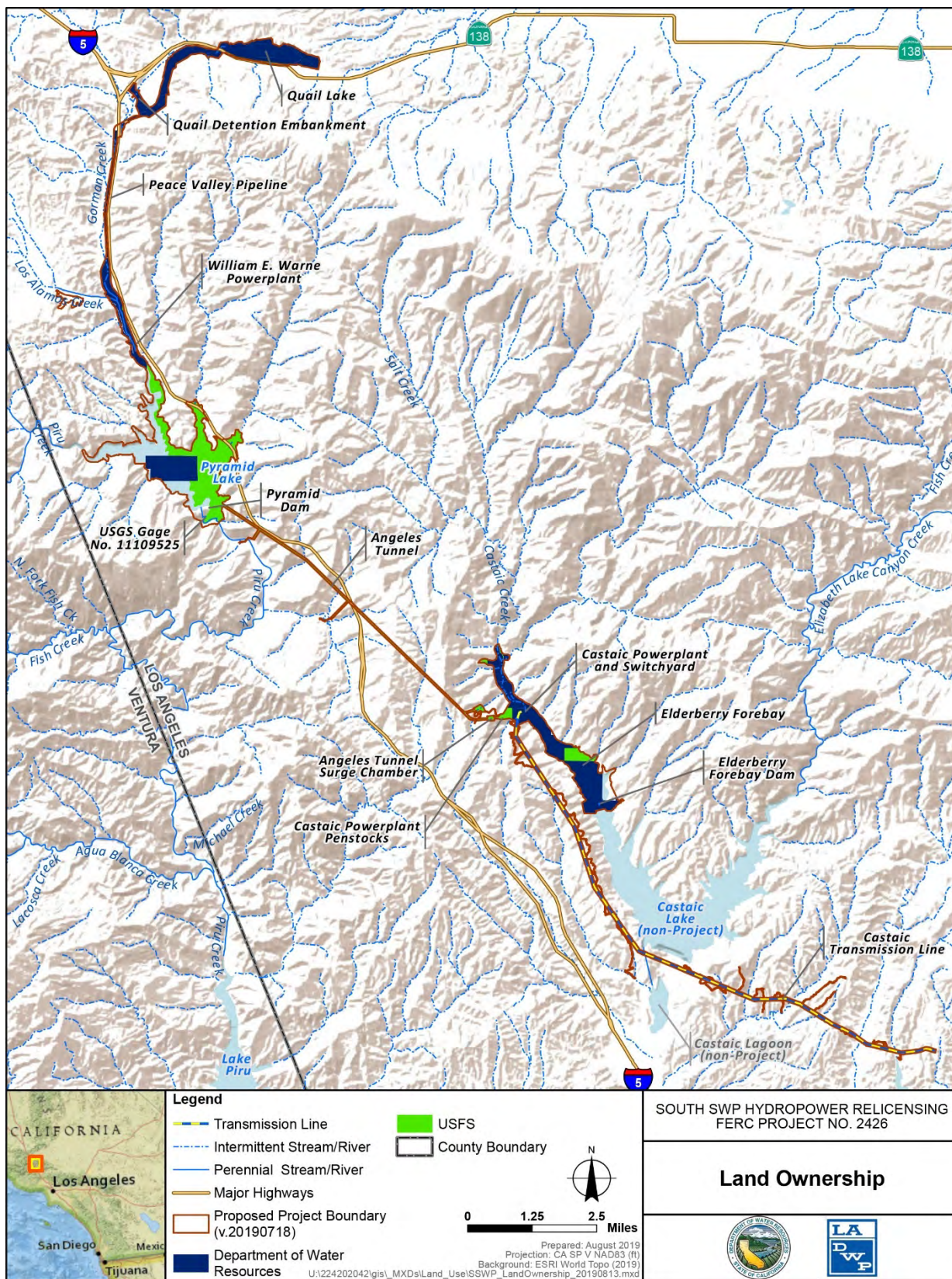


Figure 5.6-9. Land Ownership Within the Proposed Project Boundary

DWR and USFS entered into an MOU in 1969 (amended 1970) for construction, operation, and maintenance of the SWP on the LPNF (areas managed by the ANF) and ANF. This MOU facilitated development of SWP facilities at Pyramid Lake and Elderberry Forebay. The MOU was amended in 1970 to address operational lake level limitations and fire hazard reduction; pertaining directly to recreation facilities, Amendment 2 in 2010 outlined the responsibilities of O&M and management of the Pyramid Lake recreation facilities.

Effective January 1, 2011, DWR assumed responsibility from USFS for routine O&M of the Project recreation sites at the Pyramid Lake Recreation Area, and the management of recreation activities. Current DWR management includes the following areas:

- Los Alamos Campground
- Emigrant Landing Day Use Area
- Yellow Bar, Bear Trap, Serrano, and Spanish Point Boat-in Picnic Areas
- Two floating restrooms on Pyramid Lake
- Vaquero Day Use Area

In 2004, CDFG (now CDFW) and DWR entered into a Stream Alteration Maintenance Agreement (per Stream Alteration Notification No. 2004-0154-R4 and pursuant to FGC Section 1602) delineating and defining routine maintenance activities within streams and lakes associated with the California Aqueduct in the DWR SFD. The Agreement identifies general and site-specific provisions and restrictions on DWR activities to prevent any substantial adverse impacts to fish and wildlife resources while permitting required maintenance activities to proceed. The Agreement is subject to renewal every five years. Activities authorized by this Agreement are as follows:

- Removal of living and dead vegetation, sediment, and debris, from inside and upon structures, and immediately upon or adjacent to inflow/discharge aprons, basins, wing walls and dissipaters of existing bridges, culverts, diversions and flow control and measurement structures
- Removal of living and dead vegetation, sediment, and debris from the channel bottom and the bottom one-half of the banks of miscellaneous streams that are an obstruction to flow
- Removal of living and dead vegetation, emergent vegetation, sediment, and debris from seeps and ponds
- Maintenance of existing structural and other flow and erosion control features to their original location and configuration

- Maintenance of existing access routes to their original location and configuration
- Maintenance activities authorized by Stream Alteration Notification No. 2004-0154-R4 will be performed at a time and in a manner to minimize adverse impacts and provide for the protection of fish and wildlife resources, in part, as follows:
 - Routine maintenance work within the streams shall be completed when the area is dry, if possible.
 - Routine maintenance work shall be limited to periods when actively nesting birds are not present in the riparian area of the stream, when nearby actively nesting birds will not be adversely affected.
 - If routine maintenance work takes place during periods other than those described above, DWR shall consult with CDFW and all other appropriate agencies for approval.
 - Routine maintenance work within the streams may commence after all pertinent permits and authorizations from other agencies are secured.
- Any oaks removed that are greater than 3 inches dbh shall be replaced in kind, at specified replacement ratios.
- Whenever possible, invasive species shall be removed and controlled in a legal manner that prevents seed dispersal.
- Where control of non-native vegetation is required within the bed, bank, or channel of the stream, the use of herbicides is necessary, and where there is a possibility that the herbicides could come into contact with water, DWR shall employ only those herbicides, such as Rodeo®, which are approved for aquatic use.
- Cleared or trimmed vegetation and woody debris shall be disposed of in a legal manner, and may be used as part of a bio-technical bank stabilization technique or used to enhance wildlife habitat.
- Sand, silt, and sediment removal shall be generally limited to the stream bottom and no more than 200 linear feet upstream or downstream of the structure.
- Cleared debris shall be removed from the stream zone and placed in an approved spoil site.
- Clean natural boulders or “shot-rock” (not broken concrete) shall be used to replenish and maintain bank stability in previously rip-rapped areas.
- Any temporary stream diversion shall be coordinated and approved by CDFW.

- DWR's ability to minimize turbidity, siltation, and erosion in a stream shall be subject to conditions of the RWQCB Lahontan Basin Plan.
- A DWR biologist shall review each routine maintenance work activity and shall issue a standard DWR environmental clearance (DWR Standard Form 77) for the subject activity.
- This Agreement does not allow for the take, or incidental take, of any federal- or State-listed special-status species.
- In areas that potentially support special-status species, a qualified DWR biologist shall conduct pre-construction surveys and notify CDFW regarding the results of these surveys.
- A qualified biologist shall be present during any routine maintenance work in areas where federal- or State-listed special-status species are known to be present and are potentially at risk.
- DWR assumes responsibility for the restoration of any fish and wildlife habitat that may be impaired or damaged either directly or incidental to the maintenance activity.
- After routine maintenance work is completed, exposed areas shall be seeded, mulched, and fertilized with a blend of a minimum of three locally native grass species, with the mix submitted to CDFW prior to application.
- Annual reports, summarizing the activities completed during the past year, shall be submitted to CDFW by January 31 of each year.
- DWR shall have primary responsibility for monitoring compliance with all protective measures included in the Agreement.

5.6.1.10 DWR Vehicular Access Routes to Project Facilities

Public vehicular access to Project facilities at Quail Lake and the Lower Quail Canal is provided via Interstate 5, and State Highway 138 (Lancaster Road). Restricted vehicular access (official vehicles only) to the Quail Lake inlet and outlet structures is via a gated, graveled shoreline access road. The nearby Peace Valley Pipeline Intake Embankment is reached via Edison Springs Road.

The Peace Valley Pipeline is accessible from Interstate 5 via Orwin/Pyramid Lake Road. The Warne Powerplant and Emigrant Landing recreation areas at Pyramid Lake are also accessible via Pyramid Lake Road. Vehicular access to the immediate vicinity of the Warne Powerplant is restricted to official vehicles only.

Los Alamos Campground is accessible to the public from Pyramid Lake Road and Hard Luck Road, crossing Gorman Creek on a bridge located just north of the Warne Powerplant.

The Vista Del Lago Visitor Center is immediately adjacent to Interstate 5 and reachable by the exit of the same name. The Vaquero Day Use Area is accessible from this same exit.

The public may access Spanish Point Boat-in Picnic Area only by boat, although official vehicles may reach this area by road from the Vaquero Day Use Area.

The Pyramid Dam vicinity is accessible from Interstate 5 via the Golden State Highway Old Road. Only official vehicles are permitted north of Frenchmans Flat , although pedestrians may access Piru Creek closer to the dam.

Castaic Powerplant and Elderberry Forebay are accessed from Interstate 5 and 6N32/Templin Highway. Vehicular access is restricted (by gates) to official vehicles only east of the Templin Highway intersection with the Los Angeles City Water and Power Road. Pedestrian access is allowed along the Los Angeles City Water and Power Road north of the Castaic Powerplant security gate and along Goodell Fire Road/Castaic Canyon Road - 6N13 (east side of Elderberry Forebay). No pedestrian access to the Elderberry Forebay is allowed.

Refer to Section 5.3 (Primary Project Roads and Trails) in Exhibit A (Project Description) of this Application for New License for information on Primary Project Roads and Trails within the proposed Project boundary.

5.6.1.11 Wildfires, Fire Suppression, and Prevention Policies

The State Responsibility Area is the area of California where the State is financially responsible for the prevention and suppression of wildfires. The State Responsibility Area does not include lands within city boundaries or under federal ownership. Quail Lake, the Warne Powerplant, Castaic Powerplant, and the Elderberry Forebay Dam are within the California Department of Forestry and Fire Protection (CAL FIRE) State Responsibility Area, as are the lower portions of the Castaic Powerplant penstocks, the State lands surrounding Elderberry Forebay, and much of the Castaic Transmission Line (State of California 2012). CAL FIRE supports fire control and suppression within the Project.

Numerous fires originate from Interstate 5. Fire safe conditions along the interface are inconsistent and private landowners look to the ANF to create community defense zones. The urban development in the south (Santa Clarita) is creating issues of community defense along the Interstate 5 corridor, as well as encroachment and unauthorized activities. Fuel treatments have been limited in the past. Most of the fire occurrences have been within the historic range of variability, but there are areas (e.g.,

along the highway corridor) that have been identified with excessive fire occurrence (USFS 2005b).

USFS wildland fire suppression in the ANF (including lands adjacent to the Warner Powerplant, Pyramid Lake, Castaic Powerplant, and Elderberry Forebay) encompasses all activities included in containing and mitigating the damages of wildland fires caused by either natural or human means. This program also includes national support of fire and disaster teams in other areas of the country (USFS 2005b).

USFS fire prevention is based on three primary categories: education, engineering, and enforcement. Education includes Smokey Bear programs to instill a fire prevention ethic in school children, and Firewise community programs that target civic and homeowner groups. Engineering includes abatement of fire hazards along roadways and in high-use areas using fire retardants and removal of flammable vegetation. Enforcement includes executing State fire law regarding hazard abatement around structures for both public and private land in the ANF. This is also done along all electrical transmission and distribution systems (placed by public utility agencies) across the ANF (USFS 2005b).

Hazardous fuel reduction is the set of activities associated with removing brush and vegetation from areas where they pose a significant threat to human life, property, and national forest resources, and where they interfere with the health of natural fire-adapted ecosystems. Fuel reduction involves direct management of vegetation using prescribed fire, mechanical, manual, or chemical methods. This is accomplished by a multidisciplinary planning approach using resource specialists, local governments, communities and contractors. The ANF Fuels Officer provides overall leadership for this program, which is then carried out by fire management personnel and local government (USFS 2005b).

Suppression of wildland fires is the first priority for ANF program managers. All wildland fires on southern California national forests are considered to be a threat to communities. Aggressive fire suppression and prevention strategies are implemented near communities to achieve the objectives to protect life and property from wildland fire, subsequent floods, and debris flows (USFS 2005b).

Wildland/Urban Interface Defense and Threat Zones around structures, fuelbreaks, and vegetation treatments to maintain or restore forest health within community protection areas are also an ANF priority. Vegetative treatments are strategically integrated to maximize community protection efforts and minimize wildland fire size, while considering habitat needs. Mortality removal is integrated with thinning within the community protection areas (USFS 2005b).

In September and October 2006, the Day Fire burned more than 159,000 acres of the LPNF and privately owned lands approximately 20 miles north of Santa Clarita (Los Angeles Times 2006). The fire was set by an arsonist. Yellow Bar Boat-in Picnic Area facilities were destroyed by the Day Fire in 2006 and were reconstructed in compliance with USFS accessibility standards. The design was approved by USFS.

Campfire permits are not required at the developed Pyramid Lake picnic areas or campgrounds accessible to the public by motor vehicle. Visitors may use the stoves, fire pits, and campfire circles, which are provided, or their own liquid or gas fuel portable stoves as long as proper clearance is maintained. Visitors cannot build their own fire rings (USFS 2011).

5.6.1.12 Public Safety in the Project Area

As described in DWR's Project Public Safety Plan (DWR 2014), DWR has implemented many practices to promote the safety of the public and its employees. DWR educates and informs the public with many different displays and attractions, including those at the Vista Del Lago Visitor Center. At Vista Del Lago Visitor Center, visitors can learn about the Project and the SWP, the facilities, their purpose and operations, and many safety topics. Vista Del Lago Visitor Center displays inform the public about safety features on the public lakes and reservoirs, as well as the recreational fishing sections of the Project. Vista Del Lago Visitor Center has brochures and videos for visitors to learn about water safety, especially for children.

The DWR Water Safety web page (<http://www.water.ca.gov/recreation/safety/>) includes all the brochures and videos that are at Vista Del Lago Visitor Center. The videos "Water Safe for Life" and "Come Back Alive!" are intended to educate and inform the public on SWP recreational facilities, and the brochures "SWP Water Safety" and "Water Safety Materials" offer helpful tips and information to help keep the public informed and safe.

DWR uses many warning devices, such as signs, buoy lines, and alarms, to warn the public of dangers or hazards. Many signs inform the public that an area is dangerous and that its access is prohibited; other signs inform the public they can enter but only on foot, with no bicycles or vehicles; while others inform the public of extreme dangers, such as high voltage power lines, strong currents, and cold water temperatures.

DWR further promotes public safety by excluding public access from unsafe areas through the use of fences, gates, and boat barriers. Nearly all the Project facilities are surrounded by six-foot-high fencing with three-strand barbed wire tops. Manually operated gates are locked with chains and special locks made solely for DWR. Electric gates require a specific key or authorized security badge to get through, and most pumping plants and powerplants have a security camera watching the front gate with an operator and security guard monitoring at all times.

Procedures for safe Project operations are continually evolving and expanding. DWR always places safety first, and makes safety the premier aspect of all its operations. DWR currently has many safety standards set forth in its dam-specific FERC Emergency Action Plan, internal regulations, and daily Project operations. Daily patrols are conducted by DWR, and all safety procedures are checked. If a safety structure or device is damaged or needs replacement, an internal Trouble Report (TR) is generated as soon as practical, and action is taken to isolate the danger and to make the needed

repair or replacement. DWR's TR system provides a preventative strategy for dealing with extant and future public safety hazards. Furthermore, all DWR buildings are locked at all times and all exterior doors to these facilities will alarm the plant operator and Area Control Center (ACC) if opened.

The Castaic Powerplant, Elderberry Forebay, Elderberry Forebay Dam, penstocks, switchyard, and related facilities are not open to the public, except for some land areas near the Castaic Transmission Line. LADWP uses warning devices, such as signs and log booms, to warn O&M staff and the public of any dangers or hazards. Many signs inform the public that the area is dangerous and that its access is prohibited. In addition, LADWP's private security staff patrol these facilities 24 hours per day, seven days per week.

A more detailed discussion of the safety practices the Licensees have implemented at each of the Project facilities is discussed below. These facilities include those that are in publicly assessable areas, as well as Project areas closed to the public (but that are used by Project O&M staff).

Quail Lake

At Quail Lake, shoreline fishing, bird watching, and hiking take place; however, no water contact uses are allowed. DWR encourages the recreational use of Quail Lake shorelines for fishing, but also posts signs to inform the public of the rules and to inform them of potential dangers. The signs around Quail Lake also serve as warning devices. For public safety, the signs are mounted to fences and gates and are routinely maintained. Most of the signs are in English and some are in Spanish.

A buoy line across the entire width of the Lower Quail Canal at the Quail Lake outlet prevents the public from getting too close to the outlet gates and signage warns the public of the direction of the flowing water. The reservoir is surrounded by 4-foot-high barbed wire fencing and the facilities within the fence line are also surrounded by 6-foot-high chain link fencing with a three-strand barbed wire top.

At the Quail Lake inlet, escape ladders are mounted on both sides of the canal liner upstream of the gates. The liner is also marked by a painted on, easily visible, large yellow square. Quail Lake is inspected daily by DWR and TRs are generated for any issues that may arise.

Lower Quail Canal and Peace Valley Pipeline Intake

The Lower Quail Canal and Peace Valley Pipeline Intake are not accessible to the public due to safety concerns. DWR promotes public safety by excluding the public from all dangerous and hazardous equipment or operations. The Lower Quail Canal and Peace Valley Pipeline Intake are described in the information videos available at the Vista Del Lago Visitor Center and on DWR's website. Also, these areas are surrounded by signs that inform the public that the area has restricted access due to the dangers of

swimming in the water. Signs that say, “DANGER STAY ALIVE BY STAYING OUT” and “STAY OUT OF AQUEDUCT YOU MAY DROWN” (in both English and Spanish) warn the public of the danger of trying to swim in the aqueduct. Other signs inform authorized personnel of nearby features, such as “HELISPOT-LAC 77 E,” which refers to a helicopter take-off and landing area.

Buoy lines and boat barriers block the entire width of the canal at both the inlet and outlet of Lower Quail Canal. The entire area is enclosed with 4-foot-high barbed wire fencing, and the facilities within the fence line are also surrounded by 6-foot-high chain link fencing with a three-strand barbed wire top.

At the inlet and outlet of Lower Quail Canal, escape ladders are mounted to both sides of the canal liner. The liner is also marked by a painted on, easily visible, large yellow square at the location of the escape ladders. The Lower Quail Canal and Peace Valley Pipeline Intake are inspected daily by DWR and TRs are generated for any issues that may arise.

Peace Valley Pipeline and Gorman Bypass Channel

The Peace Valley Pipeline is a 12-foot diameter underground pipeline. The Gorman Bypass Channel is a concrete-lined channel that delivers Project water from the Lower Quail Canal to Pyramid Lake. The channel is not open to the public and is secured within a 6-foot-high chain link fence with a three-strand barbed wire top.

Yellow post markers warn the public of the underground pipeline. These post markers also warn the public not to dig in that location. Many signs around the Gorman Bypass Channel fence warn the public to stay out of the channel: “STAY OUT OF AQUEDUCT YOU MAY DROWN.”

The area above the Peace Valley Pipeline is enclosed within a 6-foot-high chain link fence with a three-strand barbed wire top to prevent the public from accessing the area. The area above and around the Peace Valley Pipeline and Gorman Bypass Channel is inspected daily for wet spots or signs of damage (i.e., signs of digging near the pipeline or cracks in the concrete liner of the channel). Anything unusual is documented by DWR and reported in an internal TR to the ACC.

Warne Powerplant

The Warne Powerplant is not publicly accessible. The exterior fence of the facility has many warning signs informing the public of restricted access and potential dangers. Examples of such signage are: “Authorized Personnel Only” and “Warning High Voltage Keep Out.”

The Warne Powerplant is surrounded by a 6-foot-high fence with a three-strand barbed wire top. All entrance gates to the facility are locked at all times, and can only be opened by specific keys or authorized identification badges. Exterior doors will alarm if

opened. Two buoy lines and two boat barriers prevent the public from venturing too close to the Warne Powerplant.

A security camera is operated and monitored by the Warne Powerplant operator on duty. The front gate and surrounding grounds of the facility are monitored. The operator is in constant contact with the onsite security guard and the ACC. The Warne Powerplant is manually operated, with DWR staff on site seven days per week, 24 hours per day.

Pyramid Lake

Pyramid Lake is a reservoir that is open to the public for recreation. Pyramid Lake is considered an important regional recreation resource, and is discussed in Section 5.5 (Recreation Resources) of this exhibit.

The area surrounding Pyramid Lake includes NFS lands within the boundaries of the LPNF and ANF, and State lands, which are managed by DWR for Project operations. The majority of the Project recreation areas are located on NFS lands, including the Los Alamos Campgrounds and 11 other Project-developed recreation areas around Pyramid Lake. The National Forest boundary separating the LPNF and ANF runs through the middle of Pyramid Lake, but the ANF administers all areas of existing and proposed Project boundaries located within the LPNF, including Pyramid Lake. Policies and programs associated with the ANF and LPNF apply only to the NFS lands within the Project boundary.

For Project facilities where the public has access, DWR uses signs, buoy lines, and alarms to warn the public of any dangers or hazards. Many signs tell the public the following:

- Area is dangerous, and access is prohibited
- Area can be entered, but only on foot (no bicycles or vehicles)
- Area is extremely dangerous (e.g., due to high voltage power lines)

Furthermore, DWR uses fences, gates, and boat barriers to keep the public out of all unsafe areas.

Pyramid Lake boating is patrolled by the Los Angeles County Sheriff's Department from offices located at Emigrant Landing Marina. Boating speed limits vary in different parts of the lake. In the canyons where non-motorized crafts such as canoes and rafts are popular, power boats are restricted to low speeds (5 mph, no wake) (USFS 2015). Higher speeds for waterskiing are allowed on the main body of the lake.

The Los Angeles County Sheriff's Department has set a maximum number of boats that can be safely launched on Pyramid Lake at any one time. These limits are 50 PWC and 150 boats, although the limits do not include the concessionaire rentals, which add a

small number of watercraft to the totals allowed. The Sheriff's Department can make exceptions to the limits, but typically has not changed these capacities as they have been tried and used successfully over the last 10 years or more on Pyramid Lake. Once these lake limits are reached, which can occur very early on busy weekends, boats and PWCs are only allowed to enter Emigrant Landing when a boat or PWC leaves.

Pyramid Dam

The Licensees characterize Pyramid Dam as a limited access public facility. The safest practice is to keep the public away from all dangerous and/or hazardous equipment or operations; therefore, Pyramid Dam is not accessible to the public. Pyramid reach, on the downstream side of the dam, is accessible to the public by foot. Signage immediately below the dam warns of the danger of flooding around the creek.

Many signs around Pyramid Dam inform the public of the hazards. Signs on the buoy lines on the reservoir side of the emergency spillway and radial gate that say: "KEEP OFF RESTRICTED AREA DO NOT ENTER OR TIE BOATS TO FLOAT LINE." In addition, there are signs that inform the public of where access is granted and where it is restricted: "RESTRICTED AREA, NOTIFY ACC BEFORE ENTRY."

The downstream side of the dam is only accessible over a bridge that has a large metal gate that is locked at all times and is surrounded by a chain link fence. Additionally, the stream release access tunnel and the adits all have large metal doors that are locked at all times and will alert the ACC when opened.

A security camera is monitored by the security control room operator on duty. The security control room operator monitors the dam access tunnel and surrounding grounds of the facility. Exterior lights allow monitoring 24 hours per day, seven days per week. Gates and doors at Pyramid Dam are locked at all times and will alarm if opened. The dam is also patrolled daily by DWR staff, and any unsafe or unusual activities are noted in a TR and reported to the ACC.

Castaic Powerplant and Elderberry Forebay

Castaic Powerplant and Elderberry Forebay are not open to the public and onsite security maintains site control. The water level regularly fluctuates in Elderberry Forebay by up to 25 feet due to operation of the Castaic Powerplant; therefore, it is closed for public safety. These facilities are fenced and gated, and "no trespassing" signs are posted.

While roads are located along the west (Los Angeles City Water and Power Road) and east (Goodell Fire Road/Castaic Canyon Road – 6N13) of Elderberry Forebay, public vehicular access on these roadways is prohibited. Pedestrian and bicycle use is allowed on the east shoreline road.

LADWP uses signs and a log boom to warn people of dangers and hazards. Many signs inform the public that the area is dangerous and that access is prohibited. In addition,

LADWP's private security staff patrol these facilities and maintain control 24 hours per day, seven days per week. In addition, there is a log boom on the non-Project Castaic Lake that prevents the public from entering the discharge area near Elderberry Dam. LADWP, in coordination with the Los Angeles County Sheriff's Department, installed and maintains the log boom.

5.6.1.13 Law Enforcement in the Project Area

As described above, the Quail Lake shoreline is open to pedestrians for fishing, hiking, and walking, while the lake surface is not open to the public. DWR's private security staff patrol the recreational parking area and the shorelines, and oversee the lake surface. DWR's security staff monitor the facilities, and anything unusual is documented in a TR and reported to the ACC.

The Lower Quail Canal, Peace Valley Pipeline Intake, and Peace Valley Pipeline are not open to the public. Patrols in these areas are the responsibility of DWR. Daily inspections are performed by DWR staff, and anything unusual is documented in a TR and reported to the ACC.

The Warne Powerplant and related facilities are not open to the public. Security at these facilities is the responsibility of DWR.

Pyramid Lake Recreation Area law enforcement is carried out by the Los Angeles County Sheriff's Department and California Highway Patrol. Enforcement of Pyramid Lake boating rules is conducted by the Los Angeles County Sheriff's Department from offices located at Emigrant Landing (see Section 5.6.1.7 [Public Safety in the Project Area] for further details).

Pyramid Dam and related facilities are not open to the public. The dam is also patrolled daily by DWR staff, and any sign of unsafe or unusual activities are noted in a TR and reported to the ACC.

The Castaic Powerplant, Elderberry Forebay, Elderberry Forebay Dam, penstocks, and related facilities are not open to the public.

5.6.1.14 Restrictions to Project Waters and Lands

As described above, Quail Lake shoreline is open to pedestrians for fishing, hiking, and walking, while the lake surface is not open to the public. No hunting is allowed at Quail Lake. The Warne Powerplant and related facilities are not open to the public.

Pyramid Lake Recreation Area boating and fishing rules are described within this exhibit, in Section 5.5 (Recreation Resources). Additional restrictions to Project waters and lands at Pyramid Lake, also described in Section 5.5 (Recreation Resources), address dispersed recreation, fire, and public safety. No hunting is allowed in the Pyramid Lake recreation areas.

As described above, Pyramid Dam, Castaic Powerplant, Castaic Penstocks, Elderberry Forebay, Elderberry Forebay Dam, and related facilities are not open to the public. Pyramid reach is open to the public and accessible on foot, vehicles are not allowed beyond the gate at Frenchmans Flat on the Golden State Highway.

5.6.1.15 Shoreline Management and Buffer Zone Policies

The Licensees do not have a formal shoreline management policy because there are no private developments or uses, and all of the shoreline is managed by the Licensees. Most of the Pyramid Lake and Quail Lake shorelines are open to the public, but there are no special or private uses along these shorelines that require specific shoreline occupancy and use policies or management consideration.

5.6.2 Effects of the Licensees' Proposal

5.6.2.1 Proposed Project Boundary Modifications

As part of the Project relicensing, the Licensees propose to modify the existing Project boundary, thereby reducing the area within the boundary from 6,928.0 acres to 4,563.8 acres. This change would reduce the 3,287.3 acres of federal land (47.5 percent of the total area within the existing Project boundary) to 2,007.0 acres of federal land (44.0 percent of the total area within the proposed Project boundary). This reduction includes ANF and LPNF lands that do not have Project facilities and are not needed for Project purposes. The remaining lands within the proposed Project boundary are State lands along with 15.5 acres of private lands, the majority of which are associated with the Castaic transmission corridor.

5.6.2.2 Land Use Measures

In addition, discussed in Appendix A of this Exhibit E, the Licensees propose to include in the new license two land use–related measures – a Fire Prevention and Response Plan that provides measures for preventing, reporting, and investigating Project-related wildfires; and a Project Safety Plan that provides measures needed to protect the public.

5.6.2.3 Public Use of Land

The Licensees' proposed change to the Project boundary will have no effect on the public's use of lands within the existing or proposed Project boundary. Project lands currently within the proposed Project boundary around Quail Lake and Pyramid Lake that are available for public use, and access to shorelines for recreational purposes, will remain open for public recreation. Public access to public lands proposed to be removed from the Project boundary is not expected to change. The following existing components will be added to the Licensees' Proposal and proposed Project boundary (where not already within the Project boundary): 99 existing road segments that the Licensees propose to add to the Project's licensed facilities as Primary Project Roads and the Quail Detention Embankment. The Los Alamos Campground is an existing

Project facility; however, the Los Alamos Campground was erroneously omitted from the existing Project boundary. Therefore, the Los Alamos Campground is a proposed addition to the proposed Project boundary, in order to fix this oversight.

5.6.2.4 Non-Project Uses

A non-project use of project lands is a third-party use and occupancy of project property authorized by a licensee through the conveyance of a specific interest in project lands and waters. These uses may include, but are not limited to, land for boat docks, marinas, bridges, pipelines, water withdrawals, and utility lines. Non-Project uses include Interstate 5, State Highway 138, local roadways (such as Quail Lake Road, among others), and utilities within these roadways. Non-Project uses will continue to be allowed on Project lands on a permission-only basis through the Licensees' administration of the standard license land use articles, ensuring existing and proposed uses are consistent with the purposes of protecting and enhancing the environmental values of the Project. The Licensees will continue to exercise their authority under the new license to grant permission for certain types of use and occupancy of Project lands and waters without prior FERC approval. The Licensees will exercise such authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the Project.

5.6.2.5 Vegetation Management

Upland habitats and weed-infested areas along Project roads and maintenance locations will be managed under the Licensees' proposed IVMP. As stated in Appendix A of this Exhibit E, the Licensees will, within one year after license issuance, develop and file with FERC for approval an IVMP that provides vegetation management protocols. The Licensees will implement the plan as approved by FERC.

Additionally, new recreation measures, as part of a new RMP for the Project, will include future rehabilitation of some recreation sites and additional management initiatives related to litter control. The RMP will not adversely affect land management practices associated with native wildlife habitats; rather, it will greatly improve conditions for the recreating public and their use of the shore lands surrounding Pyramid Lake.

5.6.2.6 Specific Conditions

It is anticipated a new license for the Project will include a use and occupancy article allowing the Licensees the right to convey certain interests in Project lands and waters (through leases, rights-of-way, or fee title conveyances) for certain non-Project uses without prior FERC approval.

5.6.2.7 Conveyances

Conveyances allowed under the article must be consistent with the scenic, recreational, and other environmental values of a project. In addition, the entity requesting the conveyance must fulfill specific requirements before a licensee can convey an interest

in project lands or waters. The requirements are based on the characteristics of the proposed use and the type of conveyance. The licensee must also consult with the appropriate federal and state agencies to confirm that the proposed use is compatible with a project's recreation plan and resources, and that the instrument of conveyance includes appropriate covenants to protect the scenic, recreational, and other environmental values.

However, under the Licensees' Proposal, the Licensees are proposing to include a Fire Prevention and Response Plan to help guide resource management in these areas over the term of the new license. The Fire Prevention and Response Plan provides guidance for fire prevention, response, and investigation, including prevention, emergency response preparedness, reporting, and fire control/extinguishing during Project O&M. Also related to Land Use are the proposed IVMP and the RMP for the Project.

5.6.3 Unavoidable Adverse Effects

Continued O&M activities associated with the Licensees' Proposal will have minimal effects relative to ongoing land use and management. The existing Project effects on land use and management will remain the same under the Licensees' Proposal; therefore, the Licensees' Proposal will not incur any additional unavoidable effects. The Project recreation facilities attract users that, in turn, can effect change in how lands are used in and around the Project; however, these changes are not considered adverse, as the Licensees and county/USFS land management policies (both on and off Project lands) help prevent the possibility of non-conforming uses from being established.

5.7 AESTHETIC RESOURCES

This section addresses aesthetic resources and is divided into three subsections. Section 5.7.1 describes existing Project conditions, and includes three sub-sections: Section 5.7.1.1 characterizes aesthetic resources in the Project region; Section 5.7.1.2 describes management plans that are pertinent to aesthetic resources affected by the Project; and Section 5.7.1.3 describes the aesthetic character of each above-ground Project facility. Potential effects of the Licensees' Proposal on aesthetic resources are described in Section 5.7.2, and unavoidable adverse effects are addressed in Section 5.7.3.

The Licensees augmented existing, relevant, and reasonably available information relative to aesthetic resources by conducting Study 4.1.15, Scenic Integrity. The study is complete and the study results are incorporated into this section. Refer to Appendix B of this Exhibit E or to the South SWP Hydropower relicensing website (<http://south-swp-hydropower-relicensing.com/>) for the detailed study approach, study summary, and detailed study data.

5.7.1 Existing Environment

This section provides information regarding existing aesthetic resources.

5.7.1.1 Aesthetic Character of Project Vicinity

The San Gabriel Mountains, which are located east of the Project, rise 10,000 feet over the metropolitan areas of Los Angeles County. Stands of pine, fir, and other evergreens cover the higher slopes of the San Gabriel Mountains. The desert floor of the Antelope Valley, located north of the Project's Quail Lake, is carpeted with wildflowers in early spring (County of Los Angeles 1980). West of the Project, the Santa Clara canyons rise up from the Santa Clara River at elevations starting at about 1,200 feet and reach up to 5,000 feet. Quail Lake, Pyramid Lake, and Elderberry Forebay are located on the western edges of the Sierra Pelona Mountains. This range separates the Antelope Valley from the Santa Clarita Valley.

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

Approximately 7.3 miles of Piru Creek in Pyramid reach beginning immediately below Pyramid Dam are included in the National Wild and Scenic River System as of 2009. Approximately 4.3 miles of the reach are designated as "Wild River," and upstream of that segment, approximately 3 miles are designated as "Recreation River," nearest to the Project.

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

5.7.1.2 Pertinent Management Plans

Antelope Valley Area Plan

The planning area for the Antelope Valley Area Plan: Town & Country (Los Angeles County Department of Regional Planning 2015) includes the Project's Quail Lake and

Pyramid Lake. Because the plan was prepared by a local government agency, it does not apply to State and federal agencies, yet is a useful reference for relicensing in that it describes the local environmental setting and the county's policies related to future development in the area. As described in this plan's Final Environmental Impact Report (FEIR) (Los Angeles County Department of Regional Planning 2014), scenic landform features include hillsides and ridgelines, canyons, creeks, trees, and water features. The most prominent landforms are the Antelope Valley and Mojave Desert in the north, and the San Gabriel Mountains in the south. The transition between these two regions is the visual backdrop for most of the inhabited portions of the planning area. Visual character varies widely throughout the planning area. However, because most of the region is undeveloped, the area is known for its rural character.

Interstate 5, which passes along the east side of Pyramid Lake, Gorman Post Road, and State Highway 138 (Lancaster Road), situated south of Quail Lake, are designated as "Priority Scenic Drives" in the Antelope Valley Area Plan. Goal COS-5 of this plan states that the Antelope Valley's scenic resources, including scenic drives, water features, significant ridgelines, buttes, and hillside management areas, shall be enjoyed by future generations. Policy COS 5.7 of this plan was established to help ensure that incompatible development is discouraged along designated scenic drives by developing and implementing standards and guidelines for these identified viewsheds.

Santa Clarita Valley Area Plan

The planning area for the Santa Clarita Valley Area Plan: One Valley One Vision (Los Angeles County Department of Regional Planning 2012a) includes the Project's Pyramid Dam, Angeles Tunnel, Castaic Powerplant, Elderberry Forebay, Elderberry Forebay Dam, and Castaic Transmission Line. Because the plan was prepared by a local government agency, it does not apply to State and federal agencies, but is a useful reference for relicensing in that it describes the local environmental setting and the county's plans for development in the area. As described in this plan's FEIR (Los Angeles County Department of Regional Planning 2012b), the planning area is dominated by a physical setting that offers residents and visitors a variety of scenic experiences due to the mixture of topography, flora and fauna, and a rich historical and cultural heritage. Memorable and distinctive scenery provides residents with a sense of place and identity, heightening the feeling of belonging and instilling a sense of uniqueness and civic pride. Prominent scenic resources include ridgelines, rivers and creeks, canyons, and forest lands. ANF land, most of which is undeveloped and protected, occupies much of the planning area.

As described in the Santa Clarita Valley Area Plan, development has the potential to impair scenic resources if not carefully planned and controlled. Increasing development pressures could impact the quantity, quality, and variety of scenic vistas in the Santa Clarita Valley through increased smog and light pollution, development on prominent ridgelines and hillsides, obstruction of scenic views along various roadways, signage and streetscape clutter, and aesthetically deficient development. Policies have been added to address the goal of protecting the scenic and aesthetic beauty of the valley.

Objective LU-6.1 of the plan is to maintain the natural beauty of the Santa Clarita Valley's hillsides, significant ridgelines, canyons, oak woodlands, rivers and streams. Objective LU-6.2 is to provide attractive public and open spaces in places visited by residents and visitors, where feasible and appropriate.

Angeles and Los Padres National Forest Land Management Plans

Within the proposed Project boundary, NFS lands managed by the ANF occupy 1,334.6 acres and lands managed by the LPNF occupy 665.9 acres. Policies and programs associated with the ANF and LPNF apply only to NFS lands.

Generally, landscapes that are most attractive and viewed from popular travel routes are assigned higher Scenic Integrity Objectives SIO. Each SIO depicts a level of scenic integrity used to direct landscape management on NFS lands.

Figure 5.7-1 shows the SIOs for NFS lands in and around the proposed Project boundary. Based on the SIO maps in the ANF and LPNF Land Management Plans (USFS 2005b, 2005c), the SIO for NFS lands within and around the proposed Project boundary is predominately high (i.e., landscape appears unaltered). Deviations from the natural landscape may be present, but must repeat the form, line, color, texture, and pattern common to the landscape character. There are a few small areas of Moderate SIO (i.e., landscape appears slightly altered). Noticeable deviations must remain visually subordinate to the landscape character being viewed. Project facilities on NFS lands include:

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

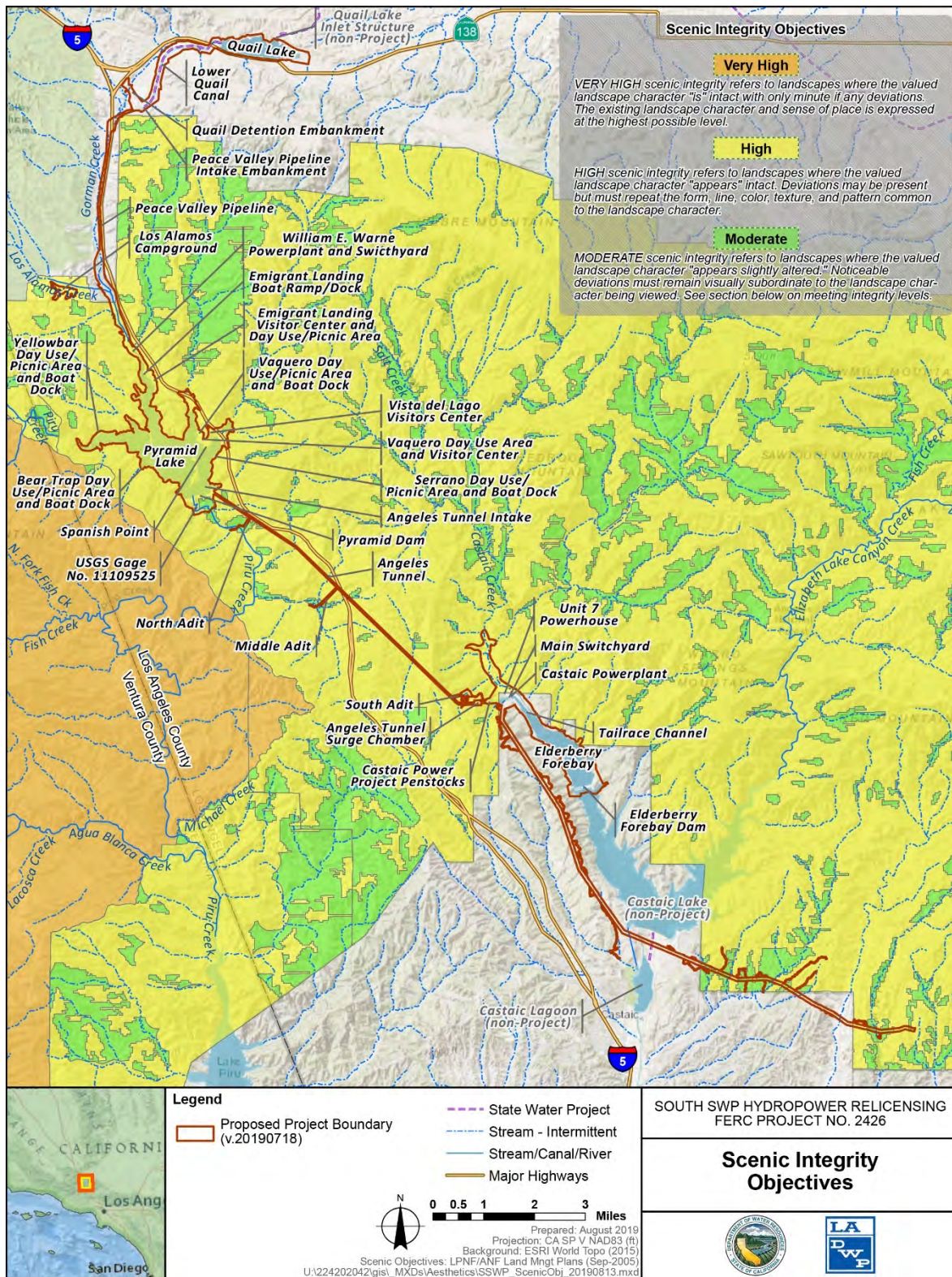
The ANF and LPNF Land Management Plans include two aesthetic management standards, as follows (USFS 2005a):

- S9: Design management activities to meet the SIOs shown on the Scenic Integrity Objectives Map.
- S10: SIOs will be met with the following exceptions:

- Minor adjustments not to exceed a drop of one SIO level are allowable with the Forest Supervisor's approval.
- Temporary drops of more than one SIO level may be made during and immediately following project implementation providing they do not exceed three years in duration.

Bureau of Land Management South Coast Resource Management Plan

Lands managed by BLM occupy 6.5 acres within the proposed Project boundary. BLM's South Coast Resource Management Plan guides the management of these lands as part of the Los Angeles County Management Area, which utilizes a visual resource management system to determine visual values, classes, and objectives. The lands within the proposed Project boundary are managed to a visual resource management Class 3 (i.e., partially retain the existing character of the landscape; level of change to the characteristic landscape is moderate) (BLM 1994). None of the Project facilities are located on BLM lands. Specifically, the BLM lands within the proposed Project boundary are located on the eastern boundary of Elderberry Forebay. Recreational access to the Elderberry Forebay area and waters is prohibited. Roads are located along the eastern shore of the forebay (Goodell Fire Road/Castaic Canyon Road [USFS Road 6N13]); however, public vehicular access on these roadways is prohibited. Non-motorized public use of the gated Goodell Fire Road/Castaic Canyon Road (USFS Road 6N13) and adjacent upland areas are allowed, but use is very light and Elderberry Forebay, Castaic Powerplant, and Castaic Penstocks are, therefore, largely unseen by the general public.



Sources: USFS 2005b, 2005c

Figure 5.7-1. USFS Scenic Integrity Objectives for National Forest System Lands Within and Around the Proposed Project Boundary

5.7.1.3 Aesthetic Resources Associated with Project Facilities

Recreation facilities, trails, and roadways offer predominant viewing areas of the Project facilities. These facilities often have key observation points (KOP) from which the public may observe Project facilities and features. Aesthetic resources at the Project facilities are discussed by the following groupings:

- Quail Lake, Quail Lake Outlet, and Lower Quail Canal
- Peace Valley Pipeline Intake Embankment and Gorman Bypass Channel
- Warne Powerplant and Switchyard
- Pyramid Dam, Pyramid Lake, and associated recreation facilities
- Angeles Tunnel and Surge Chamber
- Castaic Penstocks, Powerplant, and Switchyard
- Elderberry Dam and Forebay
- Castaic Transmission Line

In December 2018, the Licensees conducted Study 4.1.15 to document the existing scenic character of the Project facilities, including identifying KOPs where the Licensees evaluated the consistency of the existing visual condition with applicable visual or scenic quality guidance, dependent on the land ownership from the following viewpoints: foreground (i.e., KOP within 0.5 miles of the Project facility), middleground (i.e., 0.5 miles to 4 miles) and background (i.e., 4 miles to horizon) (USFS 1995). The Licensees conducted Study 4.1.15 in consultation with ANF landscape architects, including one field evaluation day (December 3, 2018).

Maps identifying the KOPs for each Project resource area (Figures 5.7-2 through 5.7-7) are provided below. The KOP location numbers shown in the aforementioned figures are numbered based on the order of the facilities listed above and generally start from north to south. These facilities were evaluated in the field from December 2, 2018, through December 4, 2018.

The Licensees identified 36 preliminary KOPs in consultation with USFS prior to conducting the field evaluations. However, the Licensees removed nine preliminary KOPs from the field evaluations based on field conditions, and ultimately evaluated a total of 27 KOPs in the field. Table 5.7-1 identifies the 36 preliminary KOPs, the 27 final KOPs, the facility evaluated, the land ownership where the Project facility is located, and the in-field reason for adding, removing, or shifting a preliminary KOP. Note that the final KOP list does not exactly match the preliminary KOP list since some final KOPs were not identified during the preliminary KOP identification process, but were identified/located while conducting the evaluation in the field. The following section

utilizes a selection of the final 27 KOPs that show critical, prominent, or highly representative viewpoints of the Project facilities. Where applicable, the Licensees identified the KOP in the discussion below.

Scenic resources also are described and photographically documented below. All photographs were taken at the equivalent of a 50 mm lens, unless otherwise noted, which best represents what the human eye can view at one point in time.

Notably, all of the Project facilities north of and including Warne Powerplant and south of Castaic Powerplant are located on State of California lands, except for the Castaic Transmission Line east and south of Castaic Lake, where the land is primarily NFS lands and private lands. Pyramid Lake is primarily on NFS lands.

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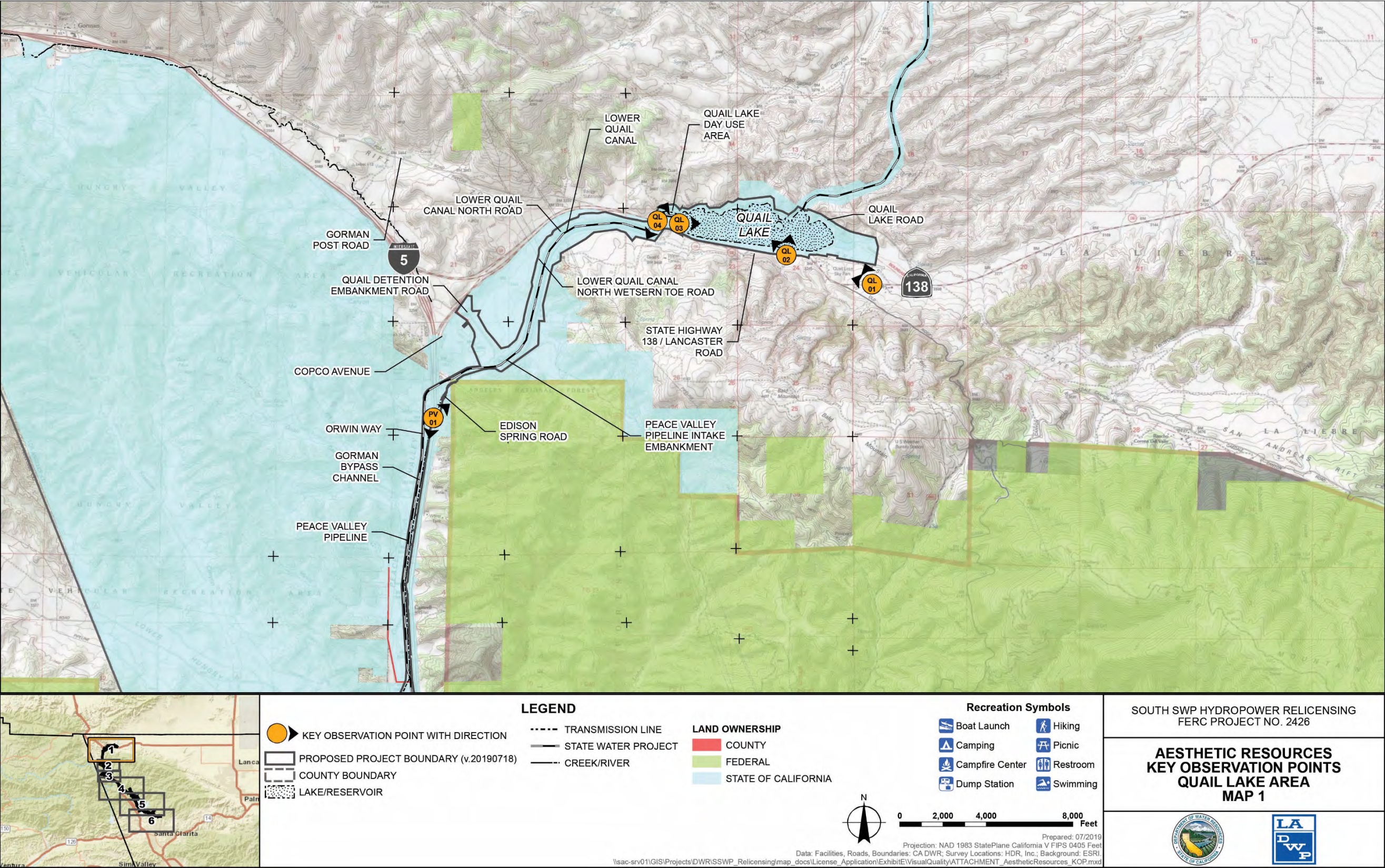


Figure 5.7-2. Key Observation Points Near Quail Lake, Lower Quail Canal, and Gorman Bypass Channel

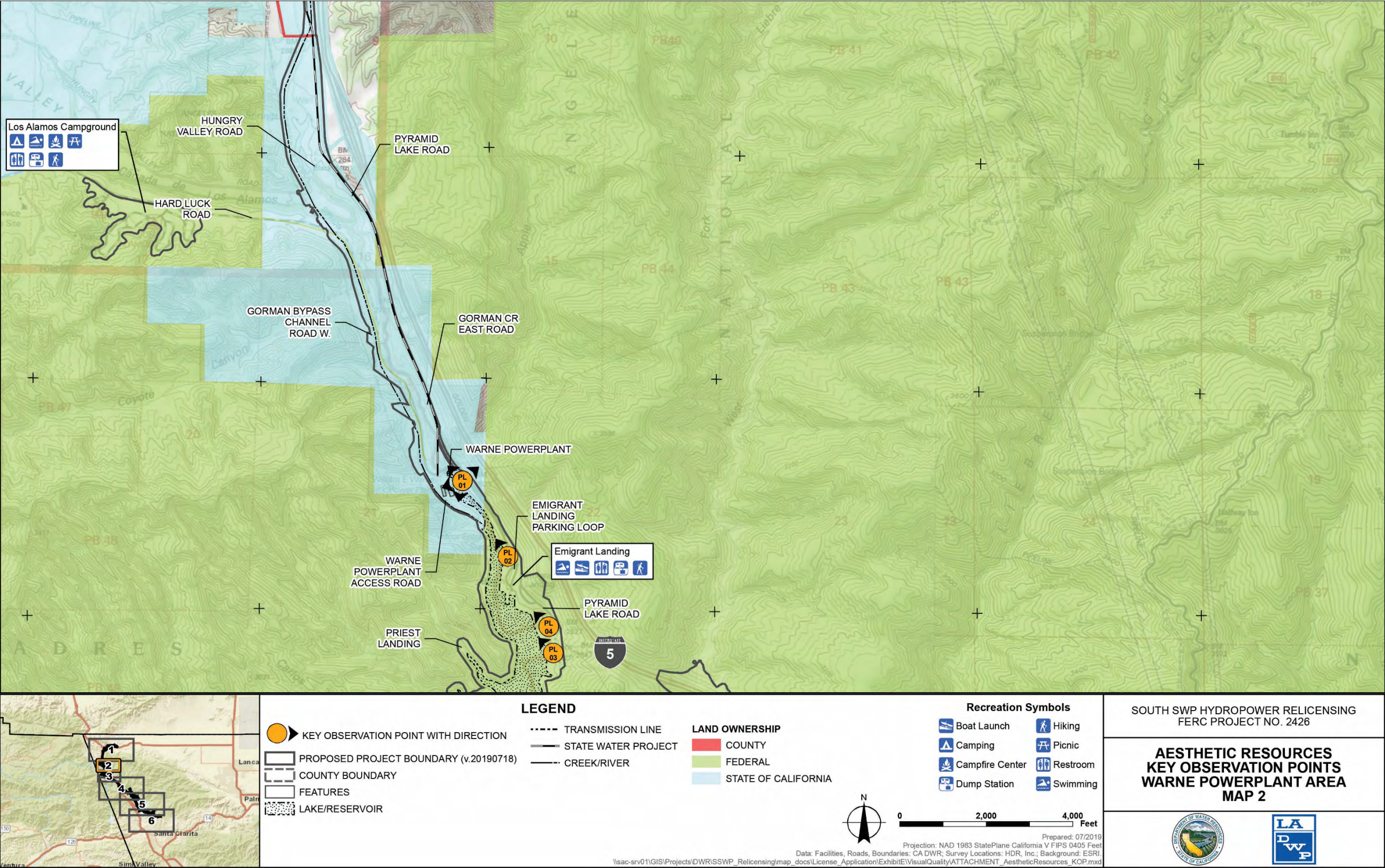


Figure 5.7-3. Key Observation Points Near Warne Powerplant

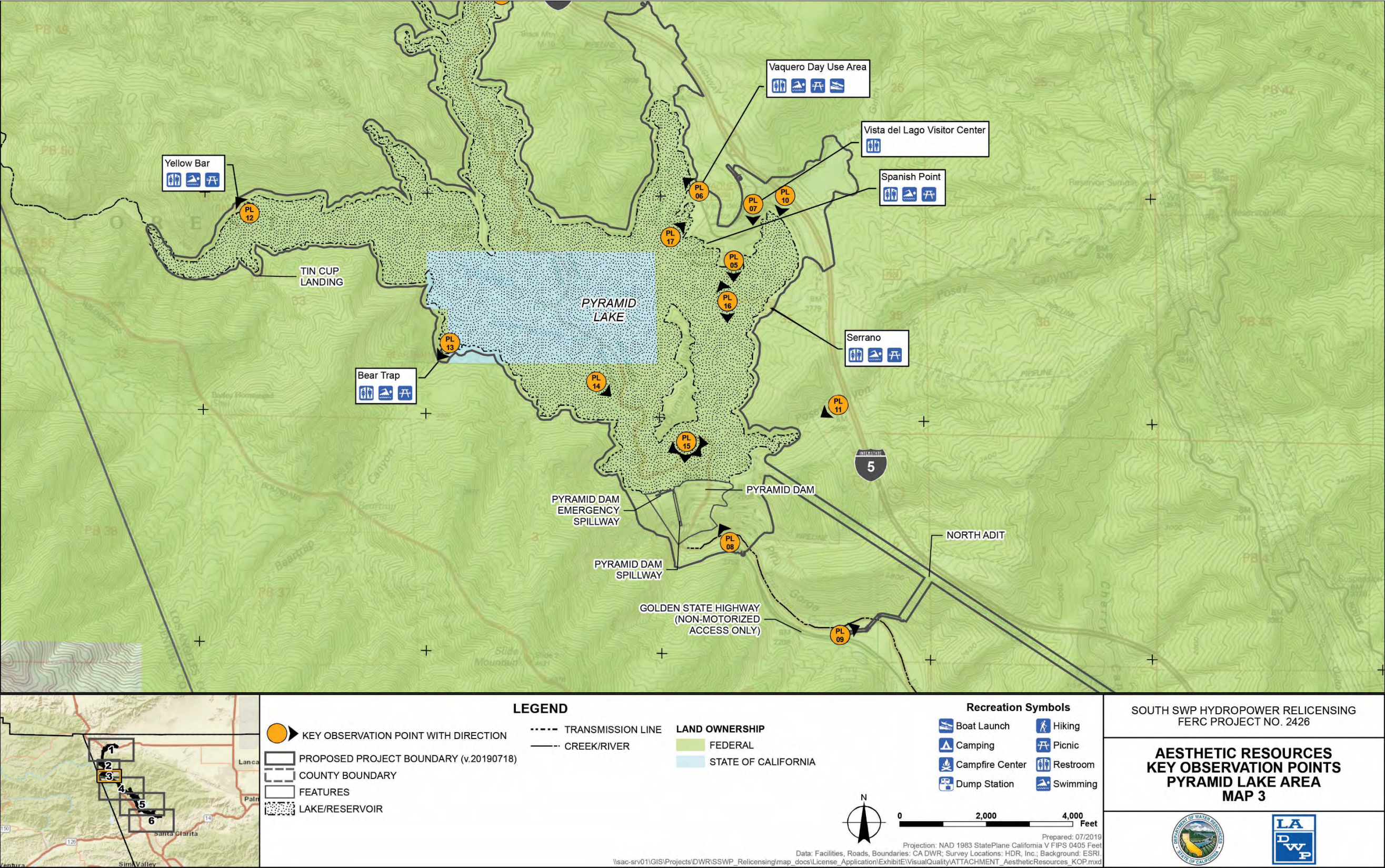


Figure 5.7-4. Key Observation Points Near Pyramid Lake and Dam

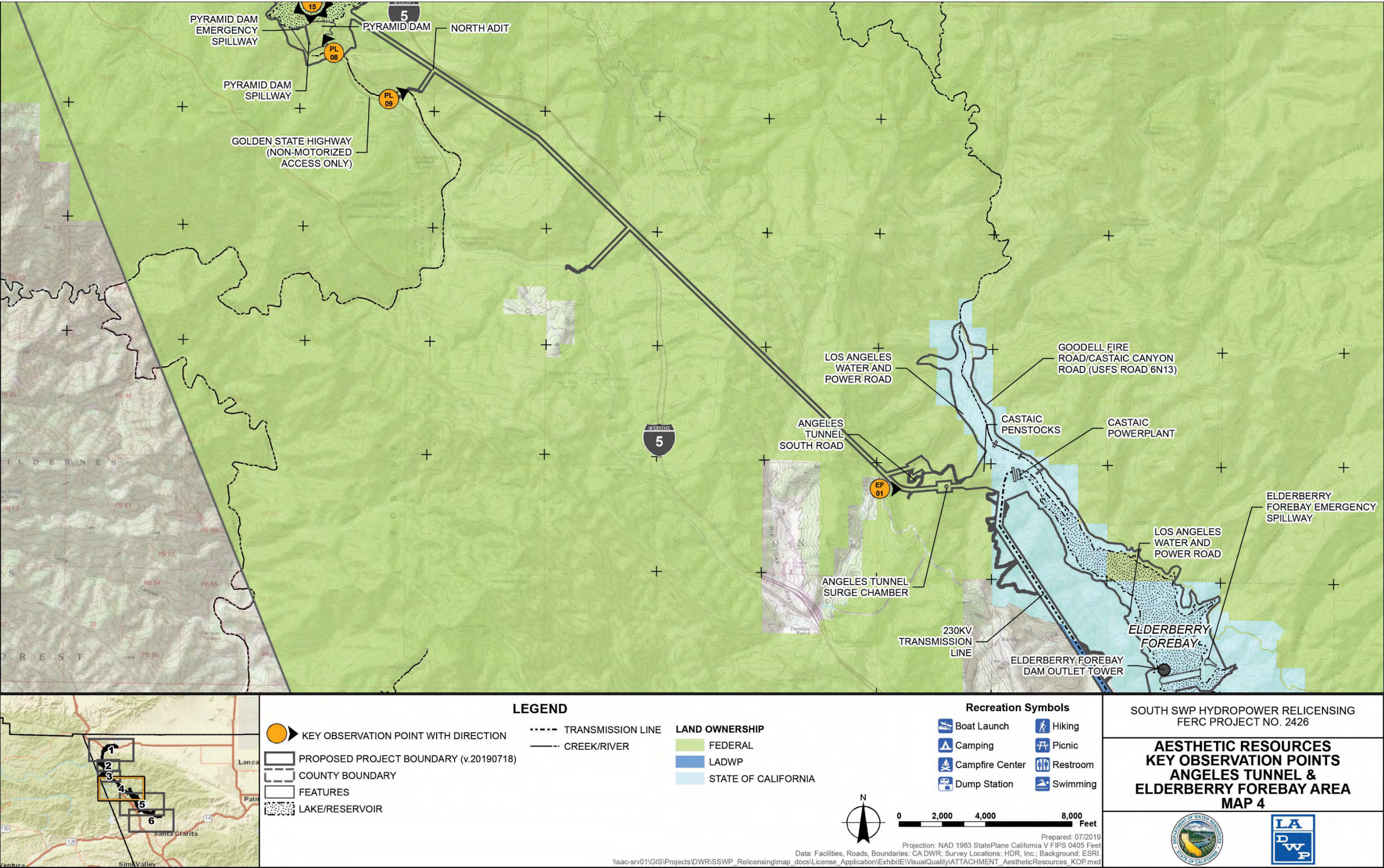


Figure 5.7-5. Key Observation Points Near Castaic Powerplant, Angeles Tunnel Surge Chamber, and Elderberry Forebay

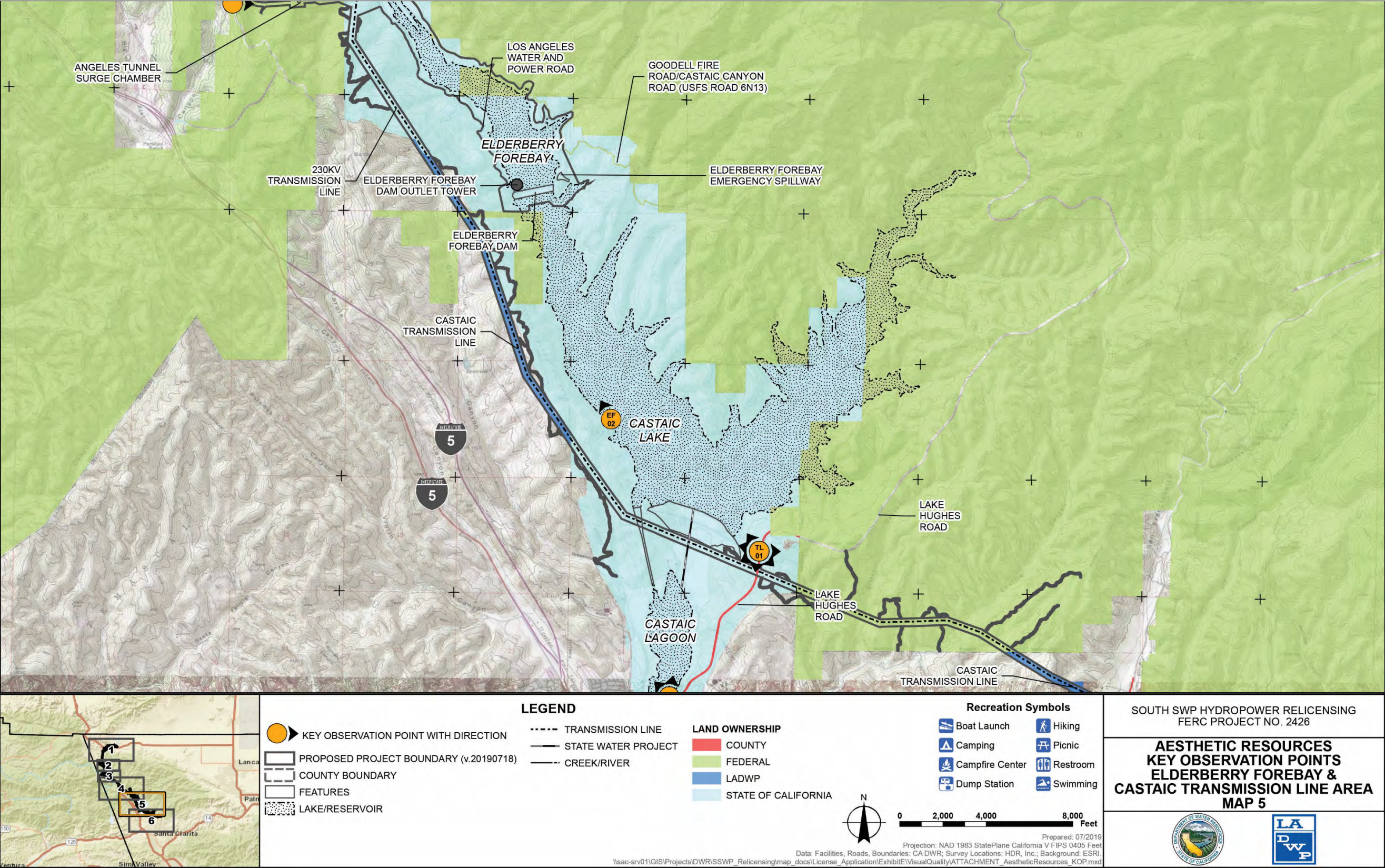


Figure 5.7-6. Key Observation Points Near Elderberry Forebay and the Upper End of Castaic Transmission Line

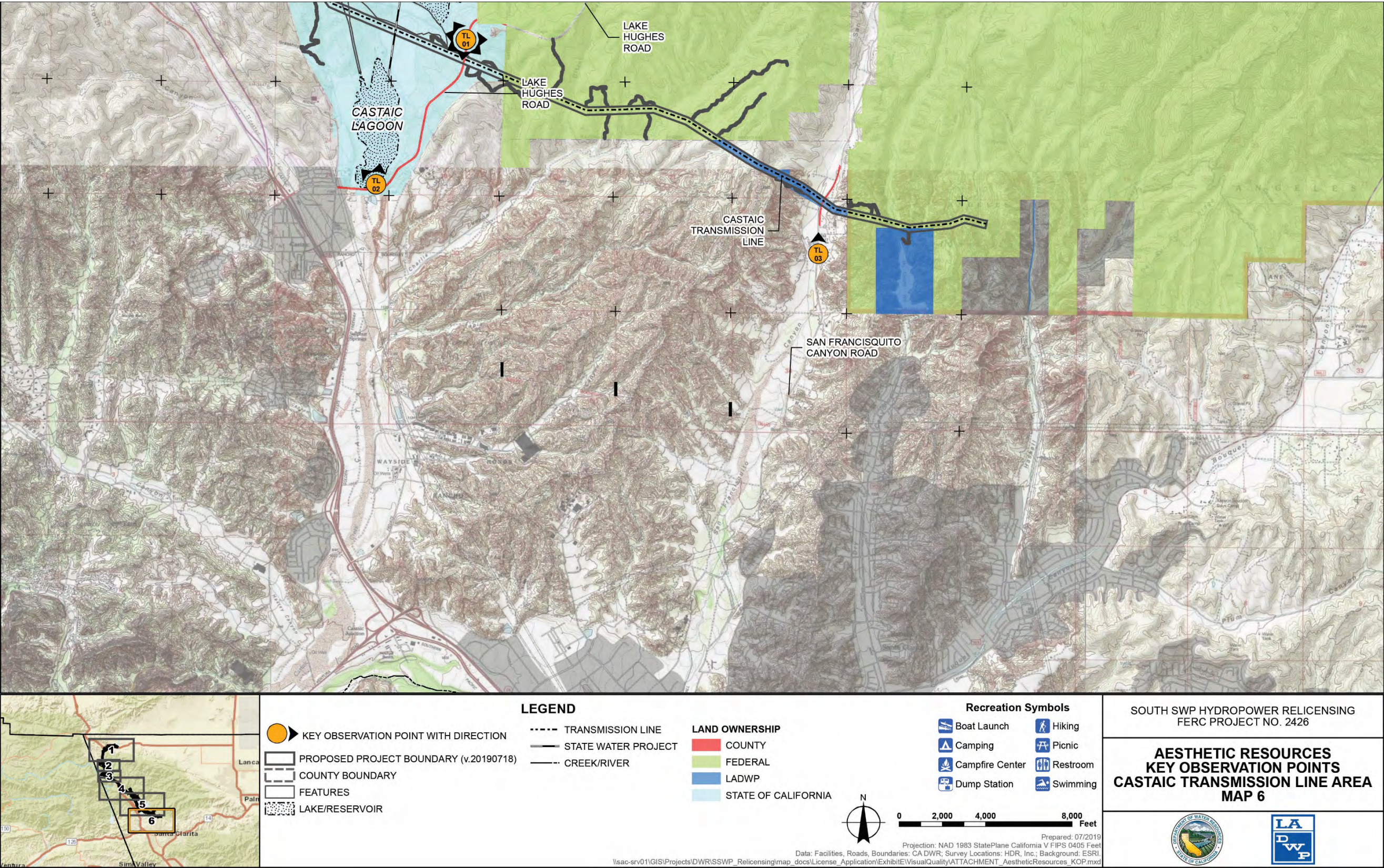


Figure 5.7-7. Key Observation Points Near the Lower End of Castaic Transmission Line

Table 5.7-1. Preliminary and Final Key Observation Points, Resource Areas, Facilities Evaluated, and In-Field Reasons for Changes

Preliminary KOP	Final KOP	Resource Area	Facilities Evaluated and General Viewpoint	Facility Land Ownership	In-Field Reason for Change from Preliminary to Final (if applicable)
not identified	QL01	Quail Lake	Quail Lake from State Highway 138	State of California	Added KOP in field; provides elevated, representative overall view of Quail Lake
1	QL02	Quail Lake	Quail Lake from State Highway 138	State of California	Moved KOP slightly to provide improved view without vegetation screening
not identified	QL03	Quail Lake	Quail Lake from shoreline recreation access	State of California	Added KOP in field for view of Quail Lake from shoreline users via the formal recreation access
2	QL04	Quail Lake	Quail Lake Outlet and Lower Quail Canal from State Highway 138	State of California	No significant change in location
3	PV01	Gorman Bypass Channel and Peace Valley Pipeline Intake Embankment	Gorman Bypass Channel from Interstate 5 southbound; Peace Valley Pipeline Intake Embankment from Interstate 5 northbound	State of California	Moved to PV01 location for improved viewpoint of both Gorman Bypass Channel and Peace Valley Pipeline Intake Embankment
4	none	Gorman Bypass Channel and Peace Valley Pipeline Intake Embankment	Gorman Bypass Channel from Interstate 5 southbound; Peace Valley Pipeline Intake Embankment from Interstate 5 northbound	State of California	Removed preliminary KOP; PV01 view is best, most prominent view
5	none	Hungry Valley	Los Alamos Campground from Hungry Valley Road	NFS	Removed preliminary KOP at USFS request (i.e., recreation facility design better addressed through recreation management)
6	none	Hungry Valley	Los Alamos Campground (internal view of facility)	NFS	Removed preliminary KOP at USFS request (i.e., recreation facility design better addressed through recreation management)
7	PL01	Pyramid Lake	Warne Powerplant and Warne Transmission Line from Pyramid Lake Road at recreation area entrance station	State of California/NFS	Moved to PL01 location for better view of all Project facilities
8	PL02	Pyramid Lake	Warne Powerplant from Emigrant Landing Boat Launch	State of California	Moved to PL02 location for better view of all Project facilities
9	PL04	Pyramid Lake	Warne Powerplant from picnic ground at Emigrant Landing	State of California	Moved to PL03 location for better view of all Project facilities
10	PL03	Pyramid Lake	Emigrant Landing facilities from Pyramid Lake	NFS	Moved KOP to recreation site (Emigrant Landing swim beach) where most common views occur
11	none	Pyramid Lake	Warne Powerplant and Warne Transmission Line from Interstate 5 northbound	State of California (powerplant)/NFS (transmission line)	Removed preliminary KOP; Project facilities not visible due to terrain (i.e., ridge)
12	PL05	Pyramid Lake	Pyramid Lake Dam from Spanish Point Boat-in Picnic Area	NFS	No significant change in location
13	PL07	Pyramid Lake	Pyramid Lake Dam from Vista Del Lago Visitor Center	NFS	No significant change in location
not identified	PL06	Pyramid Lake	Maintenance Yard from Vaquero Beach parking area	NFS	Added KOP due to view of maintenance yard from recreation site
14	PL17	Pyramid Lake	Vaquero Beach from Pyramid Lake	NFS	No significant change in location
15	PL16	Pyramid Lake	Pyramid Lake Dam, Serrano Boat-in Picnic Area, Spanish Point Boat-in Picnic Area from Pyramid Lake	NFS	No significant change in location

Table 5.7-1. Preliminary and Final Key Observation Points, Resource Areas, Facilities Evaluated, and In-Field Reasons for Changes (Continued)

Preliminary KOP	Final KOP	Resource Area	Facilities Evaluated and General Viewpoint	Facility Land Ownership	In-Field Reason for Change from Preliminary to Final (if applicable)
16	none	Pyramid Lake	Serrano Boat-in Picnic Area (internal view)	NFS	Removed preliminary KOP at USFS request (i.e., internal recreation facility design better addressed through recreation management)
17	PL13	Pyramid Lake	Bear Trap Boat-in Picnic Area from Pyramid Lake	NFS	Moved closer to recreation site for improved visibility of on-site facilities (i.e., preliminary KOP 17 was too distant)
18	none	Pyramid Lake	Bear Trap Boat-in Picnic Area (internal view)	NFS	Removed preliminary KOP at USFS request (i.e., internal recreation facility design better addressed through recreation management)
19	PL12	Pyramid Lake	Yellow Bar Boat-in Picnic Area from Pyramid Lake	NFS	Moved closer to recreation site for improved visibility of on-site facilities (i.e., preliminary KOP 19 was too distant)
20	none	Pyramid Lake	Yellow Bar Boat-in Picnic Area (internal view)	NFS	Removed preliminary KOP at USFS request (i.e., internal recreation facility design better addressed through recreation management)
not identified	PL14	Pyramid Lake	Pyramid Lake Dam and Spillway, Angeles Tunnel Intake	NFS	Added KOP in field; represents most common boat-based view of dam facilities in main body of reservoir
not identified	PL15	Pyramid Lake	Pyramid Lake Dam and Spillway, Angeles Tunnel Intake	NFS	Added KOP in field; represents most critical view of dam facilities south of Chumash Island
21	PL10	Pyramid Lake	Pyramid Lake and Dam from Interstate 5 southbound	NFS	No significant change in location
22	PL11	Pyramid Lake	Pyramid Lake Dam from Interstate 5 southbound	NFS	No significant change in location
23	none	Pyramid Lake	Pyramid Lake Dam from Interstate 5 northbound	NFS	Removed preliminary KOP; Project facilities not visible due to terrain (i.e., ridge)
24	PL08	Pyramid Lake	Pyramid Lake Dam and Angeles Tunnel North Adit from Golden State Highway	NFS	Moved KOP to be specific to Pyramid Lake Dam at end of road (no public vehicle access); added new KOP specific to Angeles Tunnel North Adit (KOP PL09)
not identified	PL09	Angeles Tunnel	Angeles Tunnel North Adit from Golden State Highway	NFS	Added KOP specifically for view of North Adit
30	none	Elderberry Forebay	Angeles Tunnel Surge Chamber from Interstate 5	NFS	Removed preliminary KOP; Project facilities not visible due to terrain (i.e., ridge)
31	EF01	Elderberry Forebay	Angeles Tunnel Surge Chamber from Templin Highway	NFS	Moved KOP location where viewable by the limited viewing population in this area (i.e., adjacent to residences off Old Ridge Route road before gate/end of public access); preliminary KOP did not have views of surge chamber
44	EF02	Elderberry Forebay	Elderberry Forebay Dam from Castaic Lake shoreline	State of California	No significant change in location
32	none	Elderberry Forebay	Angeles Tunnel Surge Chamber from Old Ridge Route	NFS	Removed preliminary KOP; no public access this far up Old Ridge Route road due to private gate approximately 1.5 miles from junction with Templin Highway
40	none	Castaic Transmission Line	Castaic Transmission Line from Interstate 5 southbound	State of California	Removed preliminary KOP; Project facilities not visible due to terrain (i.e., ridge)

Table 5.7-1. Preliminary and Final Key Observation Points, Resource Areas, Facilities Evaluated, and In-Field Reasons for Changes (Continued)

Preliminary KOP	Final KOP	Resource Area	Facilities Evaluated and General Viewpoint	Facility Land Ownership	In-Field Reason for Change from Preliminary to Final (if applicable)
41	none	Castaic Transmission Line	Castaic Transmission Line from Interstate 5 northbound	State of California	Removed preliminary KOP; Project facilities not visible due to terrain (i.e., ridge)
42	none	Castaic Transmission Line	Castaic Transmission Line from Interstate 5	State of California	Removed preliminary KOP; Project facilities not visible due to terrain (i.e., ridge)
43	TL01	Castaic Transmission Line	Castaic Transmission Line from Lake Hughes Road	State of California	No significant change in location
50	TL02	Castaic Transmission Line	Castaic Transmission Line	State of California	Moved to Castaic Lake Recreation Area South Boat Ramp parking area where most common views occur; preliminary KOP 50 was too distant and views were screened by terrain and vegetation
51	none	Castaic Transmission Line	Castaic Transmission Line from Copper Hill Drive	State of California/LADWP/NFS	Removed preliminary KOP; Project facilities not visible (too distant); numerous non-Project transmission lines, terrain and residential communities block views
52	TL03	Castaic Transmission Line	Castaic Transmission Line from San Francisquito Canyon Road	LADWP	No significant change in location
53	none	Castaic Transmission Line	Castaic Transmission Line on NFS land on Charlie Canyon Road	NFS	Removed preliminary KOP; no public access due to private property gate approximately 0.75 miles from junction with Tapia Canyon Road

Key:
KOP = Key Observation Point
N/A = not applicable
NFS = National Forest System
USFS = U.S. Department of Agriculture, Forest Service
LADWP = Los Angeles Department of Water and Power

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Quail Lake, Quail Lake Outlet, and Lower Quail Canal

Quail Lake

Quail Lake is located just east of Interstate 5 and immediately north of State Highway 138 in a relatively low lying flat valley surrounded by gentle rolling hills backed by rugged mountains to the north, south, and west of the lake. Quail Lake is the scenic feature in this area as the landscape transitions to desert as one travels east away from Quail Lake on State Highway 138. Quail Lake is seen from State Highway 138 in foreground and middleground as vehicles travel at typical speeds of 55 mph and higher. State Highway 138 is designated as one of the “Priority Scenic Drives” in the Antelope Valley Area Plan. For vehicles, the primary place to stop and park is a large graveled parking area on the west side of the lake that is part of a Project recreational facility. A chain link fence, portions of which are topped with barbed wire, separates State land from adjoining private property, which is predominantly used for cattle grazing. All of the Project facilities associated with Quail Lake, both recreational and operational, are located on State of California lands, which do not have any specific scenic integrity requirements. NFS lands are located 2 or more miles to the south of Quail Lake.

Overall, Quail Lake has a natural appearance due to the presence of shrubs, grasses, and wetland vegetation along much of the shoreline, and especially as seen in middleground from State Highway 138 looking to the west (KOP QL02) (Figure 5.7-8). However, the non-Project utility poles and transmission lines and a chain link fence with barbed wire that runs along the Project boundary on the immediate shoulder of State Highway 138 detracts from the scenic quality of the lake. For foreground views of Quail Lake from vehicles, the chain link fence between the highway and the lake presents high visual contrast due primarily to the linear fence posts and overall industrial look of the fence, compared to the natural tans, greens, yellows (fall color), and blue of the lake. The chain link and barbed wire are faintly visible at the high speed of the viewer in a vehicle. The fencing is essential for security purposes (i.e., to prevent vehicles from accessing the non-public vehicular road surrounding Quail Lake from the highway and to prevent surrounding private cattle from accessing the lake). The largely see-through design and oxidized coloration of the chain link fence help to minimize the contrast, and the linear metal fence posts are visually subordinate to the much larger utility poles that parallel the chain link fence. Notably, on the north side of Quail Lake in the foreground, a non-Project inlet structure is visible from this viewpoint (KOP QL02).

The Licensees have considered measures to minimize the visual effect of the fencing, such as lowering the fence height and/or adjusting the coloration of the fencing, but found them to be impractical or unnecessary. Although lowering the fence height would partially reduce the visual contrast, doing so would reduce the fence’s security function, which is its primary purpose. Changing the fence color would be impractical due to the variety (and seasonal changes) of the natural colors behind the fence, including shoreline vegetation, trees, and hills, as well as the blue lake water. The current irregular coloration of the partially oxidized chain link likely represents an acceptable coloration given the variety and changing landscape colors behind the fence. Overall,

the fence's existing effect on visual resources in the vicinity of Quail Lake is minor, and the fence is needed for security.



Figure 5.7-8. View of Quail Lake Looking Northwest from a Vehicle on State Highway 138 (KOP QL02)

Quail Lake Outlet and Lower Quail Canal

Quail Lake Outlet and Lower Quail Canal are highly visible from discreet locations, primarily from vehicles traveling along State Highway 138 or Edison Spring Road, or parked within the Quail Lake Day Use Area parking area. As one travels west on State Highway 138, the views of the canal are very limited because the highway drops in elevation and the canal is physically screened from view. The most prominent views of the Quail Lake Outlet and Lower Quail Canal facilities occur along State Highway 138, west of Quail Lake (KOP QL04), where water passes under State Highway 138 as vehicles travel at typical speeds of 55 mph and higher (Figure 5.7-9). When looking northeast, the Quail Lake Outlet facilities, fences, and riprap of the shoreline are seen in the immediate foreground. When looking southwest, the Lower Quail Canal is seen in the immediate foreground (Figure 5.7-9). Both of these facilities represent high visual contrast due to the fences, gages, intake structures, concrete-lined canal, and riprap-lined shoreline at the west end of Quail Lake. The man-made structures all have light gray colors, smooth textures, or linear elements that do not borrow from the natural shapes and colors of the surrounding landscape.

The Licensees have considered measures to minimize the visual effect of these industrial facilities and found such measures to be impractical because these facilities

are typical designs for critical hydroelectric facilities. Additionally, while changing the coloration of the facilities may partially mitigate the visual contrast, the varied and seasonal changes in the surrounding natural landscape would likely result in periods when the facilities would blend and periods when the facilities would have the same or higher visual contrast. Screening these facilities with slatted fencing would mask the visual contrast of the facilities, but then would create visual contrast through a slatted fence design that blocks the facilities, and the natural landscape beyond, from view. Furthermore, the current chain link fence design is largely see-through, which minimizes the visual contrast of the fencing; and, while still visible, the fence is essential for the security of these facilities. Overall, the existing Project effect on visual resources is minor, and the facilities are needed for safety.



Figure 5.7-9. View of Lower Quail Canal Looking Southwest from State Highway 138 (KOP QL04)

Peace Valley Pipeline Intake Embankment and Gorman Bypass Channel

Peace Valley Pipeline Intake Embankment

The Peace Valley Pipeline Intake Embankment is located on State of California lands approximately 0.75 miles south of the State Highway 138 interchange with Interstate 5, and is viewed prominently from Interstate 5, though the views are brief and distant (KOP PV01) (Figure 5.7-10). The embankment is also viewed from up close along the lightly traveled Edison Spring Road. The facility is at the western end of a fairly open valley that then turns south and narrows into a canyon that heads toward Pyramid Lake. Interstate 5 follows this narrow canyon southward and then passes to the east of Pyramid Lake. The homogenous light brown color of the Peace Valley Pipeline Intake Embankment matches well with the surrounding browns in the landscape to the extent

that it is barely noticeable. The distant and slightly inferior (i.e., lower) viewing positions effectively screen the concrete and other facilities associated with the intake.



Figure 5.7-10. View of Peace Valley Pipeline Intake Embankment and Bypass Channel Road Looking Northeast from Interstate 5 Northbound Traffic (KOP PV01)Gorman Bypass Channel

The Gorman Bypass Channel runs southward, located along the west shoulder of Interstate 5, and is visible from Interstate 5 for approximately 2.5 miles before veering slightly westward and out of view. The facility is entirely on State lands. The bypass channel is primarily seen in the foreground from Interstate 5 (KOP PV01), and is also seen from other lesser-used local roads (e.g., Copco Avenue, Orwin Way, Hungry Valley Road, Hard Luck Road, and Pyramid Lake Road). The light colored concrete and smooth texture of the bypass channel structure results in a long, linear element with geometric shapes that are in moderate to high visual contrast in comparison with the natural browns, greens, and tans of the surrounding natural landscape to the west (Figure 5.7-11). The slightly superior (i.e., higher) position for vehicles heading south on Interstate 5 allows for the facility to be clearly visible. However, the bypass channel directly abuts the Interstate 5 corridor for approximately 2.5 miles and thus is situated within a highly developed freeway corridor with large-scale, linear, and smooth textures of the freeway surface and guardrails, as well as prominent green highway signage. In the overall viewshed, the visual contrast of the Gorman Bypass Channel is subordinate to the Interstate 5 corridor.

The Licensees have considered measures to minimize the visual effect of the channel, primarily color changes, but found they would be very costly and only partially mitigate the color contrast, but not lessen the shape and form contrast inherent in the standard design of such water conveyance facilities. Chain link fencing already exists for security purposes and modifying the fence design to screen the facilities would create a similar or stronger visual contrast than the bypass channel currently presents. Overall, the Gorman Bypass Channel and its security fencing has a minor effect on visual resources because they are consistent with other major non-Project infrastructure facilities (e.g., Interstate 5) as seen from Interstate 5 (KOP PV01).

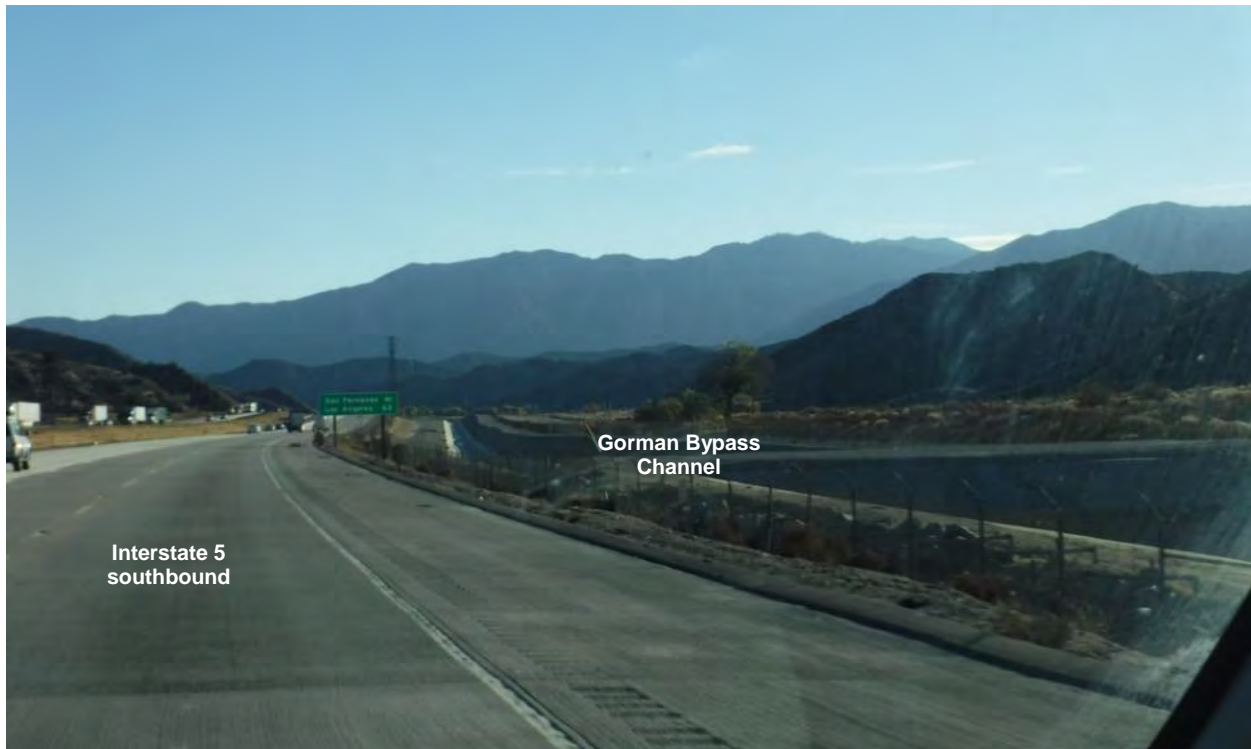


Figure 5.7-11. View of Gorman Bypass Channel Looking South from Interstate 5 Southbound Traffic (KOP PV01)

Warne Powerplant and Switchyard

Warne Powerplant and Switchyard are located at the upstream end of Pyramid Lake on State lands and visible in foreground from Hard Luck Road, Pyramid Lake Road, and the adjoining parking area (Figure 5.7-12). The powerplant is also partially seen at the end of foreground from Emigrant Landing Boat Launch. The powerplant and the Emigrant Landing Boat Launch are located in a narrow canyon. The Warne Transmission Line (a non-Project facility) starts beside the powerplant, crosses the road and drainage to the east and rapidly ascends out of the canyon and on to NFS land.

Warne Powerplant's appearance is a combination of tan columns and lintels with white panels and one smaller colorful tile panel and was designed in accordance with the

DWR's architectural motif for the SWP (Figure 5.7-12). Some of the concrete panels below the building and part of the channel are light gray in color as well as some of the structures associated with the switchyard. The facility is seen in the immediate foreground from Pyramid Lake Road as vehicles enter the recreation area just past the entry gate (KOP PL01) (Figure 5.7-12). The powerplant presents strong visual contrast due to the white panels, light concrete structures, geometric shapes, colorful tile, and smooth textures that do not blend with the rougher surrounding natural landscape textures characterized by dark green brush, interspersed tan grasses, and exposed brown soils and rock. Warne Powerplant is also seen at the end of the foreground from Emigrant Landing Boat Launch (KOP PL02). From this more distant viewpoint, the presence of some mature ornamental pine trees softens the structure's contrast, but the visual contrast is still high. Overall, Warne Powerplant is seen primarily from the roads and recreation site located in the canyon floor, but is predominantly screened by topography from boaters on Pyramid Lake and vehicles on Interstate 5.

The Licensees have considered measures to minimize the visual effect of the Warne Powerplant building, but found them to be impractical and unnecessary. While different building colorations may lessen the color contrast, overall, the large-scale, linear features, and industrial design of the building would still present high visual contrast in comparison to the surrounding natural landscape and could be inconsistent with DWR's architectural motif for the SWP. Furthermore, the viewing population is predominantly recreation visitors entering or exiting the Pyramid Lake Recreation Area, where visitors expect to see man-made structures and buildings (i.e., restrooms, entrance stations, general store, marina/boat dock structures). Overall, the Warne Powerplant and Switchyard have a minor effect on visual resources.



Figure 5.7-12. View of Warne Powerplant Looking West from Pyramid Lake Road (KOP PL01)

Pyramid Dam, Pyramid Lake and Associated Recreation Facilities

Pyramid Dam (Upstream Face)

Pyramid Dam is located at the south end of Pyramid Lake, less than 1 mile west of Interstate 5. Pyramid Dam is located deep in a canyon and is primarily visible from facilities at Pyramid Lake and by boaters on the reservoir. Viewpoints from Interstate 5 southbound are limited and short in duration due to the high speed of vehicle travel (i.e., 55 mph and faster). Typically, only the top 5 to 9 feet of the upstream face of Pyramid Dam are visible. Pyramid Lake water surface elevations typically fluctuate within the upper 9 feet of the reservoir, between 2,578 feet and 2,569 feet. However, water surface elevation data from the PYM gage (CDEC) during the nine-year period from October 2, 2008 to October 1, 2017, showed that 95 percent of the time, the reservoir's water surface elevation was within 5 feet of the NMWSE, or 2,573 feet (DWR 2018).

The most prominent land-based view of Pyramid Dam in the middleground occurs at Spanish Point Boat-in Picnic Area and the Vista Del Lago Visitor Center. The viewpoint from Spanish Point Boat-in Picnic Area (KOP PL05) is from a popular boat-in picnic and shoreline use facility, where day-use recreationists are using these facilities for long periods of time (i.e., several hours) and are viewing the scenery, including the dam, for long periods of time. The view of Pyramid Dam from KOP PL05 is due south in the middleground (Figure 5.7-13). The visual contrast of the dam is considered moderate due to the light color of the riprap rock facing on the dam and the straight line created by

the top of the dam. The geometric shape of the dam and straight line along the top are somewhat visible and do not blend with the irregular natural shapes of the surrounding mountains. The view from the Vista Del Lago Visitor Center (KOP PL07) is similar to the view from the Spanish Point Boat-in Picnic Area, but slightly further away. From these KOPs, only the large, linear dam feature is visible; and the smaller, related facilities (i.e., Angeles Tunnel Intake structure, Pyramid Dam spillway, fencing, and guardrails) are not visible. Because of the moderate contrast, Pyramid Dam corresponds to a Low SIO, which is not consistent with the ANF Land Management Plan's High SIO for the area.

The Licensees have considered measures to minimize the visual effect of Pyramid Dam, but found them to be impractical, since the surrounding natural landscape colors are varied and change depending upon the season. Overall, the primary visual effect is a result of the linear form and extent of the dam, and measures to lessen the linear form and extent are not feasible as the dam is a key component of a critical hydroelectric facility. The upstream face of the dam is composed of rock riprap, which somewhat lessens the visual contrast. Because only the uppermost portion of the dam is visible above the reservoir level, the dam is visually subordinate to the landscape character being viewed; therefore, the existing Project effect is minor.



Figure 5.7-13. View of Pyramid Dam Looking South from Spanish Point Boat-in Picnic Area (KOP PL05)

Boaters can see Pyramid Dam from many locations. However, Chumash Island blocks many of the middleground views north of the island. The closest view of the dam for boaters is just south of Chumash Island in the immediate foreground (i.e., KOP PL15) looking at the dam to the south (Figure 5.7-14). Due to the immediate foreground views, the entire dam is clearly visible. The visual contrast varies depending on the direction of view. The view of the dam to the southeast presents high visual contrast due to the white colors and larger, light concrete structures at the Angeles Tunnel Intake and the spillway; and to a lesser degree, the small structures atop the dam, including the chain-link fence and guard rail. The two middle views present more moderate visual contrast, primarily due to the large geometric shape and long linear element at the top of the dam (Figure 5.7-15). The view to the southwest returns to a high visual contrast due to the spillway geometry and the massive bank cut above the end of the dam that results in a triangular shape created by a series of repeating parallel benches interrupted by linear perpendicular drilling remnants (Figure 5.7-16). While the color of the cut bank matches the surrounding rock and soils, the linear faces of the cut bank reflect the sun and make it more visible. Overall, the high and moderate visual contrast results in an SIO rating for Pyramid Dam of Low, which is not consistent with the ANF Land Management Plan's High SIO for the area.

The Licensees have considered measures to minimize the visual effect of the Angeles Tunnel Intake and Pyramid Dam spillway facilities, including painting or coating the Angeles Tunnel Intake along the east side of the dam a darker brown or tan color, and the white buildings associated with the spillway a brown or dark tan color. However, measures to minimize the visual effect of Pyramid Dam, spillway, and cut bank from the immediate foreground viewpoint are not practical due to the size and scope of these critical hydroelectric facilities. The Licensees proposed measures to minimize the visual effect of the smaller-scale features atop Pyramid Dam, including the chain-link fence and guard rail. Overall, the existing visual effect is minor with the visual enhancement measures and considering the limited viewing population (i.e., reservoir boaters south of Chumash Island) and that reservoir boaters expect to see dams, spillways, and cut banks in a reservoir-based setting, particularly in the Project region.



Figure 5.7-14. View of the Angeles Tunnel Intake and Pyramid Dam Looking East/Southeast from the Reservoir (KOP PL15)



Figure 5.7-15. View of Pyramid Dam from the Reservoir Looking South (KOP PL15)



Figure 5.7-16. View of the Pyramid Dam Spillway and Cut Bank Looking Southwest from the Reservoir (KOP PL15)

There are several views of Pyramid Lake and Dam to the west from Interstate 5 southbound. However, these views are very short in duration due to the high speed of vehicles and the short period of visibility. The best view of the dam from Interstate 5 is closest to the dam, in the middleground and just less than 1 mile away (Figure 5.7-17). Traffic is typically traveling at 55 to 70 mph, on average. Thus, the viewing time is short, but given the high traffic volume on Interstate 5, the view is substantial. The visual contrast is high due to the light (i.e., white/gray color) of the rock facing of the dam, geometric shapes, and straight lines of the dam and spillway, and the large triangular cut bank into the ridge west of the dam. These elements are in strong contrast to the surrounding landscape of dark green vegetation, tan grasses, and occasional browns. As a result, the SIO rating is Low, which is not consistent with the ANF Land Management Plan's High SIO for the area.

The more distant view of Pyramid Dam from vehicles on Interstate 5 southbound is in the middleground about 1.5 miles from the dam (Figure 5.7-18). The distance and slightly less superior (i.e., less elevated) view reduces the visual contrast, but the light color of the rock facing of the dam still presents moderate visual contrast, at a minimum.



Figure 5.7-17. View (short duration) of Pyramid Dam Looking West from Interstate 5 Southbound (KOP PL11)



Figure 5.7-18. View of Pyramid Dam Looking Southwest from Interstate 5 Southbound (KOP PL10)

Pyramid Dam (Downstream Face)

The primary view of Pyramid Dam from its downstream side is located at the terminus of Golden State Highway in Piru Creek Canyon. The old paved road is gated approximately 3 miles before the terminus, which requires the public to walk or bike to the terminus, so public access and the viewing population are very limited.

From the terminus of Golden State Highway (i.e., KOP PL08), the visual contrast is low overall for the dam due to textures and colors that mimic the surrounding landscape (Figure 5.7-19). However, at ground level, a galvanized guard rail and 4-foot-high chain link fence are visible in the immediate foreground. The light gray colors and linear elements do not match the surrounding landscape. In the more distant foreground, reflective sign panels and a light-colored guard rail along the access road midway up the dam face do not match the surrounding landscape coloration and form. These man-made structures reduce the dam and appurtenant facilities' SIO rating to Low, which is not consistent with the ANF Land Management Plan's Moderate SIO for the area.

The Licensees proposed measures to minimize the visual effect, including staining or painting the chain-link fence and guard rail to reduce visual contrast. Overall, the existing Project effect is minor with the Licensees' proposed visual enhancement measures.

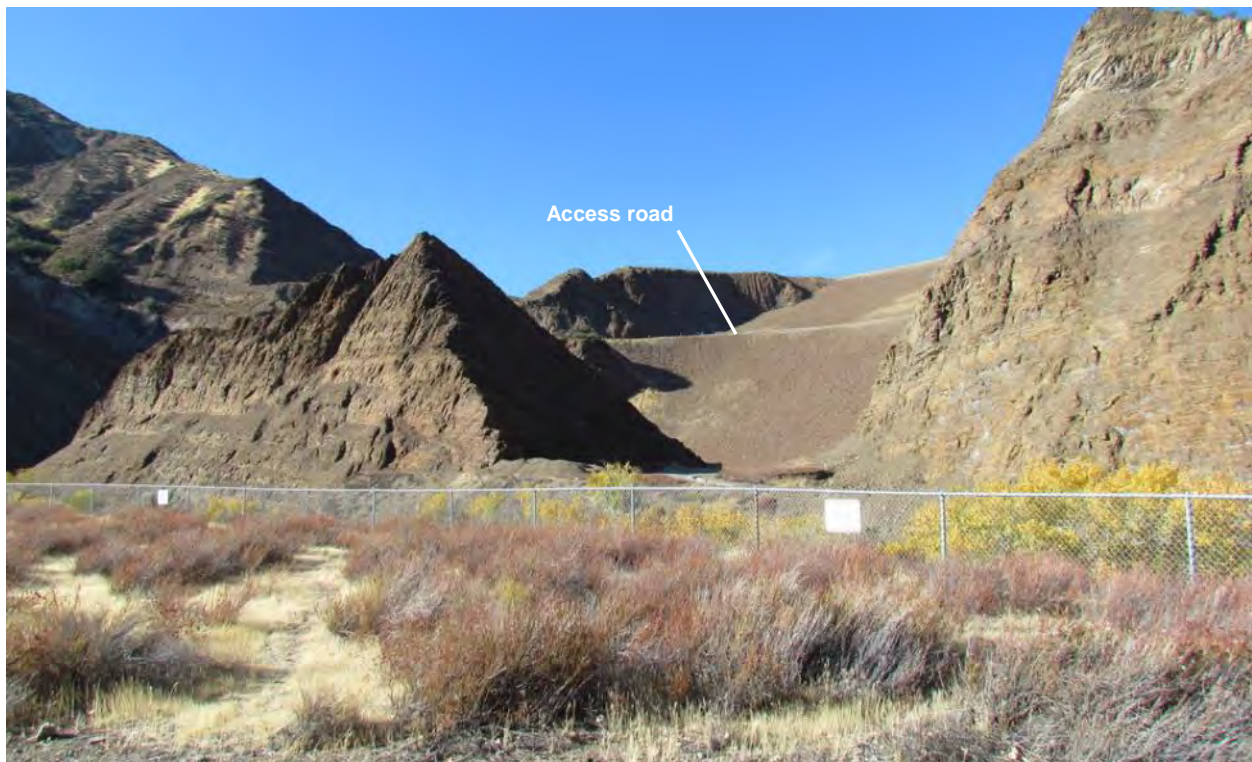


Figure 5.7-19. View of the Downstream Face of Pyramid Dam Looking North from the Terminus of Golden State Highway (KOP PL08)

Recreation Facilities

Pyramid Dam and Pyramid Lake are located at the upper end of Piru Creek Canyon, just west of Interstate 5. Pyramid Lake, Pyramid Dam, and the recreation facilities are nestled low in the canyon, with the predominant views being from the local recreation area access roads and boaters on the reservoir. Only a few short views of the Pyramid Lake Project facilities, particularly Pyramid Dam, are viewable from southbound vehicles on Interstate 5. The primary recreation facilities are located on the northeast shoreline, where moderately sloped terrain allows for recreational site development (i.e., parking area, boat launch, beach, and picnic facilities). Overall, the site design and materials used in the recreation facilities were designed and approved by USFS. Since the time of the development of the existing recreation facilities (built in the 1970s) the ANF and LPNF have implemented updated land management plans (USFS 2005a) and today any new or redeveloped/rehabilitated recreation developments are generally guided by the USFS' Built Environment Image Guide, Forest Service Handbook 2309.13, and the ANF's and LPNF's Land Management Plans (USFS 2005b, 2005c). Some of the developments at the existing recreation facilities do not blend well with the surrounding landscape. These facilities were evaluated for scenic integrity in the following discussion. The remaining facilities blend well with the surroundings and are visually subordinate to the overall recreation facility character being viewed.

Emigrant Landing Swim and Picnic Area is located in the northernmost arm of Pyramid Lake, just south of Warne Powerplant, and provides picnic facilities, a swim beach area, boat launch, marina, and parking facilities. Overall, these facilities blend in well with the landscape from most viewpoints. However, the view from the swim beach (KOP PL03) reveals some visual contrast issues (Figure 5.7-20). The view to the northwest towards the boat launch and marina in the foreground has low visual contrast, except for the white doors on the floating toilet buildings, highly reflective metal light standard, and green canopies on the sheriff's boat slips, which exhibit strong visual contrast. In the immediate foreground along the riprapped shoreline within the beach boundary, a chain link fence has moderate visual contrast. The SIO for this area is Moderate because of these visual contrast issues, which is not consistent with the ANF Land Management Plan's High SIO for the area; however, these facilities were in place when the USFS 2005 Land Management Plan SIOs were developed, and the recreation improvements have been developed following the terms of the MOU between USFS and DWR (USFS and DWR 1969 MOU as amended in 1970 and 2010). To minimize the visual effects of the light standard and the chain-link fence, the Licensees propose to replace or apply color treatments to the light standard and replace the chain-link fencing with a style and color of fencing that blends better with the surrounding natural setting. However, the doors are typically colored white or a light color for visibility by reservoir boaters while located out on the reservoir. Since the floating restroom buildings are only temporarily moored at the marina/boat launch area for maintenance purposes, Licensees did not propose any mitigation measures for the white doors due to the safety function when the restrooms are in use on the reservoir.

Overall, the existing Project effect is minor considering the Licensees' proposed enhancement measure, the safety function of the restroom building doors, and the green canopies are visually subordinate to the overall recreation facility character being viewed.

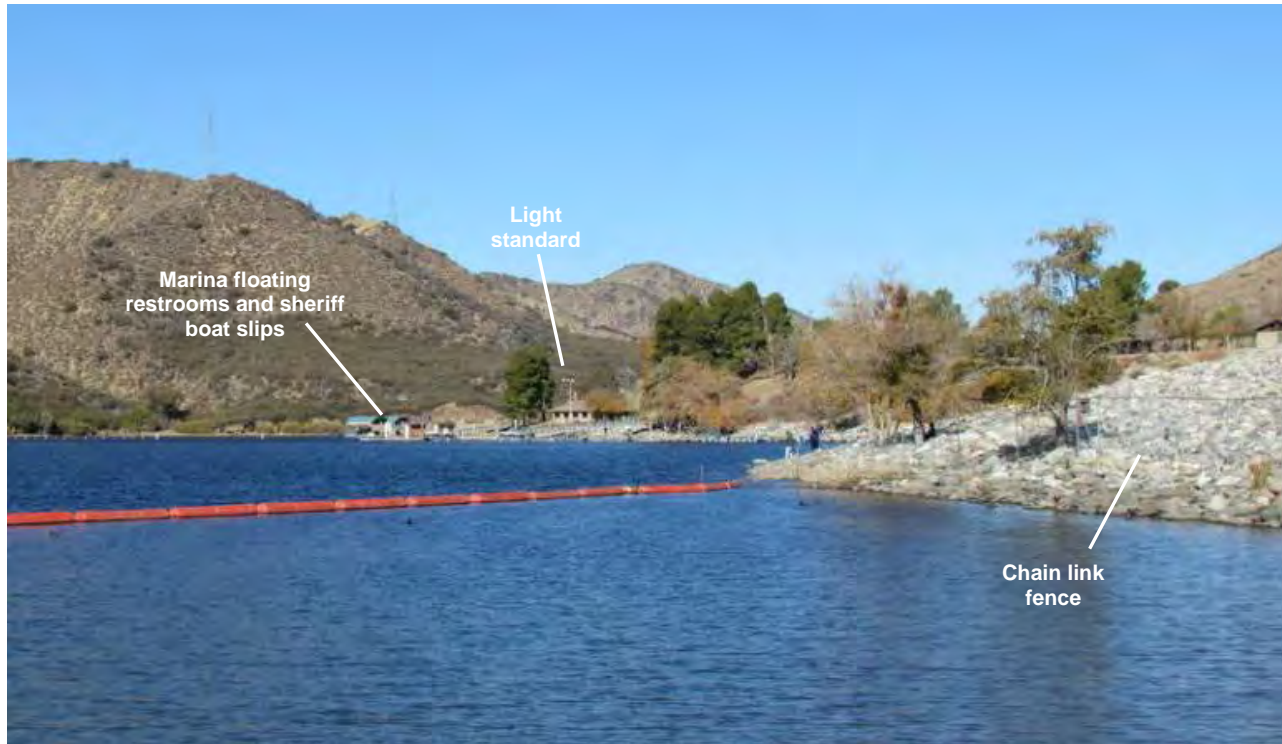


Figure 5.7-20. View of Emigrant Landing Boat Launch and Marina Looking Northwest from Emigrant Landing Swim and Picnic Area (KOP PL03)

Vaquero Day Use Area is located west of the Vista Del Lago Visitor Center and north of Spanish Point Boat-in Picnic Area. Vaquero Day Use Area provides swimming, picnicking, and boat launch facilities. Most of the facilities blend well with the surrounding landscape, except for the maintenance yard, transformers, seven tall metal light poles, and a lifeguard station on the beach. The maintenance yard and transformers are seen in immediate foreground from the swim beach parking area (Figure 5.7-21). At the time of the Licensees' evaluations, the maintenance yard presented high visual contrast due to the bright-colored supplies stored in the yard. However, the maintenance yard is only used by DWR on a temporary basis for O&M work/projects; and, at the time of the Licensees' evaluations, the maintenance yard was being used for temporary storage of supplies for a temporary project. The maintenance yard does not typically store the supplies and equipment that were in place when viewed (and shown in Figure 5.7-21). The two transformer boxes also present high contrast due to faded irregular green and gray colors that do not blend with the surrounding landscape. Thus, these facilities result in an SIO rating of Moderate to Low, which is not consistent with the ANF Land Management Plan's High SIO for the area; however, the improvements have been developed following the terms of the MOU

between the USFS and DWR (USFS and DWR 1969 MOU as amended in 1970 and 2010).



Figure 5.7-21. View of Maintenance Yard and Transformer Boxes Looking Northwest from the Vaquero Day Use Area Parking Area (KOP PL06)

Vaquero Day Use Area also can be seen in foreground by boaters on the reservoir (Figure 5.7-22). Most of the facilities blend in well with the surrounding landscape, except for the lifeguard station and seven tall metal light poles in the parking area. The visual contrast of the lifeguard station is high due to the bright white paint of the walls and roof. However, these colors are typical for lifeguard stations at swim areas and visibility is essential for public safety. The very light color of the light poles in the parking area do not blend with the gray greens and tans of the landscape. Thus, the SIO rating is Low, which is not consistent with the ANF Land Management Plan's High SIO for the area. However, the improvements have been developed following the terms of the MOU between the USFS and DWR (USFS and DWR 1969 MOU as amended in 1970 and 2010). To minimize these visual effects, the Licensees propose to treat, paint, or replace the light standards in the parking area, re-paint the transformer boxes, and apply a treatment to the chain-link fence, all to blend better with the surrounding natural setting.

Overall, the existing Project effect is minor considering the Licensees' proposed enhancement measures and the necessary visibility of the bright-colored lifeguard stations.

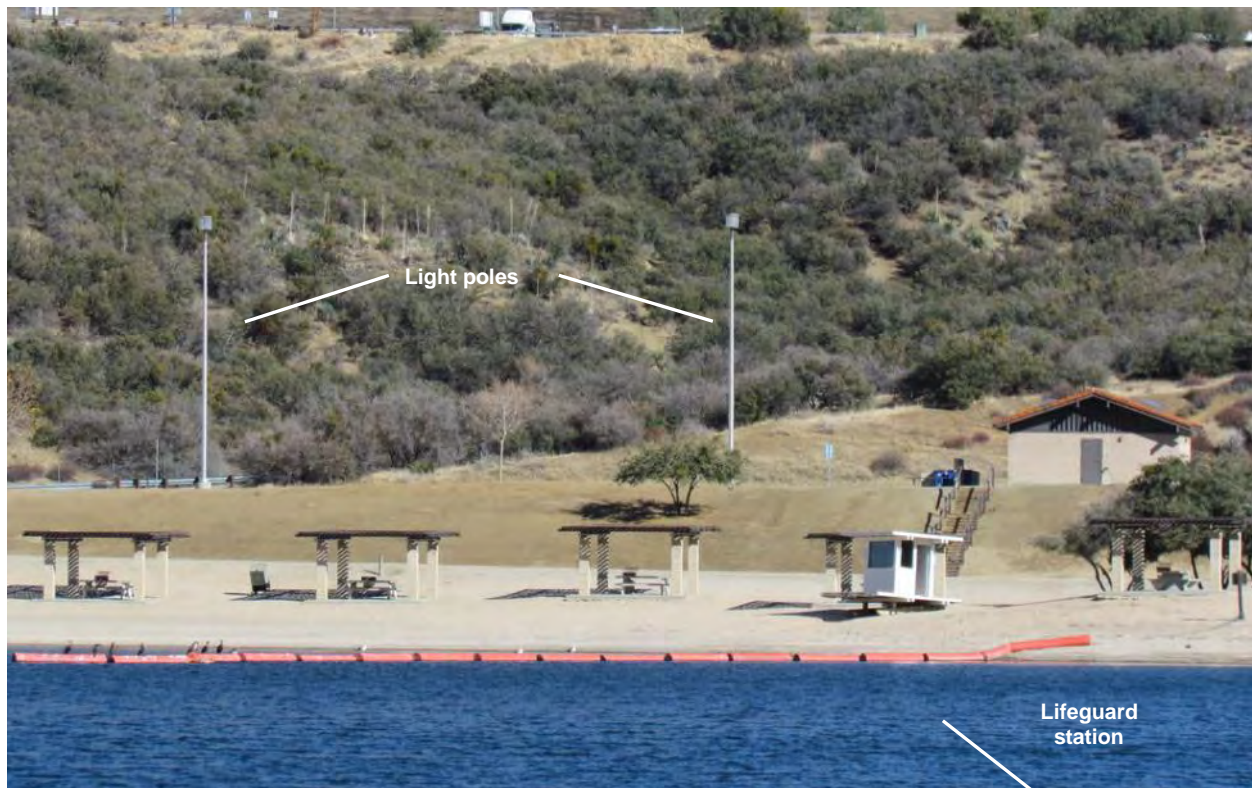


Figure 5.7-22. Telephoto View of Vaquero Day Use Area Looking Northeast from the Reservoir (KOP PL17)

Spanish Point Boat-in Picnic Area is located just south of and below the Vista Del Lago Visitor Center. All the recreation structures seen in the foreground from the reservoir by boaters (KOP PL16) blends well with the surrounding landscape and meet a Moderate SIO (Figure 5.7-23). However, a cover for an emergency release valve at the potable water treatment facility located above the picnic area presents high visual contrast due to the cover's white color and geometric shape (Figure 5.7-23). The SIO rating is Low due to this high visual contrast, which is not consistent with the ANF Land Management Plan's High SIO for the area. The valve cover at the potable water treatment facility must retain its white color to protect it and the underlying valve from fatigue caused by thermal expansion and, therefore, cannot be re-coated in a darker color. The Vista Del Lago Visitor Center is also visible in middleground to the north. The orange roof of the structure does not blend in with the surrounding landscape. However, the roof material and color is consistent with the building roofs at the adjacent Spanish Point Boat-in Picnic Area and Vaquero Day Use Area. Furthermore, the facility is intended to be visible because of its role as a visitor center and is an architectural statement using decorative and ornamental clay-tile roofing. However, the improvements have been developed following the terms of the MOU between the USFS and DWR (USFS and DWR 1969 MOU as amended in 1970 and 2010). To minimize the visual effects of the potable water treatment facility, the Licensees propose to: (1) plant and maintain a vegetative screen that blocks views of the valve cover from boaters and shoreline recreation areas; and (2) replace the roof of the maintenance building with a design that

generally conform to the USFS' BEIG Southwest Province architectural style and color when it reaches the end of its useful life. To minimize the visual effects of the Spanish Point Boat-in Picnic Area, the Licensees proposed to replace the restroom and shade structures with structures that generally conform to the USFS' BEIG Southwest Province architectural style and color for Pyramid Lake recreation facilities.

Overall, the existing Project effect is minor considering the Licensees' proposed enhancement measures.



Figure 5.7-23. View of Spanish Point Boat-in Picnic Area Looking North from Reservoir (KOP PL16)

Yellow Bar Boat-in Picnic Area is located in the westernmost arm of Pyramid Lake, created by Piru Creek. Most of the terrain in this arm of the reservoir is very steep. Yellow Bar Boat-in Picnic Area is seen in foreground by boaters (KOP PL12) (Figure 5.7-24). Overall, the facilities present low visual contrast, with the exception of the galvanized fence panels, white light standard near the toilet building, and light-colored restroom exterior. The gray fence panels and white light standard present moderate and high visual contrast with the surrounding dark green vegetation. Bear Trap Boat-in Picnic Area is southeast of Yellow Bar Boat-in Picnic Area along the main reservoir shore (KOP PL13) (Figure 5.7-25). The facilities and views are similar to the Yellow Bar Boat-in Picnic Area, with the same fencing design and contrast. The moderate and high visual contrast results in an SIO rating of Low, which is not consistent with the ANF Land Management Plan's High SIO for the area; however, these improvements have been developed following the terms of the MOU between the USFS and DWR (USFS and DWR 1969 MOU as amended in 1970 and 2010). Yellow Bar Boat-in Picnic Area

facilities were destroyed by the Day Fire in 2006 and were reconstructed in compliance with USFS accessibility standards. The design was approved by USFS. To meet the accessibility standards, the site design included retaining walls to meet the requisite grades at the picnic sites and, as a result, the fencing was installed for public safety.

To minimize these visual effects, the Licensees propose to: (1) apply a treatment to the metal fencing and railing to match the tones found in the natural background at Yellow Bar and Bear Trap Boat-in Picnic Areas; (2) re-paint or treat the white tops of the light standard at Yellow Bar Boat-in Picnic Area using a darker tone matching vegetative or earth tones in the natural background; (3) re-paint or treat the exterior of the restroom buildings at Yellow Bar and Bear Trap Boat-in Picnic Areas using a darker tone matching the vegetative or earth tones in the natural background; and (4) replace the restroom at Yellow Bar and Bear Trap Boat-in Picnic Areas with a structure that generally conforms to the selected architectural style and color for the Pyramid Lake recreation facilities when the restroom building is either due for painting, a major upgrade, or rehabilitation or replacement.



Figure 5.7-24. View of Yellow Bar Boat-in Picnic Area Looking North from the Reservoir (KOP PL12)



Figure 5.7-25. View of Bear Trap Boat-in Picnic Area Looking Southwest from the Reservoir (KOP PL13)

Overall, the existing Project effect is minor considering the Licensees' proposed enhancement measures.

Angeles Tunnel and Surge Chamber

Except for the Angeles Tunnel Intake and three adits, the Angeles Tunnel is not visible above the ground surface. Approximately 4,000 feet south of the terminus of Golden State Highway, the North Adit for the Angeles Tunnel, including the concrete drainage canal on NFS lands is visible to the east in the foreground from the road (Figure 5.7-26). The adit face is in high contrast with the surrounding landscape because the light-colored concrete and smooth texture does not blend with the tan, buff, rock formations with more rugged and rough textures. This visual contrast results in an SIO rating of Low, which is not consistent with the ANF Land Management Plan's Moderate SIO for the area. As noted above, this area along Piru Creek is closed to public vehicular traffic north of Frenchmans Flat (i.e., 1.3 miles prior), and the viewing population is essentially limited to those walking or riding bicycles along the road or recreating (e.g., angling, wading) along Piru Creek.

To minimize these visual effects, the Licensees propose to apply a concrete stain color treatment to the faces of the North Adit structure and drainage canal that matches the dominant color of the existing rock face directly above the structure.

Overall, the Angeles Tunnel has a minor effect on visual resources considering the Licensees' proposed enhancement measures and the relatively limited public access and overall viewing population.



Figure 5.7-26. View of the Angeles Tunnel North Adit Looking East from the Golden State Highway (KOP PL09)

The Angeles Tunnel surge chamber, on NFS land, is seen in the foreground from the Ridge Route Road looking in an eastward direction while driving (Figure 5.7-27). Its coloration of very light green with hints of yellow and gray presents a high visual contrast against the surrounding natural landscape. The surge chamber's shade of green is not similar to the surrounding dark greens of the native vegetation. In addition, the very smooth texture is in strong contrast to the more rugged, irregular textures of the surrounding mountains. These strong visual contrasts result in a Low SIO rating, which is not consistent with the ANF Land Management Plan's High SIO for the area. However, the viewing population for this facility is very limited as the roads in the area from which the facility is viewed (i.e., Ridge Route Road and Templin Highway) are both dead-end/gated roads with limited public vehicle traffic.

To minimize these visual effects, the Licensees propose to consult with USFS to discuss a color treatment that will help the surge chamber blend better visually with the surrounding landscape when the facility is planned for a new paint coating, substantial upgrade, or replacement.

Overall, the Angeles Tunnel surge chamber has a minor effect on visual resources considering the Licensees' proposed enhancement measures and the limited viewing population.



Figure 5.7-27. View of the Angeles Tunnel Surge Chamber Looking East from the Ridge Route Road (KOP EF01)

Castaic Powerplant, Penstocks, Switchyard, and Elderberry Forebay and Dam

Castaic Powerplant, Penstocks, and Switchyard

Located at the upstream (north) end of Elderberry Forebay are the Castaic Penstocks, Powerplant, Switchyard, and associated facilities. These Project facilities are closed to the public for safety and security reasons. On-site security maintains site control due to the water level regularly fluctuating in Elderberry Forebay by up to 25 feet due to operation of the Castaic Powerplant. Public access (motorized and non-motorized) along the west shoreline is prohibited. While Goodell Fire Road/Castaic Canyon Road (USFS Road 6N13) is located on the east side of Elderberry Forebay, public vehicular access on this road is also prohibited. Non-motorized use is possible on Goodell Fire Road/Castaic Canyon Road (USFS 6N13), but given that public access to the forebay is restricted, recreation demand/use along Goodell Fire Road (USFS Road 6N13) is very light. Since prominent public viewpoints of the penstocks and powerplant do not exist, these facilities were not evaluated for scenic integrity in Study 4.1.15.

Elderberry Dam and Forebay

Recreational access to the Elderberry Forebay area and waters is prohibited, as noted above. While roads are located along the west (Los Angeles City Water and Power Road) and east (Goodell Fire Road/Castaic Canyon Road [USFS Road 6N13]), public vehicular access on these roadways is prohibited. Non-motorized public use of the gated Goodell Fire Road/Castaic Canyon Road (USFS Road 6N13) and adjacent upland areas is allowed. Non-motorized use is, however, very light considering the remoteness, and access to water-based uses is prohibited. Therefore, the Elderberry Forebay waterbody, similar to the Castaic Powerplant and Penstocks, is largely unseen by the general public. Similarly, the forebay's concrete outlet structure (southwest shore) and emergency spillway (southeast shore) are largely unseen by the general public.

However, from the downstream side of Elderberry Forebay at the non-Project Castaic Lake, the Elderberry Forebay Dam is visible (Figure 5.7-28). This viewpoint represents shoreline and boater views of Elderberry Forebay Dam (located on State lands) in a northerly direction in the middleground. The visual contrast is low when viewed from the middleground, which is the most prevalent view, due to the color and texture of the dam, which is similar to the tan and brown surrounding landscape. Overall, the Elderberry Forebay and Dam are visually subordinate to the landscape character being viewed; therefore, the existing Project effect is minor.



Figure 5.7-28. View of Elderberry Forebay Dam Looking North from the Non-Project Castaic Lake (KOP EF02)

Castaic Transmission Line

The 11.4-mile-long Castaic Transmission Line and associated dual steel lattice towers run south along the top of the slope that forms the west shore of the Elderberry Forebay. The Castaic Transmission Line continues along this slope, past the Elderberry Forebay Dam, and runs adjacent to Castaic Lake SRA. The transmission line then crosses Castaic Lake Dam and continues southeast to San Francisquito Canyon. There are several views of the Castaic Transmission Line from several non-Project roadways and recreation sites, all on State, LADWP, or private lands. The portions of the transmission line located on NFS land are not visible from public viewpoints.

Lake Hughes Road provides a viewpoint of the Castaic Transmission Line, particularly at the intersection of Lake Hughes Road and the access road to the non-Project Castaic Lake Main (East) Boat Launch. One viewshed from this viewpoint (i.e., KOP TL01) is to the southwest, where one of the transmission towers is in the foreground and partially in silhouette, along with substantial urban development behind the towers throughout much of the viewshed. However, this viewpoint is from a stationary perspective, which is not typical as most viewers are in vehicles driving 35 to 45 mph. From this stationary viewpoint, the transmission tower has high visual contrast due to the light color and geometric lattice work that does not match with the grass tans of fall or the light greens of spring. From the typical vehicle passenger viewpoint, the towers are less evident and the visual contrast is low to moderate.

Another view is to the west, with the Castaic Transmission Line in foreground and middleground, all on State or private lands, just south of Castaic Dam and to the west. From this viewpoint, the transmission line is below the viewer and the gray color of the towers is muted and less visible partly due to the lack of direct lighting (i.e., morning shadows from the eastern ridge), resulting in low visual contrast.

Another view of the Castaic Transmission Line is to the northwest overlooking the non-Project Castaic Dam and Lake. The view is looking down or even with the transmission line. With this view, the towers are in direct sunlight so the towers are lighter in color and more visible but still somewhat muted. This results in low visual contrast overall with moderate visual contrast where a few transmission towers are silhouetted in the middleground.

The view from non-Project Castaic Lagoon Boat Launch parking area is representative of multiple views as seen by boaters on the lagoon, day users at the recreation facilities on the west side of the lagoon, and recreationists at the east side boat launch facility. The views are toward the north by northwest and north of the Castaic Transmission Line in middleground (all on State of California, LADWP, or private lands). The non-Project Castaic Dam is a very large facility and dominates the landscape. The Castaic Transmission Line in comparison, while visible, is subordinate in the viewshed. The visual contrast is moderate-to-low depending on the lighting due to the light gray color of the towers sometimes in silhouette in front of dark hillsides. As the transmission line recedes to the northwest, the towers become less visible. As the transmission line

approaches the dam, the towers are visible in silhouette and then are barely visible directly in front of the dam.

Another view of Castaic Transmission Line is from State or private lands along the main road in San Francisquito Canyon looking to the north by northwest. People viewing the transmission line are primarily motorists traveling approximately 55 mph along a straight section of road facing the transmission line, equestrians using local trails in the canyon, and private residences. The first two visible sets of towers are located on LADWP land in middleground, seen partially in silhouette with the sky. The visual contrast is moderate due to the gray color and geometric lattice work visible in silhouette and in front of the tan hillsides.

Overall, the Castaic Transmission Line is primarily visible in highly developed recreation areas and residential settings, all on State or private lands. The transmission towers, while visible, are visually similar to the surrounding setting, including other non-Project transmission lines, towers, dams, spillways, and residential and commercial developments. In some instances, the transmission towers are visually subordinate to the landscape character being viewed, particularly along the ridge between Elderberry Forebay and at the non-Project Castaic Dam. Transmission lines and towers are relatively common in this area and in southern California overall. As such, the public is generally accustomed to viewing transmission line features and understand the function and purpose of such facilities.

To minimize the visual effects on NFS land, the Licensees propose to consult with USFS to perform a full scenery analysis in accordance with NEPA at such time over the license term when the Licensees determine that a major upgrade, improvement, rehabilitation, or replacement of the transmission line towers is necessary.

Overall, the Castaic Transmission Line has a minor effect on visual resources when considering the Licensees' proposed enhancement measures.

5.7.2 Effects of the Licensees' Proposal

This section discusses the potential effects of the Licensees' Proposal, as described in Section 2.0 of this Exhibit E, on scenic resources. The Licensees' Proposal would not cause any new adverse effects on the existing scenic resources, as described in Section 5.7.1. On State, LADWP, and private lands, there is no specific requirement to meet scenic standards. Additionally, all of the Project facilities are located in mountainous areas that are considered part of the mountain scenic/open space backdrop to the greater Los Angeles area. County area plans speak to the importance of maintaining scenic values associated with open space, but do not have specific scenic goals or objectives.

DWR has proposed one measure specifically related to scenic resources: Measure VR1, would implement the Visual Resources Management Plan included in Appendix A of the Application for New License. The plan includes measures to reduce the visual

contrast of some Project facilities. DWR developed this plan in collaboration with interested parties.

As discussed in Section 5.7.1, the existing minor effects of the Project facilities on scenic resources are expected to continue, but the Licensees' Proposal would not have any new adverse effects on scenic resources at Quail Lake, Gorman Bypass Channel, Warne Powerplant, Pyramid Lake, Angeles Tunnel, Angeles Tunnel Surge Chamber, Castaic Penstocks, Castaic Transmission Line, and Elderberry Forebay Project facilities. The Licensees considered measures to minimize the minor effects, and found some to be impractical, primarily because many of the Project facilities are industrial in design, critical hydroelectric infrastructure, and/or required to safely operate the Project. Further, the measures considered would not noticeably lessen the visual effects, would be high cost with nominal visual contrast improvement, or the Project facilities are rarely viewed by the public. However, the Licensees' proposed measures included in Measure VR1 would minimize the visual effects at Pyramid Dam, Angeles Tunnel North Adit, Angeles Tunnel Surge Chamber, portions of Castaic Transmission Line, and at several recreation facilities, including Emigrant Landing Boat Launch, Emigrant Landing Swim and Picnic Area, Vaquero Day Use Area, Spanish Point Boat-in Picnic Area, Vista Del Lago Visitor Center, and Yellow Bar and Bear Trap Boat-in Picnic Areas.

Overall, the Licensees' Proposal would result in the same minor Project effects as described in Section 5.7.1 for the life of the new license, but to a lesser degree when considering the Licensees' proposed visual enhancement measures in Measure VR1. As such, no substantial change in these effects is expected to occur and the Licensees' Proposal would have minor effects on scenic resources.

5.7.3 Unavoidable Adverse Effects

The Licensees' Proposal would not result in any unavoidable Project effects (i.e., Project facilities' inconsistencies with ANF and LPNF Land Management Plan SIOs) beyond the existing minor Project effects described in Section 5.7 of this Exhibit E. The existing Project effects are minor due to the localized nature of the effects and the nature of the inconsistencies. In addition, the inconsistencies are considered minor because the public using the areas are generally accustomed to these features and understand the function and purpose of such facilities, which are relatively common in southern California. Also, the facilities pre-date the ANF and LPNF Land Management Plans and, in many cases, the steep terrain and industrial design and function of Project facilities precludes other functional options where facilities might fit in the landscape with less visual effect. The Licensees' proposed Measure VR1 would minimize the minor visual effects of the Project.

5.8 CULTURAL AND TRIBAL RESOURCES

This section includes three main sub-sections. Section 5.8.1 describes existing Project conditions and presents a cultural history overview. Section 5.8.1 also describes the existing environment, and specifically includes the Licensees' cultural resources

investigations conducted under the *Cultural Resources Study*; provides a general overview of the cultural resources documented within the Area of Potential Effects (APE); and lists potentially affected Indian tribes and describes the results of the Tribal Resources Study. Section 5.8.2 describes the effects of the Licensees' Proposal on cultural resources and tribal resources. Section 5.8.3 describes any unavoidable Project effects on cultural and tribal resources.

Licensees augmented existing, relevant, and reasonably available information regarding cultural and tribal resources in the Project area by conducting two studies: (1) *Study 4.1.12, Cultural Resources Study*, and (2) *Study 4.1.13, Tribal Resources Study*. The studies are complete. Refer to Appendix B of this Exhibit E or to the South SWP Hydropower relicensing website (<http://south-swp-hydropower-relicensing.com/>) for the detailed study approaches, study summaries, and detailed study data. Given the sensitive nature of the information developed as part of each study (e.g., locations and maps of cultural and tribal resources), a confidential Privileged Study Report will be filed with FERC for each resource study and will be made available to USFS, ANF, the SHPO, BLM, and Indian tribes, with the tribes' concurrence on the *Tribal Resources Study Report* consistent with existing non-disclosure agreements. The Licensees anticipate filing these confidential Privileged Study Reports with their Final Application for New License. The confidential Privileged cultural and tribal resources information is only summarized in this section.

5.8.1 Existing Environment

5.8.1.1 *Background Information*

This section provides information regarding cultural and tribal resources located within the Project APE. The APE includes at a minimum all lands within the proposed Project boundary, which includes all Project facilities and features, that are currently used by the Licensees to operate and maintain the Project.

The existing Project boundary covers 6,928.0 acres of land. Within the total acreage, 3,287.3 acres are federal lands, with 2,249.5 acres of NFS lands managed by USFS as part of the ANF; 1,016.1 acres of NFS lands managed by USFS as part of the LPNF; and 21.7 acres of land administered by BLM. The initial cultural and tribal resources data gathering for the PAD encompassed the area within the existing Project boundary, plus a 0.25-mile buffer surrounding the existing Project boundary.

The Licensees propose several changes to the existing Project boundary to more accurately define lands necessary for the safe O&M of the Project and other purposes, such as recreation and protection of environmental resources. The proposed modifications to the Project boundary include: (1) the addition of lands that are currently utilized with a preponderance of use related to Project O&M, and (2) proposed removal of lands from the Project boundary that do not have Project facilities and are not used or necessary for Project O&M. These proposed changes are essentially corrections to the existing Project boundary. Other modifications include proposed changes to the existing

Project boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE. The most significant change in the delineation is the use of a 100-foot buffer from Pyramid Lake's NMWSE to define the proposed Project boundary around portions of the lake, which reduces the land area considerably.

The net effect of modifying the existing Project boundary is the reduction of area within the boundary from 6,928.0 acres to 4,563.8 acres. This change would reduce the 3,287.3 acres of federal land (47.5 percent of the total area within the existing Project boundary) to 2,007.0 acres of federal land (approximately 44.0 percent of the total area within the proposed Project boundary) that consists of 1,334.6 acres of NFS lands managed by ANF, 665.9 acres of NFS lands managed by LPNF, and 6.5 acres managed by BLM.

For purposes of defining the APE, the Licensees used the proposed Project boundary, inclusive of 4,563.8 acres of land, with the exclusion of the lands overlying the Angeles Tunnel, as the Licensees do not perform any Project O&M activities on these lands. The SHPO concurred with the proposed APE in a letter dated September 21, 2017. Subsequently, the Licensees proposed revisions to the APE by the inclusion of existing access road segments to add to the Project's licensed facilities as Primary Project Roads and to remove the non-Project SCE-owned Warne Transmission Line. The Licensees consulted with participating tribes and agencies on the proposed revised APE and no comments were received. The SHPO concurred with the revised APE on July 17, 2019. The revised APE is shown on Figures 5.8-1 and 5.8-2, and correspondence with the SHPO is provided in Volume II of the *Privileged Cultural Resources Study Report* (Lloyd et al. 2019).

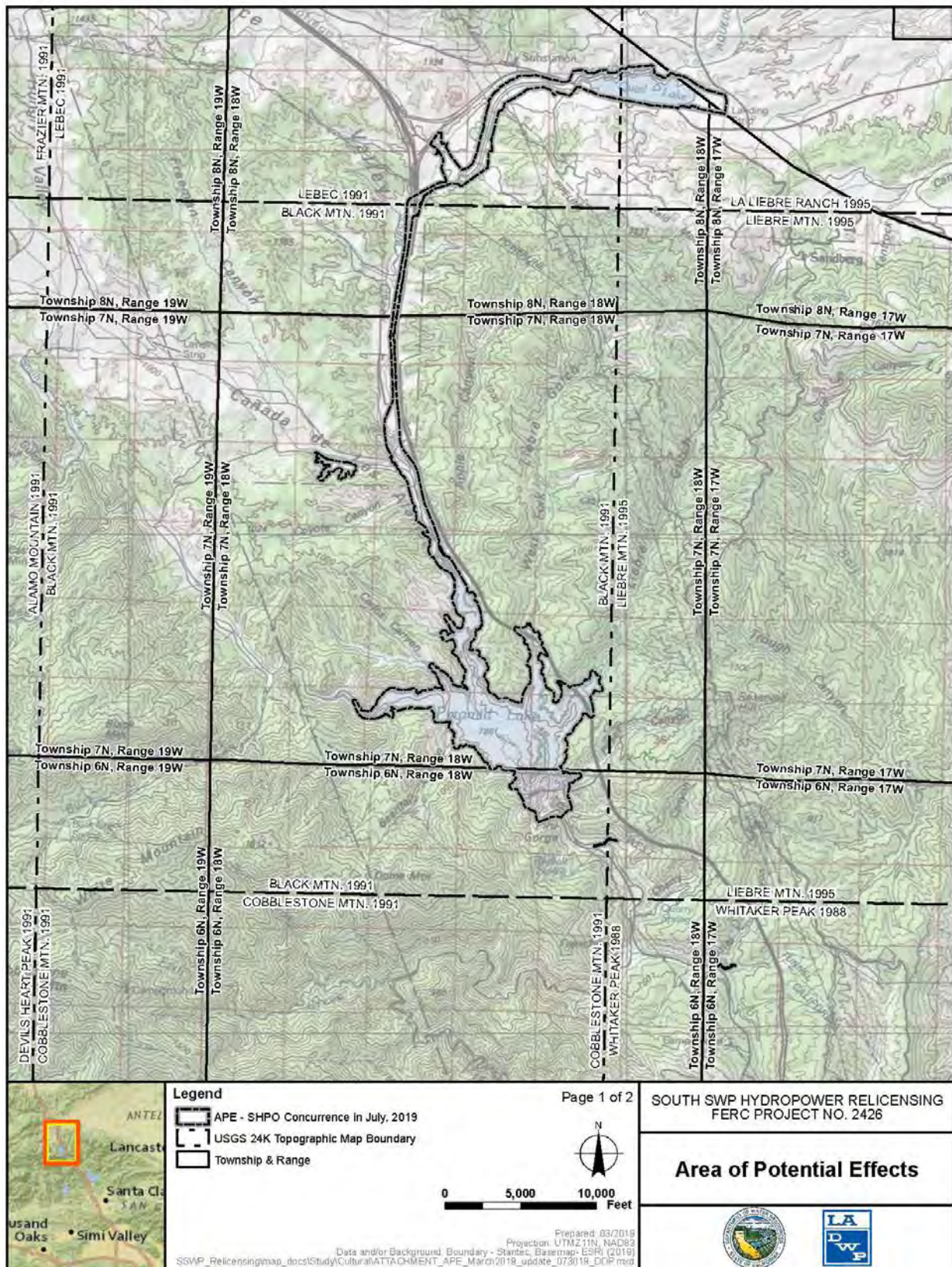


Figure 5.8-1. APE of the South SWP Hydropower (Map 1 of 2)

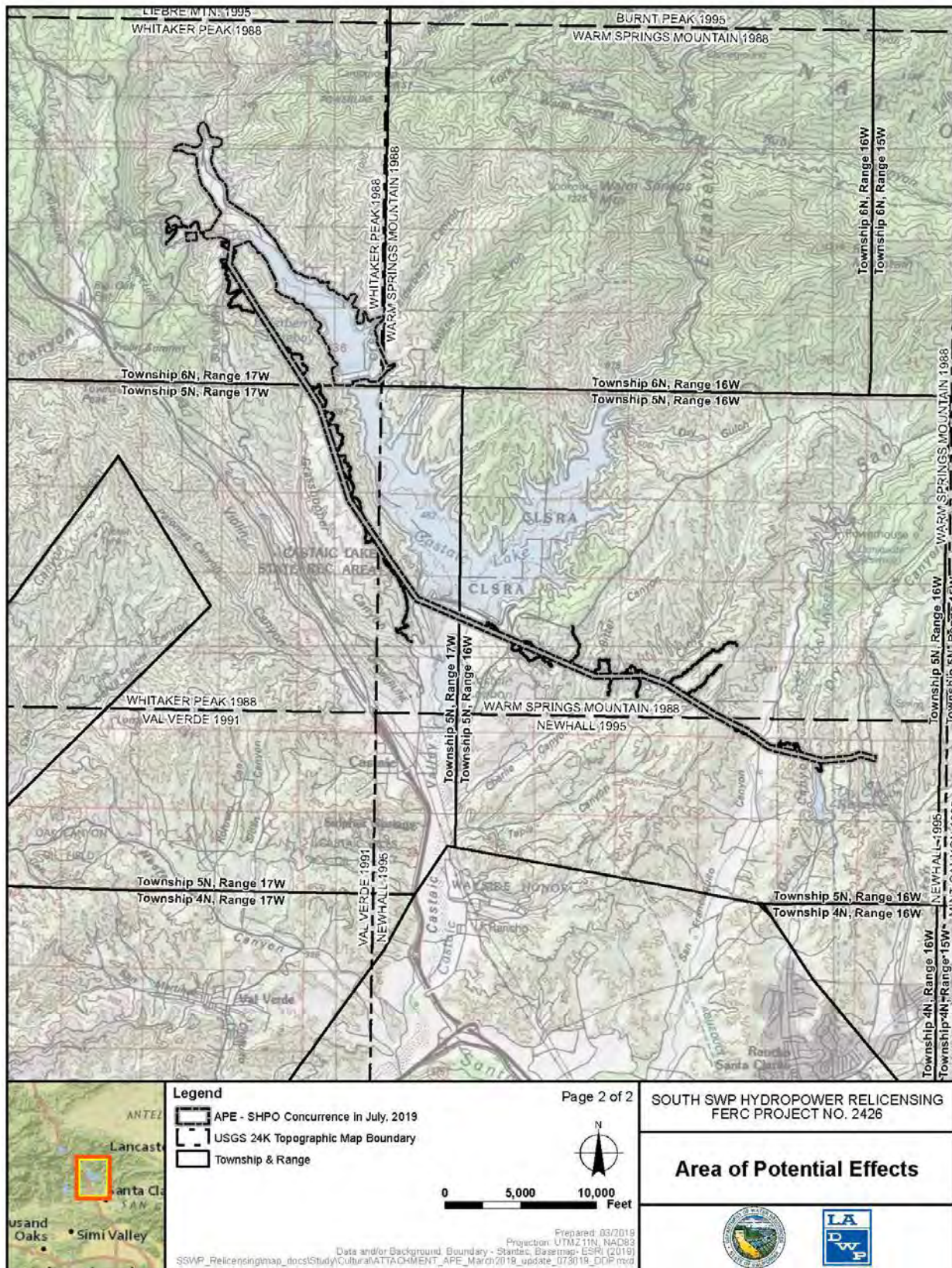


Figure 5.8-2. APE of the South SWP Hydropower (Map 2 of 2)

For the purpose of this section, a cultural resource is any prehistoric or historic district, site, building, structure, or object, regardless of its National Register of Historic Places (NRHP) eligibility. Tribal resources are primarily Indian Trust Assets (ITA), Traditional Cultural Properties (TCPs), or other resources or locations of interest. Agreements that may exist between tribes and other entities, such as land-managing agencies, may be useful in further identifying potentially undocumented tribal resources. ITAs are legal interests in property held in trust by the United States for Indian tribes or individuals. The U.S. Secretary of the Interior, acting as the trustee, holds many assets in trust. ITAs can be real property, physical assets, or intangible property rights. Examples of ITAs are lands, including reservations and public domain allotments; minerals; water rights; hunting and fishing rights; other natural resources; and money or claims. While most ITAs are on reservations, they may also be found off-reservation. An ITA cannot be sold, leased, or otherwise alienated without the United States government's approval. ITAs do not include things in which a tribe, or individual, has no legal interests. For example, off-reservation sacred lands or archaeological sites in which a tribe has no legal interest are not ITAs. TCPs are explained and defined in Parker and King (1998:1) as follows:

One kind of cultural significance a property may possess, and that may make it eligible for inclusion in the [National] Register, is traditional cultural significance. "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. Examples of properties possessing such significance include:

- A location associated with the traditional beliefs of an Indian tribe about its origins, its cultural history, or the nature of the world;
- A rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
- An urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;
- A location where tribal religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
- A location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity.

A TCP, then, can be defined generally as one that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that: (1) are rooted in that community's history, and (2) are important in maintaining the continuing cultural identity of the community.

Agreements are contracts between a tribe and a private land owner or land-managing agency that provide tribes with access to a landowner's or agency's property for fishing, gathering of traditional plants, or other tribal practices.

5.8.1.2 Cultural History Overview

The cultural history overview provides a context by which the significance of cultural resources can be measured and evaluated. The Project region has a long history of human occupation as discussed below, and it focuses on the presence or absence of archaeological evidence collected over many decades from the APE and surrounding area. Additionally, in-depth reviews of ethnographic sources were conducted as part of the *Tribal Resources Study* to develop the site-specific context as may be applicable to the physical locations identified during past and current archaeological investigations and discussions with local tribes and tribal members.

Prehistory

Understanding when, how, and why people occupied the California desert region and southern California during prehistoric times has been a work-in-progress by archaeologists for more than 60 years (Crabtree 1981; King 1976; Rogers 1939, 1945; Stickel et al. 1980; Wallace 1962; Warren and Crabtree 1972, etc.). Based on some of the more recent studies, the APE is within the Mojave and Great Basin Desert Chronological Region (Moratto 1984:348-430; Sikes 2006:2-21). This region is divided into four cultural complexes that use temporal periods based on years Before Present (B.P.); meaning the number of years prior to 1950. These include the Lake Mojave Complex (circa [ca.] 10,000 through 7,000 B.P.), the Pinto Complex (ca. 7,000 through 4,000 B.P.), the Gypsum Complex (ca. 4,000 through 1,500 B.P.), and the Saratoga Springs Complex (ca. 1,500 through 800 B.P.).

Some researchers have suggested categorizing local chronologies using the broader temporal periods discussed by Fredrickson to better reflect cultural traits found similarly throughout the State (Fredrickson 1973, 1974, 1994a, and 1994b). These include the Paleoindian Period (ca. 10,950 through 7,950 B.P.), the Archaic Period (ca. 7,950 through 1,450 B.P.), and the Emergent Period (ca. 1,450 B.P. through Historic era Contact). The discussion below provides a brief overview of these temporal periods and the Mojave and Great Basin Desert Regions' chronological complexes associated with each. (Fredrickson 1973, 1974, 1994a, and 1994b; Sikes 2006:2-22).

Paleoindian Period

Less is known about the Paleoindian Period than other periods, although significant initial human occupation in California has been identified with this period. The Paleoindian Period is generally associated with the presence of lanceolate and fluted lanceolate Lake Mojave, Clovis, Folsom and other types of projectile points. Crescents, leaf-shaped and stemmed or shouldered points, knives, scrapers, and other tools also characterize this period. The start of this period is associated with the end of the Pleistocene, a geologic epoch that corresponds to the last glacial period, which is typified by a cooler, moist climate supporting an environment conducive to larger animals such as mammoths, camels, and other large game. This is exemplified in the archaeological evidence that demonstrates a subsistence strategy focused on large game hunting and gathering of other resources around the shores of old Pleistocene lakes at this time; the dry lake beds of which now include several that occupy the arid portions of modern southern California. (Moratto 1984:523; Sikes 2006:2-22; Warren 1967:177).

The Lake Mojave Complex occurs during this period, with the majority of archaeological evidence found in the Mojave Desert and southwestern Great Basin. Artifact assemblages from this complex indicate that humans were very mobile at this time, traveling in small groups and exploiting plant and animal resources from early Holocene marshes and wetland environments. The Holocene is the current geologic epoch, which followed the Pleistocene, marking the start of the current warm period. The Lake Mojave Complex is one of several that have been grouped under the Western Pluvial Lakes Tradition (WPLT), associated with human exploitation of wet, grassland environments from as far north as Oregon to southern California, and along the Cascade and Sierra Nevada ranges into the Great Basin. Hunting appears to have been the dominant source of food acquisition as milling equipment associated with the WPLT is sparse. However, Lake Mojave artifact assemblages differ somewhat from that of the typical WPLT assemblage in that large slabs and handstones have been found at Lake Mojave sites, indicating that vegetal resources were also incorporated into the regional diet (Basgall and Hall 1993:19; Goldberg 2010:18; Moratto 1984:90).

Archaic Period

The Paleoindian Period concludes and the Archaic Period emerges around 6000 B.P. with the onset of a warmer, drier environment referred to as the Altithermal (Sikes 2006:2-23). It is during this time frame that the pluvial lakes of the Great Basin dried up and desert biotic communities replaced wet marshlands (Moratto 1984:461). The Archaic Period is defined by three subdivisions, each of which is described below.

Lower Archaic Period (ca. 7,950 through 4,950 B.P.)

The first 3,000 years of the Archaic Period are referred to as the Lower Archaic and is represented by an increase in the number of archaeological sites found from this time period. Artifact assemblages include an increase in milling equipment, and therefore, an

increase in the use of plant resources, the addition of seeds, the continuation of hunting, and the suggested scheduling of seasonal procurement activities. Tools associated with the Lower Archaic Period include large, side-notched points and large, simple core and flake tools. (Sikes 2006:2-24).

The Pinto Complex begins during the Lower Archaic Period but continues throughout the Middle Archaic Period described below. For the desert regions of southern California, the patterns of human occupation transitioned at this time in response to the aridity occurring in the deserts. The reliance on pluvial lakes changed to the use of seasonal water sources. The shift in climatic conditions further resulted in a transition to a more plant and seed resource base, the hunting of smaller game animals as opposed to the large game of the Lake Mojave Complex, but with a continued reliance on artiodactyls. Sites related to this complex tend to be small, surface sites, likely reflective of small groups of people. Artifact assemblages include Pinto series points (i.e., coarsely made points with indented bases and weak shoulders), leaf-shaped bifaces, domed and heavy-keeled scrapers, milling equipment, and cobble tools. (Goldberg 2010:18).

Middle Archaic Period (4,950 through 2,950 B.P.)

The Middle Archaic Period is designated by a heavier reliance on local and regional resources, with an evolution in milling equipment from slab mortars and handstones to pestle and mortar technology. Middle Archaic Period artifact assemblages become more diverse and include large stemmed points, lanceolate and leaf-shaped forms, drills, larger knives, flake scrapers, and an increase in bone awls and other tools, suggestive of a more diversified use of resources. This period is also defined by an increase in population and non-utilitarian objects. (Sikes 2006:2-25).

The Gypsum Complex immediately follows the Pinto Complex, starting during the Middle Archaic Period and extending into the Upper Archaic Period described below. It is represented by an expansion of the artifact assemblage identified during the Pinto Complex, likely in response to an increase in wetter conditions that occurred about 3,700 through 3,500 B.P. (Goldberg 2010:18-19). The increase in moisture resulted in the appearance of perennial lakes. Large villages occur at this time, suggesting there was less reliance on seasonal forays for resource procurement and an increase in sedentism, likely to exploit the permanent water sources and related resource procurement opportunities. During this time, ritual practices and hunting petroglyphs appear, and artifact assemblages include any combination of Humboldt concave base, Gypsum Cave, and Elko series points, in addition to leaf shaped points, rectangular base knives, flake scrapers, and milling equipment, among other items (Moratto 1984:414-416). Perishable materials associated with this complex were recovered from a cave site near the area examined by Licensees, and included tortoise-shell bowls, atlatl hooks, dart shafts and foreshafts, sandals, S-twist cordage, and other items that do not preserve in open air sites (Goldberg 2010:19; King and Blackburn 1978:536; Moratto 1984:416).

Upper Archaic Period (ca. 2,950 through 1,450 B.P.)

The Upper Archaic Period is identified by an increase in the diversification of artifacts and features compared to Middle Archaic Period assemblages. This included the development of more permanent settlements, more complex societies, and wealth. Upper Archaic sites are associated with large contracting-stemmed and occasional concave base points, all types of milling equipment, stone effigies, stone pipes, charmstones, a variety of beads and bone tools, rock art, and items reflecting trade goods from long distances. Interment burials, sometimes under cairns, appear as the more common mortuary practice, with few cremations represented during this period (Sikes 2006:2-27).

Emergent Period

The Emergent Period (ca. 1,450 B.P. through Historic era Contact) is defined by an even further expansion of the changes witnessed during the Upper Archaic Period, including increased social complexities, divisions of class, intensification of resource exploitation, and population growth and associated increases in the number and size of settlements. Ornamental objects and pottery begin to appear at this time in the archaeological record (Sikes 2006:2-28 to 2-29).

The Saratoga Springs Complex dates to the Emergent Period and is represented by a similar material cultural to that of the Gypsum Period. This likely reflects similar climatic conditions that occurred for occupants associated with both complexes. However, the Saratoga Springs Complex is defined archaeologically by the intensification of permanent settlement patterns over those seen during the Gypsum Complex, with more focus on regional cultural developments, especially in the Mojave Desert. Anasazi and Hakataya groups move into southern California at this time, introducing Brown and Buff Ware pottery, and Cottonwood and Desert Side-notched points. Trade patterns emerge in the archaeological record based on the presence of coastal shell beads and steatite items, which may suggest advancing sedentary lifestyles with larger, permanent villages (Goldberg 2010:20).

Ethnohistory

Ethnographically, the area examined by the Licensees lies within the territory traditionally ascribed to the Tataviam (King and Blackburn 1978:535). Although evidence regarding the origins of the Tataviam language is weak, it is believed that the Tataviam likely spoke a form of Takic, a sub-family of the Uto-Aztecan linguistic group related to the tribe's Shoshone roots (King and Blackburn 1978:535; Moratto 1984:541). The Uto-Aztecs are believed to have arrived in the Mojave Desert from the Utah or Mexico areas about 5,000 years B.P., expanding their occupation in California through about 3,900 B.P., during the time the Gypsum Complex of the Middle Archaic Period appears in the archaeological record (Moratto 1984:559).

The Tataviam primarily occupied the Santa Clara River drainage, extending east from Piru Creek to about Elizabeth Lake, and north over the Sawmill Mountains to Antelope Valley (King and Blackburn 1978:535). The Chumash occupied lands to the north and west of the Tataviam, the Serrano lived to the east, and the Gabrielino occupied lands to the south. Documentation on Tataviam lifestyles is limited until the Spanish period of missionization (1776 through 1821), although archaeological data indicates that the Tataviam lived in villages of varying population size, obtained and prepared food in similar ways to neighboring groups, and were virtually all baptized at the San Fernando Mission by 1810 (King and Blackburn 1978:536). Primary food sources included acorns, sage seeds, juniper berries, small mammals, deer, and possibly antelope, supplemented by various fish species (King and Blackburn 1978:536). Villages varied in size from small settlements of 10 to 15 people, up to large centers containing 200 people. At the time of historic era contact, the total population is estimated to have been less than 1,000 people (King and Blackburn 1978:536). Research regarding the Tataviam social organization has not fully differentiated the tribe from the Kitanemuk or Gabrielino societies. However, archaeological evidence from a local cave site revealed ritual objects similar to those described ethnographically by Ventureño Chumash for ceremonies conducted by secret societies (Elsasser and Heizer 1963; King and Blackburn 1978:536).

History of the Region

The history of southern California began when Europeans first made contact with the Indian tribes of the region and can be broken down into three major periods: Spanish (1769 through 1821), Mexican (1821 through 1848), and American (1848 through present). Spain began settling California in the late eighteenth century; however, the Spanish had little success in gaining a stable foothold due to several factors such as internal strife, lack of adequate supply routes, and Indian hostility. After a long war, Mexico liberated itself from the Spanish Crown and increased a presence in California through new policies of settlement and more amiable international relations. Inevitably, the Mexican system of rule was doomed to failure as the government was only a democracy on the surface and was increasingly at odds with the wealthy land owners in California. The United States took advantage of this weakness and by the middle of the nineteenth century, Mexico lost control of California.

Spanish Period (1769–1821)

Prior to the eighteenth century, Spain did not show much interest in the lands to the north of Baja California as there did not seem to be a need to rush settlement. Missions were already being established in Baja, and the Jesuits were slowly making their way north. However, perceived international interference from the British and Russians forced Spain to change tactics and gain a presence in Alta California (Hayes 2007). From the early seventeenth century up to the middle of the nineteenth century, Spanish and Mexican governments established colonies, towns, and religious centers throughout the northern borderlands of the Spanish colonial empire. A total of 21 missions were established along the California coastline from San Diego in the south to

Sonoma in the north (CMRC 2018). All the missions were connected by El Camino Real (The Kings Highway) and other routes such as La Cuesta Vieja (El Camino Viejo [The Old Road]) through the Transverse Mountain Range of southern California (Robinson 2005).

In 1767, the King of Spain, Carlos III, ordered the expulsion of Jesuits from New Spain, and they were to be replaced by the Franciscan order led by Father Junípero Serra. Veteran army commander Gaspar de Portolá was selected to carry out this mission in preparation for the northward expansion of New Spain. In 1769, Portolá led “The Sacred Expedition” into Alta California with orders to occupy Monterey Bay. The expedition made it as far as San Diego before encountering a number of difficulties, including the loss of most of their supplies. Nevertheless, Portolá was resourceful and pressed on, leaving Father Serra behind to found the Mission of San Diego de Alcalá (Hayes 2007; Hoover et. al. 2002; Starr 2007).

On July 30, 1769, the expedition entered what was to become Los Angeles County and made camp near La Puente. Before continuing north towards Monterey, Portolá became the first European to enter the San Gabriel Valley when he led the expedition west to set up camp just north of the Whittier Narrows (Hayes 2007; Hoover et. al. 2002; Starr 2007). Several days later, the expedition continued west and entered the Indian tribal village of Yang-Na, which was the first recorded encounter with the friendly and welcoming Tongva. During this visit, Father Crespí named the river adjacent to the village Nuestra Señora la Reina de los Angeles de la Porciúncula (Our Lady the Queen of the Angels of the little portion), which would later be shortened to Los Angeles (Hayes 2007; Hoover et. al. 2002). Portolá continued north over rough mountainous terrain to a place called Valle de Santa Catalina de Bononia de los Encinos (later the San Fernando Valley) encountering another Indian tribal village called Chaquayabit. The party then passed into the Santa Clarita Valley and north through the mountains on its way to Monterey (Robinson 2005).

By 1770, Portolá and Serra succeeded in establishing a presidio and mission (Mission San Carlos Borromeo de Carmelo) at Monterey, which facilitated the expansion of New Spain throughout the coastal California region. A third mission, San Antonio de Padua, was quickly established just to the southeast of Monterey; however, the founding of the fourth Spanish mission in the San Gabriel Valley was to come from San Diego. In August 1771, friars Pedro Cambón and Angel Somera took a contingent of 10 soldiers north to establish a new mission, and by September, Mission San Gabriel Arcángel, Pride of the Missions, was founded. The original mission was established on a small bluff adjacent to the San Gabriel River at the Indian tribal village of Shevaanga; present day Montebello (CMRC 2018; Hayes 2007; Hoover et. al. 2002; Starr 2007). In 1775, the mission was relocated approximately three miles to the northwest at the Indian tribal village of Lisanchanga (Figure 5.8-3)(CMRC 2018).



Source: USC Digital Library 2017

Figure 5.8-3. Exterior View of Mission San Gabriel, Photograph Taken by Edward Vischer Before 1875

From an economic standpoint, Mission San Gabriel Arcángel was the most successful of the 21 California missions. Fathers Antonio Cruzado, Miguel Sanchez, and José Zalvidea oversaw the construction of *asistencias*, canals, vineyards, orchards, gardens, and mills. By the early nineteenth century, the mission maintained more than 25,000 cattle, 15,000 sheep, and produced more than 350,000 bushels of wheat, barley, corn, beans, peas, and lentils. The padres proved themselves to be masters of organization and industry. However, this success was mainly due to the subjugation of the more than 1,700 neophytes who worked the mission lands (CMRC 2017; Starr 2007). The Tongva and Chumash were the first to fall under the power of Mission San Gabriel, and regular expeditions were sent throughout the region to collect more Indian people, such as the Serrano and Mojaves to the north and west (Bean and Smith 1978; GTT 2017; SMBMI 2017).

The native peoples who were captured and forced to work the mission lands were eventually referred to as *Gabrieleños* after the mission. Those who resisted were killed and those who did not resist were subjected to forced assimilation and harsh treatment by the padres. Many of the padres maintained a disdain for the Indian people, viewing them as little more than children incapable of comprehension, thought, and feeling. Other padres, like José Zalvidea, may have had good intentions, but suffered from the isolated lifestyle and succumbed to nervous breakdowns and possibly insanity (Starr 2007). Regardless of whether or not any of the padres' intentions were good or bad, the

fact remains that the Indian people who fell under their control were little more than slaves; subjugated by the Crown of Spain like the Incas, Aztecs, and all their environs.

The Gabrieleños, under the tutelage of the padres, constructed some of the finest early structures in the region, such as the second mission church of San Gabriel (1791 to 1803 [see Figure 5.8-3 above]) and California's first water powered gristmill (1810 to 1812). The San Gabriel church was constructed of stone and cement up to the windows and then brick throughout the remainder of the structure. The Gabrieleños painted the interior of the church, which included depictions of the 14 Stations of the Cross; the earliest post-contact Indian art in California. The old mill is approximately 2 miles to the north of the mission and is constructed of solid masonry. Both structures are still in use today and are a testament to the architectural and engineering prowess of the Spanish Mission Period. Several of the numerous adobe structures that served the mission have also survived (Hoover et. al. 2002).

Aside from San Gabriel's economic importance, it was a primary stop and staging point for many Spanish expeditions in southern California. Throughout the 1770s, Juan Bautista de Anza, Pedro Fages, and Father Francisco Garcés utilized Mission San Gabriel as a resupply point. Anza and Fages primarily led expeditions for settlement, while Garcés was in search of new Indian tribal converts. One of the most notable of these expeditions was that of Father Garcés in 1776. Initially, Garcés was attached to Anza's Colorado River expedition; however, Garcés broke off from Anza and traveled west in search of the Mojave Trail, a long-established trade route that linked Colorado River Indian villages with coastal villages (Hayes 2007; Starr 2007). Garcés' mission was a success, and he managed to locate a number of Indian villages and learn about the socio-economic complexity of the Indian people before reaching Mission San Gabriel. Garcés attempted to pass on the knowledge he gained to educate others on the intelligence of the Indian people, but to no avail (Earle 2005; Hayes 2007; Starr 2007; Swisher 1999). In 1781, the overland route to Alta California was closed after the Yuma Indians destroyed the missions along the Colorado River and massacred a military detachment, which included Garcés (Hayes 2007).

The jurisdiction of Mission San Gabriel was far reaching; however, Spain had difficulty controlling the mountainous territory to the north, and it was decided that a new mission was necessary. In 1795, Governor Diego de Borica and Father Fermin Francisco Lasuen sent Ensign Pablo Cota and Father Vicente de Santa Maria north to scout for a new mission site. The place that was chosen was the rancho of Francisco Reyes, who was granted the San Fernando Valley by Governor Pedro Fages in 1789 for service as alcalde of Los Angeles. The San Fernando land grant was never certified, so when it was chosen as a mission site, Reyes did not have any legal recourse to defend his claim (Robinson 2005; Weber 1987).

On September 8, 1797 (the Feast of the Nativity of Mary Most Holy), Father Lasuen and six soldiers founded the seventeenth mission at a place the Indian tribes called Achois Comihabit, and christened it under the patronage of San Fernando, Rey de España, hero of the Spanish Reconquista. Padres Francisco Dumetz and Juan Cortez were the

first patrons and they controlled all the land from the headwaters of the Santa Clara River to Piru Creek. According to mission records, by 1800, the population of the mission was 541, actively engaged in ranching, farming, and other trades. The Indian people of this mission spoke three different languages, but all became known as Fernandinos. At the height of mission prosperity, there was a total of 21,745 head of livestock including: 12,800 cattle, 7,800 sheep, 176 goats, 45 pigs, 780 horses, 144 mules, and an unknown number of chickens. The mission was known for its ironwork, as well as producing products such as hides, wool clothing, soap, tallow, shoes, and a variety of woven plant products sealed with asphaltum. Cultivated products included: wheat, barley, corn, peas, lentils, garbanzo beans, grapes, pears, apples, apricots, peaches, figs, pomegranates, lemons, oranges, quinces, olives, and prickly-pear fruit (CMRC 2018; Los Angeles Star 1855; Robinson 2005; Weber 1987).

The structures of the San Fernando mission were some of the most lavishly decorated of all the missions having been constructed in the Moorish style (Figure 5.8-4). The interior and exterior of the Convento building was decorated with Indian tribal designs, such as animal motifs, emblazoned suns, triangles, geometric designs, and hunting scenes. The artistry of the mission has led to the belief that the Via Crucis (Way of the Cross) paintings claimed by Mission San Gabriel were originally created by the Fernandinos and housed at Mission San Fernando. The Catholic Church hired three scholars to investigate the issue; however, the only conclusive information obtained from the study was that the paintings were created in the early nineteenth century (Weber 1987).

The Spanish had succeeded in establishing a military and religious presence in Alta California with presidos and missions, but the establishment of secular civil societies was less successful. Only two settlements were able to achieve pueblo status; San José de Guadalupe, founded in 1777 on the southern edge of the San Francisco Bay, and Los Angeles, founded in 1781 where the village of Yang-Na once stood. A third settlement near Monterey was granted pueblo status as a town for veteran soldiers, but this failed as most Spaniards viewed California as an undesirable place to live (Hayes 2007; Hoover et. al. 2002; Starr 2007). The success of Los Angeles was mainly due to its proximity to the most successful mission, giving San Gabriel the title as the “Birthplace of Los Angeles” (CSG 2017). The initial settlement consisted of 14 families with a total of 44 people who traveled via Anza’s overland route before it was closed by the Yuma Massacre (Hayes 2007; Starr 2007).



Source: USC Digital Library 2018

Figure 5.8-4. Exterior View of Mission San Fernando Rey de España, Circa 1870

Mexican Period (1821 through 1848)

Mexico won its independence from Spain in 1821, signaling the waning of the mission system and shifting the control of many ranchos to the newly formed Mexican government. Many mission ranchos were then sold and granted to private citizens. At first, the secularization of the missions was intended to give lands back to Hispanicized Indian tribes, but José Figueroa, governor and creator of this plan, died before it could be realized, and only a small number of Indian people were granted mission lands (Hayes 2007; Starr 2007). Generally, the treatment of the Indians did not change, and many were exploited as forced labor by Mexican rancheros (Shipek 1977).

During the period leading up to secularization, the missions were taxed heavily to support government garrisons and to weaken the church financially. By 1835, all missions in southern California had been secularized with ranchos established on their lands. The padres, as royalists, were at odds with the new government and secularization reduced their influence significantly (Garabedian and Ruud 2016; Hayes 2007; Hoover et. al. 2002; PRHS 2008; Starr 2007). Ranchos created from mission lands surrounding Los Angeles included Nieto, Paso de Bartolo, Santa Gertrudes, Los Coyotes, Los Cerritos, San Antonioto, La Habra, La Puente, La Merced, Potrero Chico, Potrero de Felipe Lugo, Potrero Grande, and San Francisquito (BLM 2018; LAC 2018).

Further north, near the southern slopes of the San Gabriel Mountains, the ranchos included Azusa, Santa Anita, Tujunga, San Pascual, La Canada, and Ex-Mission San Fernando. Rancho Azusa, named after the Rancheria of Asuksangna, was granted to Andreas Duarte and Luis Arenas in 1841. Santa Anita was granted to Hugo Reid in 1841 and was confirmed in 1845. Tujunga, a named derived from a nearby Indian tribal village, was granted to Pedro and Francisco Lopez in 1840. San Pascual was granted to Juan Marine in 1835, Jose Perez and Henrique Sepulveda in 1840, and then to Manuel Garcias in 1843. La Canada was granted to Ygnacio Coronel in 1843, and Mission San Fernando was granted to Antonio Del Valle immediately following secularization. San Fernando was looted by angry Fernandinos out of anger for having their land taken away. Del Valle moved his family onto the rancho, but feared for their lives, so soldiers were sent to restore order. The rancho would pass into the hands of Andre Pico and Juan Manso in 1843, and finally to Eulogio de Celis in 1846 (Robinson 1991, 2005; Weber 1987).

Along the La Cuesta Vieja and nearer to the Central Valley, ranchos included: San Emigdio, La Liebre, El Tejon, Los Alamos y Agua Caliente, and Castaic. San Emigdio, a former Santa Barbara Mission Assistencia, was granted to Don Jose Antonio Dominguez in 1842. La Liebre was granted to Jose Marie Flores in 1846. El Tejon was granted to Jose Antonio Aguirre and Ygnacio Del Valle in 1843. Los Alamos y Agua Caliente was granted to Pedro Carrillo and his wife, Josefa Bandini, in 1843, but was later granted to Francisco Lopez, Luis Jordan, and Vincente Botello in 1846, because Carrillo failed to occupy and stock the land. Castaic was granted to Jose Maria Covarrubias, a Mexicanized Frenchman, in 1843. In all, these northern ranchos totaled approximately 265,000 acres and were an important gateway linking Los Angeles to the Central Valley (Kane 2005; Los Angeles Herald 1898; Robinson 2005).

The creation of these ranchos, as well as many others, helped facilitate a secular society; however, outside Los Angeles and San Jose, this secular society only benefited those families fortunate enough to receive land grants. The owners of the Mexican ranchos became the wealthy elite of Californian society and were known as Californios (Starr 2007). Along with the wealth achieved through such prosperous land grants, the Californios enjoyed a degree of political autonomy and wanted self-rule with a separation from Mexico. The wealth and power of the Californios attracted many foreign businessmen who desired to marry into these families. These marriages were encouraged by the American government, which increasingly sought to annex California towards the mid-nineteenth century (Olson-Raymer 2015; Starr 2007).

Until the 1830s, Los Angeles remained stagnant and fell victim to several floods that destroyed most of the settlement. Between 1825 and 1830, the third and final settlement was established around a central plaza by prominent Californios families such as the Avilas, De Valles, and Lugos. In 1835, the Mexican government upgraded the fast growing pueblo town of Los Angeles to a ciudad and designated it as the new capital of California. Los Angeles continued to grow and prosper during the Mexican Period and by the 1840s became the largest town in southern California, central to industries like the hide and tallow trade (Hayes 2007; Hoover et. al. 2002; Starr 2007).

The Mexican government made efforts to militarize the frontiers of California to protect against hostile Indian tribes, incursions by Russians from Fort Ross, trappers from the Hudson Bay Company, and incursions by American mountain men like Jedediah Smith. However, Mexico lacked the resources to effectively defend their frontiers. In 1826, Smith was captured by the Mexican government and held at Mission San Gabriel, but he eventually escaped. Generally, men like Smith were able to traverse the territory unmolested (Hayes 2007; Starr 2007).

In 1836, the Californios, led by Juan Bautista Alvarado, and assisted by Tennessee mountain men, declared California a sovereign state. With neither the Californios nor Mexico having the men or resources to win a victory by force, the Mexican government decided to quell the situation by upgrading California's territorial status with Alvarado as governor. Mexico also began enlisting the assistance of foreign emigrants like German-born John Augustus Sutter, who would later found the City of Sacramento, but the financial interests of men like Sutter would eventually work against the aims of the Mexican government. Rather than repel foreign incursions, they invited them as potential business prospects. By the late 1830s, American companies in partnership with the Californios were exploiting most of California with little resistance (Starr 2007).

The Mexican government did not truly have any real authority over the Californios or California for that matter. Between 1831 and 1836, 11 Mexican governors were appointed, but were unable to control the political situation and create a stable system of government. Mexico also had little control over those appointed to the governorship of California, who fostered a military despotism more akin to California under Spanish rule. Mexican California had a legislative branch of government; however, it did not have any real authority and only acted as an advisory council to the governor when convened (Olson-Raymer 2015).

Leading up to the Mexican-American War (1846 through 1848), the United States government sent an increasing number of expeditions to California, and more pioneers began making their way to the region. Early expeditions such as that of Charles Wilkes and George Emmons were highly publicized in the eastern United States, and in 1841, the first wagon train entered California guided by Northern Paiute Indians. One of the primary routes used was the Truckee Pass, now known as Donner Pass, which traveled through the Sierra Nevada Mountains leading into the Central Valley. The pass, discovered by John Fremont, was later used by the Central Pacific Railroad and roughly followed the route of modern-day Interstate 80 (Hayes 2007). Many settlers also traveled the southern route, such as the Workman Rowland-party, who took the Old Spanish Trail to Los Angeles toward the end of 1841 (Starr 2007).

Generally, the Californios were not opposed to an affiliation with the United States and some historians agree with Richard Henry Dana Jr. (Dana and Smith 1911), that California would have become part of the American Union, even if the Mexican-American War did not occur (Starr 2007). The Mexican government may have opposed the influx of Euro-American settlers, but the Californios welcomed and conducted business with the newcomers. What was important to the Californios was that their

language, customs, religion, and land titles be respected by the United States following annexation. However, to allow this would have been contrary to the principles of Manifest Destiny favored by many in the American government like Senator Thomas Benton, father-in-law of John Frémont. By 1845, unbeknownst to the Mexican government and many Californios, the wheels of conquest were already in motion (Starr 2007). In that same year, Pío de Jesus Pico IV was appointed governor of California; he would be the last of the Mexican governors (Ciancimino 2005; CPR 2017; Hoover et. al. 2002).

In January of 1846, John Frémont, at the head of a 60-man army expedition financed by the United States War Department, entered California on his way to Monterey. The expedition was exploratory in nature, but the true intentions behind the mission were to test the defenses of Mexican California and possibly instigate a war. José Castro, commandante of the north at Monterey, was outraged by the presence of armed American troops and ordered Frémont to leave. Frémont did not leave, but instead camped his men on top of Galiván Peak and raised the American flag. Castro, fearing the possibility of a Californio uprising, remained fortified in Monterey and waited. Frémont, having no orders to seize Monterey, went north to Oregon (Hayes 2007; Starr 2007). It was during this time that Frémont met and befriended Edward F. Beale, who would eventually become Frémont's business partner in a lucrative ranching enterprise (Kane 2005).

On May 13, 1846, the United States declared war on Mexico, but the news would not reach California for several months. While in Oregon, Frémont met with Archibald Gillespie, who was carrying confidential dispatches to a United States agent in California. Although it has never been substantiated, Frémont claims that Gillespie gave him a message from President Polk to seize California. Frémont, with a reinforced expeditionary force, entered California and gathered American settlers long the way (the Bear Flaggers). Supporting the U.S. Navy, Frémont helped capture San Francisco and Monterey before being taken by ship to San Diego for the capture of southern California. By August of 1846, Los Angeles fell and Governor Pico fled to Mexico to escape capture (Hayes 2007; Starr 2007).

The conquest of California seemed complete; however, harsh treatment of the Californios in San Diego and Los Angeles led to an insurrection. American forces were forced to flee Los Angeles and General Kearney was defeated at San Pasqual by Andrés Pico, the brother of Pío Pico. In 1847, the U.S. concentrated its forces to retake Los Angeles. Andrés Pico, entrenched on the bluffs of the San Gabriel River, held the U.S. forces at bay for a short time at the Battle of San Gabriel; however, he was eventually forced to fall back to Los Angeles (CSG 2017; Hoover et. al. 2002; Starr 2007). On January 10, 1847, the Mexican Forces defending Los Angeles were defeated at the Battle of La Mesa. The Californios surrendered to Frémont three days later outside of the city during a formal ceremony known as the Capitulation of Cahuenga. On February 2, 1848 the treaty of Guadalupe Hidalgo was signed. The United States acquired all territory north of the Río Grande in exchange for a \$15 million payment to

the Mexican government and \$3.25 million in reparations to Mexican citizens (Olson-Raymer 2015; Starr 2007).

American Period (1848 through present)

The United States had won the Mexican-American War, but the subsequent establishment of California as an occupied enemy territory in 1848 threatened to destabilize the Missouri Compromise of 1820. The entrance of California into the Union as either a territory or a state would disrupt the balance of free versus slave states. The United States government understood that when the time came, California would be made a free state. Southern politicians could not accept that California would be a free state, and therefore, Congress did not act. California's official entrance into the Union would have to wait, but as time went on, the situation would get more and more tenuous, especially after the onset of the Gold Rush (Starr 2007). The following overview of the American Period is separated into the following sections: Early Mining and the Gold Rush, Statehood, Indian Reservations, Transportation, Los Angeles County, Angeles National Forest, Los Padres National Forest, Local History, Ranching, Mining, Bandits and the Castaic Range War, the Community of Castaic, the Community of Gorman, and the Community of Lebec.

Early Mining and the Gold Rush

Gold was first discovered in the region by Francisco Lopez in 1842, a few miles from the town of Newhall (adjacent to Santa Clarita), followed by another discovery in San Feliciano Canyon in 1843. A rush of miners came to the region at this time, primarily to work the placer deposits. Mining activity was diverted to northern California in 1850 by the Gold Rush, but mining had again resumed in the San Gabriel Mountains by 1854. The Santa Anita Mining Company established its placer operations on the San Gabriel River in 1858. Hydraulic mining was carried out until the 1860s. Another wave of mining occurred when numerous migrants arrived in the area during the Great Depression (Robinson 1991:241-245).

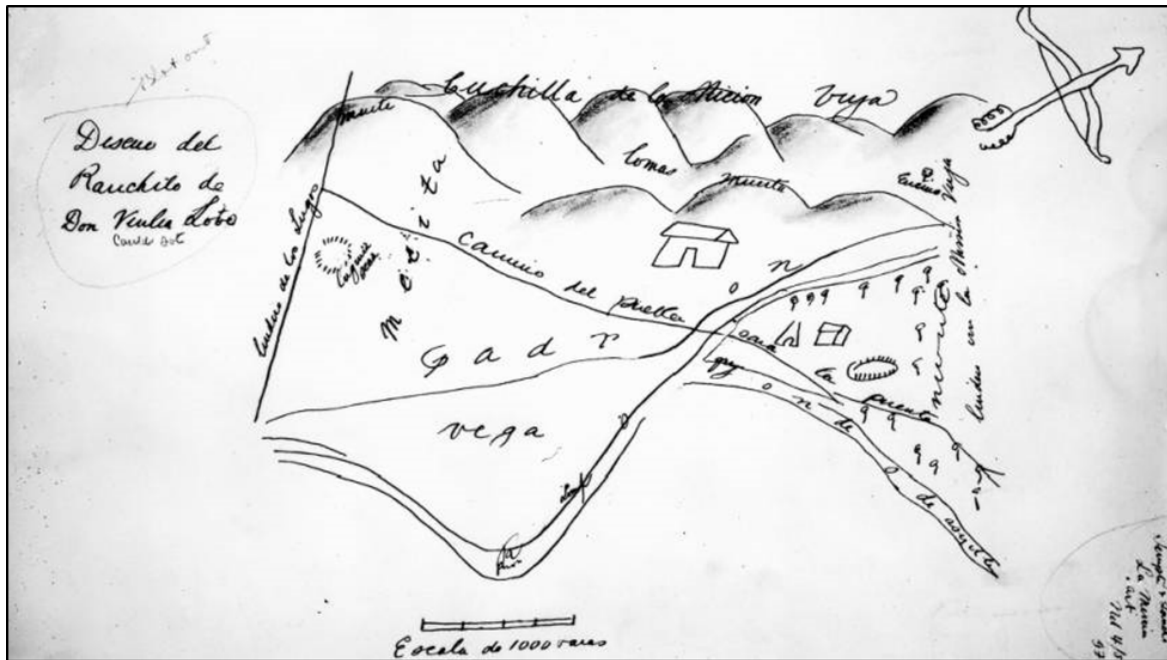
Statehood

In 1849, the military governor, Brigadier General Bennett Riley, decided to take matters into his own hands and direct California to form a state government. Forty-eight delegates were selected to convene in Monterey and form a state constitution using constitutions of other states as guidelines. The new California constitution had many flaws, such as limited franchise and legal privileges for non-whites, but it was a starting point. The size of California following the Mexican-American War was enormous and included the areas destined to become the states of Arizona, New Mexico, Nevada, Utah, and Colorado. The Californians knew that Congress would never approve the admission of such a large state, so the eastern portion of California was trimmed away. The new constitution outlawed slavery, so the exclusion of the east from the proposed State of California would make the proposition more palatable, as these areas could

potentially be entered into the Union as slave states to avoid upsetting the Missouri Compromise (Guinn and Beck 1915; Hayes 2007; Starr 2007).

By the end of 1849, California was poised for inclusion into the Union; the new State constitution was ratified and a general election was held. Peter Burnett was elected governor, John McDougal as lieutenant governor, George Wright and Edward Gilbert to the U.S. House of Representatives. John Frémont and William Gwin were selected as U.S. Senators charged with negotiating acceptance of California as a state. The debate on accepting California into the Union lasted for almost nine months, with many lawmakers viewing the formation of the State without Congressional approval as an act of gross illegality, and indeed it was. Nevertheless, the Compromise of 1850 was reached and California was admitted into the Union as a free state, with the formation of New Mexico and Utah as territories not barring slavery. On September 9, 1850, President Fillmore signed the bill creating California (Starr 2007).

After California became a state, another problem arose, sorting out the legitimacy of the hundreds of Mexican land grants. Most ranchos were never surveyed, and those that were documented, utilized an ad-hoc system that relied on general descriptions of terrain (Figure 5.8-5). Therefore, many Mexican Rancho grantees were in danger of losing their holdings, and a series of moves designed to displace and dispossess Mexican landowners and Californian Indian tribes from their land soon followed. A Board of Land Commissioners was created to assess the legitimacy of all Spanish and Mexican Land grants with each grantee having to argue their claim before the Board or in federal court. In many cases, this process could take up to two decades and very few were able to afford the cost of litigation. Most grantees sold their belongings or gifted land to their lawyers in exchange for representation. By the time a claim was settled, owners were lucky if even a fraction of their original claim was left (Hayes 2007; Starr 2007).



Source: USC Digital Library 2017

Figure 5.8-5. Undated Map of the Lugo Claim from Southern California

Indian Reservations

After California obtained statehood, tensions in the Sierra Nevada and Southern San Joaquin Valley resulted in what has been termed “The Indian War of 1851.” By order of the governor of California, the Mariposa Battalion was formed, which was a group of volunteers and war veterans from the Mexican-American War led by Major James D. Savage. Savage was a local tradesman who lived in the Sierra and operated an outpost supplying miners and ranchers (Bunnell 1892/2016; Starr 2007; Salcedo 2016). As leader of the Mariposa Battalion, Savage quickly defeated a number of Indian bands while forcing the surrender of others (Bunnell 1892/2016; Clark 1904/2008). The Indian people were brought to “The Fresno” and placed in one of two reservations that were located several miles north of the present day City of Madera (Bunnell 1892/2016; Clark 1904/2008). Here the chiefs of the various bands met with federally appointed Indian Commissioners and were forced to sign treaties giving up their land in exchange for government assistance. The treaties they signed on The Fresno were never ratified by Congress, and no government assistance was forthcoming (Bunnell 1892/2016; Clark 1904/2008; Starr 2007; Salcedo 2016).

California viewed Indian tribes as a problem that had to be dealt with and conflicts lead to the formation of several Army-administered Indian Reservations throughout California during the 1850s. Fort Tejon, in southern California, was the first in 1853; followed by the Nome Lackee Reservation in 1854; Klamath River in 1855; and Mendocino, Kings River, and Nome Cult in 1856. Indian people were either enticed to live on these reservations by false treaties or forcibly relocated. Those who signed treaties with the Indian Commissioners either received minimal assistance for a short period of time or

received no assistance at all because Congress refused to ratify any of these treaties (Hislop 1978; Los Angeles Herald 1893a).

During the late nineteenth century, California was becoming more committed to atoning for the past treatment of the Indian people. The system of reservations was of little or no help, so Congress was pressed to pass “An Act for the Relief of Mission Indians” in 1891. The Act authorized a commission to investigate and improve the reservations for the survival of California Indian tribes. The commission noted the past injustices committed on the reservations and reorganized them with a legal basis for ownership. Although the 1891 reorganization of the reservations was not perfect, it established a solid basis for California Indian tribes to be recognized as a sovereign nation. Later, Congress passed the Indian Reorganization Act allowing for the formation of tribal governments (Robinson 1989).

Transportation

Railroad Development

Mid-nineteenth century growth in California was characterized by small population booms, but this would change to a more steady growth towards the latter part of the century with the building of railroads. In 1862, Congress passed the Pacific Railroad Bill authorizing the Central Pacific Railroad and the Union Pacific Railroad to construct a transcontinental line; the first rails were spiked in 1863. However, construction of a rail line from San Francisco through the Sierra Nevada Mountains was an astronomically difficult task and numerous problems were encountered. First, the government was slow to provide the promised financial support; and second, railroad employees would frequently desert the project for more lucrative prospects. These problems were solved by the close of 1865, when the Central Pacific Railroad found that thousands of Chinese laborers, who were unemployed due to the decline of the Gold Rush, were willing to work the railroad without complaint. Within four years, these Chinese rail workers would accomplish an extraordinary feat of engineering when they met the Union Pacific Railroad in Utah on May 10, 1869, and connected the transcontinental line. California was now connected by rail to the rest of the United States (Hayes 2007; Starr 2007).

In 1875, the Southern Pacific Railroad intended to lay tracks north out of Los Angeles to join with the Central Pacific Railroad and its connection to the Transcontinental Railroad. Los Angeles was very nearly bypassed by the Southern Pacific Railroad until a group of Los Angeles business leaders convinced the railroad to run the mainline through Los Angeles in exchange for the county’s purchase of railroad bonds and stock. With the deal (newly approved by Los Angeles County voters) in hand, the Southern Pacific Railroad tackled the most difficult challenge of the mainline linkage through the Tehachapi Mountains. The 6,940-foot-long San Fernando Railroad Tunnel No. 25 was the third-longest tunnel in the United States when it was completed in 1876. It met the Central Pacific Railroad at Lang’s Station in Santa Clarita, where the two companies joined track in a “golden spike” ceremony on September 5, 1876. The Southern Pacific Railroad turned an overly used trail and stagecoach route into a transcontinental

gateway, and Los Angeles was now connected to San Francisco as well as the eastern United States (Hayes 2007; SCVHS 2018; Starr 2007).

During the 1880s, the Santa Fe Railroad laid tracks from San Diego to Los Angeles, which burgeoned the economies of existing Los Angeles County towns and facilitated the creation of many new towns (Berkman 1988; PRHS 2008). The Southern Pacific Railroad considered building a line north from Los Angeles through Piru Canyon as a more direct route to northern California; however, the plan never materialized (Los Angeles Herald 1888a). Due to the development of the railroads, Los Angeles would continue to progress as the urban center of southern California throughout the period of Euro-American settlement. However, many areas would remain rural agricultural areas just as they had been during the Spanish and Mexican periods. Corn, wheat, walnuts, avocados, a variety of citrus fruits, and grapes were grown on the numerous farms; and ranches raised cattle, sheep, and other livestock. By 1869, agriculture would employ more people than mining, and by 1879, it would surpass mining and become the chief element of the economy (Garabedian and Ruud 2016; PRHS 2008; Starr 2007). By 1890, refrigerated railcars could take produce from the fields of Los Angeles County to the eastern seaboard (Garabedian and Ruud 2016; Hayes 2007; Starr 2007).

Road Development

The La Cuesta Vieja through the mountains was the most direct route from Los Angeles to the Central Valley and was important for trade. However, for carts full of goods this was a precarious route with steep grades that had to be descended using a windlass or by cutting a tree down at the top of a ridge and dragging it behind the cart for stability. Improvements were necessary, and in the early 1850s, the La Cuesta Vieja was widened. Although this did not address the problem of travel for carts, it did improve the route for southern California cattle ranchers who continually drove their herds over the pass to feed miners in the goldfields to the north. Later, in 1855, the Los Angeles County Board of Supervisors and local businessmen raised enough capital to hire W.T.B. Sanford to grade the road. The worst grades were smoothed and a 20-foot-deep portion of the mountain crest was removed, but the end result was only slightly better than the original road (Kane 2002, 2014; Robinson 2005; Scott 2015).

In 1858, the Butterfield Stage began service in California and used the La Cuesta Vieja four times a week (Figure 5.8-6). The route was the most difficult part of its journey and required the drivers to switch wagons before and after entering the mountains because a hardier wagon was necessary to avoid breakdowns. Due to the difficulties in traversing the pass, a number of stagecoach stops and stations developed along the road. Some of the stage stops were Hart's Station and Gordon's Station (later Widow Smith's). In the same year, the Los Angeles County Board of Supervisors and local business men like Phineas Banning appropriated \$3,000 for more improvements. No work was done to improve the grade but many of the adjacent rock ledges that forced wagons off the road were removed. In 1862, the road was completely washed out during heavy rains and all the past improvements were undone. The franchise holders of the road did not have the funds for the necessary improvements so Edward Beale

purchased it and decided to fund the project. In 1863, Beale finished rebuilding the road but his improvements were rejected by the County Board of Supervisors who demanded a grade no larger than three to one. Beale had to go to greater expense but the Board offered Beale a 20-year contract to collect tolls on the route if he complied. A 15-foot-wide, 90-foot-deep (Beale's) cut at the top of the ridge was created to make the San Fernando Pass a safe travel route. In February of 1864, the Board of Supervisors accepted the new route as the Fort Tejon Road and declared it open for travel (Kane 2005; Robinson 2005).



Source: USC Digital Library 2018

Figure 5.8-6. Excerpt from a Map Depicting the Stagecoach Routes and Stops in California, 1858

In 1912, Los Angeles County began surveying the mountains for a new highway route. Piru Canyon was considered for the new route but was rejected due to issues with water rights and a proposal to build a dam and reservoir in the canyon. Two years later, the California Department of Highways took on the task of building the Ridge Route through the mountains to replace the old Tejon Wagon Road (an oiled dirt road at this time). Prior to the construction of the Ridge Route, the San Fernando Pass could only be negotiated using Beale's Cut or the Newhall Tunnel, which was built as an alternate route in 1910. The new Ridge Route was linked to the Newhall Tunnel and was named the Tejon-Castaic Ridge Road when it was completed in 1915. Speed limits were 15 mph in many places and the trip between Los Angeles and Bakersfield took approximately 12 hours. Between 1917 and 1919, the road was paved with 41.5-inch - thick reinforced concrete, and fencing and tall curbing was established for safety along the treacherous turns (Figure 5.8-7). In the 1920s, the route was paved with asphalt and

it became lined with inns and restaurants, catering to the many travelers that used the route (Kane 2002, 2005, 2014; Kehe 1998; Pool 1997; Robinson 2005; Scott 2015).



Source: USC Digital Library 2018

Note: Also shown is a section of the utility line corridor.

Figure 5.8-7. The Ridge Route in 1920, Shortly after Completion

During construction of the Ridge Route, multiple locations were used as work camps for crews and equipment. After the road was completed, some of these camps were abandoned and others were utilized for road maintenance stations or private enterprise. The Tumble Inn Hotel and Restaurant was one of the private enterprises that sprang up after completion of the road. Alfred Courtemacnche, a carpenter and builder who also built the National Forest Inn (Figure 5.8-8), constructed the Tumble Inn during the 1920s from one of the largest road construction camps along the route. Two miles to the north of the Tumble Inn, another work camp became the Liebre State Highway Maintenance Camp, which supported a full-time crew of 10 personnel led by Rex Farmer. The camp consisted of wooden barracks, a three-bedroom house for the foreman, and several metal maintenance structures with power supplied by a Model-T Ford converted into a generator. The maintenance crew was responsible for plowing snow during the winter, keeping puncher vines off the road in the summer, and ensuring the general serviceability of the road (Scott 2015).



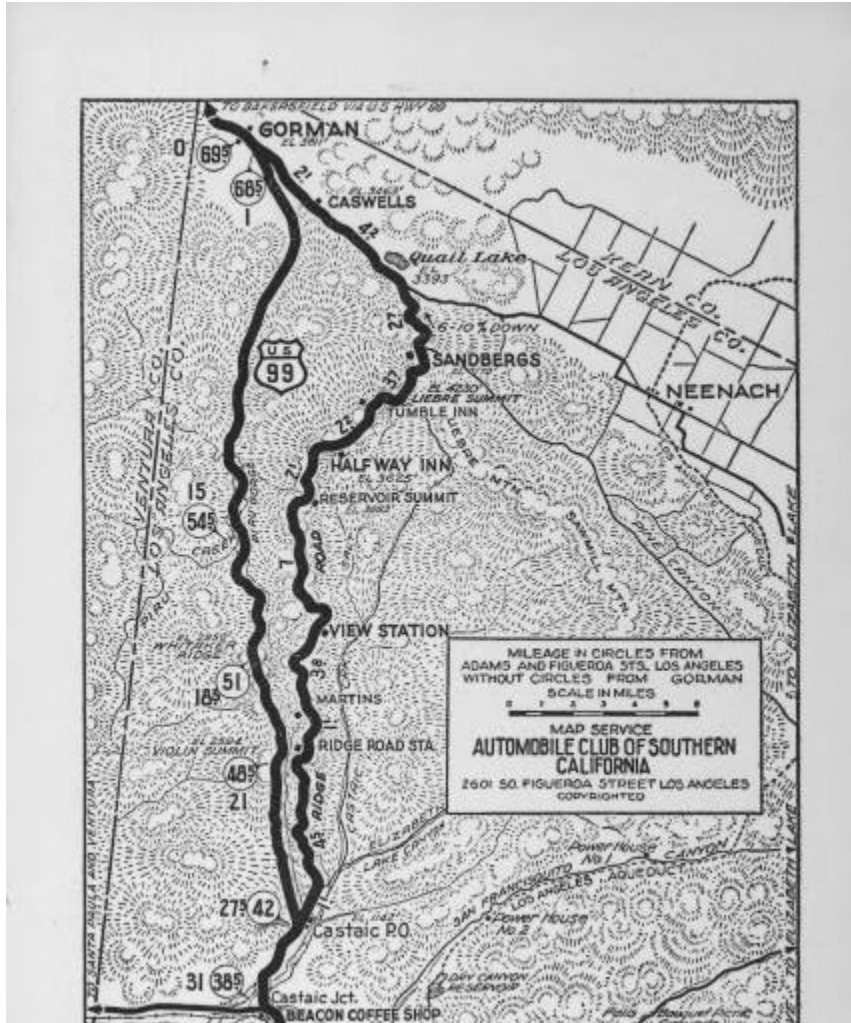
Source: USC Digital Library 2018

Figure 5.8-8. Overview of the National Forest Inn, 1920

During the 1920s, the automobile became affordable to the masses and the need for more improved roads was necessary (FHWA 2017; Garabedian and Ruud 2016). Since 1909, the Automobile Club of Southern California (established in 1900) was participating in transportation policy deliberations with local communities. The Auto Club was one of the main drivers behind road improvements in the early twentieth century and would produce the first comprehensive traffic survey of Los Angeles in 1922. Through the 1920s and 1930s, Auto Club engineers documented the conditions of streets, highways, bridges, railway crossings, buildings, and other transportation-related issues to produce the first detailed proposal for a region-wide freeway system. Additionally, the Auto Club promoted tourism, and provided road maps and traveling advice to southern California residents (USC 2017).

Towards the late 1920s, it became apparent that the Ridge Route was insufficient for the needs of Los Angeles County and the State, so plans for an alternate route began. The alternate route would be a three-lane, high-gear road, at a lower elevation, designed to accommodate higher rates of speed, and would be almost 10 miles shorter than the Ridge Route. In 1930, construction began on the new road from Castaic to Gorman, where it would connect to the 1915 Ridge Route to Bakersfield. It was completed in 1933 and designated U.S. Highway 99. Figure 5.8-9 provides the 1934 routes of the Ridge Route and Highway 99. Many local businesses along the Old Ridge Route were forced to close because travelers were primarily using the new highway. The Liebre Maintenance Station was relocated to what is now Pyramid Lake and was updated with modern amenities, such as a cookhouse and a blacksmith's shop for

maintaining equipment. None of the structures were torn down and may still be present at the bottom of Pyramid Lake. In 1936, the route north of Gorman (referred to as the Grapevine) was turned into a three-lane highway and added to the U.S. 99 designation (Kane 2014; Kehe 1998; Robinson 2005; Scott 2015).



Source: Automobile Association of Southern California 1934

Figure 5.8-9. 1934 Map of the Ridge Route and Highway 99

The federal government began planning for road improvements in the 1930s when the Dwight D. Eisenhower System of Interstate and Defense Highways was formulated. The Federal-Aid Highway Act was passed in 1938, calling for a feasibility study assessing the potential construction of three north-south highways and three east-west highways that would connect the country. In 1941, the National Interregional Highway Committee was formed to evaluate the need for a national expressway system. The study took approximately three years to complete, culminating in the Federal-Aid Highway Act of 1944. By 1947, the first interstate routes were selected for construction; however, funding was not available. Then in 1952 and 1954, Congress authorized \$400 million to be paid out in annual installments through fiscal year 1957 (FHWA 2017). The small

amount of funds was hardly enough money to complete any of the proposed routes but it was enough to start.

After a heated congressional debate, the funding for the multi-billion-dollar Interstate System was approved when the Federal-Aid Highway Act of 1956 was passed. The Act added additional mileage to the plan, established methods to appropriate funds through bonds and special taxes, and set the federal government's share of the cost at 90 percent (FHWA 2017; Hayes 2007). The Interstate System would be the largest transportation undertaking since the construction of the Transcontinental Railroad 100 years earlier, and would have just as many difficulties in execution (Hayes 2007; Moskal 1972; The Sun-Telegram 1955, 1970). Even though the California Highway Commission (established 1917) and the Auto Club of Southern California had proposed highway plans since the 1940s, it would take nearly another 10 years before real progress was made (FHWA 2017; USC 2017).

By 1962, the California State Highway Commission had allocated a total of \$303 million for the start of various highway projects, of which Los Angeles County would initially receive \$92 million (FHWA 2017; Hayes 2007; The Daily Sun 1962). Construction of Interstate 5 began in 1963, and California began accepting bids for other segments to connect other major highways (The Daily Sun 1963). U.S. 99 (Ridge Route Alternate) was used for the northbound lane in Castaic and a new southbound lane was developed to the west. Original 1955 plans called for a six-lane highway; however, Los Angeles County was expanding at such a high rate that updated plans increased the size to an eight-lane highway. Due to the nature of the slopes and the presence of underground springs, mudslides were common during construction. The problem was solved by inserting three-inch pipes into the ground to siphon off underground water. Two hundred thousand gallons of water poured from the pipes every day for two weeks, until the soil was finally stable enough to support the road (Kane 2014; Robinson 2005; Scott 2015). In 1970, Congress extended the deadline for the completion of the Interstate System to 1976, and appropriated an additional \$10 billion for this effort (FHWA 2017). Different segments of Interstate 5 opened in stages, with the final segment opening in August 1970 (DRMC 2017a, 2017b; NETR 2017; The Sun-Telegram 1965, 1970; The Desert Sun 1969).

In an effort to protect the Old Ridge Route, Harrison Scott and Doug Milburn submitted paperwork nominating it for listing in the NRHP in 1996. The California State Historical Resources Commission held a local meeting to discuss the proposition and residents submitted a petition opposing the nomination. The nomination was denied based on the local opposition and the fact that local historical sites along the route were submitted on the same form. The Commission directed Scott and Milburn to remove all other historical sites from the nomination, and to try and convince the local residents that being listed, or eligible for listing, on the NRHP would not decrease their property values. Instead, Scott and Milburn amended their submission to include only the 17.6-mile segment of roadway and other historical sites located within the ANF, such as Sandberg's Summit Hotel, the Tumble Inn, and Kelly's Ranch. The amended nomination was approved in 1997 (Kehe 1998; Scott 2015). Segments outside of the

ANF are not included in the NRHP listing and several portions of the Old Ridge Route have been destroyed (Scott 2015).

Los Angeles County

In 1850, Los Angeles County became one of the 27 original counties in the new American State of California, with the City of Los Angeles incorporated as the county seat. The county comprised approximately 34,520 square miles extending from the Pacific Coast to the Colorado River, and included all lands and settlements in present day San Bernardino, Orange, and Kern Counties. Kern County was formed in 1851, San Bernardino County was created in 1853, and Orange County was established in 1889, and thus, reducing the size of Los Angeles County to 4,084 square miles. Originally, the county formed its own government consisting of a three-member Court of Sessions. However, the Court of Sessions was dissolved in 1852, and replaced by a five-member Board of Supervisors (LAC 2018). The county government also consisted of 12 jueces del campo (judges of the plains), which were a carryover from the Mexican Period and responsible for overseeing the roundup of livestock and the administration of impromptu justice (Guinn and Beck 1915).

Throughout the 1850s and 1860s, the number of settlers in the region rapidly increased due to the discovery of gold and oil, as well as the many business prospects created by the influx of settlers and miners. The first discovery of crude oil occurred in 1864, when Benjamin Silliman, a Yale chemistry professor, published a report that large oil reserves were present throughout northern Los Angeles County. Oil was known in the area, as oil seepages had been used by Indian tribes and Mexican Period residents throughout the Sierra Madre; however, the scale of the reserves and methods of refinement were unknown until the 1860s. By 1865, approximately 100 oil claims had been staked out with Los Angeles County organizing the Asphaltum and Petroleum Mining District. Early operations were unsuccessful because of a lack of oil refinement knowledge. The lack of knowledge led to the development of substandard products, which caused the collapse of numerous companies. However, during the 1870s, the oil fields in Pennsylvania ran out and many unemployed oilmen from the east moved to California looking for work. The experienced oilmen brought the technology for the development of more efficient oil derricks and an acute knowledge of refining. By 1876, the first successful oil refinery was built in Los Angeles County (Los Angeles Herald 1900; Robinson 2005).

Two of the most lucrative business prospects fueled by the population booms were ranching and real estate speculation. Initially, these prospects were only available to the owners of large ranchos leftover from the Mexican Period. During the 1850s, many rancheros began subdividing their land and selling parcels to new settlers for substantial profits. More wealthy newcomers could afford to buy large tracts of land, which they would subdivide further into town plots. During the late 1860s, after the end of the Civil War, the pattern increased, as there was another influx of new settlers from the east hoping to start a new life or treat ailments such as consumption. More ranchos were split, giving rise to many small farms and ranches, as well as new communities like San

Fernando. In 1874, San Fernando became the first community in the San Fernando Valley and town lots were sold for \$10 apiece. Two years later, when the railroad arrived, town lots increased in price to approximately \$150 apiece. These new communities were marketed in the east with slogans such as “Go West” (LAC 2018; Garabedian and Ruud 2016; Guinn and Beck 1915; Starr 2007).

California experienced a devastating drought between 1862 and 1863, which resulted in the failure of crops and a lack of feed for livestock. Many herds of cattle and horses died off, leaving many ranchers destitute and unable to pay taxes. According to Guinn and Beck (1915), this was the greatest depression Los Angeles County ever experienced and facilitated the exchange of many large parcels of land. Following the depression of the 1860s, the county slowly recovered and sheep gradually replaced cattle as the more lucrative livestock industry. Then, in 1877, a devastating drought hit southern California. After the drought, sheep herds were almost completely destroyed, resulting in a loss of more than \$1 million. The last of the rancheros were now forced to subdivide and sell their lands to survive (Garabedian and Ruud 2016; Guinn and Beck 1915; Hayes 2007; Starr 2007).

After recovery from the drought of 1877, inflation of land prices all over Los Angeles County continued, and lots were being bought, traded, and sold. However, several years after the Santa Fe Railroad built its line through Los Angeles, the land boom collapsed. The collapse led to a recession, and from 1888 to 1894, many of the county residents were out of work. Wealthy men, like Henry Mayo Newhall, profited from the recession by purchasing foreclosed lands all over California (Robinson 2005). The recession had a greater effect on rural areas, and small towns like San Fernando achieved little growth. However, by the mid-1890s, the growing citrus industry was helping to stabilize the local economy. Scores of residents were employed at picking fruits and vegetables, transporting them to the packing houses, and preparing them for shipment. In 1905, a number of agricultural associations, like the Southern California Fruit Growers Association, banded together to form the California Fruit Growers Exchange with the “Sunkist” trademark (Garabedian and Ruud 2016; Hayes 2007; Starr 2007).

During the late nineteenth century, the agricultural industry saw a moderate amount of growth, with an average increase of \$2 million a year. However, the discovery of more oil would once again change the trajectory of southern California's history, just as the discovery of gold had done 50 years earlier. The growth of the agricultural industry alone would have seen the Greater Los Angeles area through the recession, but the discovery of more oil propelled the region out of the recession and into the industrial age. By the turn of the twentieth century, the citrus groves and farms in Los Angeles County would be intertwined with a sea of wooden oil derricks. Numerous oil companies were formed, such as the Mammoth Oil Company, which was later reorganized as the Star Oil Company. By 1905, the land boom was back on track and real estate companies were once again selling vacant lots to newcomers (Garabedian and Ruud 2016; Hayes 2007; Robinson 2005; Starr 2007). Between 1900 and 1906, the overall wealth of Los Angeles County increased by 300 percent (Guinn and Beck 1915). In

1911, Rea Maynard of the General Petroleum Corporation (later Exxon Mobile) ran a pipeline through the mountains from the oil fields of the San Joaquin Valley to Los Angeles; and in 1912, the first natural gas line was constructed from La Liebre Canyon, over the ridge to Glendale (Scott 2015).

In 1901, the Pacific Electric Railway was incorporated and began laying tracks to connect Los Angeles with the small rural towns surrounding the city. In many towns, a ceremony was conducted replicating the last spike ceremony of the Transcontinental Railroad. For the first time ever, this reliable mode of transportation allowed people to live in rural areas and commute to work in Los Angeles, thereby increasing rural growth. By 1910, the region was connected by Pacific Electric's Big Red Streetcars, making the City of Los Angeles the hub of southern California, with a population of more than 300,000 (Starr 2007). By 1913, the power that supplied the trolleys was coming from the San Joaquin River, over the ridge via a 241-mile electric line (Scott 2015).

During the late 1930s, with the threat of World War II (WWII), the economy of Los Angeles County was shifting more towards industry, with the development of numerous companies associated with military supply and development (Garabedian and Ruud 2016; Starr 2007). One of these companies was the Douglas Aircraft Company (now known as McDonald Douglas) that was founded in the Santa Monica area. After the United States entered WWII, the Douglas Aircraft Company began developing and manufacturing military aircraft for the U.S. War Department. During the war years, the company expanded considerably and created many jobs for local residents, which helped to improve the local economy. Numerous locations were built throughout southern California for the modification of aircraft, the development of new secret technologies, and testing (Bischoff 1998).

Almost immediately following the end of WWII, Los Angeles County experienced another large population boom with all of the returning military personnel and their families (Garabedian and Ruud 2016; PRHS 2008; Starr 2007). The need for housing increased exponentially, and citrus, walnut, and avocado groves would soon be turned into bustling neighborhoods (Garabedian and Ruud 2016). The need for manufacturing and military development also continued to increase due to the start of the Cold War, followed by the Korean War in 1950. Los Angeles County became more of a defense-related economy, which drove urban and suburban development throughout the latter half of the twentieth century. By the mid-1950s, Los Angeles County evolved into the electronics and aerospace center of the country, with more than 40 percent of the nation's aerospace contracts (Starr 2007). Today, more than 10.4 million people call Los Angeles County home, residing in 88 cities and approximately 140 unincorporated areas. It continues to be an industrial and financial giant, and is one of the most cultural and ethnically diverse communities in the world (LAC 2018).

Angeles National Forest

During the late nineteenth century, there was growing concern over the protection of the watershed in the southern California mountains. Fires burned out of control, the lands

were overhunted, and overgrazing of livestock went unchecked. John Muir referred to sheep as hooved locusts that turned meadows to dust and fouled local streams. In 1884, the problem gained the attention of many when water runoff from denuded slopes caused mudslides in Soledad Canyon that destroyed several miles of the Southern Pacific Railroad's tracks. Abbott Kinney, a local rancher, botanist, and developer, spearheaded a movement for forest management, and in 1886, he was appointed as the first Chairman of California's Board of Forestry. Through the efforts of Muir, Kinney, and others, Congress was pressed to take action. Then in 1891, the Forest Reserve Act was passed, which gave the President of the United States authority to set aside lands as forest reserves (Robinson 1991; Rowley 2012).

In 1892, the San Gabriel Timberland Reserve was created. However, like the creation of Indian Reservations, Congress did not consider the administration of the reserves or appropriate any funding for their management. From 1892 to 1897, the San Gabriel Reserve was only a reality on paper with no administration, officers, or rangers to enforce the law. During these years, timber cutting and livestock grazing continued to go unchecked. The public outcry was heard by the government and, in 1896, a Forest Reserve Commission, consisting of Charles Sargent, John Muir, and Gifford Pinchot, visited the Forest Reserves. The Commission declared that the protection of reserves in southern California were of the utmost importance due to their symbiotic relationship with the water supply. A rudimentary administrative structure was created and B.F. Allen was put in charge of the reserves in the southwestern United States. Allen pleaded with Congress for funding to hire additional help, and in July of 1898, they received permission to hire 20 forest rangers. Two of these rangers would be selected for the San Gabriel Reserve: Everett Thomas and Frank Allen, B.F. Allen's son (Robinson 1989, 1991).

In 1902, the San Gabriel and San Bernardino Forest Reserves were combined in hopes that consolidation would provide a better organized structure. Initially, there was little effect because the appropriate leadership was lacking, but in 1905, Gifford Pinchot was appointed head of the newly created U.S. Forest Service. Pinchot devised a civil service exam for prospective rangers and created a set standard of qualifications for supervisors and rangers that would create a professional staff of well qualified foresters. The term "reserve" was eliminated because Pinchot believed it implied the forests were off limits, so in 1907, the San Gabriel Forest Reserve became the San Gabriel National Forest. In the following year, President Theodore Roosevelt combined the San Gabriel and San Bernardino National Forests into the ANF (Robinson 1989, 1991). In the same year, the Santa Barbara National Forest was dissolved, with part going to the ANF and part becoming the LPNF (Kane 2008; Scott 2015). The San Bernardino Mountains would remain part of the ANF until 1925, under the supervision of Ruston Charlton (Robinson 1989, 1991).

As the 1930s approached, the United States fell into the Great Depression, which was the most devastating economic catastrophe the country ever experienced. The California Division of Forestry, in partnership with USFS, created a number of work camps for economic relief and the betterment of the national forests. Between 1931 and

1932, numerous camps filled with unemployed men from southern California sprang up in the ANF. The men worked six days a week building roads, trails, and firebreaks in exchange for three meals a day and lodging. These camps were the beginning of the largest construction and fire control program in USFS' history (Robinson 1989, 1991).

In 1933, President Franklin Roosevelt launched his New Deal Program, which included the Emergency Conservation Act. The Act created the Civilian Conservation Corps (C.C.C.) which operated along the same lines as the California Relief Program, but on a larger scale. Within a few months of its establishment, the C.C.C. would enroll approximately 275,000 men in 1,300 camps across the nation; and by the end of the 1930s, the number of enrollees was over one million. The ANF was allocated 12 camps, which was increased to 20 before the program ended. The Piru Camp was the first to open in May 1933, utilizing State highway construction buildings along the Ridge Route. By the end of 1933, numerous camps were established all over the forest, including a camp at Castaic. Enrollees had to commit to a six-month term and be between the ages of 17 and 29. They worked eight hours a day, five days a week on USFS projects in exchange for room, board, and a monthly salary of \$35. The Works Progress Administration, the National Industrial Relief Administration, and the State Emergency Relief Administration also worked in the forests during the 1930s. These groups not only improved infrastructure but were instrumental in reforestation projects and battling forest fires (Robinson 1989; The San Bernardino Daily Sun 1933, 1934, 1936).

The United States entered WWII at the close of 1941, which effectively ended the Great Depression, along with most of the federal relief programs. The C.C.C. was disbanded in 1942, and the former workers traded in their shovels for rifles. USFS also lost 40 percent of its rangers who signed up for military service. However, after the conclusion of the war in 1945, the ranger service was rebuilt with returning veterans. In 1960, Congress passed the Multiple Use Act, which became a cornerstone of USFS. The Act mandated that the national forests be administered for recreation, grazing, timber, wildlife and watershed protection, with management practices that promote the ability to support all areas of use. In 1965, USFS began charging fees for the use of recreational sites to help pay for maintenance (Kane 2008; Robinson 1989, 1991).

Los Padres National Forest

The LPNF was first established in 1898 by President William McKinley as the 1,144,594-acre Pine Mountain and Zaca Lake Reserve. Similar to the ANF, the LPNF was created primarily out of public concern for wildfire control in the watersheds along the coast ranges of San Diego, Santa Barbara, Monterey, Ventura, and the Los Padres areas. The reserve would grow and shrink in acreage and be called by various names over the next 40 years as presidents William McKinley, Theodore Roosevelt, William Howard Taft, Woodrow Wilson, Calvin Coolidge, and Franklin Roosevelt added and eliminated land by way of proclamations and executive orders. Following the act of 1907, various reserves along the coastal ranges were consolidated into national forests, and some of the forests further combined into larger national forests that, by 1919, had culminated into the Santa Barbara National Forest, encompassing six different counties.

The public pressured the government to change the forest name to be more representative of all six counties. Because most of the Santa Barbara National Forest covered locations immersed in the history of the missions, President Franklin Roosevelt changed the name from Santa Barbara National Forest to LPNF in 1936, in recognition of the mission padres (Blakley 1985; Brown 1945).

As a result of establishing southern California forest reserves and national forests for fire control and suppression, many of these forests contained non-timbered, chaparral covered lands that were delineated to protect the headwaters of major water sources, such as those found at Piru Creek. As a result, trail building through LPNF was important in the early formation of the forest to aid in the fire suppression activities, as the forest generally contains steep terrain, creating challenges to road building. For the forest industry, the LPNF did not provide a desirable timber market, as timber was scarce and of poor quality, difficult to harvest due to the steep terrain, and harvested in only a few locations on the forest as a result (Blakley 1985).

Other ventures on the forest included livestock grazing and mining. Credited with discovering the first gold in California, prior to the Coloma discovery, Francisco Lopez encountered gold around 1841 in the roots of wild onions growing along a stream in Placerita Canyon, previously known as San Feliciano Canyon, located in Santa Clarita Valley. This brought miners from Sonora, Mexico who worked the placer deposits of the valley. Lopez was later known for another discovery of gold in a side canyon to Piru Creek (Blakley 1985).

Recreation activities on the LPNF initially only included camping associated with hunting or fishing. Interest in camping dropped significantly with the outbreak of WWII, and was then revitalized in the 1960s and 1970s by a public interest in hiking and backpacking, and a later interest in vehicular recreation and camping (Blakely 1985; Brown 1945).

Local History

The region of Los Angeles County between Fort Tejon in the north and San Fernando and Santa Clarita in the south began as a major prehistoric trade route connecting early peoples of northern and southern California. Throughout the Spanish and Mexican periods, the legacy continued and the region was primarily used as a travel route through the mountains with very little settlement. However, towards the end of the Mexican Period, as the route through the mountains became more developed, the California ranching industry began to spread into these previously unsettled areas. In the mid-nineteenth century, mining brought an increased number of settlers giving birth to communities like Castaic, Gorman, and Lebec. During this time, miners and ranchers fought over land and water rights culminating into a local range war. Being a major trade route between northern and southern California, the mountain passes were also a haven for many of southern California's most notorious bandits (Kane 2002, 2005, 2008, 2014; Scott 2015; Robinson 2005).

With the expansion of the City of Los Angeles, the local area was targeted for the development of the Los Angeles Aqueduct, with reservoirs and pipelines built in the mountains to deliver water from the Owens Valley to the city. By 1917, the new aqueduct would not only supply much needed water, but would also provide the bulk of the region's electricity until the Boulder Dam Project was completed in the mid-1930s. The Los Angeles Aqueduct was one of two major California water projects at the time; the other being San Francisco's Hetch Hetchy Reservoir. Later, in the mid-twentieth century, the California Aqueduct was constructed through the mountains with more reservoirs constructed at locations within the SWP, now known as Quail Lake, Pyramid Lake, and Castaic Lake. These reservoirs would hold the bulk of the region's reserved water supply and become some of Los Angeles County's premier recreational areas (Kane 2008; Scott 2015).

Ranching

Ranching in the region dates back to the Spanish Period (1769 through 1821), when the herds of Mission San Gabriel and Mission San Fernando filled the mountains to the north of Los Angeles. The ranching legacy continued into the Mexican Period (1821 through 1848); although, animal husbandry was not very developed and mainly consisted of branding and marking stock. During the American Period, the ranching industry became more lucrative as the Gold Rush increased the demand for beef combined with the proceeds from hides and tallow. New stock were imported to California from the east to create improved cattle breeds. The demand for beef was so high that California's stock alone was insufficient to supply the miners, and approximately 150,000 head of cattle had to be brought in from Mexico and the midwestern United States during the early 1850s. Within 10 years, nearly the entire Spanish stock was replaced with crossbred cattle from all over the world. By the early 1860s, the demand for beef had begun to decline, and California herds grew to over three million head, and then disaster struck the industry. Intense floods from 1862 to 1863, followed by several years of drought, led to the loss of nearly one million head of cattle (Burcham 1981; Guinn and Beck 1915; Kane 2002, 2005; Scott 2015; Robinson 2005).

In the wake of the 1860s cattle crisis, Edward Beale became the principal land owner, having acquired nearly all of the former Mexican Ranchos in the vicinity of Gorman and Lebec, as well as newer ranch lands. Beale first entered the ranching industry in 1851 when he partnered with John Frémont. Beale and Frémont were awarded a government contract to supply beef to the newly created Indian Reservations of Tejon, Nome Lacke, and Nome Cult. In 1860, Beale used the wealth acquired from his business with Frémont and purchased the 49,000-acre Rancho La Liebre to the south of Fort Tejon for three cents (\$0.03) an acre. In the following year, he was appointed Surveyor General of the West by President Abraham Lincoln. He used his position as Surveyor General to acquire more lands and to have them surveyed at the government's expense; actions that would eventually lead to his dismissal. Beale quickly purchased an additional 80 acres known as Willow Springs and 40 more acres of public lands (Kane 2002, 2005; Scott 2015; Robinson 2005).

For the next four years, Beale operated Liebre as a successful cattle and sheep ranch, and then in 1865, he set out to acquire the ranchos surrounding Liebre. The Rancho Alamos y Agua Caliente was the first to be acquired, when Beale was able to purchase the distressed rancho by paying a number of judgments and liens against the property. By the time the deal was complete, Beale had paid 11 cents (\$0.11) per acre for the rancho. In 1866, the same year Kern County was formed out of lands from Los Angeles and Tulare Counties, Beale completed the purchase of Rancho Castac and Rancho El Tejon. Working with partners and intermediaries, such as Samuel Bishop and Colonel Robert Baker, who founded Bakersfield, Beale was able to add the additional 120,000 acres of lands to his holdings for 11 cents (\$0.11) per acre. The combined rancho was named Tejon, and by the close of the 1860s, Beale had amassed a ranching empire totaling more than 173,000 acres. In 1912, Beale's son, Truxton, sold the Tejon Ranch to a large company now known as the Tejon Ranch Company (Kane 2002, 2005; Scott 2015; Robinson 2005).

South of Tejon, smaller ranches were prevalent, as most of the former ranchos were subdivided into smaller plots. The establishment of these small ranches and farms was furthered in 1862 when Congress passed President Lincoln's Homestead Act, which allowed settlers to obtain 160-acre plots of public land for a nominal filing fee. Some of the more prominent ranches south of Tejon included Bailey Ranch, Cordova Ranch, Daries Ranch, and Kelly's Ranch (Guinn and Beck 1915; Kane 2002, 2005; Scott 2015; Robinson 2005). The Bailey Ranch began as a relatively small operation on the south end of what is now Pyramid Lake. The ranch was originally owned by Cawley and Hayes, who sold it to William and Marcos Bailey in 1894. The Bailey brothers had a simple two-story ranch house and raised crops and livestock in Liebre Canyon. The Bailey's were forced to move in 1907, when a severe storm destroyed most of their crops and grazing lands. The destruction was caused by roads the power company built in the canyon while they were constructing transmission lines. Wagons created ruts in the roads which became caverns during storms and funneled flood waters through the Bailey property. The Bailey's decided to move their ranch to the Quail Lake area, which would be close to the new Ridge Route Highway (Figure 5.8-10). The Bailey Ranch grew into the second largest ranching operation in the area (Kane 2002, 2004, 2008, 2014; Los Angeles Herald 1895; NETR 2018; Scott 2015).



Source: Scott 2015

Figure 5.8-10. Bailey Ranch Along the Ridge Route Near Quail Lake During the Early Twentieth Century

The Cordova Ranch, Daries Ranch, and Kelly's Ranch are further to the south of the Tejon and Bailey ranches and smaller in scale. The Cordova Ranch was first established in the late nineteenth century by a family of vaqueros who worked on the Tejon Rancho. The family included Gillermo, Miguel, Toribio, Victor, Marcos, Auelio, Simon, Anastasia, and Virginia, who were the children of Jesus and Chata Cordova. Prior to the American Period, Jesus worked at the San Fernando Mission. Most of the family settled in the Castaic area, establishing a ranch under Victor and Marcus in Castaic Canyon next to Piru Creek. The Daries Ranch was settled to the south of the Cordova Ranch in the early twentieth century by John and Pierre Daries. The Kelly Ranch was established in the late nineteenth century before the area became a national forest. Kelly's first name is unknown, but the next owner was Frank Knapp of San Fernando, who purchased the property in 1962. Throughout the late nineteenth and early twentieth centuries, more than 100 homesteads were established along the Ridge Route (BLM 2018; Kane 2002, 2004, 2008, 2014; NETR 2018; Scott 2015). Kelly's Ranch would survive; however, others like the Cordova Ranch, Daries Ranch, and Bailey Ranch would succumb to progress and now lie under the waters of reservoirs associated with the SWP (NETR 2018; Scott 2015).

Mining

There were many gold mines in the area, with the most notable being the Los Padres mine, the Piru mines, and the mines around Gorman. Two versions of the Los Padres legend are told. One version of the legend claims that Jesuits came to the mountains in the late 1500s and began extracting gold and silver, while the other claims that mining

began with the Franciscan Missions in the 1700s. When the gold rush started, the legend grew and many went in search of the fabled mine. Later in the nineteenth century, Annie Rose, a local Castaic resident, went in search of the mine and claimed to have found it. In reality, it seems that her partners and she only succeeded in destroying parts of the old San Fernando Mission. In the 1920s, King Gillette (of the Gillette Razor Company) purchased part of the old Kelly Ranch near Bear Canyon. Several old gold mines were located in the vicinity and Gillette heard a rumor that the Los Padres mine was located there. The mine was supposedly dynamited shut at the onset of the Civil War to prevent Confederate sympathizers from finding it. Gillette purchased a bulldozer and plowed up the entire canyon, including a Tataviam burial ground, in an unsuccessful attempt to locate the mine (Kane 2008; Los Angeles Herald 1888b, 1893b, 1893c, 1894; Scott 2015).

The Piru mines extended from what is now Pyramid Lake in the north to the end of the watershed in Santa Feliciana Canyon in the south. Most of the mines in the Piru District were placer claims and gold was being extracted as early as 1850. By the 1870s, larger mining operations moved into the area such as the Sespe & Piru Mining Company, which employed approximately 100 Chinese laborers. Two of the most successful mines in the area were the Frazier and Castac mines, located approximately seven miles to the south of Lockwood Creek at the southern base of Bear Mountain near Piru Creek. Small mining boom towns sprang up throughout the region like Lexington to the west of Gorman. However, the ruggedness of the mountains and distances to rail lines led to the demise of most of these boom towns. Only communities like Gorman and Lebec, located relatively close to railroads and major thoroughfares like the Ridge Route, were able to survive. Gorman was destined to survive because, after the closing of Fort Tejon, it became the primary source of supplies, services, and entertainment for miners. The town was located at a confluence of roads and was close to the Southern Pacific Railroad station in Lancaster to the east (Kane 2008; Scott 2015).

Other than gold, borax was also mined in the mountains north of Los Angeles. In 1898, a prospector named McLaren first discovered borax and a year later B.F Stevens opened the Columbus borax mine in the Piru District. By 1906, larger borax operations were established under the Russell Borate Mining Company owned by W.H Russell and his son Scott (Kane 2008; Scott 2015). Although not as well-known as gold or silver, borax mining was extremely profitable because it had more than 100 uses, such as making soaps, glazing pottery, and tanning leather (Peyton 2012). Industrial borax mining operations developed in the region during the 1920s and would be extremely important to the economies of small towns like Lebec, with 10- and 20-mule-teams transporting borax and supplies back and forth between the mines and the town. From Lebec, the mule teams would transport the borax to either Bakersfield or Lancaster to be put on trains to the east for refinement. By the end of the 1920s, it is estimated that the borax mines of this region produced more than \$1 million of ore (Kane 2008; Scott 2015).

Bandits and the Castaic Range War

Miners dominated the landscape in the first few decades of the American Period (1848 through present) and bandits hid in the mountains north of San Fernando waiting to relieve travelers of their valuables. Joaquin Murrietta and Tiburico Vasquez stole horses, cattle, and valuables from surrounding ranches and were protected by vaqueros who were generally on good terms with the outlaws (Kane 2005; Scott 2015). Lawmen in the region were few and far between so a company of volunteer rangers was organized to hunt down outlaws and keep the peace in this relatively desolate region of Los Angeles County. One of the most famous of these rangers was local farmer and rancher Bill Jenkins who owned land in Castaic and Newhall (SCVHS 2018).

After Murrietta and Vasquez were brought to justice, a new problem arose in the region over land and water rights between legitimate land owners, squatters, and miners. It was locally known as the “Castaic Range War” and Jenkins was at the center of it. The conflict was between Jenkins and the Rose family, a long standing Castaic ranching and mining family. Both Jenkins and the Rose family had supporters who fought in the conflict and two versions are told. One version claims that Jenkins had legal claim to the Castaic property (SCVHS 2018), while the other version claims that Jenkins was trying to steal land owned by the Rose family and William Chormicle (Scott 2015). Jenkins, being a former lawman, had many friends within the California government, such as Governor Henry Gage, and it seems he settled a piece of property in Castaic claimed by the Rose family as part of their ranch. Jenkins felt he had legal right to the property and the Rose family saw Jenkins as a shady character trying to steal their land. The feud escalated after oil was discovered in the area, making the land more valuable. In 1890, Billy Rose, William Chormicle, and William Gardiner attacked Jenkins’ ranch, killing two people. The county sheriff brought the attackers in to be tried for their crime; however, local support resulted in the prosecution dismissing the case (Los Angeles Herald 1890). The feud lasted 23 years and resulted in at least 21 dead. It ended in 1913, when Billy Rose shot Bill Jenkins, nearly killing him. Jenkins successfully sought Rose’s conviction and the matter was ended with Jenkins still holding title to the land (Scott 2015).

Community of Castaic

According to a local Santa Clarita historian, the origin of the name Castaic is likely from the native Tataviam word “Kashtuk,” meaning “eyes” (Santa Clarita Magazine 2008). However, the name may also be derived from Castaic Lake near Tejon where there was once a Chumash village called Casteque, according to Padre Jose Maria Zalvidea’s 1806 sojourn through the region (Robinson 2005). The area was first settled in the nineteenth century with families like the Cordova’s establishing ranches in the canyons along Piru Creek. In 1887, the Southern Pacific Railroad connected the area to Ventura by constructing a rail line to support the growing cattle industry. Shortly after building the rail line, the Southern Pacific Railroad built a small depot at present day Castaic Junction for passenger service. A large enough population existed for the establishment of a school district in 1889 and for a short-lived post office in 1894. Prior to 1915,

Castaic was a sparsely populated unincorporated area of Los Angeles County. When planning for the Ridge Route began, more people settled the area in hopes of prospering from an advantageous location along a major travel corridor. Sam Parsons was one of the first to purchase land in 1914 and he opened a filling station and store called “Sam’s Place.” In 1917, Parsons reestablished the post office and served local travelers until 1921 when he sold his store to Pierre Daries. Homesteads to the north also deeded property to the State for the building of the road. One of these landowners was Cornelia (Nell) Callahan who set up a small shack to sell gasoline and cold drinks to motorists (Castaic Area Town Council 2018; Scott 2015).

The official birth of Castaic as a town is considered to be July 1915, when the Ridge Route was completed. The town that grew around Sam Parson’s store was an automobile stop for travelers that included: the Castaic Garage, Jack Wilson’s Service Station, Shilling’s Service Station & Café, Schuyler’s Filling Station, Miller’s Service Station, Shadowland Auto Camp, the Ever Green Café, the Castaic School, White Star Auto Camp, Clark’s Service Station, and Jones’ Service Station & Garage (Figure 5.8-11). The Ridge Route also facilitated the creation of many other homesteads turned into businesses, such as the Ridge Road House (Garage) and Ed Adkins’ Castaic Brick works, which was established in 1927 (Scott 2015). Castaic Brick and George Dunn’s Wayside Dairy (established in 1929) are considered the first industrial enterprises in the community (Castaic Area Town Council 2018).



Source: Scott 2015

Figure 5.8-11. Early View of Castaic Depicting the Ever Green Café (Left) and Castaic Garage

Castaic's geographical location at the southern end of the Ridge Route secured its survival when the Ridge Route Alternate (U.S. 99) and Interstate 5 were planned and built. While businesses to the north were forced to close, Castaic would actually see a moderate amount of growth because the construction and maintenance of the new highways created high wage jobs during and after construction. Construction of the California Aqueduct also provided jobs with high salaries, with many local contractors earning \$300 to \$500 a week. After completion of the Castaic Lake SRA, more jobs were created, and Castaic became a weekend retreat for Los Angeles residents. Additionally, the oil industry was also present in the area, which continued to produce into the mid-twentieth century. Towards the late twentieth century and into the twenty-first century, the town began to grow significantly. In 2007, planning for the North Lake housing development began, and during construction, a portion of the Old Ridge Route was destroyed. Currently, the town is working on the development of a new commerce center, which is projected to create more than 20,000 jobs (Castaic Area Town Council 2018; Kane 2008; Scott 2015; SCVHS 2018).

Community of Gorman

The town of Gorman is situated in the prior location of the Tataviam village of Kulshra'jek, and is one of the oldest roadside rest stops in California. Situated along the El Camino Viejo, the area is known to have been settled in the early 1850s by a Mr. Reed who built a two-story log cabin that would become the Butterfield station in 1858. Reed sold the property to Charles Johnson, who moved his family into the cabin and continued to run the stage stop. After Charles Johnson died, the area was referred to as Rancho la Viuda (Widow's Ranch) because Johnson's widow made a living by providing for the needs of travelers. Mrs. Johnson sold the station to Don David Alexander, who was Phineas Banning's partner in the stagecoach business (Kane 2002, 2005, 2014; Scott 2015; Robinson 2005).

With the onset of the Gold Rush, travelers through the area were frequent, with a substantial increase in activity after the establishment of the Tejon Indian Reservation in 1851, followed by Fort Tejon in 1854. One of the frequent travelers was James Gorman, who was a rancher and teamster that hauled stone and lumber to Fort Tejon in the mid-1850s. He also hunted local game and sold the meat to residents at the fort. In the late 1860s, Gorman purchased the station from Alexander and moved his family to Rancho la Viuda. The place became known as Gorman's Station and received a dramatic increase in business after Fort Tejon closed in the mid-1860s (Kane 2002, 2005, 2014; Scott 2015).

In 1873, James Gorman was killed in a wagon accident, but his wife Hannah, his brother Henry, and his three children continued to run the station. Henry became the first postmaster when the post office was established there in 1877, which is considered to be the official founding of the town. With the increase of mining operations in the following decades, the town gained prominence as the main supply center. In 1898, the Gorman's sold the station to Oscar Ralphs of the well-known Ralphs Markets that originated in Los Angeles several years earlier. Two miles to the south, another member

of the Ralphs family operated Gorman Station, which was a site dedicated to servicing stagecoaches. By this time, other families such as the McKenzies had moved to the area and Oscar Ralphs married James McKenzie's oldest daughter. Oscar Ralphs and the McKenzie family continued to operate Gorman's Station and gradually improved it after the completion of the Ridge Route (Kane 2002, 2005, 2014; Scott 2015).

During the 1920s, traffic along the Ridge Route increased, along with the number of automobiles. The need for service stations grew, and in 1923, Standard Oil installed a gasoline station at Gorman. The new service station was the first gasoline stop in California that was not in close proximity to a rail line where gasoline could be delivered easily. Concurrently, the Ralphs built the Pickwick Restaurant that provided more facilities for weary travelers. In 1932, an ambulance service was established, and in 1938, the Works Progress Administration built the first school in Gorman, forming the smallest school district in Los Angeles County. The original Gorman's Station house was demolished in 1933 when the Ridge Route Alternate was built (Figure 5.8-12). Many of the other older town buildings were destroyed later during the construction of Interstate 5 (Kane 2002, 2005, 2014; Scott 2015; Robinson 2005). However, Caltrans and the Ralphs rebuilt and improved many of the service buildings. In 1997, the Ralphs family placed Gorman on the market for \$4.2 million (Robinson 2005).



Source: Scott 2015

Figure 5.8-12. Ralphs Ranch House at Gorman Station (May 28, 1913)

Community of Lebec

Settlement at Lebec began when Fort Tejon was closed in 1864. Many civilians remained in the area, and a settlement formed south of the closed fort along the Tejon Road. In 1888, Edward Beale proposed to lay out a town adjacent to his ranch called “Lebecque” after a trapper named Peter Lebeck who was killed by a local bear in 1837 (Los Angeles Herald 1888c; Scott 2015). Lebeck’s grave is marked on an old tree and Beale wanted to build his town in the vicinity of the grave and near the old military post. The location of the town along the Tejon Road, combined with the mining and cattle industries, facilitated growth. By 1895, a post office was established marking Lebec as an official town. After the turn of the twentieth century, Lebec became increasingly important to the developing borax industry by providing a stop and resupply point for mule teams hauling ore from the mines to the railroad station in Lancaster. Later, when oil was discovered nearby, Lebec became a stopping point for oil transportation and the town’s standing only improved with the construction of the Ridge Route in 1915 (Kane 2002, 2005, 2008, 2014; Scott 2015).

Between 1913 and 1915, Thomas O’Brien acquired 11,500 acres of land around Lebec and operated a large ranch with approximately 4,000 head of cattle. After 1915, O’Brien built a general store, a restaurant, a garage, and 25 cabins to capitalize on the increased number of travelers passing through along the Ridge Route. An investor and automobile racer named Cliff Durant was impressed by O’Brien’s enterprise and proposed the construction of a luxury hotel on the property. By 1919, construction of the Lebec Hotel was underway, with Durant and O’Brien as equal partners in the venture. The 22-acre resort complex was opened in 1921 and was an instant success. Many dignitaries and celebrities, such as Jack Dempsey and Charles Lindberg, frequented the hotel throughout the 1920s. O’Brien bought out Durant to become the sole owner of the property. He leased the hotel to Foster Curry and the name was briefly changed to Curry’s Lebec Lodge until O’Brien took over management again. In 1931, the Great Depression led to a loss in profits. O’Brien borrowed money from the Standard Oil Company to keep the hotel running; however, O’Brien could not repay the loan and Standard Oil foreclosed (Robinson 2005).

In 1939, a welcome center known as the Gateway to Kern County was built in Lebec. The center included the San Joaquin Valley’s exhibit from the World’s Fair, but it was moved to the Kern County Museum after being damaged by an earthquake in 1952. Unlike Gorman and Castaic, Lebec did not benefit as much from the development of the U.S. 99 high-gear road and Interstate 5. The faster travel along the route seemed to slow the growth of the community rather than increase its economic standing. Nevertheless, the town has not declined in size and is still a serene and tranquil getaway for travelers just as it was 100 years earlier (Kane 2014; Robinson 2005).

5.8.1.3 Water and Hydropower Infrastructure

Regional Water Storage, Conveyance, and Hydropower

One of the earliest issues Californians faced was periodic and often devastating floods resulting from storms and run-off from the mountains. Floods eroded canyons, causing mudslides that wreaked havoc in the foothills as well as inundating the flatland areas (DWR 1980:26). One of the methods for addressing this was the construction of foothill reservoirs, that could control the downstream flow. This quickly led to the establishment of hydropower facilities to capitalize on the flow of water, including the first three-phase hydropower plant in California, which was established in 1893 approximately 75 miles southeast of the Project area in the San Bernardino area (Scott 1968:35).

Water scarcity in the rapidly-growing region of southern California directly prompted the development of a large-scale water control and carrying project that became known as the SWP. The Burns-Porter Act, coupled with a bond, authorized funds for construction of the SWP and was formally known as the California Water Resources Development Bond Act. Intended primarily to transfer water from northern California to the San Joaquin Valley and thence to southern California, the SWP incorporated reservoirs that served a multitude of needs: flood control, water storage, recreational space, fish and wildlife preservation, and in several cases, the production of electricity. The SWP as a water project naturally turned to hydroelectric power to offset the power needs necessary for the project to work, but it also reflected an increasing interest in clean and renewable energy production in California. The SWP is one of the largest conveyance systems in the world. Using a series of natural rivers and a system of canals and pipelines, the SWP stores and transports surplus northern California water over 700 miles for use in the central and southern regions of the state (Hydro Review 1992:62).

By 1974, approximately 30 percent of the electrical energy used in California was produced in hydroelectric plants (DWR 1974:1). Ever-increasing population combined with an increase in per capita electricity use created exponential growth in the demand for electrical power. By the early 1970s, oil had become the primary fuel used in thermal generating plants in California, but with rising oil prices California began examining alternatives. The construction of nuclear plants had fallen behind schedule across the country by the 1970s amidst both protests and cost overruns that averaged more than 200 percent. Natural gas was not expected to be available in sufficient quantities for thermal generating plants. Thus, California turned its attention to alternatives such as increased hydroelectric generation (DWR 1974:2). One of the key issues facing efforts to build new hydroelectric generating plants, however, was that more than half the potential energy yield was at locations subject to State and federal natural preservation laws governing scenic rivers and national parks (DWR 1974:1). Nonetheless, DWR recommended that available sites be developed for the production of hydroelectric power.

Hydroelectric power is generally considered renewable and environmentally friendly; however, plant construction still came with logistical challenges. Even for single-use

hydroelectric plants, storage reservoirs needed to be built in order to assure a steady flow of water into the plant, since California's climate tended to create greater stream flow in the winter and spring followed by periods of substantially less stream flow during summer and autumn (DWR 1974:6). The natural irregularity of flow as well as competing water demands limited the production of hydroelectric power in California. By the late 1960s, development of further sites for hydroelectric generation was also complicated by the logistics of planning, funding, permitting, licensing, and constructing multi-phase systems, as well as acquiring the necessary water rights (DWR 1974:7).

By the early 1970s, there were 19 hydroelectric generating plants in the South Coastal Basin region, which included a small, but the most densely populated, portion of San Bernardino County. A 1974 report by DWR did not recommend additional plants in the area, as those plants would not produce sufficient energy to justify the costs (DWR 1974:59). The SWP was supported by four hydroelectric plants at the time, including the Castaic Powerplant in Los Angeles County and the Devil Canyon Powerplant in San Bernardino County, and DWR recommended four potential additions to increase generating capacity along the SWP, including one at Lake Perris in Riverside County (DWR 1974:63). Beginning in 1990, the Mojave Siphon Powerplant was constructed just north of the Cedar Springs Dam (a component of the Devil Canyon Project). Despite the completion of these additional hydropower facilities, the SWP continues to use the majority of the power it produces.

The SWP is currently California's fourth-largest energy producer, but it is also its largest single user of electricity. Its hydroelectric dams and powerplants and power purchases through agreements and the CAISO market, primarily power the work of the SWP itself. When production exceeds what is required to pump water from northern California deep into southern California, DWR sells the surplus, resulting in temporary reductions in the cost of water for those receiving SWP supply (DWR 1999:18). Hydroelectric power along the SWP contributes more to regulating the price of water than it does to serving the electricity needs of the southern California population.

Governor Edmund G. Brown California Aqueduct

The Governor Edmund G. Brown California Aqueduct, constructed between 1960 and 1974, was incorporated into the Burns-Porter Act as part of the SWP, and originally was called the San Joaquin Valley-Southern California Aqueduct before being renamed simply the Governor Edmund G. Brown California Aqueduct. Governor Edmund G. Brown, Sr., stated in his first inaugural address as governor (January 5, 1959) that "Development of our water resources is crucial to every segment of our state — the ranchers in our mountain areas, the farmers who make California the nation's leading agricultural producer and the homeowners in our population, which will grow to 20 million by 1970. No problem has occupied more of my time in the weeks since election than water. Striking progress has been made. I can tell you now that I will soon present a water program, which is rational, realistic and responsive to the needs of all the people of the state" (Aquapedia 2018). Brown's efforts led to the passing of the California Water Resources Development Bond Act (Burns-Porter Act) in 1959, which

authorized construction of the SWP. The voters approved Proposition 1 in November 1960 that authorized the Act's funding. The SWP provided resources necessary for the growth of southern California, flood control in northern California, and the California agricultural industry (Los Angeles Times 2018).

In total, the mainline of the California Aqueduct measures 444 miles, making it the longest water conveyance feature of the SWP system. The California Aqueduct is not an energy-generating facility and, thus, is not covered under any FERC license. For this relicensing, only those energy-generating components of the South SWP Hydropower covered under the FERC license were taken into account and evaluated for NRHP eligibility. As a component of the SWP, the California Aqueduct, along with the North Bay Aqueduct, South Bay Aqueduct, Coastal Branch, West Branch, East Branch, East Branch Extension, and the joint use facilities in the Delta are managed by five separate field divisions.

California Aqueduct water en route to southern California is pumped through the Tehachapi Mountains to the East and West branches. The West Branch water is pumped from the Oso Pumping plant to Quail Lake; continues to the Warne Powerplant and Pyramid Lake; enters the Angeles Tunnel to the Castaic Powerplant Penstocks; flows from the penstocks to the powerplant; and terminates in the Elderberry Forebay. The Castaic Lake (a non-Project facility completed between 1974 and 1976), is the terminus of the West Branch of the SWP and serves as the delivery point to water contractors such as MWD. The majority of the West Branch was constructed from 1967 through 1973, although elements of the system were not constructed until the 1980s. (Brewster 2012; Gonzalez and Anderson 2014).

South SWP Hydropower

By the mid-twentieth century, ongoing concerns about sufficient water for residents of southern California, including the growing population of Los Angeles and its vicinity, dominated local political and economic concerns. Los Angeles was far from the only area in the State with such concerns; by the 1920s, the rapidly increasing population of California had begun overtaking the available freshwater sources of the predominantly dry climate. A State Water Plan was first published in 1931, leading to the development of the Central Valley Project. The Central Valley Project was completed in 1937 with federal funding by the U.S. Department of the Interior Bureau of Reclamation, and it primarily delivers water to agricultural users in the Central Valley as well as urban users in the San Francisco Bay Area (DWR 1999:10).

During and after WWII, industries rapidly moved to California, and several new industries developed or expanded as well. This fed a continued population boom, especially into southern California. To address concerns about access to sufficient fresh water for both agriculture and the populace, DWR undertook several studies and developed plans for the development of California's water resources, including a massive project to transfer water from areas of plenty to areas with a shortage (DWR 1999:13).

The project was initially known as the Feather River Project, as the initial work was to be the construction of a multipurpose dam and reservoir on the Feather River near Oroville, California. The goal of the project was to provide flood control, produce electricity, and create a large reservoir to feed a system of aqueducts that would transport water from Oroville to the Bay Area, the San Joaquin Valley, and continue south from there into southern California. Flooding in 1955, which caused over \$200 million of damages and cost 64 lives, led to speedy support of the plan. The State legislature approved emergency funding, voters passed a bonds issue, and the federal government also contributed to funding for flood control (DWR 1999:14). With the completion of the Feather River Project, the SWP was born. The first water deliveries were made in 1962 (DWR 1999:24).

Construction continued and expanded to include the East and West branches of the SWP. The South SWP Hydropower is located along the West Branch of the SWP, though it does not constitute the entire length. The first component of the West Branch of the SWP, the Oso Pumping Plant, was completed by 1967. A canal was then constructed between the Oso Pumping Plant and Quail Lake that is known as the Upper Quail Canal in 1967. Neither of those resources are included in the Project. The first component of the Project to be completed was Quail Lake in 1967.

From Quail Lake, the South SWP Hydropower was extended through the Lower Quail Canal, which was initially completed ca. 1971, with substantial alteration in the early 1990s. Project facilities located from the Lower Quail Canal to Pyramid Lake were not immediately constructed, with the Gorman Bypass Channel being completed ca. 1974-1976, the Peace Valley Pipeline being completed in 1979, and the Warne Powerplant being completed in 1983. Quail Lake and the Lower Quail Canal were designed and completed by DWR between ca. 1967 and 1971. From the Warne Powerplant, water enters into Pyramid Lake, a component of the Castaic Power Development, which constitutes the majority of the South SWP Hydropower.

The Castaic Power Development is a cooperative venture between LADWP and DWR. The Castaic Powerplant was designed and constructed by LADWP personnel. On September 2, 1966, LADWP and DWR entered into an agreement to construct the Castaic Power Development. The agreement was the culmination of months of negotiations between the public agencies. Additional signatories included the USFS, MWD, the County of Los Angeles, the Federal Power Commission (the precursor to FERC, which was established in 1977), and multiple smaller water contractors (Hunsucker 1970:1).

LADWP's interest in the Project was related to the development of peak-load power from the falling water on the West Branch of the SWP, and the reuse of said water through the aid of pumped storage. If LADWP had not entered into an agreement with DWR to cooperatively develop the Project, the powerplant that would have been installed at the site would have been much smaller, with a generating power far less than what was achieved. The smaller plant would have generated energy essentially as a stream-flow plant with little to no regard for peaking capabilities and reverse pumping

capability. The reverse pumping technology that was realized utilized recently developed hydraulic machinery to provide both generating and pumping potential (Hunsucker 1970:1, 5-6).

The total estimated cost of the Castaic Power Development under the negotiated agreement was \$225,000,000. This included: Pyramid Dam and Lake; the Angeles Tunnel Intake, 7.4 miles of tunnel and the surge chamber; the seven penstocks; the powerplant and Unit 7; and the Elderberry Forebay. The contract stipulated that LADWP would cover \$158,000,000 and DWR would cover \$67,000,000 toward the final cost (Hunsucker 1970:7).

Pyramid Dam was completed in 1973, which established Pyramid Lake (though the reservoir was not completely filled until 1974). Both of Pyramid Lake's spillways were also complete by 1973. The Angeles Tunnel Intake was completed by 1972, as was all of the Angeles Tunnel, which was constructed between ca. 1967 and 1971. The surge chamber associated with the tunnel was completed in 1973.

The Castaic Powerplant Penstocks were completed over time, allowing the individual units of the powerplant (seven total) to come online in sequence as penstocks were completed. The south portal, where the Angeles Tunnel meets the penstocks, was completed in 1971, as well as Unit 7's penstock and a small operating powerplant. The Unit 7 powerplant helped provide necessary energy to complete the rest of the Castaic Powerplant. Following the completion of Unit 7, penstocks 5 and 6 were completed in 1973, and penstocks 1 through 4 were completed in 1977. The Castaic Powerplant's establishment date is 1973, though at that time only three penstocks were generating power. The powerplant building was completed by 1973, as were the switchyard, a warehouse, a maintenance building, a repair shop, and auxiliary support buildings that were later removed from the powerplant property. Additional auxiliary support buildings and structures were added to the powerplant property in the 1980s; however, minimal alteration has occurred to the powerplant property since that time.

In March 1971, an EIS was completed for the then-proposed Castaic – Haskell Transmission Line covering the 3.3-mile portion to be located within the ANF. The report stated the necessity of having at least two of the proposed four circuits completed by July 1971 in order to bring the first portion of the project, Unit 7, online in time to complete the project on schedule. The report also states that the portion not located on public lands was currently under construction, which appears to have begun ca. 1970. By July 1971, the first two circuits were completed, and by 1977, an additional circuit had been connected. The total projected cost for the transmission line was estimated to be \$1.35 million (LADWP 1971:1-4).

The Elderberry Forebay was completed in 1974, and the Elderberry Forebay Dam and Outlet Works were completed between 1974 and 1976. The Elderberry Forebay Dam is the southern terminus of the Project.

5.8.1.4 Overview of the Cultural Resources Study and Results

As part of its relicensing *Cultural Resources Study*, the Licensees conducted records searches at the South Central Coastal Information Center (SCCIC) at California State University, Fullerton (July 2015), the ANF archives (May 2016), and Licensees' archives and libraries (2015) to identify previous cultural resources investigations and recorded archaeological and historic period properties within the existing Project boundary and a 0.25-mile radius surrounding the existing Project boundary. This research also served to obtain background information pertinent to understanding the archaeology, history, and ethnohistory of the Project vicinity. Relevant data on file at these repositories included cultural resource records, cultural resource investigation reports, resource location maps, General Land Office maps, other historic-era maps, NRHP listings, California Register of Historical Resources (CRHR) listings, Office of Historic Preservation (OHP) Historic Property Directory, 1996 California State Historic Landmarks, 1976 California Inventory of Historic Resources, and the Caltrans Bridge Inventory.

This research identified a total of 108 previous cultural resources investigations or related communications within the area examined by Licensees, and approximately 90 percent of these investigations occurred 10 or more years ago. The types of investigations previously conducted were for various Licensees' projects, transportation projects, and land development projects.

Since the first cultural resources studies conducted during the late 1960s, 63 cultural resources have been documented previously within the area examined by the Licensees and include 37 prehistoric archaeological sites, 19 historical archaeological sites, 2 multicomponent archaeological sites, 3 historical built environment resources, and 2 isolated prehistoric artifacts.

Evaluations of resources for their potential eligibility to the NRHP assist in determining whether significant resources are present in a project's boundary and, subsequently, whether a project is having any effects on eligible properties. Previous NRHP evaluations were conducted on four known resources in the area examined by the Licensees during the archival research and records search (i.e., existing Project boundary plus 0.25 mile buffer); two of these were found to be eligible for listing on the NRHP, while a third site was determined to be not eligible. The final site was subject to salvage excavations, but documented results of the excavation were not found during the Licensees' data gathering, in the reports, the OHP Archaeological Determinations of Eligibility list, or on the NRHP. The Licensees' review of the previous field studies revealed that they did not meet current professional standards and were, therefore, inadequate for identification of cultural resources that may be affected by the Project.

To adequately identify cultural resources in the APE and assess historic properties that could potentially be affected by the Project, Licensees developed the scope of work provided in Study 4.1.12 (per 36 CFR § 800.4[a]). The Licensees propose several changes to the existing Project boundary to more accurately define lands necessary to safely conduct Project O&M and for other purposes, such as recreation and protection

of environmental resources. As noted in Section 5.8.1.1 above, the proposed modifications to the Project boundary include: (1) the addition of lands that are currently utilized with a preponderance of use related to Project O&M, and (2) proposed removal of lands from the Project boundary that do not have Project facilities and are not used or necessary for Project O&M. These proposed changes are essentially corrections to the existing Project boundary. Other modifications include proposed changes to the existing Project boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE. The most significant change in the delineation is the use of a 100-foot buffer from Pyramid Lake's NMWSE to define the proposed Project boundary around portions of the lake, which reduces the land area considerably.

The net effect of modifying the existing Project boundary is the reduction of area within the boundary from 6,928.0 acres to 4,563.8 acres. This change would reduce the 3,287.3 acres of federal land (47.5 percent of the total area within the existing Project boundary) to 2,007.0 acres of federal land (44.0 percent of the total area within the proposed Project boundary).

For purposes of defining the APE and conducting the study, the Licensees used the proposed Project boundary, inclusive of 4,563.8 acres of land, with the exclusion of the lands overlying the Angeles Tunnel as the Licensees do not perform any Project O&M activities on these lands. The SHPO concurred with the proposed APE in a letter dated September 21, 2017. Subsequently, the Licensees proposed modifications to the APE by the inclusion of existing access road segments to add to the Project's licensed facilities as Primary Project Roads and the removal of the non-Project SCE-owned Warne Transmission Line. The SHPO concurred with the revised APE on July 17, 2019. The APE, which encompasses the initial APE and revised APE where the SHPO provided its concurrence on September 21, 2017 and on July 17, 2019, is shown on Figures 5.8-1 and 5.8-2, and correspondence with the SHPO is provided in Volume II of the *Privileged Cultural Resources Report* (Lloyd et al. 2019).

The Licensees conducted archaeological and historical built resources field surveys in 2018 and 2019 within the entire APE, where safety considerations allowed access and examination, with the objective of addressing information gaps in the existing, relevant, and readily available information. The field surveys were used to verify data collected from the earlier investigations; identify previously unidentified and undocumented cultural resources; evaluate at the field survey level, if possible, any resources that are potentially eligible for listing on the NRHP (historic properties); and determine whether the Project is currently affecting any historic properties or unevaluated cultural resources.

The NRHP criteria for evaluating a "district, site, building, structure, or object," as defined at 36 CFR § 60.4, states that the "quality of significance in American history, architecture, archeology, engineering, and culture" must first be demonstrated by the property's "integrity of location, design, setting, materials, workmanship, feeling, and

association.” Additionally, in order to be a historic property, a “district, site, building, structure, or object” must meet at least one of the following four criteria:

Criterion A: That are associated with events that have made a significant contribution to the broad pattern of our history; or

Criterion B: That are associated with the lives of persons significant in our past; or

Criterion C: That embody the distinct characteristics of a type, period, method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

Criterion D: That have yielded or may be likely to yield information important in prehistory or history (36 CFR §§ 60.4[a-d]).

These four criteria are essential for identifying and managing historic properties because they “indicate what properties should be considered for protection from destruction or impairment” (36 CFR § 60.2). Any action, as part of an undertaking, that could affect a NRHP-listed or -eligible property is subject to review and comment under Section 106 of the NHPA. Properties listed or eligible for inclusion in the NRHP must be considered and treated in accordance with regulations set forth in 36 CFR Part 800 and/or any applicable agreement documents (e.g., Programmatic Agreements, Memoranda of Agreement). Ineligible cultural resources normally do not require special treatment beyond identification and evaluation.

Detailed discussions of the archaeological and historical built resources investigation methods and results are provided below.

Archaeological Study

The Licensees performed a field survey for Study 4.1.12 between February 7, 2018 and March 15, 2018 (documented in Lloyd et al. 2019), and between March 18, 2019 and March 22, 2019 (documented in Lloyd and Leonard 2019), to verify the locations of previously recorded archaeological resources, potential historical resources identified on historic-era maps, and to identify previously unrecorded resources within the APE, if present. The survey was led by qualified professional archaeologists who meet the Secretary of the Interior’s Professional Qualification Standards in archaeology, as defined in the Secretary of the Interior’s Standards and Guidelines for Archaeology and Historic Preservation (NPS 1983). Prior to performing the field work, all necessary permissions and permits were obtained (e.g., Archaeological Resources Protection Act permits) to conduct the cultural resources surveys on ANF and BLM lands. Copies of the permits are included in Volume II of the *Privileged Cultural Resources Study Report* (Lloyd et al. 2019) and in Appendix D of the *Privileged Supplemental Privileged Cultural Resources Study Report* (Lloyd and Leonard 2019).

Lands within the APE were examined by archaeological crew members walking parallel or meandering pedestrian transects spaced at 15 meters apart. Due to the type of slopes and vegetation encountered, wider transects were deemed unnecessary as the survey areas were either inaccessible or too dense with vegetation to examine. Inaccessible or steep areas of the APE were checked as access allowed (i.e. spot-checked). Topographic features encountered in areas considered to be sensitive for cultural resources (i.e., springs, drainages, terraces, ridge tops, etc.) were thoroughly inspected where accessible. The locations that were deemed inaccessible or unsafe (e.g., certain locations containing dense vegetation, steep slopes) are shown on the survey coverage maps included in Volume II of the *Privileged Cultural Resources Study Report* (Lloyd et al. 2019) and in Appendix C of the *Privileged Supplemental Privileged Cultural Resources Study Report* (Lloyd and Leonard 2019). To facilitate access and fluctuating water levels, survey of the APE was accomplished using both land access and boats.

Daily water surface elevations for each reservoir were monitored using LakesOnline.com to confirm the survey accounted for the lowest levels available during the fieldwork period, and therefore, covered the maximum land area available within the APE. The monitoring indicated that the water surface elevations did not fluctuate up or down by any substantial measurement.

Previously recorded sites were re-recorded only if their existing documentation did not meet the current OHP standards for recording resources (OHP 1995), or if the condition and/or integrity of the cultural resource had changed since its previous recording. Documentation for previously recorded cultural resources that did not require updates was provided on DPR 523 Continuation Sheets. The documentation included current site conditions and any other relevant observations made during the field visits. Newly discovered archaeological resources, including isolated finds, were fully documented following the procedures outlined in Instructions for Recording Historical Resources (OHP 1995) using the relevant DPR 523 Forms A-L.

Archaeological sites and isolates were photographed using digital color photography. Diagnostic artifacts, features, artifact concentrations, site boundaries, and other relevant areas or materials were mapped using a Trimble GeoXT 6000 series GPS receiver with sub-meter accuracy. The locations of resources documented during the field survey were plotted onto the appropriate USGS 1:24,000 scale topographic map by hand at the time of discovery, and the locations recorded using the Trimble GPS receiver. The GPS data are based on the North American Datum of 1983 and utilize the Universal Transverse Mercator grid system. The locations of resources identified during the pre-field research that could not be accessed during the current survey are based on the locational data obtained during the records searches and will need to be field verified if or when those resources are accessible. All artifacts encountered during the field survey were left in place; no artifacts were collected.

The results of the archival research, records searches, and 2018 and 2019 pedestrian surveys identified a total of 56 archaeological resources and 6 isolated artifacts, as detailed below.

Archaeological Sites

Twelve of the archaeological sites identified in the APE represent prehistoric occupation, 43 represent historic-era occupation, and one is a multicomponent site representing locations of both prehistoric and historic-era occupation. Cultural resource locations and DPR forms are included in Volume II of the *Privileged Cultural Resources Study Report* (Lloyd et al. 2019) and the *Privileged Supplemental Privileged Cultural Resources Study Report* (Lloyd and Leonard 2019). The locations, contents and associated features related to all cultural resources are considered to be confidential and provided only to those on a need to know basis (i.e., FERC, etc.), and will be filed with FERC as Privileged.

Prehistoric Sites

All of the prehistoric sites located in the APE (n=12) were previously recorded and represent habitation use (n=1) and other (n=10) task-specific activities (i.e., stone tool manufacturing and/or maintenance, plant or other material processing, etc.). All the prehistoric sites within the APE were inaccessible except P-19-001354/CA-LAN-1354, which was partially inaccessible at the time of the relicensing fieldwork. One site, P-19-000324/CA-LAN-0324, is recommended eligible for listing in the NRHP. The remaining 11 sites are all currently unevaluated for potential listing in the NRHP. A list of the 12 prehistoric sites identified in the APE is provided in Table 5.8-1.

Historic-era Sites

Five previously recorded and 38 newly discovered sites contain materials and features related to historic-era occupation and use (Table 5.8-2). Twenty-eight of these sites consist only of paved and unpaved roads, one with a bridge and one with a culvert. The other 15 historic-era sites include a water pumping system, a concrete ditch, two residential locations, concrete pads, refuse scatters, an industrial site, a placer mining area, and other features.

Table 5.8-1. Prehistoric Archaeological Sites Within the APE

Primary No.	Trinomial	ANF No.	Description	NRHP Eligibility
P-19-000324	CA-LAN-324	None	Habitation site	Eligible
P-19-000392	CA-LAN-392	None	Midden, lithic scatter	Unevaluated
P-19-000393	CA-LAN-393	None	Midden, lithic scatter	Unevaluated
P-19-000394	CA-LAN-394	None	Midden, BRMs	Unevaluated
P-19-000395	CA-LAN-395	None	Lithic scatter	Unevaluated
P-19-000396	CA-LAN-396	None	Lithic scatter	Unevaluated
P-19-000438	CA-LAN-438	None	Midden, lithic scatter, hearth	Unevaluated
P-19-000439	CA-LAN-439	None	Lithic Scatter	Unevaluated
P-19-000442	CA-LAN-442	None	Lithic scatter	Unevaluated
P-19-000443	CA-LAN-443	None	Lithic scatter	Unevaluated
P-19-000444	CA-LAN-444	None	Lithic scatter, BRM	Unevaluated
P-19-001354	CA-LAN-1354	05-01-53-40	Lithic scatter, faunal remains	Unevaluated

Source: 2015 SCCIC records search; 2016 USFS records search

Key:

ANF= Angeles National Forest

APE = Area of Potential Effects

BRM = Bedrock mortars

Lithic = stone (modified)

No. = number

NRHP = National Register of Historic Places

Table 5.8-2. Historic-Era Archaeological Sites Within the APE

Primary/ Temporary No.	Trinomial	ANF No.	Description	NRHP Eligibility
P-19-000990	CA-LAN-990H	05-01-53-32	A 0.3-mile modern segment of Old Ridge Route not part of previous NRHP listing	Previously evaluated as NRHP eligible and NRHP listed; segment in APE recommended as not eligible/non-contributing element of a historic property ¹
P-19-002333	None	None	Structural remains	Unevaluated
P-19-003081	None	None	Placer mining	Unevaluated
P-19-186905	None	05-01-53-283	Ruby-Clearwater-Warm Springs Road Complex	Not Eligible ¹
P-19-188491	None	05-01-53-340	Dry Canyon Road	Not Eligible ¹
HDR-SSWP-SITE-003	None	None	Road and culvert	Not Eligible ¹
HDR-SSWP-SITE-004	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-005	None	None	Water control features	Not Eligible ¹
HDR-SSWP-SITE-006	None	None	Road	Unevaluated
HDR-SSWP-SITE-006.2	None	None	Concrete ditch	Not Eligible ¹
HDR-SSWP-SITE-007	None	None	Refuse scatter	Unevaluated
HDR-SSWP-SITE-008	None	None	Collapsed structure, road, refuse scatter, fence line	Unevaluated
HDR-SSWP-SITE-009	None	None	Extensive refuse scatter	Unevaluated
HDR-SSWP-SITE-010	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-012	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-013	None	None	Powerline access road	Not Eligible ¹

Table 5.8-2. Historic-Era Archaeological Sites Within the APE (continued)

Primary/ Temporary No.	Trinomial	ANF No.	Description	NRHP Eligibility
HDR-SSWP-SITE-014	None	None	Lake Hughes Road	Not Eligible ¹
HDR-SSWP-SITE-015	None	None	Road, bridge	Unevaluated
HDR-SSWP-SITE-016	None	None	Foundation, ditch, road, industrial refuse	Unevaluated
HDR-SSWP-SITE-017	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-019	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-021	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-023	None	None	Old Highway 99, also known as Pyramid Lake Road	Not Eligible
HDR-SSWP-SITE-025	None	None	San Francisquito Canyon Road	Not Eligible ¹
HDR-SSWP-SITE-026	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-027	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-028	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-029	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-030	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-031	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-032	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-033	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-034	None	None	Road and foundation	Not Eligible ¹
HDR-SSWP-SITE-035	None	None	Road	Not Eligible ¹

Table 5.8-2. Historic-Era Archaeological Sites Within the APE (continued)

Primary/ Temporary No.	Trinomial	ANF No.	Description	NRHP Eligibility
HDR-SSWP-SITE-036	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-037	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-038	None	None	Road	Not Eligible ¹
HDR-SSWP-SITE-039	None	None	Water trough and fence line	Not Eligible ¹
HDR-SSWP-SITE-040	None	None	Concrete pads	Not Eligible ¹
HDR-SSWP-SITE-041	None	None	Bell Systems manhole	Not Eligible ¹
HDR-SSWP-SITE-042	None	None	Concrete pad	Not Eligible ¹
HDR-SSWP-SITE-043	None	None	Water pipes	Not Eligible ¹
HDR-SSWP-SITE-044	None	None	Concrete pad	Not Eligible ¹

Sources: 2015 SCCIC records search; 2016 USFS records search; 2018 and 2019 field survey efforts

Note:

¹Pending consultation and SHPO concurrence

Key:

ANF = Angeles National Forest

APE = Area of Potential Effects

No. = number

NRHP = National Register of Historic Places

One site, the 17-mile segment of the Old Ridge Route (P-19-000990) within the ANF, has been previously evaluated (elsewhere, not within the APE) as eligible for NRHP listing. The 0.3 mile modern segment within the APE does not contribute to the significance of the Old Ridge Route, and for the purposes of this Project, it is considered not eligible for the NRHP. A second resource, HDR-SSWP-SITE-023, consists of two extant stretches of the original State Highway 99. It was previously evaluated by the ANF as not eligible for the NRHP with SHPO concurrence.

Thirty-three of the historic-era sites are evaluated for potential listing on the NRHP, and therefore, the CRHR, as part of the current investigation, and are recommended as not eligible for listing on the NRHP. The remaining eight sites could not be evaluated at the survey level and their NRHP eligibility is unevaluated. All 43 of the historic-era archaeological sites are summarized in Table 5.8-2.

The current evaluations are pending consultation with SHPO concurrence. Only the archaeological sites that could be evaluated based on the current archival research and the survey data are evaluated. Unevaluated sites require more extensive investigation to assess their NRHP significance and will be managed through avoidance at this time.

Multicomponent Sites

One multicomponent site (i.e., a location containing evidence of use from various periods in time) was identified during the study (Table 5.8-3). This site represents prehistoric habitation, plant processing and other possible activities, as well as historic-era habitation, livestock use, and transportation. It is unevaluated with respect to NRHP eligibility.

Table 5.8-3. Multicomponent Archaeological Site Within the APE

Primary No.	Trinomial	ANF No.	Description	NRHP Eligibility
P-19-002401	CA-LAN-2401/H	None	Prehistoric lithic scatter and associated features Historical refuse scatter and associated features	Unevaluated

Source: 2015 SCCIC records search; 2018 Field Survey

Key:

ANF = Angeles National Forest

APE = Area of Potential Effects

Lithic = stone (modified)

No. = number

NRHP = National Register of Historic Places

¹Pending Consultation and SHPO Concurrence

Isolated Artifacts

The archaeological investigation also identified five isolated historic-era artifacts and one isolated prehistoric artifact. Isolated artifacts do not in themselves have the ability to provide information important in understanding the prehistory or history of the APE and do not, therefore, qualify for listing on the NRHP. As a result, all six isolated artifacts are recommended as not eligible for listing on the NRHP or CRHR. The isolated artifacts are listed in Table 5.8-4.

Table 5.8-4. Isolated Artifacts Identified Within the APE

Temporary No.	Description	NRHP Eligibility
HDR-SSWP-ISO-010	Sandstone milling slab	Not Eligible ¹
HDR-SSWP-ISO-10.2	1935 U.S. Coast and Geodetic Survey benchmark	Not Eligible ¹
HDR-SSWP-ISO-012	Remains of a circular, metal water tank	Not Eligible ¹
HDR-SSWP-ISO-018	Metal frame, possible trailer body	Not Eligible ¹
HDR-SSWP-ISO-020	1929 U.S. Geological Survey benchmark	Not eligible ¹
HDR-SSWP-ISO-023	Abandoned refrigerator	Not Eligible ¹

Source: 2018 Field Survey

Note:

¹Pending consultation and SHPO concurrence

Key:

APE = Area of Potential Effects

DWR = California Department of Water Resources

No. = number

NRHP = National Register of Historic Places

USGS = U.S. Geological Survey

Historical Built Environment Resources Study

The historical built environment resources investigation was led by a qualified professional architectural historian who meets the Secretary of the Interior's Professional Qualification Standards in architectural history, as defined in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (NPS 1983).

Archival research was used to prepare the resource-specific historic context by which evaluations for eligibility to the NRHP were completed for the historical built environment resources. Details regarding the research and evaluations are provided in Volume III of the *Privileged Cultural Resources Study Report*. Archival research was conducted locally from May 15, 2018 through May 16, 2018 at the following repositories: the Santa Clarita Public Library; the College of the Canyons Library and Special Collections; the Canyon County Jo Anne Darcy Library; and the Old Town Newhall Library. Research also was conducted at DWR's photograph, map, and document

archives in Sacramento, California from May 17, 2018 through May 18, 2018, as well as through online sources, including Newspapers.com and HistoricAerials.com.

Field surveys to document historical built environment resources were conducted between January 23, 2018 and May 18, 2018, and included the Project facilities and other built resources found within the APE. The fieldwork included resources (i.e., buildings, structures, etc.) 45 years of age or older. Identified resources were recorded or re-recorded to meet current OHP standards for documentation (OHP 1995). Digital color photography and sketch maps were used to document individual features that show the relationship between buildings and structures. The resources identified within the APE were assessed for their eligibility for listing in the NRHP individually as well as for their eligibility as contributing properties to a potential NRHP-eligible historic district.

Field inspection also included the documentation of any observed or potential Project effects to historical built environment resources to aid in determining whether unevaluated or NRHP-listed or eligible resources would be affected by ongoing Project O&M or Project-related recreation activities.

A total of 13 historical built environment resources were identified and recorded within the APE. Resources associated with the Project that are not yet 45 years old were not surveyed or documented. Other historical built environment resources located within the APE are not considered under the current study because they are owned, maintained, and operated by organizations other than the Licensees; do not support the Project operations in any way, and are not affected by Project activities. Each of the 13 individual components are listed in Table 5.8-5.

Table 5.8-5. Summary of Eligibility of South SWP Historical Built Environment Resources

Building/Structure Field Designation	Primary Number	NRHP Eligibility ¹
Quail Lake	None	Not Eligible
Lower Quail Canal	None	Not Eligible
Pyramid Dam	None	Eligible
Pyramid Lake	None	Not Eligible
Pyramid Dam Service Spillway	None	Eligible
Pyramid Dam Emergency Spillway	None	Eligible
Angeles Tunnel Intake	None	Eligible
Angeles Tunnel	None	Eligible
Angeles Tunnel Surge Chamber	None	Eligible
Castaic Powerplant Penstocks	None	Not Eligible
Castaic Powerplant	None	Not Eligible
Castaic Transmission Line	None	Not Eligible
Elderberry Forebay Spillway	P-19-190941	Eligible

Note:

¹Pending consultation and SHPO concurrence

Key:

NRHP = National Register of Historic Places

As a result of the analysis, it is recommended that seven of the Project facilities are eligible under NRHP Criterion A for their association with the greater SWP and statewide water conveyance and planning efforts as they retain sufficient significance and integrity to demonstrate their association. Those include Pyramid Dam, the Pyramid Dam Service Spillway and Emergency Spillway, the Angeles Tunnel Intake, the Angeles Tunnel, the Angeles Tunnel Surge Chamber, and the Elderberry Forebay Spillway (P-19-190941). The Elderberry Forebay Spillway (P-19-190941), a component of the South SWP Hydropower, was previously determined eligible for its association with the SWP in 2014, and it was found to retain its NRHP eligibility status. The Licensees recommend that the remaining six historical built environment resources do not meet any of the NRHP eligibility criteria and/or do not have sufficient integrity to convey their significance. Therefore, the six resources are recommended as not eligible for listing under the NRHP. The Project as a whole, and all of the resources evaluated as part of it, was also reviewed for potential national historic district eligibility. The resources do not represent a significant concentration of features united historically to be considered a historic district that would require evaluation for listing in the NRHP.

Built Environment Resources Not Included in Study

Seventeen built environment facilities within the APE were excluded from this study due either to being considered non-Project facilities (i.e., they are not used in any way in

support of the Project or its hydropower generation, they are owned and maintained by other organizations, and are avoided by the Project) or they were found to not meet the age criterion threshold of at least 45 years of age at the time of the study (Table 5.8-6). Resources found to be at least 45 years old were constructed in 1973 or earlier. Thus, those resources constructed in 1974 or later were not included as part of this study effort, were not documented on DPR inventory forms, and were not assessed for their historic significance or integrity.

Table 5.8-6. Built Environment Resources Not Considered in the Study

Facility Name
A small portion of the Quail Lake Inlet Structure
Three short segments of Interstate 5 with California Department of Transportation maintenance facilities near Liebre Creek
A segment of Hardluck Road
Goodell Fire Road/Castaic Canyon Road – 6N13
A segment of Pyramid Lake Road
A segment of Templin Highway west of Old Ridge Route
Los Angeles Aqueduct (P-19-002105)
Los Angeles Aqueduct Transmission Line (P-19-002132)
Peace Valley Pipeline
Gorman Bypass Channel
Warne Powerplant, Switchyard and Transmission Line
Pyramid Lake recreation resources
Los Alamos Group Campground
Storm Bypass Channel and Check Dams
Elderberry Forebay Dam
Elderberry Forebay and Outlet Tower
Castaic Lake

Thus, seven built environment resources identified within the APE are evaluated as eligible for listing on the NRHP, pending SHPO concurrence. One of the seven built environment resources was previously determined eligible. These seven resources will be considered historic properties, upon SHPO's concurrence with the recommended evaluations. The other six built environment resources are evaluated as not eligible for listing on the NRHP. Thus, pending SHPO concurrence, these six resources will require no further consideration because they do not meet the NRHP criteria as historic properties.

5.8.1.5 Overview of the Tribal Resources Study and Results

The Licensees' augmented existing, relevant, and reasonably available tribal resources information by conducting *Study 4.1.13, Tribal Resources Study*. Refer to the South SWP Hydropower Relicensing Website, <http://south-swp-hydropower-relicensing.com/>, or to Appendix B of this Exhibit E, for the Study Plan. Given the sensitive nature of the information developed as part of the study, a *Privileged Tribal Resources Study Report* will be made available to the tribes, and to FERC, ANF, BLM, and the SHPO, consistent with existing non-disclosure agreements. The Privileged information is only summarized in this section.

Potentially Affected Indian Tribes

Licensees contacted the Native American Heritage Commission (NAHC) on June 16, 2015 to obtain a list of tribes and tribal individuals who may have an interest in the Project, and to request a search of the NAHC's files for a list of any known sacred lands that may be within the existing Project boundary or in the 0.25-mile buffer. The NAHC provided the tribal contacts listed in Table 5.8-7 in a letter dated July 15, 2015. Additional outreach was conducted directly by FERC with the federally recognized Santa Ynez Band of Chumash Indians and Tejon Indian Tribe.

The Licensees contacted the NAHC again on May 7, 2019 to request an updated contact list and second search of the NAHC's Sacred Lands Files. The NAHC responded in a letter dated May 24, 2019. Native American tribes and tribal members identified in the May 24, 2019 letter, who were not on the distribution list generated from the 2015 contact, were added to the distribution list to receive all project notifications and invitations to participate. Table 5.8-8 below includes all contacts provided by the NAHC. The NAHC's 2015 and 2019 response letters are provided in Volume I of the *Privileged Cultural Resource Study Report* (Lloyd et al. 2019).

Table 5.8-7. Tribal Contacts Identified in 2015 by the Native American Heritage Commission and the Federal Energy Regulatory Commission

Fernandeño Tataviam Band of Mission Indians Rudy Ortega Jr., President	Tongva Ancestral Territorial Tribal Nation John Tommy Rosas, Tribal Administrator
Barbareno/Ventureno Band of Mission Indians Julie Lynn Tumamait-Stennslie, Chair	Kitanemuk & Yowlumne Tejon Indians Delia Dominguez, Chairperson
Gabrielino/Tongva Nation Sandonne Goad, Chairperson	Gabrielino/Tongva San Gabriel Band of Mission Indians Anthony Morales, Chairperson
Patrick Tumamait	LA City/County Native American Indian Commission Ron Andrade, Director
Randy Guzman-Folkes	San Fernando Band of Mission Indians John Valenzuela, Chairperson
Kern Valley Indian Council Robert Robinson, Co-Chairperson	Carol Pulido
Coastal Band of the Chumash Nation Michael Cordero, Chairperson	Melissa M. Parra-Hernandez
Gabrielino Tongva Indians of California Tribal Council Robert Dorame, Tribal Chair	Gabrielino-Tongva Tribe Bernie Acuna, Co-Chairperson
Gabrielino-Tongva Tribe Linda Candelaria, Co-Chairperson	Barbareno/Ventureno Band of Mission Indians Raudel Joe Banuelos, Jr.
Santa Ynez Tribal Elders Council Freddie Romero, Cultural Preservation Consultant	Gabrielino-Tongva Tribe Conrad Acuna
Gabrieleno Band of Mission Indians Andrew Salas, Chairperson	Gabrielino/Tongva Nation Sam Dunlap, Cultural Resources Director
Barbareno/Ventureno Band of Mission Indians Kathleen Pappo	PeuYoKo Perez
Tejon Indian Tribe Octavio Escobedo, Tribal Chair	

Source: NAHC 2015, 2019; FERC 2017

Table 5.8-8. Tribal Contacts Identified in 2019 by the Native American Heritage Commission

Barbareno/ Ventureno Band of Mission Indians Eleanor Arrellanes	Fernandeño Tataviam Band of Mission Indians Jairo Avila, Tribal Historic and Cultural Preservation Officer
Barbareno/ Ventureno Band of Mission Indians Patrick Tumamait	Fernandeño Tataviam Band of Mission Indians Beverly Salazar Folkes, Elders Council
Barbareno/ Ventureno Band of Mission Indians Raudel Banuelos, Jr.	Fernandeño Tataviam Band of Mission Indians Alan Salazar, Chairman Elders Council
Barbareno/Ventureno Band of Mission Indians Julie Tumamait-Stenslie, Chairperson	Gabrieleno Band of Mission Indians - Kizh Nation Andrew Salas, Chairperson
Chumash Council of Bakersfield Julio Quair, Chairperson	Gabrieleno/Tongva San Gabriel Band of Mission Indians Anthony Morales, Chairperson
Coastal Band of the Chumash Nation Gino Altamirano, Chairperson	Gabrielino /Tongva Nation Sandonne Goad, Chairperson
San Fernando Band of Mission Indians Donna Yocum, Chairperson	Gabrielino Tongva Indians of California Tribal Council Robert Dorame, Chairperson
San Luis Obispo County Chumash Council Mark Vigil, Chief	Gabrielino-Tongva Tribe Charles Alvarez
San Manuel Band of Mission Indians Lee Clauss, Director of Cultural Resources	Morongo Band of Mission Indians Denisa Torres, Cultural Resources Manager
Santa Ynez Band of Chumash Indians Kenneth Kahn, Chairperson	Morongo Band of Mission Indians Robert Martin, Chairperson
Serrano Nation of Mission Indians Wayne Walker, Co-Chairperson	Northern Chumash Tribal Council Fred Collins, Spokesperson
Serrano Nation of Mission Indians Mark Cochrane, Co-Chairperson	yak tityu tityu yak tilhini – Northern Chumash Tribe Mona Tucker, Chairperson

Source: NAHC 2015, 2019

In July 2015, the Licensees mailed all individuals and organizations included on the 2015 NAHC contact list letters of introduction to the Project and the relicensing process, and questionnaires to solicit information and any concerns about the Project relicensing.

FERC contacted the Tejon Indian Tribe and the Santa Ynez Band of Chumash Indians in letters dated August 10, 2016, to provide information regarding the Project and the relicensing, and to invite each tribe to participate in the relicensing process. In a Telephone Memo dated August 22, 2016, FERC noted that Mr. Freddie Romero of the Tribal Elders Council of the Santa Ynez Band of Chumash Indians contacted FERC to decline the tribe's participation in the relicensing process, and to encourage FERC's outreach to other tribes who might want to be involved. As detailed in FERC's Telephone Memo dated February 13, 2017, FERC contacted the Tejon Indian Tribe by telephone on September 12, 2016 again. The tribe's receptionist indicated that an email would be sent to Chairperson Escobedo as follow-up to FERC's invitation. FERC contacted the tribe by telephone on October 5, 2016, and as directed, contacted Chairperson Escobedo directly by email. FERC received no response to the email and received no further communications from the tribe. As a result of additional outreach to the Tejon Indian Tribe on June 6, 2019 by the Licensees, the tribe decided to participate in the Project relicensing and *Tribal Resources Study*.

Tribes and individuals listed in Tables 5.8-7 and 5.8-8 who have formally declined to participate in the Project include the Santa Ynez Band of Chumash Indians, the yak tityu yak tilhini-Northern Chumash Tribe, Mr. Patrick Tumamait, and the San Manuel Band of Mission Indians.

In a letter dated September 30, 2016, FERC designated the Licensees as its non-federal representatives for day-to-day NHPA Section 106 consultation. Through the Licensees' tribal consultation efforts, the NAHC list was updated to reflect staff changes and current contacts, as provided in Table 5.8-8. The Licensees further conducted a Section 106 kick-off meeting with interested tribes on June 15, 2017, followed by meet and greet meetings on August 29, 2017, a site visit with the Fernandeano Tataviam Band of Mission Indians on January 12, 2018, Consultation Meeting Number 1 on May 22, 2019 and Consultation Meeting Number 2 on July 11, 2019. A third consultation meeting is currently scheduled for September 2019. A log documenting the Section 106 consultation is provided in Volume II of the *Privileged Cultural Resources Study Report* (Lloyd et al. 2019).

Known Indian Trust Assets and Traditional Cultural Properties

Research of tribal resources was conducted between June 23, 2015 and July 29, 2015. This included a records search at the SCCIC, as described above in Section 5.8.1.2., and archival research conducted at the Los Angeles County Library and the U.S. Department of the Interior, Bureau of Indian Affairs' GIS database to review any references or data relevant to the history, tribal occupation, tribal lands, or other ITAs within the existing Project boundary and the 0.25-mile buffer surrounding the existing Project boundary. Although the Licensees found numerous source documents regarding

prehistoric tribal occupation and prehistoric archaeological resources, no documents were encountered that identified ITAs, TCPs, or agreements as defined above. As a result, the Licensees implemented the *Tribal Resources Study* to determine if these types of resources are present in the APE.

The *Tribal Resources Study* was initiated in late 2017 and early 2018, and continued to mid-2019. The APE defined above served as the study area for the *Tribal Resources Study*. Licensees' ethnographers from Albion Environmental, Inc. and Reddy Consulting, Inc. conducted additional background research to review tribal and USFS library sources, the ethnographers' private libraries, and other potential online and repository reference materials. Information relating to tribal residence and activity within the APE was sought both in published volumes and available archival documents. The information from these sources was developed to provide background context within which to interpret site-specific data. In addition to the literature search, the study investigation included consultation and cooperative efforts with the tribe(s) to identify culturally sensitive and valuable locations within the APE. These locations and the information pertaining to them, and the approaches to identify, document and evaluate them, are outlined in Bulletin 38 (Parker and King 1998), which guided the study.

The ethnographers contacted the Tribal Historic Preservation Officers and other tribal cultural resources management directors, as appropriate, to find individuals interested in and wishing to be interviewed for the study. A site visit was conducted with members of the Fernandeño Tataviam Band of Mission Indians on January 12, 2018. Interviews were conducted with seven members of the Fernandeño Tataviam Band of Mission Indians in May 2018, followed by five additional interviews with Fernandeño Tataviam Band of Mission Indians elders in May 2019. Interviews are currently being scheduled with elders from the Tejon Indian Tribe.

The primary goal of the in-person consultation and interviews is to obtain information about tribal resources in the Project APE that are only known to the tribes, and consistent with National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Identification of Traditional Cultural Properties* (Parker and King 1998). Two tribal resources were identified by the Fernandeño Tataviam Band of Mission Indians during the May 2019 tribal consultation and interviews. One resource is the historical Cordova Ranch, located within the APE. The ranch was owned by the Dolores Cook family. Dolores Cook was the son of William Cook and Trinidad Espinoza, a California Indian born at the San Gabriel Mission (SCVHS 2019). The present-day direct descendants of Dolores Cook, who were interviewed, discussed the Cordova Ranch and its importance to the Fernandeño Tataviam Band of Mission Indians.

The other resource is the ethnohistoric village of *Piinga*. King (2004:127) concludes that CA-LAN-324, located within the APE, is probably the site of *Piinga*. Several interviewed elders from the Fernandeño Tataviam Band of Mission Indians recalled that their ancestors were from this village, and it was and continues to be an important tribal resource for the tribe. However, additional information obtained during the research

indicates that *Piinga* may actually be located in a completely different location, away from CA-LAN-324 and outside of the APE.

No ITAs were identified within the APE. This *Tribal Resources Study* was substantially complete in April 2019; however, the additional tribal interviews with the Fernandeno Tataviam Band of Mission Indians elders have required necessary adjustments in the *Tribal Resources Study* schedule. Remaining work includes completing the *Privileged Tribal Resources Study Report*. It is anticipated that the *Tribal Resources Study* will be complete by the end of December 2019.

5.8.1.6 Current and On-going Project Effects

The Licensees actively operate and maintain the Project with activities, actions, or circumstances that are affecting resources identified during Study 4.1.12, some of which are recommended as eligible for listing on the NRHP, pending SHPO concurrence, and some of which are currently unevaluated.

Fifteen of the 21 NRHP-eligible or unevaluated archaeological sites are currently affected by various activities, both past and present. Eleven of the prehistoric archaeological sites in the APE are inundated and were not accessible during the current investigation. Therefore, the integrity of each site's condition was not assessed. However, the archaeological records obtained from the SCCIC indicate that each of the inundated sites was likely affected by initial construction of the Project.

Field observations of the only accessible prehistoric site in the APE, P-19-001354, indicated that the site's previously recorded location was highly disturbed with no evidence of this resource. It is presumed that the portion of the site within the APE was removed or buried by initial Project construction. Site P-19-186905 appears to be periodically maintained. Site P-19-003081 is largely outside of the APE. However, the small portion of the site which intersects with the Project is not being affected by Project-related activities. A previously recorded standing structure at one historic-era site, P-19-002333, has been removed; however, it is not clear whether this removal was Project-related. Finally, the one multicomponent site (P-19-002401) was observed during the field survey to be experiencing effects (e.g., road maintenance and vandalism) that may be Project-related. No Project-related effects were noted at the remaining six archaeological resources.

Table 5.8-9 summarizes the 21 archaeological sites that are potential historic properties, and identifies those that are, or will be, affected by the Licensees' Proposal.

Table 5.8-9. Summary of Eligible and Unevaluated Archaeological Sites Identified Within the APE Including Those With Project Effects

Primary No.	Trinomial	ANF No.	Description	NRHP Eligibility	Project Effects
P-19-000324	CA-LAN-324	None	Habitation site	Eligible	Initial Project construction
P-19-000392	CA-LAN-392	None	Midden, lithic scatter	Unevaluated	Initial Project construction
P-19-000393	CA-LAN-393	None	Midden, lithic scatter	Unevaluated	Initial Project construction
P-19-000394	CA-LAN-394	None	Midden, BRMs	Unevaluated	Initial Project construction
P-19-000395	CA-LAN-395	None	Lithic scatter	Unevaluated	Initial Project construction
P-19-000396	CA-LAN-396	None	Lithic scatter	Unevaluated	Initial Project construction
P-19-000438	CA-LAN-438	None	Midden, lithic scatter, hearth	Unevaluated	Initial Project construction
P-19-000439	CA-LAN-439	None	Lithic Scatter	Unevaluated	Initial Project construction
P-19-000442	CA-LAN-442	None	Lithic scatter	Unevaluated	Initial Project construction
P-19-000443	CA-LAN-443	None	Lithic scatter	Unevaluated	Initial Project construction
P-19-000444	CA-LAN-444	None	Lithic scatter, BRM	Unevaluated	Initial Project construction
P-19-001354	CA-LAN-1354	05-01-53-40	Lithic scatter, faunal remains	Unevaluated	Construction of the Vista Del Lago Visitor Center and other recreational development
P-19-002333	None	None	Structural Remains	Unevaluated	Building razed – unknown if Project-related
P-19-002401	CA-LAN-2401/H	None	Prehistoric lithic scatter and associated features Historical refuse scatter and associated features	Unevaluated	Road maintenance, vandalism, construction – unknown if Project-related

Table 5.8-9. Summary of Eligible and Unevaluated Archaeological Sites Identified Within the APE Including Those With Project Effects (continued)

Primary No.	Trinomial	ANF No.	Description	NRHP Eligibility	Project Effects
P-19-003081	None	None	Placer Mining	Unevaluated	None
HDR-SSWP-SITE-006	None	None	Road	Unevaluated	None
HDR-SSWP-SITE-007	None	None	Refuse Scatter	Unevaluated	None
HDR-SSWP-SITE-008	None	None	Collapsed structure, road, refuse scatter, fence line	Unevaluated	None
HDR-SSWP-SITE-009	None	None	Extensive refuse scatter	Unevaluated	None
HDR-SSWP-SITE-015	None	None	Road, bridge	Unevaluated	None
HDR-SSWP-SITE-016	None	None	Foundation, ditch, road, industrial refuse	Unevaluated	None

Source: 2015 SCCIC records search; 2106 USFS records search; 2018 Field Survey

Note:

¹Pending SHPO concurrence

Key:

ANF = Angeles National Forest

APE = Area of Potential Effects

BRM = Bedrock mortars

Lithic = stone (modified)

No. = number

NRHP = National Register of Historic Places

O&M = operations and maintenance

SCCIC = Southern Central California Information Center

The Cordova Ranch and archaeological site CA-LAN-324 were impacted by the initial construction of the South SWP Hydropower in the 1970s. Neither the Cordova Ranch nor CA-LAN-324 were accessible at the time of the 2018 archaeological field survey. As a result, their conditions and level of integrity are currently unknown. The Fernand o Tataviam Band of Mission Indians discussed the cumulative effects on tribal traditional lands and resources from the 1960s and onwards from construction of local hydropower and water supply projects. Although the tribe no longer holds legal title to the lands in these various projects, the elders who have been interviewed have strong memories of going to the Project or nearby areas for social events and ceremonial activities. Several members discussed the loss of tribal culture, including villages and the places they recall visiting, that hold social and ceremonial memories, and these memories have become increasingly significant because of the cumulative cultural loss they discussed during the interviews.

Routine Operation and Maintenance of Structures

The Project's hydroelectric operating system includes dams, powerhouses, penstocks, and associated features. As these facilities age and technology continues to advance, they may require maintenance to maintain operational efficiency or usefulness as operating facilities. Maintenance can affect the character defining features of a structure that contribute to its significance. Future maintenance requirements might include structural, mechanical or electrical upgrades of these facilities; structural repairs; replacement of components; expansion or improvement of parking and storage areas; and similar activities. Various Project O&M activities associated with structures, including repairs and/or upgrades, could result in adverse effects on those resources that are considered eligible for inclusion in the NRHP and must be considered.

Reservoir Fluctuation

Historic properties within a reservoir basin may be consistently inundated by water or subject to wave action associated with boating or reductions in reservoir water level. Research indicates that the effects of these actions may include erosion, deflation, hydrologic sorting or displacement of artifacts, and are primarily dependent on where within the reservoir basin a site is located (Lenihan et al. 1981). Additionally, when reservoir water levels are low, previously inaccessible places may become accessible to the public, which could result in additional looting of a site and/or additional ground disturbance caused by recreation or other activities. The water levels of the Project reservoirs are kept generally consistent, and drawdowns or major fluctuations in the water levels are rare.

Vegetation Management

Routine management of vegetation within the Project APE is necessary for a variety of Project functions. Routine clearing of vegetation in the vicinity of Project structures, recreation facilities, and primary Project roads occurs. Additionally, the Licensees are required to fell trees that are dead or dying, and that have a potential to fall on Project structures, such as recreation facilities, powerhouses and switchyards, or on public areas. Any of these vegetation management activities have the potential to affect historic properties, although provisions of other plans may also provide for the protection of sensitive areas, including cultural resources and plants of tribal importance. Licensees will treat any list and locations of culturally sensitive plants, if provided by tribes, as confidential Privileged information.

Road Maintenance and Rehabilitation Controls

Numerous road maintenance and construction activities have the potential to affect historic properties. Dirt access roads within the Project are maintained by grading, which can affect historic properties that may lie buried beneath them. In addition, ditches excavated for roadway drainage may cause further effects to archaeological sites. Vehicular traffic on dirt roadways can also damage historic properties that they

travel through or over, depending on the condition of the road, the season of use, and the types of vehicles that travel the roads. Roads also make historic properties more accessible to the public, and in some cases may increase their vulnerability to looting and vandalism. Additionally, roads themselves can be historic properties, and thus, any modifications to these historic properties could be considered adverse effects.

Recreation Development and Improvements

Recreational activities common in the Project area include boating, fishing, hiking, picnicking, and camping. These activities can expose historic properties to public use and can lead to disturbance of intact cultural deposits, increased erosion or deterioration of sites, unauthorized artifact collection, or more severe vandalism and looting. These types of impacts are unavoidable, as it is not usually feasible to close campgrounds or other recreation locations. Ongoing maintenance at recreational facilities, formal and informal improvements, and infrastructure development can also affect significant cultural values. Generally, the more accessible historic properties are to public traffic, the more likely they are to be affected by recreational activities and potential looting.

Emergency Actions

Emergency repairs to Project facilities, including dams, penstocks, or powerhouses may be necessary in response to serious threats to life, property, or the safe operation of Licensees' hydroelectric facilities. Such actions, however, have the potential to affect historic properties. For example, a historic or historical dam may require emergency repair not in keeping with its original materials, or the creation of a fire break could affect a lithic scatter.

Artifact Collection/Vandalism

Vandalism and looting pose potential threats to historic properties within the APE. Looting includes the casual collection of surface artifacts, as well as deliberate unauthorized digging and theft of cultural resources. The more accessible historic properties are to public traffic, the more likely they are to be affected by vandalism. Archaeological sites that have been affected by looting in the past are prone to additional potential looting.

5.8.2 Adverse Effects of the Licensees' Proposal

This section discusses the potential effects of the Licensees' Proposal, as described in Section 2.0 of this Exhibit E, on cultural and tribal resources. The Licensees' Proposal includes one PM&E measure, CR1, specifically related to cultural resources. Measure CR1 would implement the HPMP, which is filed with FERC separately as Privileged, as it contains confidential information that is provided only to those on a need to know basis. The measures included in the HPMP were developed in consultation with interested agencies and Indian tribes. The HPMP describes actions and processes to

manage historic properties within the APE under the new license. It serves as a guide for the Licensees when performing necessary O&M activities, and identifies resource treatments designed to address potential ongoing and future effects to historic properties. Resource-specific management measures included in the HPMP for treatment of historic properties include avoidance and monitoring, NRHP evaluation efforts, and mitigation measures for resolving adverse effects. The HPMP also describes a process of consultation with appropriate State and federal agencies, as well as with Indian tribes who may have interests in historic properties within the APE. Following the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* issued by FERC and ACHP in 2002 (ACHP and FERC 2002), the HPMP includes: management measures; training for all O&M staff; routine monitoring of known cultural resources; and periodic review and revision of the HPMP.

FERC typically completes NHPA Section 106 by entering into a Programmatic Agreement with the Advisory Council on Historic Preservation and the SHPO that typically requires the license applicants to develop and implement a HPMP that considers and manages effects on historic properties throughout the term of the license.

As stated in 36 CFR § 800.5(a)(1), the regulations guiding compliance with NHPA Section 106, an adverse effect to an historic property

...is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

Examples of adverse effects would include road maintenance that affects a previously undisturbed archaeological deposit, or upgrades to Project facilities that remove the windows or doors of a historic powerhouse and does not replace them in kind, with new windows and doors similar to the original style and material. In addition, certain kinds of Project-related activities may not have a direct impact on historic properties, but may create the conditions by which damage occurs. For example, a Project road may not directly affect historic properties, but may enable public access to areas that contain historic properties.

By contrast, there are Project activities that may not have an adverse effect on historic properties and there may also be historic properties within the APE that are not subject to Project O&M. For example, the continued use of a paved access road that is closed to the public and travels through a historic property that is an archaeological site would likely not be considered an adverse effect. Or a historic property comprising a recreation facility would likely not be adversely affected by continued use and maintenance of the

facility, if the facility is used as it has been in the past and any maintenance activities maintain the existing integrity of the facility. Furthermore, there may be historic properties located within the APE that are completely avoided by routine Project O&M. Subsequently, Project activities may not adversely affect these historic properties.

5.8.2.1 Effects of the Proposed FERC Boundary Changes

As previously noted, the Licensees propose several changes to the existing Project boundary to more accurately define lands necessary for the safe O&M of the Project and other purposes, such as recreation, shoreline control, and protection of environmental resources. The proposed modifications to the existing Project boundary would include the addition of new lands where Project activities occur and the proposed removal of lands where there are no Project facilities and where Project O&M is not performed. These proposed changes are essentially corrections to the existing Project boundary. Other modifications would include revising the existing Project boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE, including the use of a 100-foot buffer from Pyramid Lake's NMWSE to define the proposed Project boundary around portions of the lake, thereby reducing the land area considerably.

The proposed changes to the existing Project boundary would result in the exclusion of four archaeological sites located within the existing Project boundary (Table 5.8-10). One site is located on NFS lands managed by the ANF. Archaeological site P-19-001015 is an unevaluated prehistoric site and will continue to be managed by USFS. Thus, its exclusion from the proposed Project boundary will not result in an adverse effect on historic properties.

Table 5.8-10. Archaeological Sites and Transmission Line Omitted from the Proposed Project Boundary and APE

Primary No.	Trinomial	ANF No.	Description	Landowner	NRHP Eligibility
P-19-001015	CA-LAN-1015	None	Prehistoric lithic scatter	ANF	Unevaluated
P-19-003221	None	None	Prehistoric quarry and lithic tool manufacture site	Private	Unevaluated
P-19-003222	None	None	Prehistoric cobble quarry/workshop	Private	Unevaluated
P-19-003228	None	None	Prehistoric BRM	Private	Unevaluated

Source: 2015 SCCIC records search; 2018 Field Survey

Key:

ANF = Angeles National Forest

APE = Area of Potential Effects

BRM = Bedrock Mortars

CRHR = California Register of Historic Resources

Lithic = stone (modified)

No. = number

NRHP = National Register of Historic Places

SCCIC = Southern Central California Information Center

The other three archaeological prehistoric sites consist of P-19-3221, P-19-3222, and P-19-3228. None of these sites has yet been evaluated by the Licensees for their potential listing on the NRHP, and each is located on Tejon Ranch, a private landowner. Development of this land would require the permitting agency to comply with all aspects of CEQA, including cultural and tribal resources consultation.

5.8.3 Unavoidable Adverse Effects

Implementation of the HPMP will include treatment measures for managing historic properties under the new FERC license, will resolve these adverse effects, and provide measures for the potential avoidance, reduction, or minimization of adverse effects resulting from future Project O&M and Project-related recreation.

5.9 SOCIOECONOMICS

5.9.1 Existing Environment

This section provides information regarding socioeconomic resources in the Project region. This section is divided into three main sub-sections. The first sub-section, Section 5.9.1, is further divided into two sections. Section 5.9.1.1 describes the population characteristics and socioeconomic resources in the region in which the Project is located, including population size and density, race and ethnicity, education, housing and household characteristics, labor force and income, and industries. Other land development and management considerations are also discussed in 5.9.1.1. Section 5.9.1.2 describes Project-specific information regarding the Pyramid Lake Recreation Area and the SWP facilities within the proposed Project boundary. The effects of the Licensees' Proposal on socioeconomic resources are described in Section 5.9.2. Unavoidable socioeconomic adverse effects of the Licensees' Proposal are addressed in Section 5.9.3.

Existing, relevant, and reasonably available information is sufficient to determine the potential effects of the Licensees' Proposal on socioeconomics and to inform requirements in the new license; therefore, the Licensees did not conduct any relicensing studies related to socioeconomics.

The Project is located south of the Tehachapi Mountains in the northwestern corner of Los Angeles County, California. The Ventura County line is located approximately 1 mile west of Pyramid Lake and the Kern County line is located approximately 3 miles north of Quail Lake. The proposed Project boundary covers 4,563.8 acres of land; of that total, 2,007.0 acres are federal lands. The majority of federal lands are managed by the ANF as part of the NFS. A small portion (6.5 acres) is administered by BLM.

The Project is located north of Castaic, , a community defined by the United States Census Bureau as a census designated place (CDP) northwest of the City of Los Angeles in close proximity to Interstate 5. Los Angeles County supports a variety of industrial and commercial activities and is the State's and the nation's most populated

county (U.S. Census Bureau 2015). Los Angeles County has a diverse geographical profile that covers 4,752 square miles, including: 70 miles of coast on the Pacific Ocean; the San Gabriel Mountains with the highest peak at 10,064 feet (Mt. Baldy), and part of the Mojave Desert in the northern portion of Los Angeles County. Provided below is a description of the population size, race and ethnicity, education, housing and household characteristics, labor force and income, and industries for Los Angeles County.

5.9.1.1 *Population Characteristics and Socioeconomic Resources*

Population Size and Density

The population of Los Angeles County was approximately 9.8 million people in 2010, an increase of 3.1 percent from approximately 9.5 million people in 2000. California Department of Finance projections indicate that population growth in Los Angeles County is expected to continue increasing by approximately 11.3 percent over the next 20 years, to over 10.9 million people by 2030 (Table 5.9-1), and the population density could exceed 2.6 thousand people per square mile by 2030. Urban areas within the county contain more concentrated population densities.

Table 5.9-1. Historic and Forecasted Population and Population Density

Los Angeles County	2000 Census	2010 Census	Percent Change (2000 through 2010)	2020 Projection	2030 Projection	Percent Change (2010 through 2030)
Population (people)	9,519,338	9,818,605	3.1	10,435,991	10,930,986	11.3
Population Density (people/square mile) ¹	2,346	2,420		2,572	2,694	

Sources: U.S. Census Bureau 2000, 2010e; California Department of Finance 2014

Note:

¹Los Angeles County projected population density calculated with 4,058 square mile land area.

There are 88 cities and more than 100 unincorporated areas in Los Angeles County. The proposed Project boundary is not located within any incorporated city. The City of Los Angeles is located approximately 17 miles south of the proposed Project boundary and is the most populous city in Los Angeles County, with a population of 3,792,621 and population density of 8,092 people per square mile in 2010.

Within 10 miles of the existing Project boundary are the City of Santa Clarita and the CDPs of Castaic and Stevenson Ranch; each has a population of greater than 10,000. Populations and densities for these three communities are presented in Table 5.9-2.

Table 5.9-2. City and Census Designated Places with a Population of 10,000 or More Within 10 Miles of the Existing Project Boundary, 2010

Cities and Census Designated Places	Population	Los Angeles County (percent)	Population Density (people per square mile)
City of Santa Clarita	176,320	1.8	3,345
Castaic CDP	19,015	0.2	2,619
Stevenson Ranch CDP	17,557	0.2	2,760

Source: U.S. Census Bureau 2010e

Key:

CDP = census designated place

Age

The proportionate distribution of age groups in Los Angeles County is largely similar to the State as a whole. As shown in Table 5.9-3, the 65 years old and over population group increased by approximately 21 percent in both the county and statewide from 2010 through 2017. Also as shown in Table 5.9-3, the percentages of individuals 19 years old and younger have declined in both the county and across the State. For persons in the 20 to 64 year old age range, there was a marginal increase for Los Angeles County and a minimal decrease throughout California.

Table 5.9-3. Los Angeles County Age Groups, 2010 through 2017

Population Age	Los Angeles County		California	
	2017 (percent of population)	2010 through 2017 (percent change)	2017 (percent of population)	2010 through 2017 (percent change)
Persons under 5 years old	6.1	-7.6	6.2	-8.8
Persons 5 to 19 years old	18.4	-12.0	19.3	-9.4
Persons 20 to 64 years old	62.2	1.0	60.5	-0.2
Persons 65 years old and over	13.3	21.0	13.8	21.1

Sources: U.S. Census Bureau 2017a, 2017b, 2010a, 2010b

Race and Ethnicity

The racial and ethnic makeup of Los Angeles County compared to the statewide makeup is presented in Table 5.9-4. In 2017, the county and State populations were predominantly of Hispanic or Latino origin; White alone (not Hispanic or Latino) comprised the second largest group; Asian alone represents the third largest group. In Los Angeles County, those of Hispanic or Latino origin make up a larger proportion of the population than in the State. While the American Indian and Alaska Native alone and the Native Hawaiian and Other Pacific Islander alone groups represented the

smallest shares of the total county and statewide populations in 2017, these groups experienced the most substantial population growth between 2010 and 2017.

Table 5.9-4. Regional Race and Ethnicity, 2010 through 2017

Race and Ethnicity	Los Angeles County		California	
	2017 Population ¹ (percent)	Percent Change (2010 through 2017)	2017 Population ¹ (percent)	Percent Change (2010 through 2017)
Hispanic or Latino	48.6	1.9	39.1	4.0
White alone, not Hispanic or Latino	26.2	-5.8	37.2	-7.2
Asian alone	15.3	13.3	15.2	18.8
Black or African American alone	9.0	8.4	6.5	12.0
American Indian and Alaska Native alone	1.4	600.0	1.6	300.0
Native Hawaiian and Other Pacific Islander alone	0.4	100.0	0.5	66.7

Sources: U.S. Census Bureau 2010c, 2010d, 2017c

¹Totals more than 100 percent due to rounding

Education

Education levels (i.e., high school graduate or higher and bachelor's degree or higher for persons age 25 years and over) in Los Angeles County and California are displayed in Table 5.9-5.

Table 5.9-5. Regional Education, 2013 through 2017

Education	Los Angeles County (percent)	California (percent)
High school graduate or higher (persons age 25 years and over)	78.2	82.5
Bachelor's degree or higher (persons age 25 years and over)	31.2	32.6

Source: U.S. Census Bureau 2017c

Housing and Household Characteristics

Table 5.9-6 provides housing and household characteristics, including housing units, homeownership rate, median home value, and median household income for Los Angeles County and the State. Los Angeles County contains approximately 25 percent of the State's housing units and has higher median home values and lower ownership rates than the State overall. The number of people per household is similar between Los Angeles County and the State, while median household incomes are lower in Los Angeles County than the State.

Table 5.9-6. Housing and Household Characteristics, 2013 through 2017

Housing/Household	Los Angeles County	California
Housing units ¹	3,542,636	14,176,670
Owner-occupied housing unit rate, percent	45.9	54.5
Median value of owner-occupied housing units	\$495,800	\$443,400
Households	3,295,198	12,888,128
Persons per household	3.01	2.96
Median household income ²	\$61,015	\$67,169

Source: U.S. Census Bureau 2017c

Notes:

¹The total number of housing units as of July 1, 2017.

²In 2017 dollars.

Labor Force and Income

Labor force and income characteristics for Los Angeles County and the State are presented in Table 5.9-7. Los Angeles County comprises over 26 percent of the civilian labor force in the State. The unemployment rate for both Los Angeles County and the State was 4.5 percent (California Employment Development Department 2018). Los Angeles County per capita income is less than the per capita income in the State, and the percent of persons in poverty in Los Angeles County, as estimated by the U.S. Census Bureau (2017c), exceeds the percent of persons in poverty in the State.

Table 5.9-7. Civilian Labor Force, Unemployment, Income, and Poverty, 2017

Year	Los Angeles County	California
Labor Force ^{1,2}	5,147,000	19,391,000
Unemployment Rate, percent ^{1,2}	4.5	4.5
Per capita income ³	\$30,798	\$33,128
Persons in poverty, percent	14.9	13.3

Sources: California Employment Development Department 2018; U.S. Census Bureau 2017c

Note:

¹November 2017 data.

²Seasonally adjusted.

³Per capita income in past 12 months (in 2017 dollars), 2013-2017.

Industry

Los Angeles County's diverse geography, extensive natural resources, and economic and population centers provide unique opportunities for goods-producing, service-providing, and government industry sectors. Table 5.9-8 summarizes the percent of labor force and earnings by industry in Los Angeles County for 2017. Service-providing industries support the majority (87.1 percent) of the labor force within Los Angeles

County, while goods-producing industries represent 12.9 percent of the county's labor force.

Table 5.9-8. Los Angeles County Industry Labor Force and Earnings, 2017

Industry ^{1,2}	Labor Force (percent) ²	Earnings ³ (\$1,000)
Service-Providing	87.1	\$201,629,024
Trade, Transportation, and Utilities	21.7	\$41,161,889
Information	5.3	\$26,083,012
Financial Activities	5.8	\$23,119,153
Professional and Business Services	15.9	\$47,775,661
Education and Health Services	20.3	\$35,816,836
Leisure and Hospitality	13.7	\$19,947,461
Other Services	3.9	\$6,382,047
Unclassified	0.6	\$1,342,964
Goods-Producing	12.9	\$34,028,799
Natural Resources and Mining	0.2	\$465,000
Construction	3.6	\$8,733,863
Manufacturing	9.0	\$24,829,937
Government (Local, State, Federal)	15.0	\$40,300,456

Source: California Employment Development Department 2017

Notes:

¹These data represent the count of employment and wages for workers covered by unemployment insurance programs in the time period indicated. They are the product of a Federal-State cooperative program known as the Quarterly Census of Employment and Wages, or ES-202, program. "Industry" = the full title of the industry as found in the North American Industry Classification system.

²The average of the monthly employment for 2017, expressed as a percent of the total number of employees for all industries in Los Angeles County (3,813,583 workers) for that year. Employment is the number of filled jobs for the pay period that includes the 12th day of each month as reported by the employer and it includes full and part-time workers. If a person holds two jobs, that person would be counted twice in these data.

³The total compensation paid by an employer during the time period, regardless of when the services were performed. Wages include bonuses, stock options, the cash value of meals and lodging, tips and other gratuities. These data are displayed in thousands of dollars.

Other Land Development and Management Considerations

Angeles National Forest and the Local Economy

The geographic boundary of the ANF covers over 650,000 acres (one-quarter of Los Angeles County) (USFS 2018). The ANF supports the local economy largely through local and non-local visitor recreation, and investments in the construction and maintenance of infrastructure and environmental restoration within the forest. In 2016, ANF supported approximately 1,920 local jobs and \$113,967,000 in local labor income. Of these totals, recreation, including both local and non-local visitors, supported an average of 670 jobs and \$29,719,000 in local labor income (USFS 2016).

Roads

Numerous public and private roads are located within and adjacent to the proposed Project boundary. The public roads are largely maintained by Caltrans District 7, Los Angeles. The Caltrans' 2018/2019 budget for transportation includes \$13.6 billion (Caltrans 2018). In addition, several public roads maintained by USFS are within the proposed Project boundary.

Law Enforcement in Project Recreation Areas

The responsible agency for policing Pyramid Lake and the surrounding areas is the Los Angeles County Sheriff's Department, Parks Bureau. DWR and the Los Angeles County Sheriff's Department have an operating agreement, whereby DWR provides funding for Los Angeles County Sheriff's Department services at Pyramid Lake. Eleven permanent deputies and two sergeants are assigned to operations of both Pyramid Lake and the non-Project Castaic Lake (outside the existing and proposed Project boundaries). The Los Angeles County Sheriff's Department has specially trained deputies who can respond to all emergencies. Deputy responsibilities also include enforcing all State, local, and boating laws; enforcing CDFW regulations; responding to and investigating boating accidents; responding and extinguishing vessel fires; and providing public education regarding boating safety requirements (Los Angeles County Sheriff's Department 2018). The Los Angeles County Sheriff's Department, Santa Clarita Station is also the first responder for areas below Pyramid Dam, including the access road to the dam.

Recreational facilities at Quail Lake are owned and operated by DWR. The Quail Lake shoreline is open to pedestrians for fishing, hiking, and walking (the lake surface is not open to the public). DWR's private security staff patrol the recreational parking area, shorelines, and oversee the lake surface. DWR's security staff monitor the facilities, and anything unusual is documented in a TR and reported to DWR's ACC.

Refer to Exhibit E, Land Use Sections 5.6.1.7 and 5.6.1.8, for additional information about public safety and law enforcement, respectively, in the Project area.

Centennial Development

The Centennial development is a proposed 12,323-acre, master-planned community on the Tejon Ranch, located in the northwestern portion of the Antelope Valley and immediately north and east of Quail Lake and the proposed Project boundary. The development would allow up to: 19,333 dwelling units; approximately 7,363,818 square feet of business park uses (office, research and development, warehousing or light manufacturing uses); approximately 1,034,550 square feet of commercial uses; approximately 1,568,160 square feet of institutional/civic uses (schools for higher education, medical facilities, libraries); approximately 130,680 square feet of recreation/entertainment uses (clubhouse, farmers market, childcare facilities, health clubs); and approximately 5,624 acres of open space for natural resources protection

and greenways. In addition, the development would have schools, utilities, and infrastructure to support the proposed land uses and future residents, including a wastewater reclamation facility, water treatment facility, water bank, materials recovery facility, and Kindergarten through 12th grade schools (Los Angeles County Department of Regional Planning 2017).

The Centennial development also requires off-site components consisting of roadway improvements, and connections and upgrades to existing off-site utility systems. Improvements to utilities within State Highway 138 include the roadway crossing of the Lower Quail Canal within the proposed Project boundary. In addition, along the aqueduct, upstream of Quail Lake and outside of the proposed Project boundary, a new bridge would be constructed and an existing bridge expanded (Los Angeles County Department of Regional Planning 2017). On December 11, 2018, the Los Angeles County Board of Supervisors approved the Centennial development project, including a general plan amendment, specific plan, parcel map, and conditional use permit, and certified the FEIR under CEQA. While there are no ongoing effects to the Project since this development is only in the planning and initial approval stages, the Centennial development project, once built, could lead to the increase in the number of people that use Project recreation facilities at Quail Lake and Pyramid Lake.

5.9.1.2 Project-Specific Socioeconomic Information

As part of the Project, Pyramid Lake Recreation Area and the SWP within the proposed Project boundary contribute to the national, regional, and local economies. Revenues and expenditures for Pyramid Lake Recreation Area and the section of the SWP within the proposed Project boundary are summarized below. Though there are no fees associated with recreation at Quail Lake, recreation at Quail Lake does contribute to the local and state economies through visitors' purchases of: fuel for their cars at local gas stations; food and beverages at local markets and restaurants; fishing supplies from area purveyors; and State fishing licenses.

The continued O&M of the Project provides energy recovery for the SWP which, through sales of power generated, partially offsets the cost of delivering SWP water to water contractors and benefits local populations in reduced consumer costs.

Project use at recreation sites creates demands on public services in the form of sheriff and fire protection. DWR and the Los Angeles County Sheriff's Department entered into an operating agreement whereby DWR provides funding for Los Angeles County Sheriff's Department services at Pyramid Lake to offset the cost of these public services. The Project's demand for these public services, based on projected use of recreation facilities, is minimal compared to the county-wide demand and the population served as a whole.

Pyramid Lake Recreation Area

The Pyramid Lake Recreation Area, including the Los Alamos Campgrounds, is an important recreational area in Los Angeles County, and its annual attendance totaled 105,094 visitors (96,898 day use and 8,196 night use) in 2014 (DWR 2014). The Pyramid Lake recreation facilities, including the Los Alamos campgrounds, are owned by USFS and administered and maintained by DWR under the terms of a MOU, last updated in April 2010.

Fee collection and daily O&M at the campgrounds are carried out by RMR, a recreation concessionaire. Table 5.9-9 provides an overview of 2018 gross profit and expenditures for the Pyramid Lake concessionaire.

Table 5.9-9. Summary of Pyramid Lake Recreation Area Concessionaire Profit and Expenditures, 2018

Revenue	
Los Alamos Camping	\$ 99,352.00
Los Alamos Other	13,015.00
Emigrant Day Use	381,318.00
Emigrant Other	78,950.00
Emigrant Boat Rentals	177,576.00
Emigrant Boat Storage	19,405.00
Vaquero Day Use	34,461.00
Total Revenue	\$ 804,077.00
Cost Of Sales	
Maintenance and Supplies	35,819.00
Gasoline	11,447.00
Bait, Tackle, and Merchandise	37,822.00
Salaries and Taxes	431,800.00
Fees to DWR	40,203.85
Total Cost Of Sales	\$ 557,091.85
GROSS PROFIT	\$ 246,985.15
Operating Expenses	
Advertising / Subscriptions	\$ 350.00
Auto Expense	5,000.00
Insurance	43,200.00
Office Supplies	3,476.00
Postage	1,200.00
Utilities	25,325.00
Trash	26,098.00
Total Operating Expenses	\$ 104,649.00
NET PROFIT	\$ 142,336.15

Recreation capital improvement projects are funded by DWR. Projects related to recreational boating access and enhancement such as boat launches, docks, and boat-in day use facilities are submitted by DWR to DPR's Department of Boating and Waterways for funding, with revenue generated from boater registration fees. If funds are available, DPR's Department of Boating and Waterways uses those funds; otherwise DWR funds, designs, and constructs these boater recreation projects.

Monthly attendance for 2017 at Pyramid Lake Recreation Area is provided in Table 5.9-10. The recreation area received its highest amount of visitors between June and August. The lowest attendance for Pyramid Lake occurred in December, with 3,214 visitors to the recreation area. Monthly attendance at Pyramid Lake in 2017 was similar across monthly averages compared with data from the previous years on record (RMR 2017). Attendance at Pyramid Lake results in generated revenue which is collected from entry fees to the lake and campsites, boat rentals, boat storage, and concessions sold within the recreation area. This revenue helps fund the continued O&M of the public recreation facilities and, in turn, feeds into the regional economy and helps keep the sites maintained so recreationists continue frequenting the facilities.

Table 5.9-10 Pyramid Lake Visitation Numbers, 2017

Month¹	Attendance Total²
April	10,868
May	16,622
June	23,103
July	36,368
August	21,010
September	13,833
October	5,604
November	4,100
December	3,124

Source: RMR 2017

Notes:

¹Data is not available for January through March 2017.

²Attendance is cumulative of visitors at Los Alamos Campground, Emigrant Landing day use areas, and Vaquero Day Use Area.

State Water Project Facilities Within the Proposed Project Boundary

Project facilities contribute to the national and local economies through O&M activities and related employment. Table 5.9-11 presents operating expenditures in 2018, including labor and non-labor expenditures, for parts of the SWP within the proposed Project boundary, Quail Lake Outlet through Warne Powerplant, Pyramid Lake and Dam and Vista Del Lago Visitors Center, Angeles Tunnel, Castaic Powerplant, and Elderberry Forebay. The Licensees' current workforce assigned to the Project comprises approximately 114 positions. Of that number, the Project employs on-site

approximately 78 positions: 26 DWR staff in its SFD, headquartered at Pearblossom, California, and 52 LADWP staff, headquartered at the Castaic Powerplant.

Table 5.9-11. Operations Expenditures for State Water Project Facilities Within the Project Boundary, 2018

Operating Expenditures	DWR (in \$) ¹	LADWP (in \$)
Non-Labor Operating Expenditures ²	3,972,165	16,275,200
Labor ³	5,317,953	7,696,300
Total	9,290,118	23,971,500

Notes:

¹Source: DWR 2018

²Non-Labor operating expenses include: internal and external consultants, facility operations, general expenses, other items of expense, safety supplies, travel, capital outlays, and communications costs.

³Labor expenses include direct labor and labor assessment costs.

5.9.2 Effects of the Licensees' Proposal

This section discusses the potential socioeconomic effects of the Licensees' Proposal. The Licensees have not proposed any measures related to socioeconomics because the Licensees' Proposal would have less than significant adverse effects on socioeconomics.

The change to the proposed Project boundary would not change existing Project facilities, operations, or maintenance, nor would there be changes to recreation at Pyramid Lake, Project power generation, or local water deliveries. Local businesses will continue to earn revenue from recreation use at Pyramid Lake. This revenue will in turn continue to contribute to local and regional economic activity. The Project also will continue to provide employment, including for the concessionaire operating the recreation area at Pyramid Lake.

Continued O&M of the Project and Project-related recreation would require some commitment of local law enforcement, including Los Angeles County Sheriff's Department for policing Pyramid Lake and the surrounding area, and fire protection resources. There have been few, if any, Project-caused wildfires; however, should a fire occur, local fire response services would be needed. Local fire response resources would only be needed in cases of emergencies. In addition, Project facilities provide sources of water for fighting fires. A proposed fire prevention and response plan will help coordinate resources and the Licensees' assistance in the event of a fire on Project lands.

The Centennial development is expected to substantially increase the population in the Project area over time. This development incorporates open space areas for passive recreation, such as hiking and picnicking, and recreation/entertainment areas, including health clubs and a clubhouse. The development does not include the type of recreation facilities offered by the Project, such as campgrounds and boating. Therefore, it is expected that new residents would increase demand for use of Project recreation

facilities during the term of the new license to some extent. This increase in demand for recreation is not attributed to the Project or the Licensees' Proposal, but rather the cumulative effects of population growth in the Project area during continued operation of the recreation facilities under the new license.

5.9.3 Unavoidable Adverse Effects

Continuation of the Project under the Licensees' Proposal would continue to require local public services in the form of police, fire, and public works. However, under the new license term conditions, these needs are expected to remain substantially the same as under the existing license, and no new adverse effects are expected to occur.

5.10 AIR QUALITY

This section discusses air quality in the Project region. Existing conditions are discussed in Section 5.10.1. The effects of the Licensees' Proposal on air quality, including effects associated with greenhouse gas (GHG) emissions, are described in Section 5.10.2, and unavoidable adverse effects are discussed in Section 5.10.3. The Licensees did not conduct any studies related to air quality for the Project; existing, relevant, and reasonably available information is sufficient to determine the potential effects of the Licensees' Proposal on air quality and to inform any relevant requirements in the new license.

5.10.1 Existing Environment

This section begins with a discussion of regulatory context, and then describes existing air quality conditions.

5.10.1.1 *Regulatory Context*

The California Air Resource Board (CARB), as part of the California Environmental Protection Agency, is responsible for protecting public health and the environment from the harmful effects of air pollution. Pollutants associated with air emissions, such as ozone (O₃), particulate matter, and nitrogen dioxide (NO₂), are associated with respiratory illness. Carbon monoxide (CO), another air pollutant, can be absorbed through the lungs and into the bloodstream, reducing the ability of blood to carry oxygen. Typical sources of air emissions include commercial and industrial operations, fugitive dust, cars and trucks, aircraft, boats, trains, and natural sources, such as biogenic and geogenic hydrocarbons and wildfires.

To reduce harmful exposure to air pollutants, the federal Clean Air Act requires the EPA to set outdoor air quality standards for the nation with the option for states to adopt additional, or more protective standards, if needed. CARB has adopted ambient (outdoor) air quality standards (AAQS) that are more protective than federal standards and have implemented standards for some pollutants not addressed by federal standards. An AAQS establishes the concentration above which the pollutant is known to cause adverse health effects to sensitive groups within the greater population, such

as children and the elderly. The goal is for localized effects not to cause or contribute to an exceedance of the standards. Criteria pollutants for which AAQS have been established include O₃, particulate matter, CO, NO₂, sulfur dioxide, and lead. California and federal AAQS for criteria pollutants are presented in Table 5.10-1.

Both the State and federal governments use ambient air monitoring data to classify areas according to their attainment status with respect to criteria pollutants. These designations are used to identify areas with air quality problems and help determine whether Project emissions would be considered significant under NEPA and CEQA. The three basic designation categories are:

- Attainment – Ambient air quality is not in violation of the established standard for the specific criteria pollutant.
- Nonattainment – Ambient air quality violates the established standard for the specific criteria pollutant.
- Unclassified – There is currently insufficient data for determining attainment or nonattainment.

In addition to the above designations, the State includes a sub-category of the nonattainment designation:

- Nonattainment-transitional – Nonattainment areas that are making progress and nearing attainment.

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Table 5.10-1. California and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards ¹		Federal Standards ²		
		Concentration ³	Method ⁴	Primary ^{3,5}	Secondary ^{3,6}	Method ⁷
Ozone (O ₃) ⁸	1 Hour	0.09 ppm (180 µg/m ³)	Ultraviolet Photometry	--	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m ³)		0.070 ppm (137 µg/m ³)		
Respirable Particulate Matter (PM10) ⁹	24 Hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m ³		--		
Fine Particulate Matter (PM2.5) ⁹	24 Hour	--	--	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m ³	Gravimetric or Beta Attenuation	12.0 µg/m ³	15 µg/m ³	
Carbon Monoxide (CO)	1 Hour	20.0 ppm (23 mg/m ³)	Non-Dispersive Infrared Photometry	35 ppm (40 mg/m ³)	--	Non-Dispersive Infrared Photometry
	8 Hour	9.0 ppm (10 mg/m ³)		9 ppm (10 mg/m ³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m ³)		--	--	
Nitrogen Dioxide (NO ₂) ¹⁰	1 Hour	0.18 ppm (339 µg/m ³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m ³)	--	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m ³)		0.053 ppm (100 µg/m ³)	Same as Primary Standard	
Sulfur Dioxide (SO ₂) ¹¹	1 Hour	0.25 ppm (655 µg/m ³)	Ultraviolet Fluorescence	75 ppb (196 µg/m ³) ⁹	--	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	--		--	0.5 ppm (1,300 µg/m ³)	
	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹⁰	--	
	Annual Arithmetic Mean	--		0.030 ppm (for certain areas) ¹⁰	--	
Lead ^{12, 13}	30 Day Average	1.5 µg/m ³	Atomic Absorption	---	--	High Volume Sampler and Atomic Absorption
	Calendar Quarter	--		1.5 µg/m ³ (for certain areas) ¹²	Same as Primary Standard	
	Rolling 3-Month Average	--		0.15 µg/m ³		
Visibility Reducing Particles ¹⁴	8 Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m ³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m ³)	Ultraviolet Fluorescence			
Vinyl Chloride ¹²	24 Hour	0.01 ppm (26 µg/m ³)	Gas Chromatography			

Source: CARB 2016
Notes (CARB 2016):
¹California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
²National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m³ is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
³Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
⁴Any equivalent measurement method which can be shown to the satisfaction of the CARB to give equivalent results at or near the level of the air quality standard may be used.
⁵National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
⁶National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
⁷Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
⁸On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
⁹On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m³ to 12.0 µg/m³. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 µg/m³, as was the annual secondary standard of 15 µg/m³. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m³ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
¹⁰To attain the 1-hour national standard, the 3-hour average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards, the units can be converted from ppb to ppm.
¹¹On June 2, 2010, a new 1-hour SO₂ standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO₂ national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
¹²The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
¹³The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
¹⁴In 1989, the CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.
Key:
µg = microgram; m³ = cubic meter; mg = milligram; ppb = part per billion; ppm = part per million; O₃ = ozone

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5.10.1.2 Existing Air Quality

To manage air quality problems, the State is divided into 15 air basins, each of which is associated with one or more Air Quality Management Districts (AQMD). The area of Los Angeles County, in which the Project is located, is within the South Coast AQMD (CARB 2017). Table 5.10-2 shows the current federal and State attainment status for each pollutant in Los Angeles County.

Table 5.10-2. Attainment Status for Air Quality Pollutants in Los Angeles County

Pollutant	State Attainment Status	National Attainment Status
Ozone (8-hour)	Nonattainment	Nonattainment
Carbon Monoxide	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Fine Particulate Matter	Nonattainment	Nonattainment
Respirable Particulate Matter	Nonattainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead	Attainment	Nonattainment
Sulfates	Attainment	No Federal Standards
Hydrogen Sulfide	Unclassified	
Visibility Reducing Particles	Unclassified	

Sources: CARB 2017; EPA 2018

Note:

¹The federal 1-hour ozone rule was vacated on June 15, 2005.

The topography and meteorology of Los Angeles County and the Transverse Ranges are important factors in the environmental effects of air quality in the Project vicinity. Dispersion of high pollutant concentrations is influenced by the mountainous topography, with wind flows directed around mountains in some areas, which can result in air stagnation in downwind basins.

The Project is situated within geographic areas that are currently designated as nonattainment for 8-hour ozone, Fine Particulate Matter (PM_{2.5}), Respirable Particulate Matter (PM₁₀) (State only), and Lead (federal only). Project O&M and the use of recreation facilities generate minor amounts of air pollutants, mainly in the form of automobile emissions, motorized water craft emissions, and campfires during recreation facility use. While the Licensees have not quantified these emissions, the nature and relative volumes of the emissions suggest that they are minor. Also, emissions from recreational activities vary by season, with more activity and emissions generated during the warmer months and less during the cooler months.

5.10.2 Effects of the Licensees' Proposal

This section discusses the potential air quality effects of the Licensees' Proposal. The Licensees have not proposed any measures specifically related to air quality because the Licensees' Proposal would have a less than significant adverse effect on air quality.

No substantial change in emissions are expected to occur for the term of the new license. Project O&M would result in continuing the same air pollutant emissions as the existing Project currently generates. The Licensees' Proposal does not include any new permanent sources of air pollutants. It is conceivable that some short-term Project-related activities could require the Licensees to obtain activity-specific permits and approvals, which might include air quality permits. Adherence to the requirements of such permits would minimize air quality effects. Operation of the Project under the Licensees' Proposal would not result in a net increase of any criteria pollutant, including O₃. Therefore, the Licensees' Proposal would have a less than significant adverse effect on air quality.

Since hydroelectric systems are considered a zero emission resource, the air quality impacts associated with criteria pollutants and GHG emissions are expected to be less than significant. In addition, Castaic Powerplant stores energy by pumping during the day using emissions-free energy and will generate in the evening when less emissions-free energy is available.

5.10.3 Unavoidable Adverse Effects

The use of facilities within the Licensees' Proposal will generate some emissions, mostly through vehicular use; however, the effects are expected to be minor and seasonal. Project O&M and the use of recreation facilities will generate minor amounts of air pollutants, mainly in the form of automobile emissions, motorized water craft emissions, and campfires during recreation facility use. Some Project-related maintenance (e.g., recreation facilities improvements) may require DWR to obtain certain permits and approvals, which may include air quality permits. Adherence to the requirements of those permits will minimize air quality effects. The Licensees' Proposal would not create any short- or long-term unavoidable adverse effects related to air quality.

5.11 NOISE

This section discusses noise in the Project region. Existing conditions are discussed in Section 5.11.1, the effects of the Licensees' Proposal are described in Section 5.11.2, and any unavoidable adverse effects are described in Section 5.11.3.

The Licensees did not conduct any studies related to noise for the Project; existing, relevant, and reasonably available information is sufficient to determine the potential effects of the Licensees' Proposal on noise and to inform requirements in the new license.

5.11.1 Existing Environment

This section includes a background discussion of how noise is generally defined, the existing regulatory context related to noise, and the existing sources of noise associated with the Project.

5.11.1.1 *Background Information*

Noise is defined as unwanted sound and is emitted from many sources, including airplanes, factories, railroads, power generation plants, and motor vehicles. The magnitude of noise is described by its sound pressure. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to a common reference level, the decibel. Sound pressures described in decibels are called sound levels. Sound levels measured using an A-weighted decibel scale are expressed using the symbol “dBA”. This scale is frequency adjusted to represent the way the human ear responds to sounds. Throughout this discussion, all noise levels are expressed in dBA.

The degree of disturbance or annoyance of unwanted sound depends essentially on three factors:

- The amount and nature of the intruding noise
- The relationship between the background noise and the intruding noise
- The type of activity occurring where the noise is heard

In considering the first of these factors, it is important to note that individuals have different sensitivity to noise. Loud noises bother some people more than others. In addition, people react differently to various patterns of noise, often depending on whether such noise is viewed as uncomfortable or offensive.

With regard to the second factor, individuals tend to judge the annoyance of an unwanted noise in terms of its relationship to noise from other sources (i.e., background noise). The blowing of a car horn at night when background noise levels are relatively low (e.g., 45 dBA) generally would be more objectionable than the blowing of a car horn in the afternoon when background noise levels are higher (e.g., 55 dBA).

The third factor is related to the interference of noise with activities of individuals. In a 60-dBA environment, normal work activities requiring high levels of concentration may be interrupted by loud noises, while activities requiring manual effort may not be interrupted to the same degree. Time-averaged descriptors are utilized to provide a better assessment of time-varying sound levels. The three most common noise descriptors used in community noise surveys are the equivalent sound level (L_{eq}), percentile distributions of sound levels ($L\%$), and the day-night average sound level (L_{dn}).

The Leq is an energy-averaged sound level that includes both steady background sounds and transient short-term sounds. The Leq is equivalent in energy to the fluctuating sound level over the measurement period. The Leq is commonly used to describe traffic noise levels, which tend to be characterized by fluctuating sound levels.

The L% indicates the sound level exceeded for a percentage of the measurement period. For example, the L90 is the sound level exceeded for 90 percent of the measurement period and is commonly used to represent background sound levels. The L10 is the sound level exceeded for 10 percent of the measurement period and represents the peak sound levels present in the environment.

The Ldn is another descriptor used to evaluate community noise levels. The Ldn is a 24-hour average sound level, which includes a 10-dBA penalty added to nighttime sound levels (i.e., 10 p.m. to 7 a.m.) because people tend to be more sensitive to noise during the nighttime. The Ldn sound level is commonly used to describe aircraft and train noise levels.

5.11.1.2 Regulatory Context

For the State of California, noise intensity is discussed in terms of the Community Noise Equivalent Level, which presents a weighted average noise level that increases the relative significance of evening and nighttime noise. The Community Noise Equivalent Level descriptor is used to evaluate community noise levels, which include a 5- and 10-dBA penalty added to evening (i.e., 7 p.m. to 10 p.m.) and nighttime sound levels, respectively, in consideration of people's increased sensitivity to noise during the evening and nighttime periods.

County noise standards are generally established based on land use and zoning designations. This is done to promote acceptable noise levels that are consistent with community development goals and policies. As such, there can be variability between various counties' noise standards. The Project is located solely in Los Angeles County. Table 5.11-1 summarizes Los Angeles County's noise standards.

Table 5.11-1. Los Angeles County's Noise Standards

On-site Sound Level Descriptor	Day (7 a.m. through 10 p.m.)	Night (10 p.m. through 7 a.m.)
Residential		
Hourly Leq	50 dBA	45 dBA
Maximum	70 dBA	65 dBA
Industrial		
Hourly Leq	70 dBA	70 dBA
Maximum	90 dBA	90 dBA

Source: Los Angeles County 2015a, 2015b

Key:

dBA = sound level measured using an A-weighted decibel scale

Leq = equivalent sound level

5.11.1.3 Existing Noise

The vast majority of the Project is located in remote areas along the Interstate 5 highway corridor, and includes two areas with somewhat continuous sources of noise associated with Project powerhouses, and two areas with seasonal or intermittent sources of noise associated with recreation facilities.

The two areas where somewhat continuous noise occurs are the Warne Powerplant and the Castaic Powerplant, where noise sources include running of the units in the powerhouse and general maintenance activities. Noise from running the Project powerhouses occurs at very low levels and mostly emanates from underground chambers in relatively remote areas. Also, periodic maintenance associated with the powerplants (e.g., maintenance traffic and general maintenance activities) is normally very short in duration. The noise levels are routine in the area and low in volume, and there are no residential or commercial properties or any other noise-sensitive receptors in the immediate vicinity of either Project powerplant.

Seasonal or intermittent noise associated with recreation occurs in two areas: Quail Lake and Pyramid Lake. Noise associated with recreation facilities at Quail Lake includes vehicle parking and activities such as fishing and hiking (non-water/body contact only), and these noise levels are very local and minor. Noise associated with recreation facilities at Pyramid Lake includes seasonally higher noise levels related to PWCs and motorized boats. The recreation-related noise levels at these two areas are routine and expected by the public when visiting these recreation areas.

In addition, maintenance of Lower Quail Canal facilities, as well as the Pyramid Dam facilities and recreation facilities, can also result in some noise. However, these maintenance activities, including periodic vegetation management and road maintenance activities, are usually intermittent and short in duration.

5.11.2 Effects of the Licensees' Proposal

This section discusses the potential noise effects of the Licensees' Proposal. The Licensees have not proposed any measures related to noise because the Licensees' Proposal would have a less than significant adverse effect on noise.

O&M activities and recreational activities under the Licensees' Proposal would result in continuing the current noise generation for the term of the new license, which would occur in remote areas and would be intermittent and minor. No change in noise-generating operations or land uses near the Project are expected to occur. Therefore, the Licensees' Proposal would have a less than significant adverse effect on noise.

5.11.3 Unavoidable Adverse Effects

The impacts due to noise from the Licensees' Proposal, given the remote location of the facilities and type of activities anticipated, will be very minor and localized with respect to short-term or any long-term adverse impacts. Therefore, the Licensees' Proposal is not expected to have any unavoidable adverse effects.

6.0 DEVELOPMENTAL ANALYSIS

This developmental analysis evaluates the economic benefits of the existing Project (No Action Alternative) and the Licensees' Proposal as described in Section 2.0 of this Exhibit E; the estimated costs of these two alternatives; and PM&E measures and their effects on Project economics. This analysis evaluates economic benefits and costs of PM&E measures while focusing on power-related impacts and economic considerations. For each alternative considered, the analysis addresses the power benefits and costs derived within the context of the Licensees continuing to meet their operational requirements, including their water supply and environmental commitments.

This section analyzes the use of available water resources of the Project to generate hydroelectric power after the other commitments noted above are met. It also provides estimates of the economic benefits of the Project and the costs for proposed PM&E measures included in the Licensees' Proposal, and quantifies the effects of these measures on Project operations.

Under their proposal, the Licensees do not propose any modifications to the Project's power generation plants under the new license; the Project would continue to operate for electric power generation under the terms and conditions of any new license issued by FERC. Capacity and average annual gross power generation under the Licensees' Proposal would be substantially similar to those under the No Action Alternative; the Licensees' Proposal would not reduce power generation because the PM&E measures do not affect Project operations.

6.1 ALTERNATIVES CONSIDERED

The Licensees considered the following two alternatives:

- **No Action Alternative.** This is the current operation of the Project under its existing license conditions and operations. Under the No Action Alternative, the inflow to the Project and downstream water demands are the same as they have been historically. Under the No Action Alternative, there are no changes to existing Project facilities or operations. Costs under the No Action Alternative are the Licensees' best estimate of the costs to operate the Project in the future.
- **Licensees' Proposal.** This is the Licensees' proposed Project, including the Licensees' proposed conditions, which are described in the Licensees' Application for New License. Costs under the Licensees' Proposal are similar to the costs under the No Action Alternative, with the exception of the Licensees' proposed additions to the Licensees' Proposal and proposed PM&E measures.

6.2 POWER AND DEVELOPMENTAL BENEFITS

Under FERC's approach to evaluating the economics of hydropower projects as articulated in FERC's Order Issuing a New License to the Mead Corporation (FERC 1995), the methodology is a "current cost approach" in that all costs are presented in

present value (e.g. no consideration for potential future power costs, inflation, escalation, or deflation beyond the license issuance date; and costs to be expended over the license term are summed and normalized as current dollars) over a 30-year period. FERC’s current cost economic analysis provides a general estimate of the potential developmental benefits and costs and non-developmental benefits and costs of a project. The Licensees have prepared this section using FERC’s current cost methodology. All costs in this exhibit are provided in United States dollars to at least the nearest \$1,000.

Basic economic assumptions used by the Licensees in developing costs and benefits under both the No Action Alternative and the Licensees’ Proposal are summarized in Table 6.2-1.

Table 6.2-1. Assumptions Licensees Used in Developing Costs and Power Benefits Under the No Action Alternative and the Licensees’ Proposal

Assumption	Value
Dollars	United States dollars to the nearest \$1,000, unless otherwise specified
Period of Analysis	30 Years, consistent with Mead Decision
Base Year for Costs and Benefits	Calendar Year 2018
Annual Escalation Rate	0%

Key:
% = percent

While FERC’s current cost approach requires an applicant to base costs on a 30-year license term, the Licensees request from FERC a new license with a term of 50 years because FERC’s Policy Statement on Establishing License Terms for Hydroelectric Projects, 161 FERC ¶ 61,078 (2017) includes as a justification for granting a longer license term where significant measures are expected to be implemented under the new license for non-development purposes (environmental, recreation, water supply) or those that enhance power and developmental purposes. Further, America’s Water Infrastructure Act of 2018, Pub. L. No. 115-270, 132 Stat. 3765, requires FERC to give equal weight to investments by the licensee over the term of the existing license that resulted in redevelopment, new construction, new capacity, efficiency, modernization, rehabilitation or replacement of major equipment, safety improvements, or environmental, recreation, or other measures.

Based on these FERC and Congressional directives, a license term of 50 years is warranted. Over the years, the Licensees have invested considerable funds in the Project not required by the current license. These projects include LADWP’s \$271,000,000 modernization of the Castaic Powerplant, the \$18,000,000 addition of a 230-kilovolt (kV) circuit on the existing Castaic-Haskell transmission line (Castaic-Haskell Line 3), the \$10,000,000 upgrade of Elderberry Forebay Spillway, and the \$2,000,000 upgrade of Elderberry Forebay Dam. LADWP’s modernization upgrades on

Units 1 through 6 result in improved unit performance, efficiency, and increased capacities, and LADWP's transmission line upgrade reduces the risk of interruption of service due to wildfires and earthquakes and hardens the electrical grids with an alternate path. LADWP's upgrade of Elderberry Forebay Spillway improves flows and drainage and meets current codes and seismic requirements, and upgrade of Elderberry Forebay Dam includes installing additional and upgrading existing piezometers that will improve the accuracy and amount of data currently being collected. In addition, DWR has expended over \$17,000,000 in upgrades to the Project over the past 15 years. These include the \$14,000,000 Pyramid Dam Emergency Spillway Analysis Project to enhance dam safety, which may entail substantial additional expenditures to address any subsequent findings; the \$2,000,000 Pyramid Dam Conduit and Ducting Upgrade Project; and the \$1,000,000 Warne Development Centralized Communication System Upgrade Project. The Licensees believe that a 50-year license is necessary and appropriate to recognize these Project investments.

6.2.1 Project Annual Costs

6.2.1.1 *No Action Alternative*

Under the No Action Alternative, the Licensees' non-environmental and non-recreation average annual O&M cost for the Project is \$38,547,000: \$19,776,000 related to DWR's O&M of the Warne Power Development and \$18,771,000 related to LADWP's O&M of the Castaic Power Development, of which \$4,361,000 is for electricity to pump water from Elderberry Forebay to Pyramid Lake. These costs include O&M, station power, annual renewals and replacements, and major infrastructure repairs/improvements.

The Licensees' estimated average annual cost related to environmental actions, excluding recreation, under the existing license is \$2,124,000: \$102,000 related to DWR's operation of the Warne Power Development and \$2,022,000 related to LADWP's operation of the Castaic Power Development.

The Licensees' estimated average annual cost related to recreation actions under the existing license is \$400,000 for DWR's operations of the Warne Power Development and Castaic Power Development recreation-related facilities. Refer to Section 6.1.1 in Exhibit D of this draft Application for New License for additional details regarding costs related to the No Action Alternative.

6.2.1.2 *Licensees' Proposal*

The Licensees anticipate that the average annual cost related to non-environmental and non-recreation O&M will be the same under the Licensees' Proposal as it is under the No Action Alternative, because the Licensees do not propose any significant changes to Project generation facilities or operations.

At the time this DLA was prepared, the Licensees were collaborating with Relicensing Participants on potential PM&E measures for the new license, and therefore, detailed cost estimates for implementation of PM&E's measures in the new license at this time

are unknown. This collaboration is ongoing. As an example, the Licensees are actively working with Relicensing Participants on a Recreation Management Plan, but the details of the plan are unknown at this time. Table 6.2-2 provides the Licensees' best estimate of costs at this time for its proposed PM&E measures, with a 'TBD' (i.e., to be determined) notation in cells where costs are uncertain. The Licensees intend to include reliable, detailed PM&E measure costs in the FLA. Refer to Section 6.1.2 in Exhibit D of the Licensees' draft Application for New License for additional details regarding costs related to the Licensees' Proposal.

Table 6.2-2. Licensees' Estimated Costs in 2019 Dollars Related to Implementation of Licensees' Proposed Conditions

Licensees’ Proposed Condition		Total Capital Cost Over 30 Years ^{1, 2} (2019 U.S. Dollars)	Total O&M Cost Over 30 Years (2019 U.S. Dollars)	Annualized Cost Over 30 Years, ³ Excluding Energy (2019 U.S. Dollars)
Designation	Description			
Environment-Related Measures				
GS1	Implement the Erosion and Sediment Control Plan	\$0	\$0	\$0
WR1	Implement Pyramid Lake Water Surface Elevation Restrictions	\$0	\$450,000	\$15,000
WR2	Implement the Hazardous Materials Management Plan	\$0	\$150,000	\$5,000
AR1	Implement Flow Releases into Pyramid Reach	\$0	\$450,000	\$15,000
AR2	Implement Pyramid Lake Fish Stocking Measure	\$0	\$8,806,000	\$294,000
TR1	Develop and Implement an Integrated Vegetation Management Plan	\$0	TBD	TBD
LU1	Implement the Fire Prevention and Response Plan	\$0	\$450,000	\$15,000
LU2	Develop and Implement a Project Safety Plan	\$0	TBD	TBD
VR1	Implement the Visual Resources Management Plan	\$0	\$121,000	\$4,000
CR1	Implement the Historic Properties Management Plan	\$0	\$3,503,000	\$117,000

Table 6.2-2. Licensees’ Estimated Costs in 2019 Dollars Related to Implementation of Licensees’ Proposed Conditions (continued)

Licensees' Proposed Condition		Total Capital Cost Over 30 Years ^{1, 2} (2019 U.S. Dollars)	Total O&M Cost Over 30 Years (2019 U.S. Dollars)	Annualized Cost Over 30 Years, ³ Excluding Energy (2019 U.S. Dollars)
Designation	Description			
Recreation-Related Measure				
RR1	Develop and Implement a Recreation Management Plan	TBD	TBD	TBD
Total		TBD	TBD	TBD

Notes:

¹Refer to Appendix A of Exhibit E for the complete text of each of the Licensees’ proposed measures.

²Capital cost includes new facilities or equipment or replacement of existing facilities or equipment with facilities or equipment that extend the life expectancy of the existing facilities or equipment.

³Annualized costs are calculated by summing Capital Cost and Total O&M Cost, and dividing the sum by 30.

Key:

O&M = Operation and Maintenance

TBD = To Be Determined

U.S. = United States

6.2.2 Power Benefits

6.2.2.1 **No Action Alternative**

The Licensees estimated average annual energy production of the Project under the No Action Alternative is 683,309 MWh.

The installed capacity of the Warne Powerplant is 74,290 kW and the installed capacity of the Castaic Powerplant is 1,275,000 kW, excluding one pump-starting unit at the Castaic Powerplant, for a total Project installed capacity of 1,349,290 kW. The Licensees estimate the dependable capacity of the Warne Powerplant is 60,400 kW and the dependable capacity of the Castaic Powerplant is 201,600 kW. The total Project dependable capacity is 262,000 kW. The total average annual value of capacity of the Project is \$52,528,000.

In addition, the Licensees estimated average annual energy production of the Project under the No Action Alternative is 683,309 MWh: 304,364 MWh for the Warne Power Development and 378,945 MWh for the Castaic Power Development. The Licensees estimate that 93,775 MWh (30.8 percent) of the Warne Powerplant average total annual energy production and 353,177 MWh (93.2 percent) of the Castaic Powerplant average total annual energy production occurs as peak power. The Licensees estimate that the remaining 210,689 MWh (69.2 percent) of the Warne Powerplant average total annual energy production and the remaining 25,768 MWh (6.8 percent) of the Castaic Powerplant average total annual energy production is off-peak power. The average

annual values of the peak and off-peak power for Warne Powerplant are \$2,631,000 and \$5,892,000, respectively, and the average annual values of the peak and off-peak power for the Castaic Powerplant are \$18,961,000 and \$1,362,000, respectively. The total Project average annual energy production value is \$28,846,000. (Table 6.3-1.)

Castaic Powerplant is a crucial asset to LADWP. As a load serving entity, LADWP utilizes the Castaic Powerplant to store hundreds of megawatts, which facilitates load leveling and peak shaving. Castaic Powerplant provides valuable ancillary services to LADWP as a balancing authority, including the ability to: (1) help balance load with generation, (2) integrate intermittent energy resources, and (3) provide crucial ancillary services to the grid – namely, reactive power support, regulation and frequency support service, and operating reserve services (both spinning and supplemental). These ancillary benefits enable LADWP to maintain the dependability of its Power System, especially when power demand is high (i.e., hot summers). (LADWP 2014). LADWP estimates the value of its average annual value of ancillary services is \$84,031,000. The Warne Powerplant does not provide ancillary services.

Refer to Section 6.2.1 in Exhibit D of the Licensees’ draft Application for New License for additional details regarding the value of the Project power under the No Action Alternative.

6.2.2.2 Licensees’ Proposal

The Licensees do not propose to add or remove generation facilities from the Project, and propose to operate the Project as it has been operated historically. Therefore, average annual Project generation and value of power under the Licensees’ Proposal would be the same as under the No Action Alternative described in Section 6.2.2.1.

6.3 COMPARISON OF ALTERNATIVES

Table 6.3-1 compares the average annual power benefits and average annual costs of the No Action Alternative and the Licensees’ Proposal. For the reasons described in Table 6.2-2, Table 6.3-1 is incomplete in this DLA. At the time the DLA was prepared, the Licensees were collaborating with Relicensing Participants on potential PM&E measures for the new license, and therefore, detailed cost estimates for implementation of PM&E’s measures in the new license at this time are unknown. This collaboration is ongoing. Where the costs are unknown, the cell in Table 6.3-1 shows ‘TBD’ (i.e., to be determined). The Licensees will complete this table in the FLA.

Table 6.3-1. Comparison of Annual Power Benefits, Costs, and Net Benefits of the No Project Alternative and the Licensees' Proposal

Value	No Action Alternative	Licensees' Proposal	Change ¹
Average Annual Power Benefits			
Capacity			
Installed (kW)	1,349,290	1,349,290	0
Dependable (kW)	262,000	262,000	0
Value (2018 U.S. Dollars)	\$52,528,000	\$52,528,000	\$0
Generation			
Peak Energy (MWh)	446,952	446,952	0
Off-Peak Energy (MWh)	236,457	236,457	0
Subtotal (MWh)	683,309	683,309	0
Value (2018 U.S. Dollars)	\$28,846,000	\$28,846,000	\$0
Ancillary Services			
Regulation-Up (MWh)	438,00	438,00	0
Regulation-Down (MWh)	620,500	620,500	0
Spinning Reserve (MWh)	8,470,433	8,470,433	0
Subtotal (MWh)	9,528,933	9,528,933	\$0
Value (2018 U.S. Dollars)	\$84,031,000	\$84,031,000	\$0
Total Benefits (2018 U.S. Dollars)	\$165,405,000	\$165,405,000	\$0
Average Annual Costs			
Non-Environmental / Non-Recreation (2018 U.S. Dollars)	\$38,547,000	\$38,547,000	\$0
Environmental (2018 U.S. Dollars)	\$2,322,000	TBD	TBD
Recreation (2018 U.S. Dollars)	\$202,000	TBD	TBD
Total Value (2018 U.S. Dollars)	\$41,071,000	TBD	TBD
Average Annual Net Benefits			
Value (2018 U.S. Dollars)	\$124,334,000	TBD	TBD

Note:

¹Calculated by subtracting the No Action Alternative values from the values for the Licensees' Proposal.

Key:

kW = kilowatt

MWh = megawatt hours

U.S. = United States

6.4 OTHER DEVELOPMENTAL AND NON-DEVELOPMENTAL BENEFITS

6.4.1 Recreation

Recreation resources are focused on Quail Lake and Pyramid Lake, which are included in the Project facilities. These resources are discussed below.

6.4.1.1 *Quail Lake*

Recreational access to Quail Lake is walk-in only; natural surface trails lead to the lake from the parking area. A graveled service road surrounding the lake is open to hikers and fishermen. Shoreline fishing is permitted; however, boating and swimming are not allowed at Quail Lake.

6.4.1.2 *Pyramid Lake*

Impounded by Pyramid Dam, Pyramid Lake is popular with boaters and fishermen. In addition, the lake, its surrounding shorelines, and adjacent areas are used by swimmers, hikers, and picnickers, particularly during the summer months. Pyramid Lake recreation facilities include boat launches, swim beaches, campgrounds, shade ramadas, picnic tables, and a visitors center.

6.4.2 Water Diversions

The movement of water through Pyramid Lake is primarily driven by SWP operations, including inflow of SWP water conveyed from Quail Lake to Pyramid Lake, as well as water released to and pumped through Castaic Powerplant from Elderberry Forebay. Please refer to Exhibit B for a more detailed discussion of water diversions.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This section compares the developmental and non-developmental effects of the No Action Alternative (existing Project) and the Licensees' Proposal.

7.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the FPA (16 U.S.C. §§ 797[e] and 803[a]) require that FERC give equal consideration to all uses of the waterway on which a project is located. When FERC reviews a hydropower project, it considers the water quality, fish and wildlife, recreational, and other non-developmental values of the involved waterway equally with its electric energy and other developmental values. Accordingly, any license issued will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Based on the environmental analysis in Section 5 and the costs for each PM&E measure, the Licensees find its alternative is the preferred alternative because: (1) issuing a new license for the Project consistent with the Licensees' Proposal would allow the Licensees to operate the Project as an economically beneficial and dependable source of electrical energy; (2) the 1,349,290 kW of electric capacity would come from a renewable resource that does not contribute to atmospheric pollution, including GHGs; (3) the Project would continue to help the State provide cost-effective water supplies to southern California; (4) the public benefits would exceed those of the No Action Alternative; and (5) the measures would protect and enhance fish and wildlife resources, and improve recreation opportunities at the Project.

7.2 LICENSEES' RECOMMENDED PM&E MEASURES INCLUDED IN APPENDIX A OF EXHIBIT E

This section describes the PM&E measures the Licensees propose as part of the Licensees' Proposal. The following 11 PM&E measures are proposed measures in Appendix A of Exhibit E:

- GS1. Implement the Erosion and Sediment Control Plan, within one year after license issuance, that includes measures to control sedimentation and erosion when stabilizing slopes affected by the Project.
- WR1. Maintain a minimum pool and limit water surface elevation fluctuations in Pyramid Lake for the benefit of fisheries and recreation. This measure incorporates minimum pool and water surface elevation restrictions from the DWR and USFS 1969 MOU, as amended.
- WR2. Implement the Hazardous Materials Management Plan, within one year after license issuance, that includes measures to manage hazardous materials, including response and clean-up of hazardous materials spills.

- AR1. Continue to provide minimum flows from Pyramid Lake into Pyramid reach. This measure is identical to the Pyramid Lake portion of Article 52 in the existing Project license, with the exception that the multiplier for estimating the ungaged flow into Pyramid Lake has been updated based on current GIS and hydrologic methods, as described in Appendix A to Exhibit E of this Application for New License.
- AR2. Stock fish in Pyramid Lake, beginning in the first full calendar year after license issuance and annually thereafter during the stocking season (October 1 to May 30), to maintain the rainbow trout recreational fishery and conduct periodic angler surveys. This measure is similar to Article 51 in the existing Project license.
- TR1. Develop and implement an IVMP, within one year after license issuance, that includes measures for controlling non-native plant species, protecting special-status species during vegetation management, and re-vegetating disturbed areas.
- LU1. Implement the Fire Prevention and Response Plan, within one year after license issuance, that provides measures for preventing, reporting, and investigating Project-related wildfires.
- LU2. Develop and implement a Project Safety Plan, within one year after license issuance, that provides measures for installing and maintaining signs, lights, sirens, and other devices at Project facilities. This measure is similar to Articles 60 and 402 in the existing license.
- VR1. Implement the Visual Resources Management Plan, within one year after license issuance, that includes measures to reduce the visual contrast of Project facilities.
- CR1. Implement the Historic Properties Management Plan, within one year after license issuance, that provides specific actions and processes to manage historic properties.
- RR1. Develop and implement a Recreation Management Plan, within one year after license issuance, that includes measures for the management and operations of Project recreational facilities, including periodic use monitoring, the modification of Project recreation facilities, and a schedule for implementing modifications. This measure is similar to Article 50 in the existing Project license.

See Appendix A of Exhibit E for the specific plans and proposed PM&E measures.

7.3 COLLABORATIVE DEVELOPMENT OF PM&E MEASURES

From February through August 2019, the Licensees held three meetings in Los Angeles County, California; conducted a site visit to the Project; and organized and held two conference calls with Relicensing Participants. The purpose of these meetings, site visit, and conference calls was to collaboratively develop and agree upon certain PM&E measures that the Licensees would include in their DLA and that the Relicensing Participants would support. These meetings and calls were open to all Relicensing Participants.

The following Relicensing Participants participated in one or more of the meetings, the site visit, or calls: ANF, LPNF, USFWS, NMFS, NPS, and CDFW. The SWRCB participated in some of the collaborative meetings and calls, but stated that it cannot agree to or take a position on the merits of any PM&E measures before completing its CEQA review of the Licensees' Proposal.

The collaborative group agreed to focus its efforts on the development of five PM&E plans, which are provided in Appendix A to this Exhibit E. Additional collaboration with Relicensing Participants is ongoing. Following issuance of the DLA, the Licensees will continue to make a good faith effort to reach collaborative agreement on as many PM&E plans and measures as possible with as many Relicensing Participants as possible. Based on these good faith collaborative discussions, the Licensees and the Relicensing Participants will reach agreement on the PM&E plans with one or more Relicensing Participants, and will provide this information in the FLA.

7.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA (16 U.S.C. § 803[a][2][A]) requires FERC to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving waterways affected by the project. On April 27, 1988, FERC issued Order No. 481A, which requires FERC to give FPA Section 10(a)(2)(A) comprehensive plan status to any federal or state plan that meets each of the following three criteria: (1) it is a comprehensive study of one or more of the beneficial uses of a waterway or waterways; (2) it specifies the standards, the data, and the methodology used to develop the plan; and (3) it is filed with FERC.

FERC's Revised List of Comprehensive Plans, dated March 2019, can be found at FERC's eLibrary (<https://www.ferc.gov/industries/hydropower/gen-info/comp-plans.asp>). In Section 8 of its January 13, 2017, SD2, FERC identified 17 comprehensive plans that may be relevant to the South SWP Hydropower relicensing. As required by 18 CFR § 5.18(b)(5)(ii)(F), this section provides an explanation of how and why the Licensees' Proposal would, would not, or should not comply with each of the plans listed in SD1 and in FERC's most recent Revised List of Comprehensive Plans, or in some cases, directs the reader to the appropriate section of the Application for New License for an in-depth discussion of compliance with the plan. To facilitate FERC's review, the plans are

discussed below in the order presented by FERC in its SD2. The full reference for each plan is also provided.

California Department of Fish and Game. U.S. Fish and Wildlife Service. 2010. Final Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement. Sacramento, California. January 2010.

This jointly prepared document considers the environmental effects of several alternative hatchery management schemes that would direct management of federal and State hatcheries, and related stocking programs and associated activities, in California. The preferred alternative will allow CDFW to continue stocking fish for the express purpose of providing recreational opportunities to anglers. This alternative provides a mechanism for CDFW to implement guidelines that will allow for the protection of native species by identifying any such species prior to continuation of stocking. The pre-stocking evaluation protocol includes steps to provide for restoration of native species in those areas where stocking is not consistent with CDFW's goals to manage and protect multiple species. This alternative also provides a mechanism for continuing to improve the management of CDFW-operated anadromous hatcheries to minimize impacts on salmon and steelhead, as well as other native species. The alternative includes steps to reduce impacts from the private stocking permit program by eliminating permit exclusions and requiring certification for hatchery operations, and by providing for species surveys at planting locations. This is also USFWS' preferred alternative, and is the NEPA Environmentally Preferable Alternative. The plan does not include any specific recommendations regarding the surface waters in the vicinity of the Project, and the Licensees' Proposal does not include a hatchery, but does include a fish stocking and creel survey measure. The Licensees' Proposal is consistent with CDFW's and USFWS' 2010 plan.

California Department of Fish and Game. 2007. California Wildlife: Conservation Challenges, California's Wildlife Action Plan. Sacramento, California. 2007.

In response to the State Wildlife Grant Program enacted by Congress in 2000, CDFW partnered with the Wildlife Health Center at the University of California, Davis to develop California's Wildlife Action Plan, entitled California Wildlife Conservation Challenges. California's Wildlife Action Plan is directed at answering three primary questions:

1. What are the species and habitats of greatest conservation need?
2. What are the major stressors affecting California's native wildlife and habitats?
3. What are the actions needed to restore and conserve California's wildlife, thereby reducing the likelihood that more species will approach the condition of threatened or endangered?

The document concludes that CDFW's species of special concern have the greatest need of conservation; this "Special Animals List" consists of 140 avian species, 127 mammals, 102 fishes, 43 reptiles, 40 amphibians, and 365 invertebrates. It also

concludes that in California's nine bioregions – Mojave Desert, Colorado Desert, South Coast, Central Coast, North Coast-Klamath, Modoc Plateau, Sierra Nevada and Cascades, Central Valley and Bay-Delta, and Marine Region – the major stressors to California's native wildlife and habitats consist of growth and development, water management conflicts, invasive species, and climate change. With respect to actions needed to restore and conserve California's wildlife, 11 statewide conservation actions were recommended, as well as specific conservation actions for each of the nine regions in California. The plan does not include any specific recommendations regarding the Project area or Project. As described in Sections 5.3 and 5.4 of this Exhibit E, the Licensees' Proposal, which includes an IVMP, would be protective of California native wildlife and habitats. Therefore, the Licensees' Proposal is consistent with CDFW's 2007 plan.

California Department of Fish and Game. 1996. Steelhead Restoration and Management Plan for California. February 1996.

CDFW's plan focuses on restoration of native and naturally produced (wild) stocks because these stocks have the greatest value for maintaining genetic and biological diversity. Goals for steelhead restoration and management are: (1) increase natural production, as mandated by the Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988, so that steelhead populations are self-sustaining and maintained in good condition; and (2) enhance angling opportunities and non-consumptive uses. While this plan described measures for the restoration of salmonids in California, no specific prescriptive comments were directed to the surface water in the vicinity of the Project. As described in Section 5.4.3 of Exhibit E, the Licensees' Proposal would have no effect on steelhead and, therefore, the Licensees' Proposal is consistent with CDFW's 1996 plan.

California Department of Fish and Game. 2003. Strategic Plan for Trout Management: A Plan for 2004 and Beyond. Sacramento, California. November 2003.

This plan identifies key issues and concerns relative to trout resources and fisheries in California, and develops goals and strategies that will address these issues going forward. The plan guides and enables trout managers to meet public trust responsibilities of protecting and maintaining California's heritage of native trout and other aquatic resources, and emphasizes the use of sound ecosystem management principles. It provides for diverse angling and recreational opportunities, and encourages increasing the general public's appreciation and awareness of trout and their habitats. The scope of the plan includes all resident (non-anadromous) forms of salmonids, including landlocked steelhead, resident coastal cutthroat trout, and inland salmon. Presently, there are 11 native species or forms of trout in California, and three non-native species of trout. The plan supports a strategy that calls for an ecosystem (i.e., watershed) approach, and includes strategies that recognize interactions between trout and other aquatic species. This approach is consistent with an ecosystem management strategy stipulated in the CDFW's department-wide strategic plan. The goals and strategies presented in this plan have been developed around two themes

that reflect the general mission of CDFW: (1) habitat and native species protection and management; and (2) public use; in this case, recreational angling. The plan does not include any specific recommendations regarding the surface waters in the vicinity of the Project. As described in Section 5.3 of this Exhibit E, the Licensees' Proposal would have no adverse effect on trout, and includes fish stocking and creel surveys, controlling Pyramid Lake water surface elevations, and minimum flow releases into Pyramid reach. The Licensees' Proposal is consistent with CDFW's 2003 plan.

California Department of Fish and Wildlife. 2008. California Aquatic Invasive Species Management Plan. Sacramento, California. January 18, 2008.

This California Aquatic Invasive Species Management Plan was released by CDFW in January 2008. Recreational equipment and activities have been identified as vectors for distributing some AIS, and this plan proposes management actions for addressing AIS threats to the State. It focuses on the non-native algae, crabs, clams, fish, plants, and other species that continue to invade California's creeks, wetlands, rivers, bays, and coastal waters. The main purpose of the plan is to coordinate State programs, create a statewide decision-making structure, and provide a shared baseline of data and agreed-upon actions so that State agencies may work together more efficiently. In addition, the plan provides the State's first comprehensive, coordinated effort to prevent new invasions, minimize impacts from established AIS, and establish priorities for action statewide. Finally, the plan supports the State's first rapid response process for high-risk invaders. The plan does not include any specific recommendations regarding the surface waters in the vicinity of the Project. Outside of relicensing, both DWR and LADWP adhere to State guidelines regarding the control of AIS.

California Department of Parks and Recreation. 1998. Public Opinions and Attitudes on Outdoor Recreation in California. Sacramento, California. March 1998.

DPR's SOPA, the most recent version of which is dated 2012, provides information used in the development of the DPR's SCORP. The SOPA identifies: (1) California's attitudes, opinions, and values with respect to outdoor recreation; and (2) demand for, and participation in, 42 selected outdoor recreation activities. Broad generalizations contained in the document are as follows:

- Outdoor recreational areas and facilities are very important to the quality of life of most Californians
- Californians are fairly well satisfied with the areas and facilities currently available
- Californians spent approximately 2.2 billion days participating in outdoor recreation activities during 1997
- Californians engage in simple and inexpensive activities far more than those which require considerable skill and expense

- Californians do not show a strong willingness to pay for the recreational areas and facilities they use or desire
- Californians strongly believe that protection of the natural environment is an important aspect of outdoor recreation

The plan does not include any specific recommendations regarding the Project or the area within the proposed Project boundary. The Licensees' Proposal, which includes a Recreation Plan, is consistent with DPR's 1998 plan.

California Department of Parks and Recreation. 1994. California Outdoor Recreation Plan (SCORP). Sacramento, California. April 1994.

The objectives of DPR's SCORP, the most recent version of which is dated 2015, are to determine outdoor recreation issues that are currently the problems and opportunities most critical in California, and to explore the most appropriate actions by which State, federal, and local agencies might address these issues. The SCORP also provides valuable information on the State's recreation policy, code of ethics, and statewide recreation demand, as well as demographic, economic, political, and environmental conditions. The plan lists the following major issues: (1) improving resource stewardship; (2) serving a changing population; (3) responding to limited funding; (4) building strong leadership; (5) improving recreation opportunities through planning and research; (6) responding to the demand for trails; and (7) halting the loss of wetlands. The plan does not include any specific recommendations regarding the Project or the area within the proposed Project boundary. The Licensees' Proposal, which includes a Recreation Plan, is consistent with DPR's 1994 plan.

California Department of Water Resources. 1994. California Water Plan Update. Bulletin 160-93. Sacramento, California. October 1994. Two Volumes and Executive Summary.

This plan was listed in FERC's January 2017 SD2, which was based on FERC's Revised List of Comprehensive Plans at that time. FERC's March 2019 Revised List of Comprehensive Plans does not include this plan. Therefore, this plan is not discussed in detail in this section, other than to note the Licensees' Proposal would aid in continuing to provide to southern California a source of clean and affordable water.

California State Water Resources Control Board. 1995. Water Quality Control Plan Report. Sacramento, California. Nine Volumes.

This plan was listed in FERC's January 2017 SD2, which was based on FERC's List of Comprehensive Plans at that time. FERC's March 2019 Revised List of Comprehensive Plans does not include this plan. Within the Project area, Quail Lake is located within the Lahontan RWQCB; and Pyramid Lake, Piru Creek, and Elderberry Forebay are within the jurisdiction of the Los Angeles RWQCB. Both agencies have issued water quality control plans for their regions. The Water Quality Control Plan for the Lahontan Region, North and South Basins, was effective on March 31, 1995, and has been amended through August 16, 2011, and is not included in FERC's March 2019 Revised

List of Comprehensive Plans. The Water Quality Control Plan for the Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, was adopted in 1994, and amended through July 2015, and is included in FERC's March 2019 Revised List of Comprehensive Plans. As discussed in Section 5.2 of this Exhibit E, surface water in and surrounding the Project is generally consistent with the applicable basin plan WQOs, and the Licensees propose no changes to the Project that would degrade water quality or relevant designated beneficial uses. Therefore, the Licensees' Proposal is consistent with the SWRCB's applicable water quality control plans, although the SWRCB will make the final determination on this issue.

U.S. Department of Agriculture, Forest Service. 2005. Los Padres National Forest Land and Resource Management Plan. Department of Agriculture, Goleta, California. September 2005.

The Forest and Rangeland Renewable Resources Planning Act requires that each national forest prepare an initial forest plan that provides direction for the efficient use and protection of forest resources within their administrative boundaries. The revised land and resource management plans for the southern California national forests, including the LPNF, describe the strategic direction at the broad program level for managing the land and its resources.

Part 1 is the vision for the southern California national forests. It describes the forests' uniqueness on a national and regional level; USFS' national goals; the roles and contributions that national forests make; the desired conditions for the various landscapes within the national forests; and evaluation/monitoring indicators used to assess progress made toward accomplishing the desired conditions.

Part 2 is the strategy. It describes the objectives that USFS intends to implement in order to move the forests toward the vision described in Part 1. The national forests have been subdivided into geographic areas called "places." The Hungry Valley/Mutau Place rises from the Piru basin to Frazier Mountain. The lower elevation to the east edge is delineated by Pyramid Lake and the higher elevation edge by a series of high peaks and ridges. The area offers views of a scenic montane landscape to the local communities and to Interstate Highway 5 travelers. The dominant plant community at lower elevations is mixed chaparral. Mixed conifer forests, Jeffrey Pine forests, and singleleaf pinyon pine woodlands are prevalent at higher elevations. Canyon live oak forms dense forests along shaded slopes and in canyon bottoms. Water from Piru Creek drains to Pyramid Lake, a year-round, water-based recreation area that serves as an important source of water for the Los Angeles County and Ventura County regions. California spotted owls occupy the area and a wild trout fishery on Piru Creek provides fly-fishing opportunities. The arroyo toad also occurs on Piru Creek, which is designated as a Critical Biological Zone. An important wildlife habitat linkage connects the southern Los Padres ranges to the Castaic ranges to the east.

Part 3 is the design criteria. It includes laws, standards, and other guidance that USFS uses during project planning and implementation.

The LPNF Land and Resource Management Plan does not include any specific recommendations regarding the Project area, other than those described above. The Licensees have consulted with USFS through the relicensing process, and the Licensees find that the Licensees' Proposal, which includes numerous recreation and environmental measures, is consistent with the LPNF's Land and Resource Management Plan.

U.S. Department of Agriculture, Forest Service. 2005. Angeles National Forest Land and Resource Management Plan. Department of Agriculture, Arcadia, California. September 2005.

Like the LPNF Land and Resource Management Plan, the ANF plan is divided into three parts. Part 1 is the vision for the southern California national forests. It describes the forests' uniqueness on a national and regional level; USFS' national goals; the roles and contributions that national forests make; the desired conditions for the various landscapes within the national forests; and evaluation/monitoring indicators used to assess progress made toward accomplishing the desired conditions.

Part 2 is the strategy. It describes the objectives that USFS intends to implement in order to move the forests toward the vision described in Part 1. For the ANF, the Interstate 5 Corridor Place runs north and south along both sides of Interstate 5, between Marple Canyon on the south and the intersection of State Highway 138 on the north. The east and west boundaries of the Interstate 5 Corridor Place are defined by the ridges visible from Interstate 5. This Place functions as a scenic gateway and transitional landscape for visitors to southern California. The flow of people and materials through this gateway landscape links the greater Los Angeles area, as well as southern California, to the rest of California and the nation. It also serves as an important wildlife corridor between the ANF and LPNF. The deep canyon of Pyramid Lake, along with its various side canyons, dominates this landscape. The predominant plant community at lower elevations is mixed chaparral. Pine and juniper are present at higher elevations. Riparian areas provide habitat for federally listed southwestern willow flycatcher, least Bell's vireo, and California condor, which has historically nested adjacent to Pyramid Lake. Piru Creek is managed for wild trout by the CDFW. Hiking, backpacking, equestrian use, bicycling, mountain biking, hunting, OHV use, and water-based recreation are popular. The dramatic changes in scenery and vegetation provide a viewshed that promotes driving for pleasure. Recreation is centered on Pyramid Lake, with dispersed and developed recreation opportunities located in close proximity to major travel routes.

Part 3 is the design criteria. It includes laws, standards, and other guidance that USFS uses during project planning and implementation.

The Santa Clara Canyons Place provides year-round, low elevation open space for greater Los Angeles and the Antelope Valley. This Place is generally accessed from Interstate 5, Interstate 14, and State Highway 138. The paths through this landscape lead visitors to dramatic canyon panoramas and rugged mountain background views.

The lower elevation along the southern edge is marked by the urban interface with the community of Santa Clarita and two man-made lakes – Bouquet Reservoir and Castaic Lake. Mixed chaparral is the dominant plant community. Canyon and coast live oaks are present in dense woodlands along shaded slopes and in canyons. Black oaks occur in dense patches at higher elevations. Deciduous trees and shrubs occupy riparian areas. Several ESA-listed and USFS Region 5 sensitive plants and animals occur in the Place, including: CRLF, arroyo toad, two-lined garter snake, unarmored threespine stickleback, least Bell's vireo, southwestern willow flycatcher, and California condor. Developed recreation sites are limited, with recreation focused mainly on remote camping and day use in the canyon bottoms. Hiking, backpacking, equestrian, bicycling, mountain biking, and OHV uses are popular.

The Licensees have consulted with USFS throughout the relicensing process, and the Licensees find that the Licensees' Proposal, which includes numerous recreation and environmental measures, is consistent with the ANF's Land and Resource Management Plan.

National Marine Fisheries Service. Pacific Fishery Management Council. 1978. Fishery Management Plan for Commercial and Recreational Salmon Fisheries Off the Coast of Washington, Oregon and California Commencing in 1978. March 1978.

The Fishery Management Plan for Commercial and Recreational Salmon Fisheries (FMP) was created by the Pacific Fishery Management Council (PFMC). Creation of the council was initially authorized by the Magnuson-Stevens Fishery Conservation and Management Act of 1976. The FMP was developed to meet eight original conservation objectives for the Pacific salmon fishery through the implementation of management measures for commercial and recreational sport fishing. The primary objectives were focused on the long-term maintenance of the fishery, meeting treaty obligations with Native American tribes, and coordination between Canada and the PFMC. Initial management measures were entirely focused on ocean fishing (commercial and recreational) and river mouth fishing closures. The FMP has been amended numerous times since 1978. The eighth amendment, which is addressed below, was adopted in 1988 and introduced habitat considerations into the plan. The most recent amendment (the fourteenth amendment in 1999) designated EFH as a result of the considerations introduced by the eighth amendment. The surface waters affected by the Licensees' Proposal do not include any waters designated by the PFMC as EFH. Therefore, NMFS' 1978 plan is not relevant to the South SWP Hydropower relicensing.

National Park Service. The Nationwide Rivers Inventory. U.S. Department of the Interior, Washington, D.C. 1993.

The Nationwide Rivers Inventory (NRI) is a listing by the NPS of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. In addition to these eligibility criteria, river segments are divided into three potential classifications: Wild, Scenic, and Recreational river areas. Under a

1979 Presidential Directive and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments. Such adverse impacts could alter a river segment's eligibility for listing and/or alter its classification. Based on a review of the most recent NRI list, the Licensees found one NRI river segment potentially affected by the Licensees' Proposal. Approximately 13 miles of Pyramid reach have been found eligible for designation from the boundary between Los Angeles and Ventura Counties to Lake Piru. This reach is immediately below a designated National Wild and Scenic River that includes the upper 3 miles nearest to Pyramid Dam and is designated a "recreation river," and the next 4.3 miles designated as a "wild river" leading to the Los Angeles and Ventura County boundary.

As described in Section 2 and Section 5.2 of this Exhibit E, the Licensees' Proposal would have no adverse effect on this segment of river: the Licensees do not propose any new facilities in the reach that would be inconsistent with the outstandingly remarkable characteristics of the reach, and the Licensees propose to produce releases from Pyramid Dam into Pyramid reach that mimic the magnitude and timing of natural flows in the river, with the exception of up to 3,150 AF of annual supplemental water releases of SWP water to the UWCD in the November through March period. Therefore, the Licensees' Proposal is consistent with NPS' 1993 inventory, as updated.

Pacific Fisheries Management Council. Eighth Amendment to the Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coast of Washington, Oregon and California Commencing in 1978. Portland, Oregon. January 1988. March 1978.

As discussed above, the surface waters affected by the Licensees' Proposal do not include any waters designated by the PFMC as EFH. Therefore, the eighth amendment to NMFS' 1978 plan is not relevant to the South SWP Hydropower relicensing.

State Water Resources Control Board. 1999. Water Quality Control Plans and Policies Adopted as part of the State Comprehensive Plan. April 1999.

This plan was listed in FERC's January 2017 SD2, which was based on FERC's List of Qualifying Plans at that time. FERC's March 2019 List of Qualifying Plans does not include this plan. Refer above to the Licensees' discussion of consistency with applicable basin plans.

U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. U.S. Department of the Interior. Environment Canada. May 1986.

The North American Waterfowl Management Plan (NAWMP) is an update of the Convention for the Protection of Migratory Birds, which was established between the United States and Canada in 1916. The plan is a guide for private and public entities in the conservation and management of waterfowl. Goals and general recommendations are described for the protection of habitat, financing of research, and managing harvest.

The plan outlines a framework for separating the larger group of waterfowl into smaller guilds – dabbling ducks, diving ducks, sea ducks, and geese – which will benefit from similar management strategies. The NAWMP leaves implementation to local conservation and management groups. Refer to Section 5.4 of this Exhibit E for a discussion of the effects of the Licensees' Proposal on waterfowl. The Licensees conclude that the Licensees' Proposal is consistent with USFWS' 1986 plan.

U.S. Fish and Wildlife Service. n.d. Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C.

This document is a 12-page policy statement that was signed by John F. Turner, then-Director of USFWS, on December 5, 1989. The document is out of date. A 2019 version of the policy, which is now more of an international strategy, was signed into law. The out-of-date policy statement is not relevant to the South SWP Hydropower relicensing.

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8.7 REFERENCES CITED – SECTION 7.0 CONCLUSIONS AND RECOMMENDATIONS

None.