

## 4.1.5 Botanical Resources Study

### 4.1.5.1 *Project Nexus*

Continued Project O&M and Project-related recreation activities have the potential to affect botanical resources, including special-status plant species. Continued Project O&M and Project-related recreation activities also have the potential to affect wetland and riparian habitats, which are considered special-status natural communities by the CDFW and provide habitat for numerous wildlife species, including ESA-listed birds. This *Botanical Resources Study* addresses these two resources (special-status plants, and wetland and riparian communities) in separate study components.

For the purpose of this *Botanical Resources Study*, a special-status plant species is a plant that meets one or more of the following criteria: (1) listed as a USFS Sensitive Species and occurs on NFS lands; (2) listed by the BLM as Sensitive and occurs on federal lands administered by BLM; (3) listed under the CESA as an endangered, threatened, or rare plant; (4) State-listed rare or a State candidate for listing species under the Native Plant Protection Act of 1977 (CDFW 2015a); or (5) listed by the California Native Plant Society (CNPS) on its Inventory of Rare and Endangered Plants, including species that are rated as CNPS 1A through 4B (CNPS 2015). Plants listed as federal threatened (FT) under the federal ESA, or as candidates or species proposed for listing under the ESA, will be addressed in the ESA-Listed Plants study, which is focused specifically on those resources.

This study also includes mapping and assessment of wetland and riparian habitats using the Bureau of Land Management's (BLM) PFC assessment (Prichard et al. 2003, Dickard et al. 2015). Federal policy defines wetlands 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." (Prichard et al. 1993) These can include marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas (Prichard et al. 1993). Riparian areas are defined as, "a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil." (Prichard et al. 1993).

### 4.1.5.2 *Existing Information and Need for Additional Information*

Existing, relevant, and reasonably available information regarding special-status plants known or with the potential to occur within the proposed Project boundary is provided in Section 4.6.3 of the Licensees' PAD. As a summary, the Licensees found that no comprehensive special-status plant surveys have been performed recently within the proposed Project boundary, but 44 special-status plant species have the potential to

occur (Table 4.1-3). Additional species may be added to this list based on field findings, or if recommended by resource agencies. The special-status plant survey component of this *Botanical Resources Study* will augment existing, relevant, and reasonably available information by mapping occurrences of special-status plants and compiling a floristic inventory of plant species in the proposed Project boundary.

**Table 4.1-3. Special-Status Plants Known or with the Potential to Occur in the Project Study Area**

Common Name/ Scientific Name	Status <sup>1</sup>	Flowering Period	Elevation Range (feet)	Habitats <sup>2</sup>	Potential for Occurrence in the Project Area
Mt. Pinos onion ( <i>Allium howellii</i> var. <i>clokeyi</i> )	1B.3, LPNF	April - June	4265 - 6070	<ul style="list-style-type: none"> <li>• Meadows and seeps (edges)</li> <li>• Pinyon and juniper woodland</li> </ul>	Potential habitat exists.
California androsace ( <i>Androsace elongata</i> <i>ssp. acuta</i> )	4.2	March - June	492 - 4282	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Coastal scrub</li> <li>• Meadows and seeps</li> <li>• Pinyon and juniper woodland</li> <li>• Valley and foothill grassland</li> </ul>	Potential to occur in upland areas surrounding Quail Lake and Pyramid Lake.
Horn's milkvetch ( <i>Astragalus hornii</i> var. <i>hornii</i> )	1B.1	May - October	197 - 2789	<ul style="list-style-type: none"> <li>• Lake margins with alkaline soils</li> <li>• Meadows and seeps</li> <li>• Playas</li> </ul>	Potential habitat exists. Potential to occur in wetland areas surrounding Pyramid Lake.
Round-leaved filaree ( <i>California macrophylla</i> )	1B.2, BLM	March - May	49 - 3937	<ul style="list-style-type: none"> <li>• Cismontane woodland (clay soils)</li> <li>• Valley and foothill grassland (clay soils)</li> </ul>	CNDDDB occurrences in Lebec, La Liebre Ranch, Whitaker Peak, and Warm Springs Mountain quadrangles. Potential to occur in upland areas surrounding Quail Lake.
Catalina mariposa lily ( <i>Calochortus catalinae</i> )	4.2	February - June	49 - 2297	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Coastal scrub</li> <li>• Valley and foothill grassland</li> </ul>	Potential habitat exists.
Club-haired mariposa lily ( <i>Calochortus clavatus</i> var. <i>clavatus</i> )	4.3, ANF, LPNF	March - June	246 - 4265	Typically occurs on serpentinite, clay, rocky soils in: <ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Coastal scrub</li> <li>• Valley and foothill grassland</li> </ul>	Potential habitat exists. Potential to occur in upland areas surrounding Pyramid Lake.

**Table 4.1-3. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)**

Common Name/ Scientific Name	Status <sup>1</sup>	Flowering Period	Elevation Range (feet)	Habitats <sup>2</sup>	Potential for Occurrence in the Project Area
Slender mariposa lily ( <i>Calochortus clavatus</i> <i>var. gracilis</i> )	1B.2, ANF, LPNF, BLM	March - November	1050 - 3281	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Coastal scrub</li> <li>• Valley and foothill grassland</li> </ul>	CNDDDB occurrences in Black Mountain, Liebre Mountain, Newhall, Whitaker Peak, and Warm Springs Mountain quadrangles. Specifically identified by CNDDDB as occurring near the southwestern end of Elderberry Forebay. Potential to occur in upland areas surrounding Quail Lake and Pyramid Lake.
Late-flowered mariposa lily ( <i>Calochortus fimbriatus</i> )	1B.3, ANF, LPNF	June - August	902 - 6250	Often occurs on serpentinite soils in: <ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Riparian woodland</li> </ul>	Potential habitat exists. Potential to occur in upland areas surrounding Quail Lake.
Palmer's mariposa lily ( <i>Calochortus palmeri</i> <i>var. palmeri</i> )	1B.2, ANF, LPNF, SBNF	April - July	2329 - 7841	Mesic areas, including: <ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Lower montane coniferous forest</li> <li>• Meadows and seeps</li> </ul>	CNDDDB occurrences in Liebre Mountain, La Liebre Ranch, and Whitaker Peak quadrangles. Potential to occur in upland areas surrounding Quail Lake.
Plummer's mariposa lily ( <i>Calochortus plummerae</i> )	4.2	May - July	328 - 5577	Granitic, rocky soils in: <ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Coastal scrub</li> <li>• Lower montane coniferous forest</li> <li>• Valley and foothill grassland</li> </ul>	Potential habitat exists. Potential to occur in upland areas surrounding Pyramid Lake.
Peirson's morning-glory ( <i>Calystegia peirsonii</i> )	4.2	April - June	98 - 4921	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Coastal scrub</li> <li>• Lower montane coniferous forest</li> <li>• Valley and foothill grassland</li> </ul>	CNDDDB occurrences in Whitaker Peak quadrangle. Specifically mapped by CNDDDB in proposed Project boundary in Castaic Creek area upstream of Castaic Powerplant. Potential to occur in upland areas surrounding Quail Lake and Pyramid Lake.

**Table 4.1-3. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)**

Common Name/ Scientific Name	Status <sup>1</sup>	Flowering Period	Elevation Range (feet)	Habitats <sup>2</sup>	Potential for Occurrence in the Project Area
Mt. Gleason paintbrush ( <i>Castilleja gleasoni</i> )	1B.2, CR, ANF, BLM	May - September	3806 - 7119	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Lower montane coniferous forest</li> <li>• Pinyon and juniper woodland</li> </ul>	CNDDDB occurrences Liebre Mountain quadrangle.
Island mountain- mahogany ( <i>Cercocarpus betuloides</i> var. <i>blancheae</i> )	4.3	February - May	98 - 1969	<ul style="list-style-type: none"> <li>• Closed-cone coniferous forest</li> <li>• Chaparral</li> </ul>	Potential habitat exists.
Mojave spineflower ( <i>Chorizanthe spinosa</i> )	4.2	March - July	20 - 4265	<ul style="list-style-type: none"> <li>• Mojavean desert scrub</li> <li>• Playas</li> </ul>	Potential habitat exists.
Monkey-flower savory ( <i>Clinopodium mimuloides</i> )	4.2	June - October	1001 - 5906	<ul style="list-style-type: none"> <li>• Streambanks, mesic areas</li> <li>• Chaparral</li> </ul>	Potential habitat exists. Potential to occur in stream bank areas in the vicinity of Pyramid Lake (DWR 2014, Environmental Science Associates 2014a).
Paniculate tarplant ( <i>Deinandra paniculata</i> )	4.2	March - November	82 - 3084	Usually vernal mesic areas, sometimes sandy soils in: <ul style="list-style-type: none"> <li>• Coastal scrub</li> <li>• Valley and foothill grassland</li> <li>• Vernal pools</li> </ul>	Potential habitat exists.
Mt. Pinos larkspur ( <i>Delphinium parryi ssp. purpureum</i> )	4.3, LPNF	May - June	3281 - 8530	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Mojavean desert scrub</li> <li>• Pinyon and juniper woodland</li> </ul>	Potential habitat exists.
Umbrella larkspur ( <i>Delphinium umbraculorum</i> )	1B.3, LPNF	April - June	1312 - 5249	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> </ul>	CNDDDB occurrences Lebec quadrangle.
Tehachapi buckwheat ( <i>Eriogonum callistum</i> )	1B.1	May - July	4593 - 5676	Openings, rocky soils, and limestone areas in chaparral	Potential habitat exists.

**Table 4.1-3. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)**

Common Name/ Scientific Name	Status <sup>1</sup>	Flowering Period	Elevation Range (feet)	Habitats <sup>2</sup>	Potential for Occurrence in the Project Area
Fort Tejon woolly sunflower ( <i>Eriophyllum lanatum</i> <i>var. hallii</i> )	1B.1, LPNF	May - July	3494 - 4921	<ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> </ul>	CNDDDB occurrences Lebec quadrangle.
San Gabriel bedstraw ( <i>Galium grande</i> )	1B.2, ANF, BLM	January - July	1394 - 4921	<ul style="list-style-type: none"> <li>• Broadleaved upland forest</li> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Lower montane coniferous forest</li> </ul>	Potential habitat exists.
Palmer's grappling hook ( <i>Harpagonella</i> <i>palmeri</i> )	4.2	March - May	66 - 3133	On clay soils; open grassy areas within: <ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Coastal scrub</li> <li>• Valley and foothill grassland</li> </ul>	Potential habitat exists.
Newhall sunflower ( <i>Helianthus</i> <i>inexpectatus</i> )	1B.1	August - October	984 - 984	Freshwater, seeps in: <ul style="list-style-type: none"> <li>• Marshes and swamps</li> <li>• Riparian woodland</li> </ul>	Potential habitat exists.
Los Angeles sunflower ( <i>Helianthus</i> <i>nutallii ssp. parishii</i> )	1A	August - October	33 - 5495	Marshes and swamps (coastal salt and freshwater)	Presumed extirpated, not likely to occur.
Vernal barley ( <i>Hordeum</i> <i>intercedens</i> )	3.2	March - June	16 - 3281	<ul style="list-style-type: none"> <li>• Coastal dunes</li> <li>• Coastal scrub</li> <li>• Valley and foothill grassland (saline flats and depressions)</li> <li>• Vernal pools</li> </ul>	Potential habitat exists.
Southern California black walnut ( <i>Juglans</i> <i>californica</i> )	4.2	March - August	164 - 2953	Alluvial areas in: <ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Coastal scrub</li> <li>• Riparian woodland</li> </ul>	Potential habitat exists.

**Table 4.1-3. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)**

Common Name/ Scientific Name	Status <sup>1</sup>	Flowering Period	Elevation Range (feet)	Habitats <sup>2</sup>	Potential for Occurrence in the Project Area
Fragrant pitcher sage ( <i>Lepechinia fragrans</i> )	4.2, ANF, SBNF	March - October	66 - 4298	• Chaparral	Potential habitat exists.
Ross' pitcher sage ( <i>Lepechinia rossii</i> )	1B.2, ANF, LPNF	May - September	1001 - 2592	• Chaparral	CNDDDB occurrences Whitaker Peak quadrangle.
Ocellated Humboldt lily ( <i>Lilium humboldtii</i> <i>ssp. ocellatum</i> )	4.2	March - August	98 - 5906	Openings in: • Chaparral • Cismontane woodland • Coastal scrub • Lower montane coniferous forest • Riparian woodland	Potential habitat exists. Potential to occur in upland or riparian areas surrounding Pyramid Lake.
Sylvan microseris ( <i>Microseris sylvatica</i> )	4.2	March - June	148 - 4921	• Chaparral • Cismontane woodland • Pinyon and juniper woodland • Valley and foothill grassland (serpentinite)	Potential habitat exists. Potential to occur in upland areas surrounding Quail Lake and Pyramid Lake.
Tehachapi monardella ( <i>Monardella linoides</i> <i>ssp. oblonga</i> )	1B.3, LPNF	May - August	2953 - 8104	• Lower montane coniferous forest • Pinyon and juniper woodland • Upper montane coniferous forest	Potential habitat exists.
Baja navarretia ( <i>Navarretia</i> <i>peninsularis</i> )	1B.2, ANF, LPNF, SBNF	May - August	4921 - 7546	Mesic areas, including: • Chaparral (openings) • Lower montane coniferous forest • Meadows and seeps • Pinyon and juniper woodland	CNDDDB occurrences in Lebec quadrangle.
Piute mountains navarretia ( <i>Navarretia</i> <i>setiloba</i> )	1B.1	April - July	935 - 6890	Clay or gravelly loam in: • Cismontane woodland • Pinyon and juniper woodland • Valley and foothill grassland	CNDDDB occurrences in Lebec quadrangle. Potential to occur in upland areas surrounding Quail Lake.

**Table 4.1-3. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)**

Common Name/ Scientific Name	Status <sup>1</sup>	Flowering Period	Elevation Range (feet)	Habitats <sup>2</sup>	Potential for Occurrence in the Project Area
Robbins' nemacladus ( <i>Nemacladus secundiflorus</i> var. <i>robbinsii</i> )	1B.2, ANF, LPNF	April - June	1148 - 5577	Occurs in openings in: • Chaparral • Valley and foothill grassland	Potential habitat exists. Potential to occur in upland areas surrounding Quail Lake and Pyramid Lake.
Short-jointed beavertail ( <i>Opuntia basilaris</i> var. <i>brachyclada</i> )	1B.2, ANF, SBNF, BLM	April - August	1394 - 5906	• Chaparral • Mojavean desert scrub • Pinyon and juniper woodland	CNDDB occurrences in Newhall quadrangle.
Bakersfield cactus ( <i>Opuntia basilaris</i> var. <i>treleasei</i> )	1B.1	April - May	394 - 4757	Sandy or gravelly areas in: • Cismontane woodland • Valley and foothill grassland	Potential habitat exists. Potential to occur in upland areas surrounding Quail Lake.
Adobe yampah ( <i>Perideridia pringlei</i> )	4.3	April - July	984 - 5906	Serpentinite, often clay soils in: • Chaparral • Cismontane woodland • Coastal scrub • Pinyon and juniper woodland	Potential habitat exists. Potential to occur in upland areas surrounding Quail Lake and Pyramid Lake.
Hubby's phacelia ( <i>Phacelia hubbyi</i> )	4.2	April - July	0 - 3281	Gravelly, rocky, and talus-slope areas in: • Chaparral • Coastal scrub • Valley and foothill grassland	Potential habitat exists.
Mojave phacelia ( <i>Phacelia mohavensis</i> )	4.3	April - August	4593 - 8202	Sandy or gravelly soils in: • Cismontane woodland • Lower montane coniferous forest • Meadows and seeps • Pinyon and juniper woodland	Potential habitat exists.
Chaparral ragwort ( <i>Senecio aphanactis</i> )	2B.2	January - April	49 - 2625	Sometimes on alkaline soils in: • Chaparral • Cismontane woodland • Coastal scrub	Potential habitat exists. Potential to occur in upland areas surrounding Pyramid Lake.



**Table 4.1-3. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)**

Common Name/ Scientific Name	Status <sup>1</sup>	Flowering Period	Elevation Range (feet)	Habitats <sup>2</sup>	Potential for Occurrence in the Project Area
San Bernardino aster ( <i>Symphyotrichum defoliatum</i> )	1B.2, ANFSP, LPNFSP, SBNF, BLM	July - November	7 - 6693	Near ditches, streams, springs in: <ul style="list-style-type: none"> <li>• Cismontane woodland</li> <li>• Coastal scrub</li> <li>• Lower montane coniferous forest</li> <li>• Meadows and seeps</li> <li>• Marshes and swamps</li> <li>• Valley and foothill grassland (vernally mesic)</li> </ul>	CNDDDB occurrences in Lebec quadrangle. Potential to occur in shoreline areas and adjacent wetlands of Quail Lake and Pyramid Lake.
Greata's aster ( <i>Symphyotrichum greatae</i> )	1B.3, BLM	June - October	984 - 6594	Mesic areas, specifically: <ul style="list-style-type: none"> <li>• Broadleaved upland forest</li> <li>• Chaparral</li> <li>• Cismontane woodland</li> <li>• Lower montane coniferous forest</li> <li>• Riparian woodland</li> </ul>	CNDDDB occurrences in Liebre Mountain and Whitaker Peak quadrangles. Potential to occur in upland areas surrounding Quail Lake and Pyramid Lake.
Lemmon's syntrichopappus ( <i>Syntrichopappus lemmonii</i> )	4.3	April - June	1640 - 6004	Sandy or gravelly soils in <ul style="list-style-type: none"> <li>• Chaparral</li> <li>• Pinyon and juniper woodland</li> </ul>	Potential habitat exists. Potential to occur in upland areas surrounding Pyramid Lake.
Silvery false lupine ( <i>Thermopsis californica</i> var. <i>argentata</i> )	4.3	April - October	2182 - 7661	<ul style="list-style-type: none"> <li>• Cismontane woodland</li> <li>• Lower montane coniferous forest</li> <li>• Pinyon and juniper woodland</li> </ul>	Potential habitat exists.

Sources: CDFW 2015b, CNPS 2015, BLM 2015, USFS 2013

Notes:

•CNPS Status:

1A = presumed extirpated in California and either rare or extinct elsewhere

1B = rare, threatened, or endangered in California and elsewhere

2A = presumed extirpated in California, but common elsewhere

2B = rare, threatened, or endangered in California, but more common elsewhere

3 = more information is needed

4 = plants of limited distribution

Threat Ranks (number following period):

1-Seriously threatened in California (over 80 percent of occurrences threatened / high degree and immediacy of threat)

2-Moderately threatened in California (20-80 percent occurrences threatened / moderate degree and immediacy of threat)

3-Not very threatened in California (less than 20 percent of occurrences threatened / low degree and immediacy of threat or no current threats known)

*“Habitats” = habitats are limited to those types that occur within the Project vicinity*

*The following quadrangles were queried: Lebec, La Liebre Ranch, Black Mountain, Whitaker Peak, Warm Springs Mountain, Newhall, and Cobblestone Mountain*

*Key:*

*DWR = California Department of Water Resources*

*CR = California Rare*

*ANFSP = Angeles National Forest Sensitive Plant*

*LPNFSP = Los Padres National Forest Sensitive Plant*

*SBNF = San Bernardino National Forest*

*BLM = Bureau of Land Management*

*CNDDB = California Natural Diversity Database*

Existing, relevant, and reasonably available information regarding wetland and riparian habitats within the proposed Project boundary is provided in PAD Sections 4.7.1 and 4.7.2. The Licensees also found that no recent comprehensive riparian or wetland habitat assessment has been performed within the proposed Project boundary. The wetland and riparian PFC assessment component of this *Botanical Resources Study* will augment existing, relevant, and reasonably available information by conducting wetland and riparian studies in the proposed Project boundary.

Additional information on botanical resources will be generated by the *Special-status Terrestrial Wildlife – CWHR Study*. As part of the study, the CWHR map generated for the Project PAD will be ground-truthed and an updated and corrected map developed. This will include the removal of any incorrect alliances, such as the Pinyon-Juniper (identified as being <1 percent of the Project acreage) and identification of any additional sensitive natural communities (per VegCAMP crosswalk)<sup>1</sup> beyond the wetland and riparian areas already included as part of the survey.

#### **4.1.5.3 Study Goals and Objectives**

The goals of this *Botanical Resources Study* are to: (1) perform surveys to identify occurrence locations of special-status plant species in the proposed Project boundary; (2) use PFC protocols to assess wetland and riparian areas in the proposed Project boundary; (3) identify potential wetland and riparian habitat locations for the Special-Status Terrestrial Wildlife Species, CWHR, and ESA-listed Riparian Bird species studies; and (4) collect ancillary data related to sensitive habitats and species, including geographic extent and indications of potential threats resulting from Project O&M and Project-related recreation activities.

The objective of this *Botanical Resources Study* is to gather sufficient data necessary to fill recognized gaps in existing information about the presence of special-status plants and wetland and riparian habitats in the *Botanical Resources Study* area.

#### **4.1.5.4 Study Methods**

##### **Study Area**

The study area for the *Botanical Resources Study* will consist of the land area within the proposed Project boundary, excluding lands overlying the Angeles Tunnel on which the Licensees do not perform any Project O&M. This includes staging areas; construction areas; upstream maintenance areas above reservoirs; fuel modification requirement areas; areas cleared for access to transmission line poles and access routes to these areas; Lower Quail Canal, Quail Lake, and associated maintenance roads/areas and recreational features; and Gorman Bypass Channel and associated maintenance roads/access. The study area will also include a 100-foot buffer from all Project features where disturbance is expected to occur. The study area will extend beyond the

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<sup>1</sup> Per the crosswalk, only one non-wetland/riparian sensitive natural community was identified as potentially occurring in the study area.

proposed Project boundary to accommodate this buffer, where necessary. The study area for the *Botanical Resources Study* is shown in Figure 4.1-10.

### **General Concepts and Procedures**

- Personal safety is the most important consideration of each fieldwork team. Fieldwork will only occur in safely accessible areas and under conditions deemed safe by the field crews. Locations within the study area that cannot be accessed in a safe manner (e.g., locations containing dense vegetation or unsafe slopes) and areas inundated when the surveys are performed, will not be surveyed; these areas will be identified in the data summary and an explanation for survey exclusion will be provided.
- The *Botanical Resources Study* will begin after FERC issues its Study Plan Determination.
- The *Botanical Resources Study* does not include the development of requirements for the new license, which will be addressed outside the Study.
- The *Botanical Resources Study* focuses specifically on the resource within the proposed Project boundary, but the study area for the *Botanical Resources Study* is specific to the areas within the proposed Project boundary containing ecological conditions suitable for that resource.
- If required for the performance of the *Botanical Resources Study*, the Licensees will make a good faith effort to obtain permission to access private property well in advance of initiating the Study. The Licensees will only enter private property if permission has been provided by the landowner.
- The Licensees will acquire all necessary agency permits and approvals prior to beginning fieldwork for the *Botanical Resources Study*.
- Field crews may make variances to the *Botanical Resources Study* in the field to accommodate actual field conditions and unforeseen problems. Any variances to the *Botanical Resources Study* will be noted in the data resulting from the *Botanical Resources Study*.
- To prevent the introduction and transmittal of amphibian chytrid fungus and invasive aquatic species (e.g., quagga mussels, zebra mussel, and Asian clams), field crews will be trained on, provided with, and use materials (e.g., Quat) for decontaminating their boots, waders, and other equipment when leaving or traveling between water-based study sites. Field crews will follow DWR's Quagga and Zebra Mussel Rapid Response Plan for decontaminating their boots, waders, and other equipment between water-based study sites, and will follow CDFW's Aquatic Invasive Species Decontamination Protocol found at the following link: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=43333>. All boats used during the study will follow clean protocols, including inspections

before and after use. All decontamination requirements in place at Project reservoirs including those of DWR's Quagga and Zebra Mussel Rapid Response Plan for the SWP will be strictly followed (DWR 2010).

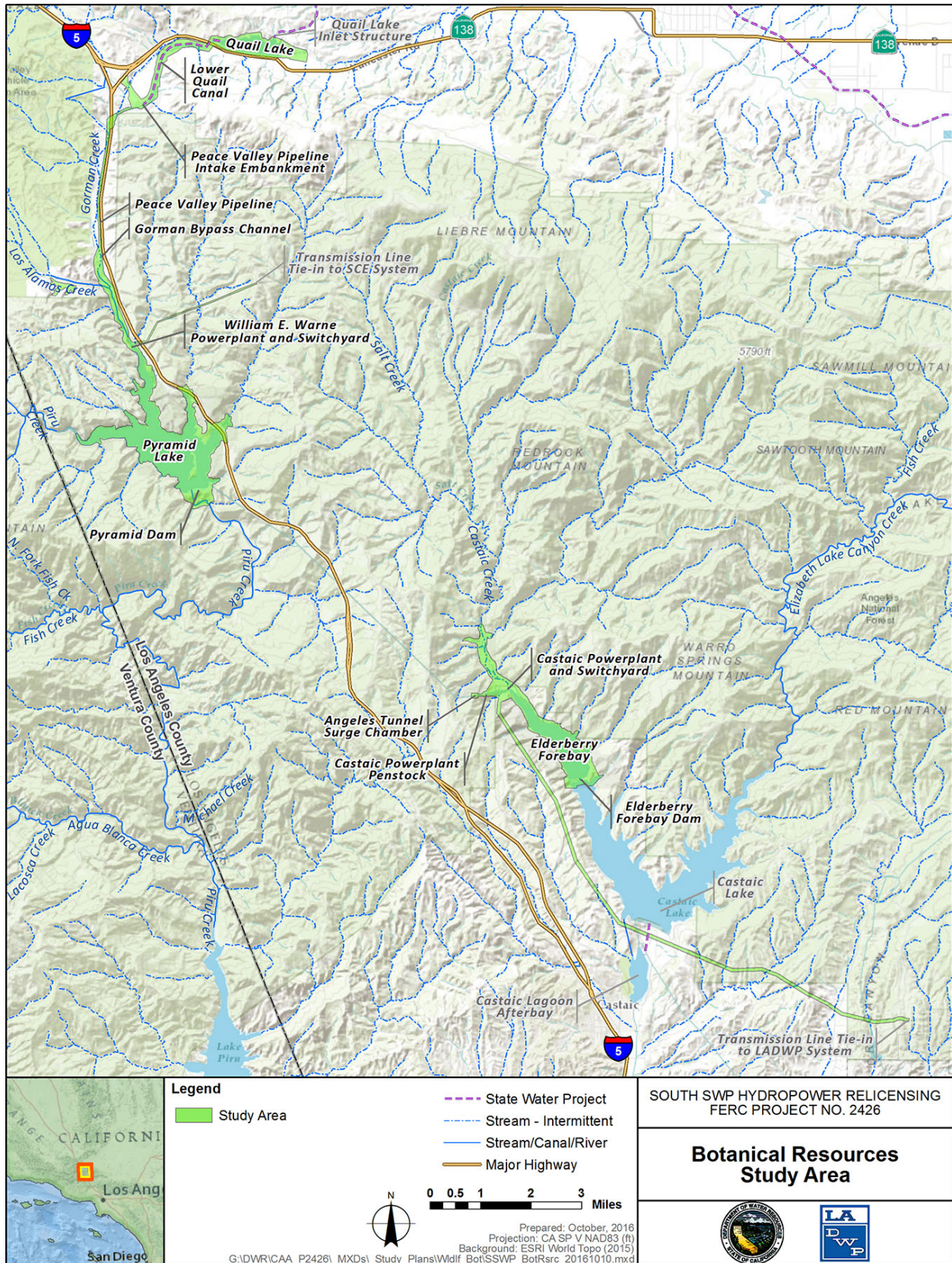


Figure 4.1-10. Botanical Resources Study Area

## **Methods**

The *Botanical Resources Study* will consist of three separate steps: (1) existing data assembly; (2) special-status plant surveys; and (3) wetland and riparian assessment. These steps are described below.

**Step 1 – Existing Data Assembly.** Prior to implementing field studies, the Licensees will review existing data, including National Wetlands Inventory (NWI) data (USFWS 2016), aerial imagery, and other relevant data that may be identified during this *Botanical Resources Study*. Field maps will be prepared with suitable aerial imagery that displays the CWHR habitat and will use these maps for field navigation and data collection.

**Step 2 –Special-Status Plant Surveys.** Prior to implementing special-status plant surveys, field staff will review and print the list of special-status plants that are known or have potential to occur within the study area for the *Botanical Resources Study* (Table 4.1-7). Additionally, field staff will visit reference sites, if available, for special-status plants most likely to occur in the Project study area (those known from CNDDDB reports in the Project or surrounding quadrangles or with other known occurrences nearby). This may include the following plants: Round-leaved filaree; Slender mariposa lily; Palmer's mariposa lily; Peirson's morning-glory; Umbrella larkspur; Fort Tejon woolly sunflower; Ross' pitcher sage; Baja navarretia; Piute Mountains navarretia; Short-jointed beavertail; San Bernardino aster; and Greata's aster.

The Licensees will conduct a botanical survey in the study area for the *Botanical Resources Study* to identify the locations of special-status plant species, if present. The Licensees will conduct special-status plant surveys that will follow applicable CDFW protocol methodology described in the botanical survey section of the CDFW Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (2009). This protocol uses systematic sampling techniques to ensure thorough coverage of plant communities that could support special-status plant species. The CDFW protocol states that “the level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified.” Staff will conduct surveys by walking all locations in the study area that can be safely accessed (as described in section 4.1.5.4 Study Methods) to ensure thorough coverage, noting all plant taxa observed. Documentation of surveys on NFS lands will include completion of USFS' data forms for any USFS sensitive plant species, as specified in the USFS Threatened, Endangered, and Sensitive Plants Element Occurrence Protocol and Field Guide (USFS 2014) and Threatened, Endangered and Sensitive Plants Element Occurrence Protocol and Field Guide (USFS 2015).

Field staff will perform surveys that provide coverage of known flowering periods between March and August, (encompassing the period within which the potentially occurring special-status species bloom), as well as survey outside those months, with at least two survey visits being performed in all suitable habitats to maximize the likelihood of detection of all plant species. Surveyors will be botanists or scientists that are qualified to identify plant species likely to occur in the study area for the *Botanical*

*Resources Study.* Taxonomy and nomenclature will be based on The Jepson Manual (Baldwin et al. 2012). If a special-status plant is identified, the survey team will prepare a California Native Species Field Survey Form so the occurrence can be added to the CNDDDB. Surveyors will collect and record the following data associated with each occurrence (either to the edge of the occurrence, or to the edge of the study area for the *Botanical Resources Study*, whichever is less, though surveyors will estimate the size of the occurrence outside of the study boundary to the extent possible):

- Digital photographs to document the occurrence, phenology, reproductive state, associated habitat, and indications of potential threats
- Location and approximate extent of the special-status plant population delineated using a handheld GPS device and the estimated number of plants in the population
- Habitat description, including dominant and subdominant vegetation in the area
- Activities observed in the area that have a potential to adversely affect the population (e.g., recreational trails and uses)

The Licensees will review and verify field data and create a digital data layer depicting the locations of special-status plant species.

Step 3 –Wetland and Riparian Assessment. A qualified team of field staff will assess the condition of wetland and riparian habitat using the PFC qualitative methods for wetland (Prichard et al. 2003) and riparian areas adjacent to flowing water (Dickard et al. 2015). Surveyors will identify areas to be evaluated prior to field surveys during the review of existing information, as described in Step 1. Additional areas may be identified during reconnaissance of the Project's study area. Field staff will traverse, or survey by boat, the entire length of riparian vegetation for each area to be assessed and will collect data at representative areas. Surveyors will determine the locations where PFC data will be collected (sample points) while in the field based on site observations. Surveyors will collect data at a minimum of one sample location per 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 will be evaluated. For lotic areas, field staff will complete the Reach Information Form (Lotic) and PFC Assessment Form (Lotic) (Dickard et al. 2015) and will record species observed. For lentic areas, field staff will complete the Lentic Standard Checklist (Prichard et al. 2003). The Reach Information Form records location and description of lotic reaches. The PFC Assessment Form (for lotic areas) and the Lentic Standard Checklist (for lentic areas) record information on attributes and processes that are used to determine functionality and that will be used for other studies dependent upon this data. Surveyors will also collect GPS points, take photographs at each sample point, and photograph features at other locations to document conditions within each wetland and riparian area. The Licensees will review and verify field data and create a wetland and riparian area digital data layer that captures relevant data.



**Quality Assurance and Quality Control**

Field data will be collected in a manner that promotes high quality results, and will be subject to appropriate QA/QC procedures, including spot-checks of transcription and comparison of GIS maps with field notes to verify locations of sensitive habitats and species.

**Analysis**

After completion of special-status plant species surveys and wetland and riparian habitat PFC assessment, the Licensees will evaluate data and identify sensitive and unique areas. Areas that are, or may be, susceptible to disturbance by Project O&M or Project-related recreation activities will be noted.

**Reporting**

*Botanical Resources Study* results will be incorporated into the Licensees' ISR, USR, DLA, and FLA to the extent they have been completed at the time they are needed for each of the aforementioned licensing milestones. If any special-status plants are found, a report will be developed and considered Privileged, and will be provided only to FERC, USFWS, and CDFW. If any of these occurrences are found on NFS lands, this Privileged report will also be provided to the USFS and reported using the USFS' *Threatened, Endangered and Sensitive Plants Element Occurrence Field Guide* (USFS 2008) protocol.

**4.1.5.5 Consistency of Methodology with Generally Accepted Scientific Practices**

Elements of this *Botanical Resources Study* are consistent with the goals, objectives, and methods outlined for most recent FERC hydroelectric relicensing efforts in California, including the Don Pedro Project (FERC No. 2299), the Yuba River Development Project (FERC No. 2246), and the Merced River Hydroelectric Project (FERC No. 2174), and will follow applicable standard botanical survey methods as defined by CDFW (2009) and USFS (2008).

**4.1.5.6 Schedule**

The *Botanical Resources Study* will begin after FERC issues its Study Plan Determination. The Licensees anticipate the schedule below will be followed to complete the *Botanical Resources Study*.

Fieldwork Preparation	April 2017 – February 2018
Fieldwork	May 2017 – April 2018
Data QA/QC	May 2017 – September 2018
Data Analysis and Reporting	October 2018 – December 2018

#### 4.1.5.7 Level of Effort and Cost

Based on the work effort described above, the Licensees estimate the current cost to complete this *Botanical Resources Study* will range between \$520,000 and \$694,000.

#### 4.1.5.8 References

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