

1.0 BOTANICAL RESOURCES STUDY APPROACH

This preliminary draft study approach is provided to inform of the general methods DWR followed during the study phase under FERC's Traditional Licensing Process.

1.1 PROJECT NEXUS

Continued Project operation and maintenance (O&M) and Project-related recreation activities have 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 California Department of Fish and Wildlife (CDFW) and may provide habitat for numerous wildlife species, including ESA-listed birds. This Study Approach addresses these resources (special-status plants, and wetland and riparian communities) in separate study components.

For the purpose of this *Botanical Resources Study Approach* (Study), a special-status plant species is a plant species that meets one or more of the following criteria: (1) listed by United States Department of Agriculture, Forest Service (USFS) as Sensitive; (2) listed under the California Endangered Species Act as an endangered, threatened, or rare plant; (3) California State-listed rare or endangered under the Native Plant Protection Act of 1977 (CDFW 2015a); or (4) 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 federally threatened (FT) under the federal ESA, or as candidates or species proposed for listing under the ESA, are addressed in a separate study for this relicensing effort that is specific to those resources.

This Study also includes mapping and assessment of wetland and riparian habitats using the United States Department of the Interior, Bureau of Land Management's (BLM) Properly Functioning Condition (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).

1.1.1 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 4.6.2 of the California Department of Water Resources (DWR) Pre-Application Document (PAD). As a summary, DWR found that no comprehensive special-status plant surveys have been performed recently within the proposed Project boundary, but 30 special-status plant species have the potential to occur (Table 1.1-1). The special-status plant survey component of this *Botanical Resources Study Approach* 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.

Existing, relevant, and reasonably available information regarding wetland and riparian habitats within the proposed Project boundary is provided in PAD Sections 4.7.1, 4.7.2, and 4.7.3, respectively. DWR also found that no recent comprehensive habitat mapping has been performed within the proposed Project boundary. The wetland and riparian assessment component of this *Botanical Resources Study Approach* 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- California Wildlife Habitat Relationships (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.

Table 1.1-1. Special-Status Plants Known or with the Potential to Occur in the Project Study Area

Common Name/ Scientific Name	Status ¹	Flowering Period	Elevation Range (feet)	Habitat Associations Summary	Occurrence Within the Proposed Project Boundary
Singlewhorl burrobrush (<i>Ambrosia monogyra</i>)	2B.2	August - November	33 - 1640	Sandy substrates within: • Chaparral • Sonoran desert scrub	Potential habitat present.
California androsace (<i>Androsace elongata</i> ssp. <i>acuta</i>)	4.2	March - June	492 - 4282	• Chaparral • Cismontane woodland • Coastal scrub • Meadows and seeps • Pinyon and juniper woodland • Valley and foothill grassland	Potential habitat present.
Mexican mosquito fern (<i>Azolla microphylla</i>)	4.2	August	98 - 328	• Marshes and swamps (ponds, slow water)	Potential habitat present.
Catalina mariposa lily (<i>Calochortus catalinae</i>)	4.2	February - June	49 - 2297	• Chaparral • Cismontane woodland • Coastal scrub • Valley and foothill grassland	Potential habitat present.
Palmer's mariposa lily (<i>Calochortus palmeri</i> var. <i>palmeri</i>)	1B.2, SBNF	April - July	2329 - 7841	Mesic areas in: • Chaparral • Lower montane coniferous forest • Meadows and seeps	CNDDDB occurrences in SWL quad. Potential to occur in upland areas, riparian forest, or wetlands adjacent to Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
Plummer's mariposa lily (<i>Calochortus</i> <i>plummerae</i>)	4.2	May - July	328 - 5577	Granitic, rocky substrates within: • Chaparral • Cismontane woodland • Coastal scrub • Lower montane coniferous forest • Valley and foothill grassland	CNDDDB occurrences in SWL quad near Cottonwood campground. Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).

Table 1.1-1. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)

Common Name/ Scientific Name	Status ¹	Flowering Period	Elevation Range (feet)	Habitat Associations Summary	Occurrence Within the Proposed Project Boundary
White pygmy-poppy (<i>Canbya candida</i>)	4.2, SBNF	March - June	1969 - 4790	Gravelly, sandy, or granitic substrates within: • Mojavean desert scrub • Pinyon and juniper woodland	CNDDDB occurrences in SWL quad. Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
San Bernardino mountains owl's-clover (<i>Castilleja lasiorhyncha</i>)	1B.2, SBNF	May - August	4265 - 7841	Mesic areas in: • Chaparral • Meadows and seeps • Pebble (pavement) plain • Riparian woodland • Upper montane coniferous forest	CNDDDB occurrences in SWL and SBN quads
Mojave paintbrush (<i>Castilleja plagiotoma</i>)	4.3, SBNF	April - June	984 - 8202	• Lower montane coniferous forest • Pinyon and juniper woodland	Potential habitat present.
Parry's spineflower (<i>Chorizanthe parryi</i> var. <i>parryi</i>)	1B.1, SBNF, BLM	April - June	902 - 4003	Sandy or rocky substrates, openings within: • Chaparral • Cismontane woodland • Coastal scrub • Valley and foothill grassland	CNDDDB occurrences in SBN quad. Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
Mojave tarplant (<i>Deinandra mohavensis</i>)	1B.3, CE, SBNF, BLM	May - January	2100 - 5249	Mesic areas in: • Chaparral • Coastal scrub • Riparian scrub	Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014), although CNDDDB (2015) indicates that the nearest recorded population (Mojave River at Deep Creek downstream of Cedar Springs Dam) may be extirpated.
Southern Sierra woolly sunflower (<i>Eriophyllum lanatum</i> var. <i>obovatum</i>)	4.3	June - July	3655 - 8202	Sandy loam substrates within: • Lower montane coniferous forest • Upper montane coniferous forest	Potential habitat present.

Table 1.1-1. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)

Common Name/ Scientific Name	Status ¹	Flowering Period	Elevation Range (feet)	Habitat Associations Summary	Occurrence Within the Proposed Project Boundary
Pine green-gentian (<i>Frasera neglecta</i>)	4.3	May - July	4593 - 8202	<ul style="list-style-type: none"> • Lower montane coniferous forest • Pinyon and juniper woodland • Upper montane coniferous forest 	Potential habitat present.
California satin (<i>Imperata brevifolia</i>)	2B.1, SBNF	September - May	0 - 3986	Mesic areas in: <ul style="list-style-type: none"> • Chaparral • Coastal scrub • Mojavean desert scrub • Meadows and seeps (often alkali) • Riparian scrub 	CNDDDB occurrences in SBN quad. Potential to occur in upland or riparian areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
Southern California black walnut (<i>Juglans californica</i>)	4.2	March - August	164 - 2953	Alluvial areas within: <ul style="list-style-type: none"> • Chaparral • Cismontane woodland • Coastal scrub • Riparian woodland 	Potential habitat present.
Duran's rush (<i>Juncus duranii</i>)	4.3	July - August	5801 - 9199	Mesic areas in: <ul style="list-style-type: none"> • Lower montane coniferous forest • Meadows and seeps • Upper montane coniferous forest 	Potential habitat present.
Ocellated Humboldt lily (<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>)	4.2	March - August	98 - 5906	Openings in: <ul style="list-style-type: none"> • Chaparral • Cismontane woodland • Coastal scrub • Lower montane coniferous forest • Riparian woodland 	Potential habitat present.
Parish's desert-thorn (<i>Lycium parishii</i>)	2B.3	March - April	443 - 3281	<ul style="list-style-type: none"> • Coastal scrub • Sonoran desert scrub 	CNDDDB occurrences in SBN quad, but currently presumed extirpated

Table 1.1-1. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)

Common Name/ Scientific Name	Status ¹	Flowering Period	Elevation Range (feet)	Habitat Associations Summary	Occurrence Within the Proposed Project Boundary
Hall's monardella (<i>Monardella macrantha</i> ssp. <i>hallii</i>)	1B.3, SBNF	June - October	2395 - 7201	<ul style="list-style-type: none"> • Broadleaved upland forest • Chaparral • Cismontane woodland • Lower montane coniferous forest • Valley and foothill grassland 	Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014)
California muhly (<i>Muhlenbergia californica</i>)	4.3	June - September	328 - 6562	<p>Mesic sites, seeps, and streambanks within:</p> <ul style="list-style-type: none"> • Chaparral • Coastal scrub • Lower montane coniferous forest • Meadows and seeps 	Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014)
Short-jointed beavertail (<i>Opuntia basilaris</i> var. <i>brachyclada</i>)	1B.2, SBNF, BLM	April - August	1394 - 5906	<ul style="list-style-type: none"> • Chaparral • Mojavean desert scrub • Pinyon and juniper woodland 	CNDDDB occurrences in SWL quad. Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
Mojave phacelia (<i>Phacelia mohavensis</i>)	4.3	April - August	4593 - 8202	<p>Sandy or gravelly substrates within:</p> <ul style="list-style-type: none"> • Cismontane woodland • Lower montane coniferous forest • Meadows and seeps • Pinyon and juniper woodland 	Potential habitat present.
Woolly chaparral-pea (<i>Pickeringia montana</i> var. <i>tomentosa</i>)	4.3	May - August	0 - 5577	Gabbroic, granitic, clay substrates in chaparral	Potential habitat present.
Black bog-rush (<i>Schoenus nigricans</i>)	2B.2, SBNF	August - September	492 - 6562	<ul style="list-style-type: none"> • Marshes and swamps 	CNDDDB occurrences in SBN quad. Potential to occur in Silverwood Lake shoreline areas and adjacent wetlands (DWR 2014, Environmental Science Associates 2014).

Table 1.1-1. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)

Common Name/ Scientific Name	Status ¹	Flowering Period	Elevation Range (feet)	Habitat Associations Summary	Occurrence Within the Proposed Project Boundary
Southern mountains skullcap (<i>Scutellaria bolanderi</i> ssp. <i>austromontana</i>)	1B.2, SBNF	June - August	1394 - 6562	Mesic areas in: • Chaparral • Cismontane woodland • Lower montane coniferous forest	CNDDDB occurrences in SWL quad. Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
Chickweed oxytheca (<i>Sidotheca</i> <i>caryophylloides</i>)	4.3, SBNF	July - September	3655 - 8530	• Lower montane coniferous forest (sandy)	Potential habitat present.
Laguna Mountains jewel- flower (<i>Streptanthus</i> <i>bernardinus</i>)	4.3	May - August	2198 - 8202	• Chaparral • Lower montane coniferous forest	Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
Southern jewel-flower (<i>Streptanthus</i> <i>campestris</i>)	1B.3, SBNF, BLM	April - July	2953 - 7546	Rocky substrates within: • Chaparral • Lower montane coniferous forest • Pinyon and juniper woodland	CNDDDB occurrences in SBN quad. Potential to occur in upland areas surrounding Silverwood Lake (DWR 2014, Environmental Science Associates 2014).
San Bernardino aster (<i>Symphyotrichum</i> <i>defoliatum</i>)	1.B.2, SBNF, BLM	July - November	7 - 6693	Near ditches, streams, springs within: • Cismontane woodland • Coastal scrub • Lower montane coniferous forest • Meadows and seeps • Marshes and swamps • Valley and foothill grassland (vernally mesic)	CNDDDB occurrence in SBN quad. Potential to occur in Silverwood Lake shoreline areas and adjacent wetlands (DWR 2014, Environmental Science Associates 2014)

Table 1.1-1. Special-Status Plants Known or with the Potential to Occur in the Project Study Area (continued)

Common Name/ Scientific Name	Status ¹	Flowering Period	Elevation Range (feet)	Habitat Associations Summary	Occurrence Within the Proposed Project Boundary
Lemmon's syntrichopappus (<i>Syntrichopappus lemmonii</i>)	4.3	April - June	1640 - 6004	Sandy or gravelly substrates within: <ul style="list-style-type: none"> • Chaparral • Pinyon and juniper woodland 	Potential habitat present.

Sources: CNDDDB 2015, CNPS 2015, BLM 2015, USFS 2013

Notes:

¹CNPS 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% of occurrences threatened / high degree and immediacy of threat)

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

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

The following quads were queried: SWL = Silverwood Lake, SBN = San Bernardino North

Key:

BLM = Bureau of Land Management

CE = California Endangered

CNDDDB = California Natural Diversity Database

CNPS = California Native Plants Society

CR = California Rare

SBF = San Bernardino National Forest

SBN = San Bernardino North

SWL = Silverwood Lake

1.1.2 Study Goals and Objectives

The goals of this 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 and ESA-listed Riparian Bird 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 recreation.

The objective of this *Botanical Resources Study Approach* 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 Study Area.

1.1.3 Study Methods

1.1.3.1 Study Area

The Study Area for the *Botanical Resources Study Approach* consists of the land area within the proposed Project boundary, excluding lands overlying the San Bernardino Tunnel on which DWR does not perform any Project O&M. The Study Area is shown in Figure 1.1-1.

1.1.3.2 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 Study may begin as early as January 2017.
- The Study does not include the development of requirements for the new FERC license, which will be addressed outside the Study.
- The Study focuses on the resource addressed by the Study within the proposed Project boundary, but the Study Area is specific to that resource.
- If required for the performance of the Study, DWR will make a good faith effort to obtain permission to access private property well in advance of initiating the Study. DWR will only enter private property if such permission has been provided by the landowner.
- DWR will acquire all necessary agency permits and approvals prior to beginning fieldwork for the Study.

- Field crews may make variances to the Study Plan in the field to accommodate actual field conditions and unforeseen problems. Any such variances will be noted in the resulting Study Plan deliverables.
- To prevent the introduction and transmittal of amphibian chytrid fungus and invasive invertebrates (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 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 when leaving or traveling between water-based study sites, and will also 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).

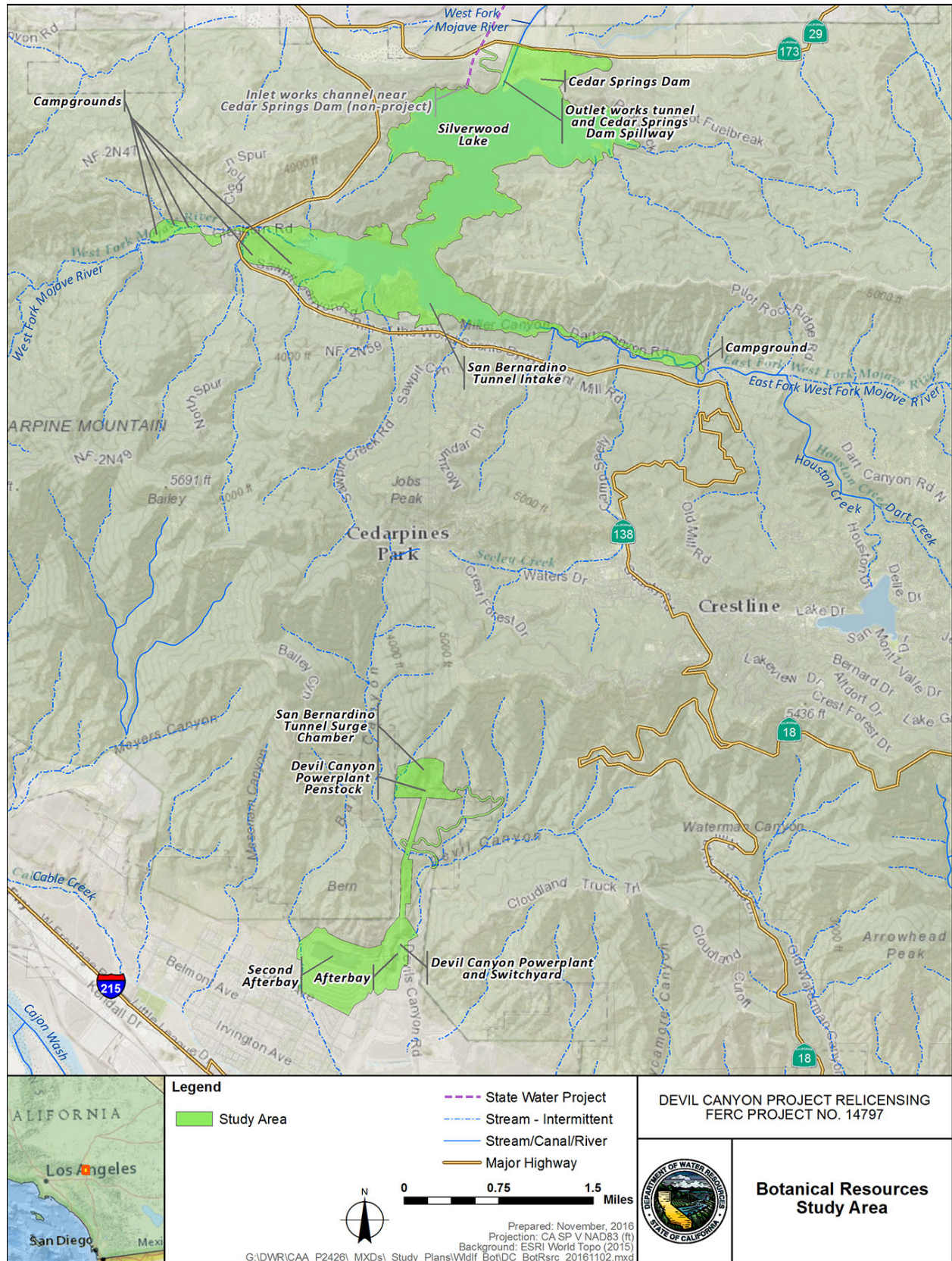


Figure 1.1-1. Botanical Resources Study Area

1.1.3.3 Methods

The *Botanical Resources Study Approach* 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, DWR will review existing data, including National Wetlands Inventory data (USFWS 2016), aerial imagery, and other relevant data that may be identified during this Study. Field maps will be prepared with suitable aerial imagery that displays the WHR habitat, and DWR 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 (Table 1.1-1). Additionally, field staff will visit reference sites, if available, for special-status plants most likely to occur on the Project (those known from CNDDDB reports in the Project or surrounding quadrangles or with other known occurrences nearby).

DWR will conduct a comprehensive botanical inventory over the entire Study Area to identify the locations of special-status plant species, if present. DWR will conduct special-status plant surveys that will follow applicable protocol methodology described in the botanical survey section of the California Department of Fish and Wildlife (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 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 Survey Protocol and Field Guide (USFS 2014) and Threatened, Endangered and Sensitive Plants Element Occurrence Protocol and Field Guide (USFS 2015).

DWR plans to perform surveys that provide coverage of known flowering periods between February and August, encompassing the period within which potentially occurring special-status species bloom, 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 qualified to identify plant species likely to occur in the Study Area. 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 CDFW’s California Natural Diversity Database. 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 proposed Project boundary, whichever is less, though surveyors will estimate the size of the occurrence outside the study boundary to the extent possible):

- digital photographs to document the occurrence, phenology, and reproductive state, associated habitat, and indications of potential threats
- location and approximate extent of the special-status plant population delineated using a handheld GPS 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)

DWR 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 and additional areas may be identified 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 DWR's field staff), up to three sample points will be evaluated. Field staff will complete the Reach Information Form and PFC Assessment Form (lentic or lotic). The Reach Information Form records key information that must be included with the assessment, and the PFC Assessment Form records the assessment information that will be used for other studies dependent upon this data, as stated in Section 1.1.2. 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. DWR will review and verify field data and create a wetland and riparian area digital data layer that captures relevant data.

1.1.3.4 Quality Assurance and Quality Control

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

1.1.3.5 Analysis

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

1.1.3.6 Reporting

Data collected and analyzed will be compiled and synthesized for use in the Non-Native Invasive Plants Study, the Special-Status Terrestrial Wildlife Species Study, the ESA-Listed Bird Species Southwestern Willow Flycatcher and Least Bell's Vireo Habitat Evaluation Study, and the ESA-Listed Plant Species Study. Information will also be incorporated into the Draft License Application and Final License Application.

1.1.4 Consistency of Methodology with Generally Accepted Scientific Practices

Elements of this 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), Yuba River Development Project (FERC No. 2246), and Merced River Hydroelectric Project (FERC No. 2174), and will follow applicable standard botanical survey methods as defined by CDFW and USFS.

1.1.5 Schedule

The Study may begin as early as January 2017. DWR anticipates the schedule below will be followed to complete the Study.

Fieldwork Preparation	January 2017– February 2017
Fieldwork	February 2017 – August 2017
Data QA/QC	July 2017 – October 2017
Data Analysis and Reporting	October 2017- December 2017

1.1.6 Level of Effort and Cost

Based on the work effort described above, DWR estimates the current cost to complete this Study will range between \$283,367 and \$377,822.

1.1.7 References

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