

4.1.2 Quail Lake Fisheries Assessment Study

4.1.2.1 Project Nexus

Continued Project O&M and Project-related recreation activities have the potential to affect fish populations in Quail Lake, which is used by the public for non-contact recreation, including fishing.

4.1.2.2 Existing Information and Need for Additional Information

Existing, relevant, and reasonably available information regarding fisheries in Quail Lake is provided in Section 4.5 of the Licensees' PAD. As a summary, the Licensees found mostly outdated, anecdotal information regarding fish populations or the fisheries in Quail Lake. A DWR brochure (DWR 1997) describes six species of fish that can be found there, including striped bass (*Morone saxatilis*), channel catfish (*Ictalurus punctatus*), Sacramento blackfish (*Orthodon microlepidotus*), tule perch (*Hysterocarpus traskii*), threadfin shad (*Dorosoma* sp.), and Sacramento hitch (*Lavinia exilicauda exilicauda*). Neither the Licensees nor CDFW stock fish in Quail Lake. This *Quail Lake Fisheries Assessment Study* will supplement existing information by providing current information regarding fish populations and the fisheries in Quail Lake.

4.1.2.3 Study Goals and Objectives

The goals of this *Quail Lake Fisheries Assessment Study* are to characterize: (1) fish species composition and relative abundance (i.e., not quantitative abundance estimates); (2) fish size and condition factor; and (3) the angling resources present at Quail Lake.

The objective of this *Quail Lake Fisheries Assessment Study* is to gather sufficient data necessary to fill recognized gaps in information concerning the distribution, occurrence, and condition of fish in Quail Lake, and the current status of the recreational fisheries in Quail Lake.

4.1.2.4 Study Methods

Study Area

The study area for the *Quail Lake Fisheries Assessment Study* will consist of the area within the proposed Project boundary surrounding Quail Lake. The study area for the *Quail Lake Fisheries Assessment Study* is shown below in Figure 4.1-6.

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 *Quail Lake Fisheries Assessment Study* will begin after FERC issues its Study Plan Determination.
- The *Quail Lake Fisheries Assessment Study* does not include the development of requirements for the new license, which will be addressed outside the Study.
- The *Quail Lake Fisheries Assessment Study* focuses specifically on fish populations within Quail Lake, but the study area for the *Quail Lake Fish Populations Study* is specific to that resource.
- If required for the performance of the *Quail Lake Fisheries Assessment 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 *Quail Lake Fisheries Assessment Study*.
- Field crews may make variances to the *Quail Lake Fish Populations Study* in the field to accommodate actual field conditions and unforeseen problems. Any variances in the *Quail Lake Fisheries Assessment Study* will be noted in the data resulting from the *Quail Lake Fisheries Assessment Study*.
- 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 when leaving or traveling between water-based study sites. For guidance on correct procedures field crews will follow DWR's Quagga and Zebra Mussel Rapid Response Plan and CDFW's Aquatic Invasive Species Decontamination Protocol found at <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=43333>. All boats used during the study will follow cleaning 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).

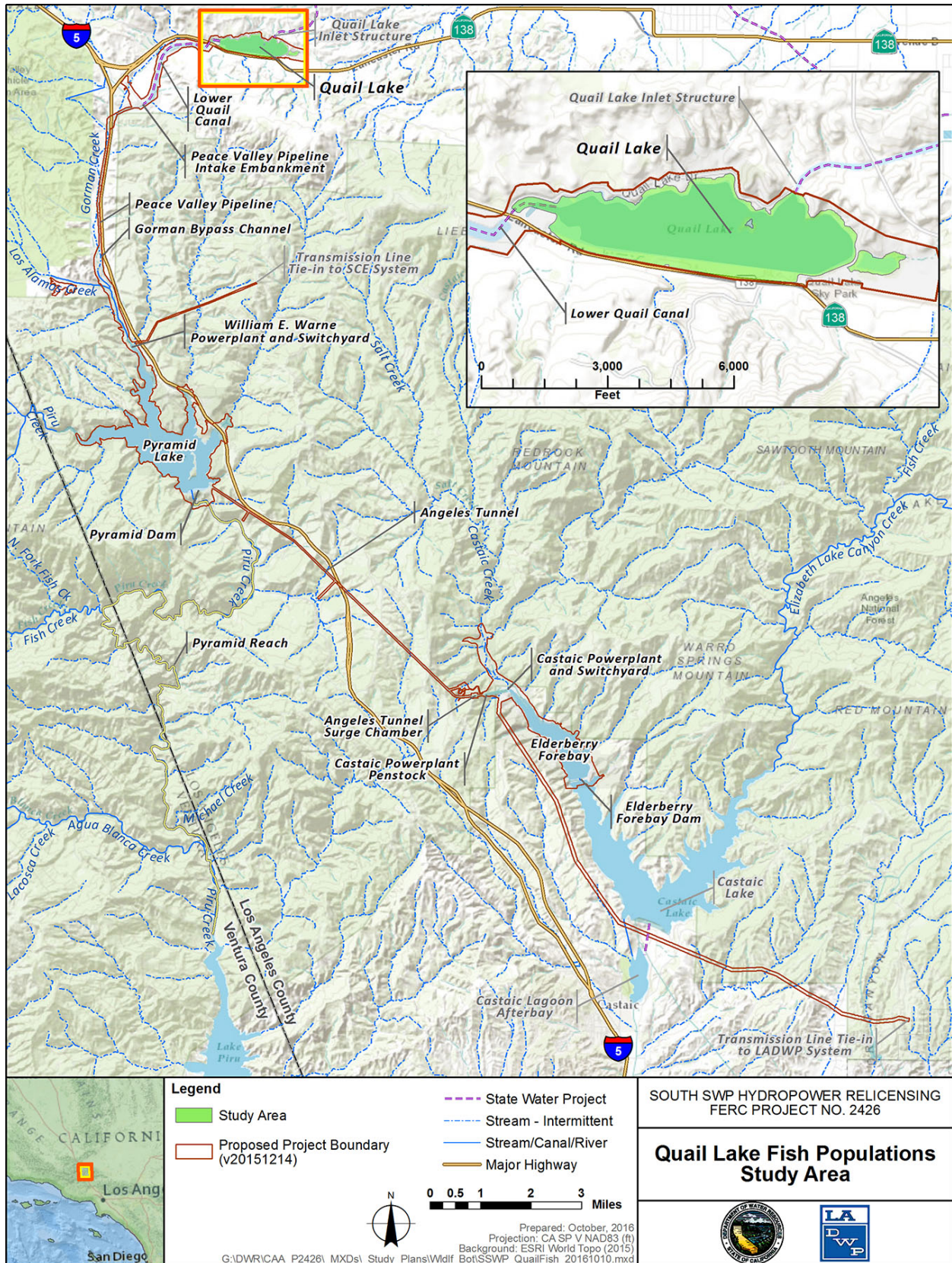


Figure 4.1-6. Quail Lake and the Related Project Vicinity

Methods

This *Quail Lake Fisheries Assessment Study* will consist of two core steps: (1) data gathering and planning; and (2) fieldwork, primarily electrofishing and creel surveys. These steps are described below.

Step 1 – Data Gathering and Planning. Prior to fieldwork being conducted, GIS data will be used to divide the Quail Lake shoreline into six segments of approximately 0.5 mile each, which will cover the entire shoreline of the reservoir. These segments will be treated as individual sites to divide the electrofishing into more manageable amounts and reduce the holding time for captured fish.

Planning for the creel surveys will include the selection of 50 days by stratified random sampling (16 high use days and 34 low use days) from October 1, 2017 through July 31, 2018, and will be limited to roughly 5 days per month (Pollock et al. 1994; Malvestuto 1996). Weekends and major holidays are considered high use days, and weekdays and the winter season are considered low use days.

Step 2 – Fieldwork. Fieldwork will consist of two elements: boat electrofishing and creel surveys, as described below.

Boat Electrofishing: Electrofish sampling will be conducted from the shoreline out to a depth that coincides with the radius of the electrofishing field. The radius of the electrofishing field will be estimated by measuring the maximum distance from the anode at which a voltage can be measured by a multimeter while the electrofishing unit is on. This will be measured prior to sampling activities each day and recorded. Water quality data for Quail Lake will be reviewed to ensure the electrofishing equipment is properly prepared and calibrated. Fish sampling will be conducted by boat electrofishing at night to provide data regarding species composition and relative abundance. This activity requires a CDFW-issued scientific collection permit, which will be applied for once the *Quail Lake Fisheries Assessment Study* is approved by FERC. Restrictions and limitations imposed by the scientific collecting permit may result in modifications to the methods used in this *Quail Lake Fisheries Assessment Study* in order to meet the permit requirements. Any variances from the study methods resulting from permit restrictions or limitations will be noted. The shoreline of Quail Lake will be sampled one night in October, using boat electrofishing beginning one hour after civil twilight. Boat electrofishing will take place using methods detailed by Reynolds (1996) and Bajer et al. (2012). Sampling will employ an approach similar to that used by CDFW in 2013 at Pyramid Lake. The six sites selected in Step 1 will be sampled for a minimum of 10 minutes (600 seconds) of pulsed direct current (or alternating current depending on the water quality) applied to the water, and this time will be recorded. A generator powered pulsator (Smith-Root 5.0 or similar) electrofishing unit will be used with one or two electrode booms to apply the appropriate current to the water. The sampling crew will include three team members: one boat operator, and two netters. Sampling will be conducted in a “leap frog” manner, in which a short portion of shoreline is fished followed by a “leap” of approximately 50 feet in order to limit herding or moving fish. Fish will be held in live wells with adequate aeration during sampling and processing.

Once the captured fish from each site are processed, they will be released near the end of the site where sampling began in order to temporarily segregate them from electrofishing sampling at the next site.

All collected fish will be identified to species and counted. General condition (e.g., muscle tone, vigor, color) will be noted and any external parasites will be documented and photographed. Up to 50 individuals of each species will be measured to the nearest millimeter (fork length [FL] for all species with a deeply forked caudal fin, or total length [TL] for centrarchids or other species lacking a forked caudal fin) and weighed by digital scale to the nearest gram. Additional fish will be examined and counted.

General information recorded will include impoundment name, GPS sample site locations (beginning and end of each site), crew member names, weather conditions, air temperature, and water chemistry at approximate fish sampling location (i.e., water temperature, DO, and conductivity). Maximum depth (full extent of electrical field), average depth, primary substrate, secondary substrate, cover, adjacent shoreline characteristics, level of public use, and average bed slope will be recorded for each site. Representative photographs of each site will be included in the final report. Minimum, maximum, and mean water depths at the location will be recorded.

Creel Surveys: A stratified random sample of 16 high use days and 34 low use days will be selected for sampling between October 1, 2017 and July 31, 2018. High use days are weekends and major holidays and low use days are weekdays and the winter season. On average, 5 days per month will be sampled over the ten-month period. Additionally, a schedule of A.M. (7:00 – 10:00) or P.M. (3:00-6:00) surveys will be randomly selected for each survey day. This will provide for a total of 75 hours of potential survey time over the five months (3 hours per day for 25 days).

Creel surveys will be conducted at the parking area adjacent to Highway 138 (the parking area is the only access point to Quail Lake). The access and lack of boat launch will limit the area that anglers spread out around the reservoir and effectively funnel anglers to surveyors, which will aid in making sure all anglers are surveyed. Anglers will be interviewed as they return from their fishing trip.

Information to be collected in each interview will include the following:

- Start and end time of angling outing and the time of the interview
- Number of fish caught by species (including fish harvested and released)
- Targeted fish species
- Angler age by category (<16, 16–55, >55 years old)
- Angler gender (male, female)
- Angler distance traveled by category (<20 miles, 20–50 miles, >50 miles)

- Angler satisfaction ranking for number of fish caught, size of fish caught, and overall fishing experience (1=poor, 2=fair, 3=good, 4=excellent)
- Whether angling was the primary reason for their visit to Quail Lake
- Zip code of residences

Additional information that will be recorded each day will include:

- Date, day of the week
- Approximate air temperature
- General description of the weather
- A.M. or P.M. survey
- Harvested fish measured to the millimeter (fork or standard length depending on species); harvested fish will not be weighed

Similarly, CPUE will be calculated for game fish species for which creel data are collected. CPUE will be calculated by taking the total number of fish caught and dividing by the total number of angling hours (fish per hour of angling effort). Length information will be compared to the weight-length relationships developed from the electrofishing data to evaluate which stratum of the fish population are impacted by angling. The results of the qualitative angling interview questions will be summarized and presented with the electrofishing analysis.

Quality Assurance and Quality Control

Field data gathered during *Quail Lake Fisheries Assessment Study* will be collected in a manner that promotes high quality results, and will be subject to appropriate QA/QC for sample collection equipment, procedures, and cross-checking of data. As part of the QA/QC procedures, extreme care will be taken to ensure the data collected is accurate and maintained in a safe environment.

Electrofishing equipment will be calibrated prior to conducting sampling. A voltmeter will be used to measure voltage and amperage across 1-, 3-, 5-, and 10-foot intervals at 1, 3, 5, and 10 feet from the electrodes and the maximum range of the electrical field will be determined for a 1-foot span between electrodes. Measured values will be compared to the values given by the electrofishing equipment and recorded.

All data will be recorded on a prepared data sheet with fields for all required data. Field staff will fill in data during data collection and the field lead will review prior to leaving each site to verify all data has been recorded. The field lead will do a final review prior to the end of fieldwork each day. Data sheets will be scanned or photographed at the end of each day and copies will be uploaded to a server or emailed to the team to

create a digital back up. Similar procedures will be followed for all creel survey and electrofishing data.

Analysis

Boat electrofishing results will be documented both as total catch and in terms of CPUE. CPUE for fishes captured by boat electrofishing will be calculated by dividing the number of fish of each species captured by the length of time fished (e.g., fish per minute). CPUE will be summarized by species. Weight-length relationships, relative weight, proportional size distribution, and relative size distribution (Guy et al. 2007) will be calculated for special-status species, and any species captured that is recognized as game fish by CDFW.

Reporting

Quail Lake Fisheries Assessment Study methods and results will be prepared and included, to the extent completed and ready for inclusion, in the Licensees' ISR, USR, DLA, and FLA.

4.1.2.5 Consistency of Methodology with Generally Accepted Scientific Practices

The *Quail Lake Fisheries Assessment Study* methodology is generally consistent with recently performed electrofishing studies and creel surveys performed by CDFW and its contractors and the annual creel surveys being conducted by Environmental Science Associates, Inc. at Pyramid Lake. The level of effort (number of sampling days) is less than those being done at Pyramid Lake because Quail Lake is a much smaller and less trafficked reservoir.

4.1.2.6 Schedule

The *Quail Lake Fisheries Assessment Study* will begin after FERC issues its Study Plan Determination. The Licensees anticipate the schedule below will be followed to complete the *Quail Lake Fisheries Assessment Study*:

Fieldwork Preparation	June 2017 – October 2017
Fieldwork	October 2017 – July 2018
Data QA/QC	August 2018
Data Analysis and Reporting	August 2018

4.1.2.7 Level of Effort and Cost

Based on the work effort described above, the Licensees estimate the current cost to complete this *Quail Lake Fisheries Assessment Study* will range between \$188,000 and \$251,000.

4.1.2.8 References

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