

AQ 3 – FISH POPULATION TECHNICAL STUDY PLAN

**Kern River No. 1 Hydroelectric Project
FERC Project No. 1930**



February 2024

TECHNICAL STUDY PLAN

AQ 3 – Fish Population

POTENTIAL RESOURCE ISSUE

- Fish species composition, distribution, and abundance.

PROJECT NEXUS

- Project operations modify the flow regime and fish habitat in the impoundment and bypass reach³.

RELEVANT INFORMATION

The following information is available to characterize the fish population in the Democrat Dam Impoundment and bypass reach. See Pre-Application Document Section 3.5, Fish and Aquatic Resources for a summary of fish population and passage information.

- California Fish Website, Fish Species by Watersheds: Isabella Lake-Kern River-180300010607 (CalFish 2020).
- FERC's Final Environmental Assessment for Hydropower License, Kern River No. 1 Hydroelectric Project, FERC Project No. 1930-014 (FERC 1998)
- SCE's Application for New License for the Kern River No. 1 Hydroelectric Project (SCE 1994)
- SCE's Borel Fish Population Monitoring Report 2020 (SCE 2021).
- Fishes of the Sacramento-San Joaquin Estuary and Adjacent Waters, California: A Guide to the Early Life Histories (Wang 1986)
- SCE's Final Report Kern River No. 1 Hydroelectric Project Smallmouth Bass Study (SCE 2009)
- California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDDB) (CNDDDB 2022)
- Nonindigenous Aquatic Species Database (USGS 2020)
- Natural Resource Information System (NRIS) (U.S. Forest Service [Forest Service] 2022)

POTENTIAL INFORMATION GAPS

- Recent information on fish composition, distribution, and abundance.

³ A bypass reach is a segment of a river downstream of a diversion facility where Project operations result in the diversion of a portion of the water from the river.

STUDY OBJECTIVES

- Document fish species composition, distribution, and abundance in the impoundment and bypass reach.
- Characterize fish size, condition factor, and approximate population age structure in the impoundment and bypass reach.

EXTENT OF STUDY AREA

The study area includes the Democrat Dam Impoundment and bypass reach in the Kern River from Democrat Dam to the Kern River No. 1 Powerhouse Tailrace.

STUDY APPROACH

STUDY SITES

- The locations of study sites for developing fish species composition and abundance estimates are shown in Table AQ 3-1, Figure 3-1, and Map AQ 3-1. Sampling will be conducted during the late summer/early fall base flow period. The river sampling sites (electrofishing) will approximately 100 m long inclusive of the historical sampling sites (ENTRIX 2009). The Democrat Dam Impoundment sampling site will include a minimum of 300 meters of shoreline habitat.
- The specific locations of the sampling sites will be determined in the field and will approximate the historical sampling locations (adjusted for channel changes and input from resource agencies, as appropriate). Mesohabitat characterization will be based on aerial image mapping and will be used to identify representative reach sampling sites with mesohabitat types in approximately similar proportion to the larger geomorphic river segments. Table AQ 3-1 shows the specific location, length, and sampling methods.

IMPOUNDMENT SAMPLING

- The impoundment sampling methods will be electrofishing and trammel netting (Table AQ 3-1) (poor water clarity precludes snorkeling at this site).
 - Electrofishing will be conducted using Smith-Root™ “E-Cat” light-duty cataraft electrofisher (e-cat) with oars and a small outboard motor or similar equipment. It is assumed the cataraft can be safely deployed at the site (i.e., the flow allows safe deployment with no risk of entrainment over the diversion dam).
 - If the e-cat cannot be deployed, backpack electrofishers will be used along the shore where wading is possible.
 - If the e-cat can be deployed, then it will be used to set 2 trammel nets for 4 hours (daylight) in deeper portions of the impoundment that cannot be electrofished effectively.

BYPASS REACH (RIVER) SAMPLING

- The bypass reach (river) study sites will be sampled using electrofishing and trammel netting (Table AQ 3-1) (poor water clarity precludes snorkeling at these sites).
 - Where possible due to natural river features or the river being amendable to blocknetting, multi-pass electrofishing (e.g., Reynolds 1996; Van Deventer and Platts 1989; Rexstad and Burnham 1992) will be used to sample and estimate fish populations in shallow stream habitats (<1.5 m) at each study site.
 - Captured fish from each pass will be kept in separate live wells or buckets. Where possible, the sampling sites will be partitioned into mesohabitat types for sampling.
 - In deeper portions of the sampling site, an e-cat electrofisher cataraft will be used to obtain abundance estimates based on length/area sampled provided the e-cat cataraft can be transported to the sampling site.
 - If pool habitat exists that is deeper than the e-cat can effectively electrofish, 1 to 2 trammel nets will be set in the river for 4 hours (daylight), if possible.

FISH PROCESSING

- Fish will be anesthetized (CO₂), enumerated, identified to species, and measured (fork length and weight).
- Fish will be returned to the study site when the sampling is completed.
- Sampling protocols and field data forms will be consistent with those in Flosi et al. 1998.
- The lengths and widths of the habitat units sampled will be recorded to calculate fish abundance by length and area (density) of stream sampled.
 - Captured fish from each pass will be kept in separate live wells or buckets. Where possible, the sampling sites will be partitioned into mesohabitat types for sampling.
 - In deeper portions of the sampling site, an e-cat electrofisher will be used to obtain abundance estimates based on length/area sampled if the e-cat can be transported to the sampling site.
- If fish mortalities occur, they will be recorded and the fish will be properly placed back into the river system for organic decomposition in deep pools by puncturing their air bladders.

WESTERN POND TURTLE (WPT) AND INCIDENTAL SPECIES

- At the Democrat Dam Impoundment and bypass reach, observations of WPT and/or other incidental aquatic species will be documented at the fish and water quality sampling locations.

REPORTING

- Study methods and results will be documented in a AQ 3 – Fish Population Technical Study Memo (TSM). Stakeholder review and comment period for the TSM is identified below in the schedule.
- Fish abundance will be reported by species and depending on the sampling method used by either catch-per-unit-effort (CPUE) (fish per length/area of stream sampled or by net-hour) in the case of trammel netting or e-cat electrofishing and by (fish per mile, fish per acre) for multi-pass electrofishing.
- Fish abundance will be compared to historical data sets in the Kern River No. 1 bypass reach and recent sampling in the upstream Borel Project river reach (ENTRIX 2009; Cardno 2021).
- Develop a distribution map for each species in the Project study area using the quantitative abundance estimates and qualitative sampling data.
- Develop a fish life stage periodicity chart (or life history chronology chart by month) for each species based on available literature, consultation with qualified fisheries biologists, and the fish population sampling data.
- Develop length frequency histograms of sampled fish and to determine the age structure of fish populations using scale data.
- Calculate fish condition factors using measured weight and length data.
- Upon request, an electronic database (Excel spreadsheet) will be provided of all fish sampling data (date, location, fish species, fish size, sampling pass, etc.) to resource agencies and interested stakeholders.

SCHEDULE

This is a one-year study to be conducted during the first year of the study period with the study results reported in the Initial Study Report (ISR).

Date	Activity
April 2024–July 2024	Select fish population sampling sites in collaboration with interested resource agencies
August 2024–October 2024	Conduct quantitative/quantitative fish sampling (electrofishing/ snorkeling)
November 2024–February 2025	Analyze data and prepare technical memo

Date	Activity
February 2025	Distribute draft technical memo to the stakeholders
March 2025–May 2025	Stakeholders review and provide comments on draft technical memo (90 days)
June 2025–July 2025	Resolve comments and prepare final technical memo
December 2025	Distribute final technical memo in Draft License Application

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