Version 3.0 Plan Issued on November 15, 2018 Comments Due on January 7, 2019	Word versions will be distributed via secure ShareFile link provided in an email. Comments may be submitted via similarly provided link

REVISED DRAFT BISHOP CREEK FISH DISTRIBUTION BASELINE STUDY PLAN

BISHOP CREEK HYDROELECTRIC PROJECT (FERC PROJECT NO. 1394)

Prepared for:

SOUTHERN CALIFORNIA EDISON®

Energy for What's Ahead℠

Bishop, California

Prepared by:

Kleinschmidt

Portland, Oregon
www.KleinschmidtGroup.com

September 2018

DRAFT

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SOUTHERN CALIFORNIA EDISON

1.0 INTRODUCTION

Southern California Edison Company (SCE) is the licensee, owner and operator of the Bishop Creek Hydroelectric Project (Project) (Federal Energy Regulatory Commission [FERC] Project No. 1394). The Project is located on Bishop Creek in Inyo County, California, approximately 5 miles southwest of the city of Bishop (Figure 1-1). The licensee operates the Project under a 30-year license issued by FERC on July 19, 1994. Because the current license is due to expire on June 30, 2024, SCE has initiated the formal relicensing process utilizing the Integrated Licensing Process (ILP) by filing the Notification of Intent (NOI) and Pre-Application Document (PAD) with FERC on XXXX.

In advance of filing the NOI and PAD, SCE worked with stakeholders to identify necessary studies, with the goal of accelerating FERC's ability to issue a Study Plan Determination. Efforts began over 1 year prior to the formal initiation of the process with FERC, through a series of Technical Working Group (TWG) meetings held in Bishop, California.

During these TWG meetings, stakeholders identified the need for a Baseline Fish Distribution Study Plan (Study Plan) that focus on creeks below Project reservoirs. A separate effort will be described that also examines fish distribution in the reservoirs. This study plan details SCE's proposal for study objectives, study area, methods and schedule for the effort. Appendix A is a consultation summary of discussions specific to this plan, along with a table that summarizing stakeholders' comments on previously reviewed versions, and how SCE addressed those comments. If SCE does not incorporate a comment or request, SCE will provide rationale based on Project specific information and FERC ILP Study Plan criteria.

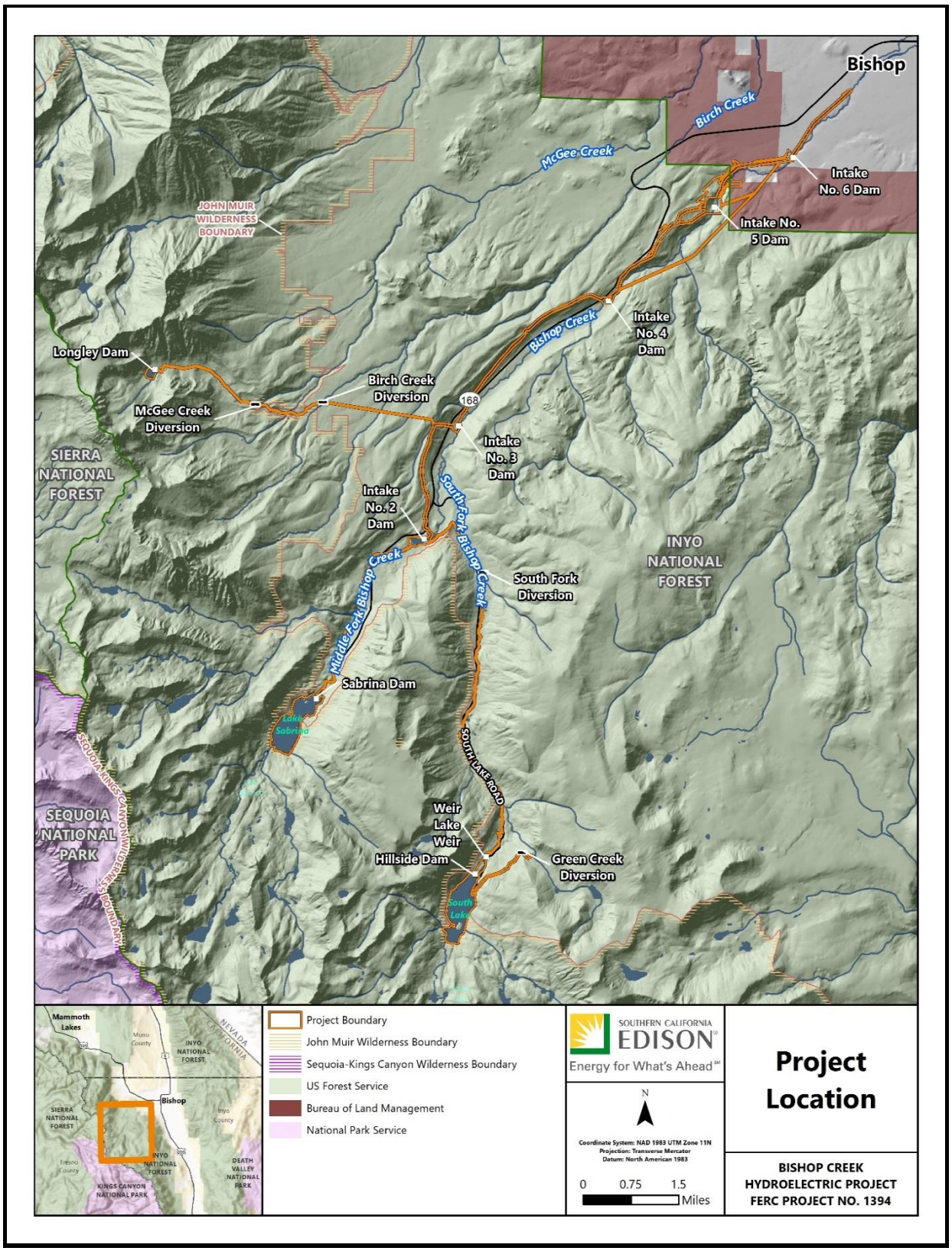

FIGURE 1-1 PROJECT LOCATION MAP

2.0 PROJECT NEXUS

Project operations may indirectly or directly influence fish resources occupying Project waters, primarily by regulating reservoir water levels or by flows throughout the creek basin. The effect may be direct (e.g., altered hydrology due to flow management), or indirect (e.g., public access to Project areas). Future Project facilities and operations should not be inconsistent with the Desired Conditions described in the "Land Management Plan for the Inyo National Forest" (USDA 2018) as they relate to ecological sustainability and diversity of plant and animal communities. Therefore, this Study Plan focuses on identifying the presence and distribution of fish species within the Project area that may be affected.

3.0 STUDY GOALS AND OBJECTIVES

Study goals and objectives are determined based on input received in consultation with stakeholders participating in the Aquatic Resources TWG during the March 2018 through August 2018 timeframe, information reviewed from SCE files, and a Project area site visit during June 2018 and written comments received by August 31, 2018. The TWG stated that there is no current information regarding the distribution of both game and non-game fish species of interest in the Project area; nor is the status known regarding the growth and density of wild brown trout populations in the Project area. Study Plan goals and objectives include:

- Characterize fish populations and distribution in Project influenced stream reaches
  - Sample for Owens sucker in Bishop Creek downstream from Lake Sabrina and South Lake
  - Assess distribution of other fish species in Bishop Creek downstream from Lake Sabrina and South Lake
  - Obtain population date sufficient to identify the extent to which self-sustaining brown trout populations are consistent with levels documented during the 1990s through 2010 at historic monitoring sites
  - Evaluate population, health and condition of recreationally important brown trout and brook trout in lotic habitat affected by Project operation via added monitoring of the historic monitoring sites
- Evaluate select, localized water quality parameters that may affect the growth and distribution of fish species

- Ensure that future Project facilities and operations are not inconsistent with the Desired Conditions described in the "Land Management Plan for the Inyo National Forest" (USDA 2018) as they relate to ecological sustainability and diversity of plant and animal communities.

4.0 PERTINENT LIFE HISTORY INFORMATION

Although Project waters were originally fishless, the California Department of Fish and Wildlife (CDFW) currently manages waters in the Project area as a popular stocked rainbow trout fishery, and Bishop Creek presently supports a self-sustaining brown trout fishery. McGee and Birch creeks maintain small brook trout populations. Introduced species such as Owens sucker and speckled dace may potentially be occupying Project waters.

Brown Trout. Brown trout are an introduced species to the Bishop Creek watershed that has established a self-sustaining fishery, supported entirely by natural reproduction. Spawning recruitment to the fishery does not appear to be a limiting factor (N. Buckmaster, CDFW, *personal communication*). The following summary of brown trout life history is excerpted from Raleigh, *et al*. (1986).

> *Brown trout mature as early as the end of their first year and as late as their eighth year but most mature in their third to fifth year. Brown trout up to 30.0 cm in length feed generally on terrestrial and aquatic insects but, as they exceed 25.0 cm, fish and crustaceans become more important in the diet. Brown trout are fall spawners with apparent latitudinal differences in time of onset. Spawning migrations appear to be triggered by decreasing day length, increased late fall flows, or drops in water temperature to <9 ^{o}C though these events are usually concurrent. In California, however, spawning often occurs when stream flows are low. Eggs are buried in unguarded nests (redds) built in well aerated gravels where they incubate throughout the winter. Egg sac larvae live in the gravels prior to emerging as fry in the spring.*
>
> *Optimal brown trout riverine habitat is characterized by clear, cool to cold water; a relatively silt-free rocky substrate in riffle-run areas; a 50% to 70% pool to 30% to 50% riffle-run habitat combination with areas of slow, deep water; well vegetated, stable stream banks; abundant instream cover; and relatively stable annual water flow and temperature regimes. Brown trout tend to occupy the lower reaches of low to moderate gradient areas (~1%) in suitable, high gradient river systems.*

Owens Sucker. Owens sucker have been introduced to the Bishop Creek watershed, and specifically are known to occupy Lake Sabrina. It is not known if they have colonized other

portions of the watershed. The species occupies waters specifically in the Owens River Valley but has also escaped via the Owens Aqueduct to the Santa Clara River drainage.

The species prefers soft-bottomed runs in cool-water streams and the bottoms of lakes and reservoirs. Owens suckers feed at night on aquatic insects, algae, detritus and organic matter. They spawn from early May through early July. Larval suckers become juveniles at a total length of 19 millimeters (mm) to 22 mm and hide under cover along stream margins and in backwaters. According to CDFW (*https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=104359*):

> *Owens suckers, in the Owens River … are most common in stream reaches with long runs and few riffles (Deinstadt et al. 1986). Habitat in these reaches is characterized by fine substrate…with lesser amounts of gravel and cobble, water temperatures of 7-13□C, and pH of 7.9-8.0. In lakes and reservoirs, … adults are abundant near the bottom, regardless of depth. Adult suckers (> 15 cm) were also commonly found at the bottom of pools in a 10 mile reach of the Owens River Gorge (CDFW snorkel surveys 2008; S. Parmenter, CDFW, pers. comm. 2009). Recent surveys in the lower Owens River found suckers predominantly in off-channel habitats, such as backwaters (M. Hill, pers. comm. 2009).*

5.0 REVIEW OF EXISTING INFORMATION

Project facilities (13 dams and diversions, and 5 powerhouses and associated intakes) are sited along Bishop Creek and its tributaries as well as Birch and McGee creeks. Bishop Creek has a total drainage area of approximately 70-square-miles from its headwaters to the confluence with the Owens River. South Lake and Lake Sabrina are the major storage reservoirs in the watershed. SCE manages the releases from the storage reservoirs, for purposes of hydro-generation and meeting water allocation requirements in accordance with the 1922 Chandler Decree. Water from McGee and Birch creeks (combined drainage area of approximately 25-square-miles) is also diverted to Bishop Creek through the hydroelectric facilities.

This network of creeks and reservoirs supports both stocked and self-sustaining trout fisheries, including brown trout, brook trout and rainbow trout managed by the CDFW. The CDFW introduced these trout, which are managed to support an angling harvest. All three species are nonindigenous, and stocking is required to support heavy angling exploitation for the put and take fishery in the reservoirs. Segments of the lower reaches of Bishop Creek support self-sustaining brown trout populations, and McGee and Birch creeks maintain scattered populations

of brook trout. Owens sucker are believed to have been informally introduced (N. Buckmaster, CDFW, *personal communication*), and during an early June 2018 field visit to Lake Sabrina, adult Owens sucker were observed spawning in a shallow arm near the eastern end of the Lake Sabrina dam. EA (1987) also netted unidentified sucker from Lake Sabrina, which the authors speculated were Owens sucker. Edison monitored the Bishop Creek brown trout population at intervals from 1988 through 2010 (Sada, 2010). Sada (2010) found that population parameters such as growth, age and abundance remained similar to that of other regional Sierra creeks throughout most of the study period, however abundance declined during 2010, the last year of monitoring. CDFW noted that growth of adults has been limited in recent years but that recruitment from natural reproduction does not appear to be a limiting factor (N. Buckmaster, CDFW, *personal communication*).

6.0 STUDY AREA

Figure 6-1 below shows the proposed study area for the Study Plan. The study would be conducted downstream from South Lake, Sabrina Lake, and select Bishop Creek bypass reaches.

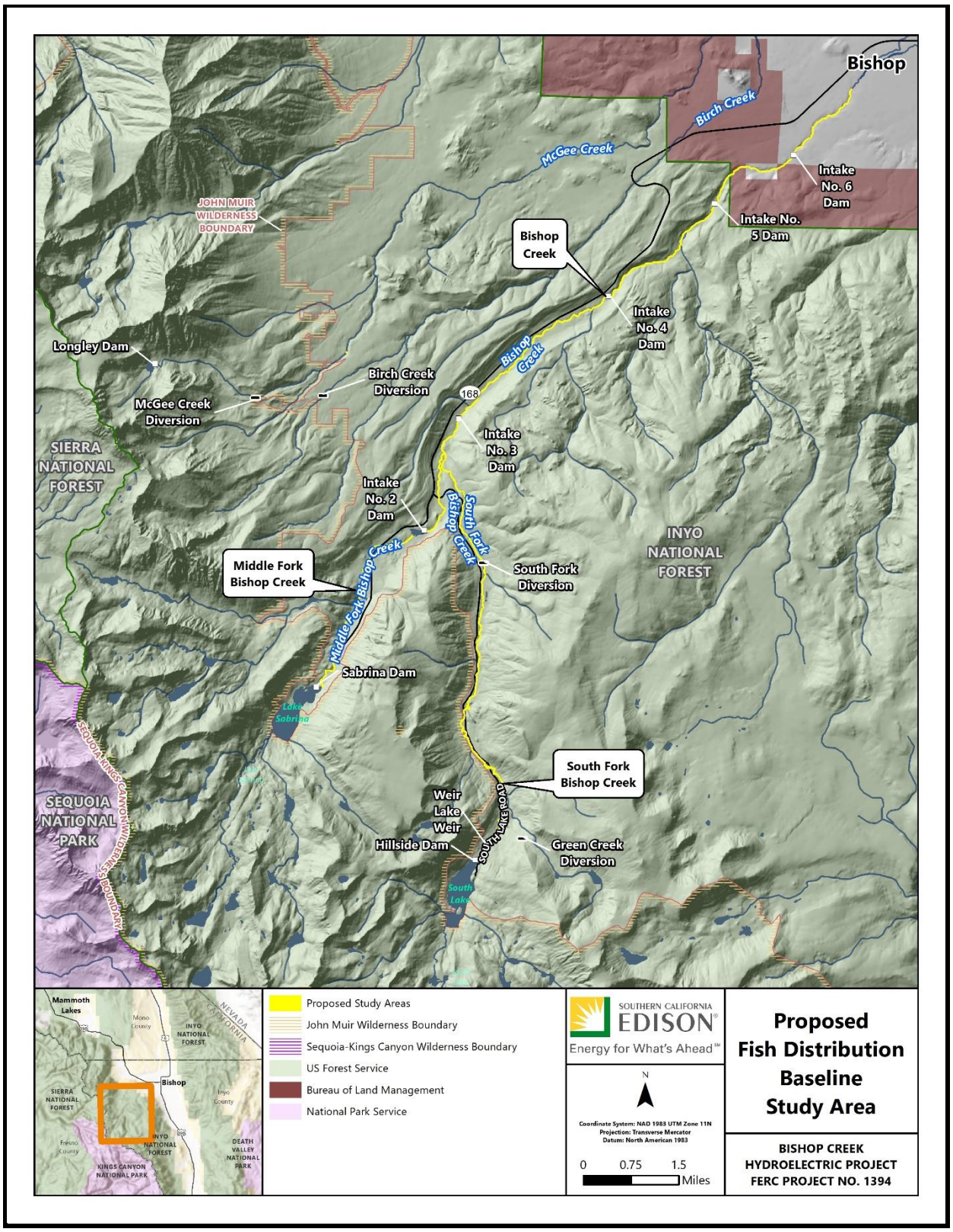

FIGURE 6-1 PROPOSED BASELINE FISH DISTRIBUTION STUDY AREA

7.0 METHODS

1. *Document if recruitment of Owens sucker has occurred downstream from Lake Sabrina and South Lake in Bishop Creek (field effort combined with Objective 3 below)*

   The extent to which downstream escapement of Owens sucker from Lake Sabrina (or South Lake if suckers exist there) occurs is unknown. SCE proposes the following study methods to document the presence of this species in other Project areas downstream from these lakes.

   a. *Locate and geo-reference sampling areas in appropriate habitat between the lakes and Plant 2*

   In general, Owens sucker species are detritovores that prefer pools and runs with sediments and fine substrates. SCE will target likely habitat for further sampling. SCE assumes that natural pools and forebays would be the primary focus of this investigation, although other areas will be surveyed as part of Objective 2 below.

   b. *Sample for fish using backpack electrofishing in wadable areas and gillnets or trap nets in deeper un-wadable areas*

      Sampling will be included as a component of the overall fishery survey outlined below in Objective 2.

   c. *Collect length, weight and age data for any suckers collected*

      SCE will document basic biometric information, such as numeric abundance, length (total length or fork length) and weight. Scale samples will be obtained from each adult and made available to CDFW for age determination if desired.

   d. *Collect collateral water quality data*

      During each sampling event, SCE will use calibrated meters to measure *in situ* ambient temperature, dissolved oxygen, pH and conductivity water clarity.

   e. *Sampling season anticipated as late summer or early fall*

      SCE will conduct a one-time survey. To the extent possible, sampling will be scheduled to occur in late spring and in early fall. The fall sample will allow any young of year (YOY) specimens to grow to a detectable size, and occur prior to the fall trout spawning period.

2. *What is the distribution of other fish species in Project waters?*

No recent surveys have documented the general abundance and distribution of fish species in the Project area. CDFW believes that Owens sucker and speckled dace may potentially occupy Bishop Creek downstream from Plant 4.

a. *Combine effort with Objective 2 survey*

Each sampling site will be georeferenced. In addition to stations identified under Objective 2, at least one additional station will be in each branch of Bishop Creek below the reservoirs and in fluvial habitat below selected forebay diversion dams, subject to access and safety considerations, and include historic long-term monitoring sites employed by Sada (2010). Each site will be selected based on habitat characteristics in consultation with CDFW and U.S. Forest Service (USFS). SCE will conduct a one-time survey and to the extent possible, sampling will be scheduled to occur in late summer or early fall. This will allow any YOY specimens to grow to a detectable size and occur prior to the fall trout spawning period. Sampling will be conducted in wadable areas using backpack electrofishing techniques. Trap nets and/or gill nets will be deployed in any unwadable sampling areas such as forebay pools. Station selection and sampling effort (i.e., stream length and duration of net sets) will be determined in consultation with CDFW and USFS. In addition to data to be collected as described under Objective 1, SCE will also gather the following biological data:

- length and weight data for brook trout and rainbow trout
- length, weight and scale samples for brown trout
- enumerate any other species encountered (*retain voucher specimen(s) for species not previously reported*)

3. *To what extent are naturally reproducing brown trout populations consistent with levels documented during the 1990s through 2010 at historic monitoring sites*?

Brown trout are an introduced game species with a self-sustaining population in the lower portion of the Project area. SCE monitored this population periodically following implementation of habitat-based instream flow, through 2010. Sada (2010) summarized the findings and reported that common population metrics (i.e., density, growth, age) were comparable to other regional streams with similar habitat throughout most of this period. However, the 2009 data indicated that density had declined, although growth and age remained about the same as before. It is not known if this decline reflected a causal trend, an aberration, or natural variability. SCE proposes to obtain an additional time series reference point by sampling the historic reference sites and replicating past monitoring studies described by Sada (2010).

SCE proposes the following steps to the study for this objective:

- Re-measure habitat parameters to determine if sites are still comparable to historic conditions.
- Review macrohabitat factors (*e.g*. climatic and streamflow) for at least 3 years prior to survey to identify or rule out large-scale abiotic perturbations that could influence Bishop Creek aquatic populations.
- Replicate sampling methods, data collection and analysis performed by Sada (2010). This includes population metrics such as length and weight at age and density (number of fish per unit area of stream).
- Analyze identical metrics to Sada (2010).
- Statistical analysis to determine:
    - degree of similarity/dissimilarity to past data sets
    - the extent of any variability in the data

4. *Evaluate select, localized water quality parameters that may affect the growth and distribution of fish species.*

    a. The study will gather concurrent *in situ* water quality parameters during all sampling events. This will provide localized data describing water quality at stations where quantitative fish sampling occurs as discussed above under objectives 1 and 2 and will include temperature, dissolved oxygen, pH and conductivity. These data will supplement and compliment the water quality data gathered under the Water Quality Study Plan, which will gather data on the same parameters as well as others as described under that plan.

5. *Ensure that future Project facilities and operations are not inconsistent with the Desired Conditions described in the "Land Management Plan for the Inyo National Forest" (USDA 2018) as they relate to ecological sustainability and diversity of plant and animal communities.*

    a. The study process will provide the data that documents the extent to which the aquatic community is ecologically sustainable by assessing the growth and health and relative abundance of wild brown trout, brook trout and Owens sucker in the Bishop Creek watershed.

8.0 SCHEDULE AND REPORTING

The anticipated Study Plan development and implementation schedule is identified in Table 8-1 below.

TABLE 8-1 ANTICIPATED POST PAD/NOI STUDY PLAN DEVELOPMENT MILESTONES AND FERC PROCESS THROUGH STUDY PLAN DETERMINATION

TASK	RESPONSIBLE ENTITY	SCHEDULE MILESTONES
File NOI/PAD with FERC along with Final Study Plans	SCE	03/29/19
FERC Holds Scoping and Site Visit	FERC	05/30/19 – 06/29/19
FERC Director's Study Plan Determination	FERC	01/10/20 - 02/09/20
First Field Season	SCE	2020
Initial Study Report (adjust as necessary in consultation with TWGs)	SCE	01/10/21 - 02/09/21
Second Field Season (as necessary)	SCE	2021
Final Study Report	SCE	2022
License Application	SCE	June, 2022

9.0 REFERENCES

EA Engineering. 1987. Eastside Sierra Hydroelectric Relicensing Studies: Impacts of Reservoir Drawdown on Fish Populations. Prepared for Southern California Edison. March 1987.

Sada, D.W. and C. Rosamond. 2010. 2009 and 2010 fish population surveys Bishop and McGee Creeks, Inyo County, California. Submitted to Southern California Edison, Rosemead, CA. 26 pp.

Raleigh, R. F., L. D. Zuckerman, and P. C. Nelson. 1986. Habitat suitability index models and instream flow suitability curves: Brown trout, revised. U.S. Fish Wildlife Serv. Biol. Rep. 82(10.124). 65 pp.

United States Department of Agriculture (USDA), 2018. Land Management Plan for the Inyo National Forest. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd589652.pdf.

APPENDIX A: Study Plan Consultation Record

Appendix A

Study Plan Consultation Record

This Study Plan was developed in consultation with the Bishop Creek Aquatic Resources Technical Working Group (TWG). The intent of the consultation process is to achieve consensus, to the degree possible, on the need for specific studies, the key resource questions to be addressed by the studies, and the appropriate methodology and level of effort for the study.

This appendix summarizes the key consultation milestones for each study plan (Table A-1), and how Southern California Edison Company (SCE) addressed comments received through the consultation process. Table A-2 is a Response to Comments Table for comments received from stakeholders, and how comments were addressed in the final Study Plan. Where stakeholder comments requests were not incorporated, Table A-2 provides a rationale based on Project specific information and Federal Energy Regulatory Commission's (FERC) Study Plan Criteria (18 Code of Federal Regulation [CFR] § 5.9).

TABLE A-1 KEY STUDY PLAN DEVELOPMENT MILESTONES AND TECHNICAL WORKING GROUP PLANNING SCHEDULE

DELIVERABLE	MATERIAL DISTRIBUTED	MEETING TYPE	TWG MEETING DATES	PROPOSED DATES FOR COMMENTS
Project Description	5/25/2018	TWG	6/4/2018, 6/5/2018, and 6/7/2018	7/9/2018
Annotated Study Plans, Goals, Objectives	7/26/2018	TWG	8/14/2018 and 8/15/2018	8/31/2018
Draft Study Plans	9/17/2018	TWG	10/9/2018 to 10/11/2018	10/26/2018
Final Study Plans	11/15/2018	TWG	12/4/2018 to 12/6/2018	1/7/2019

TABLE A-2 SCE RESPONSES TO COMMENTS RECEIVED ON STUDY PLANS

COMMENT NO.	DATE OF COMMENT	ENTITY	COMMENT	SCE RESPONSE
1	8/29/2018	Nick Buckmaster, California Department of Fish & Wildlife	Fish distribution and population studies should be considered separate	This will be addressed narratively within the existing study to make it clear that both components will be addressed and reported on separately.
2	8/29/2018	Nick Buckmaster, California Department of Fish & Wildlife	Fish population studies should include determination of limiting factors for wild trout in Bishop Creek (e.g. bioenergetics constraints on growth, habitat, recruitment, angling pressure)	The scope of this request needs discussion relative to the nexus to the Project. Determining limiting population factors at the watershed scale would require significant effort, given the many environmental, biological and temporal variables (many unrelated to Project operation) that could affect the populations. How would CDFW propose using results of study? SCE proposes to address inferentially within context of fish distribution, water quality, sediment transport, and population study. Proposed study would focus effort on reaches below Plant 4 which seems to be of most interest to both CDFW and SCE.
3	8/29/2018	Nick Buckmaster, California Department of Fish & Wildlife	Studies should be separated into “riverine” and “reservoir” categories	SCE agrees that these studies should be separated. Please see Bishop Creek Reservoirs Baseline Fish Distribution Study.

COMMENT NO.	DATE OF COMMENT	ENTITY	COMMENT	SCE RESPONSE
4	8/29/2018	Nick Buckmaster, California Department of Fish & Wildlife	A separate assessment of angler catch/ fishery exploitation should be included (overlap with recreation TWG)	Data will be collected as creel census information under the recreation survey study scope
5	8/31/2018	Tristan Leong, US Forest Service	Proposed objective: characterize fish populations and distribution in project reservoirs and project affected stream reaches	SCE will revise objectives to characterize fish populations and distribution with respect to age-classes, size distribution and Catch per unit effort data. SCE does not think that fish population estimates or recruitment/mortality metrics are warranted, given current fisheries management focus on put-take fisheries and the large geographic scope.
6	8/31/2018	Tristan Leong, US Forest Service	Proposed modifying existing objective to "evaluate population, health, and condition of recreationally important trout populations in Project affected stream reaches; compare current estimate to previous monitored data.	SCE agrees that this objective can be modified if the focus is on self-sustaining populations of brown trout and brook trout in lotic habitat affected by Project operation. SCE would propose to evaluate by sampling the historic monitoring sites.
7	10/10/2018	CDFW	Determine trout age classes from scale samples rather than inferring from length; identify aquatic amphibian species encountered during sampling	SCE concurs and will add this to the study scope

COMMENT NO.	DATE OF COMMENT	ENTITY	COMMENT	SCE RESPONSE
8	10/10/2018	CDFW	Sample two seasons (spring and early fall)	SCE concurs and will add this to the study scope