SOUTHERN CALIFORNIA EDISON COMPANY

Kaweah Project
FERC Project No. 298

Proposed Study Plan

SOUTHERN CALIFORNIA EDISON

An *EDISON INTERNATIONAL*SM Company

Prepared by:

Southern California Edison Company
1515 Walnut Grove Avenue
Rosemead, CA 91770
http://on.sce.com/kaweah

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TABLE OF CONTENTS

List of Tables

List of Figures

Appendices

Abbreviations

FERC	Federal Energy Regulatory Commission
ILP	Integrated Licensing Process
MW	megawatt
NOI	Notice of Intent
PAD	Pre-Application Document
SCE	Southern California Edison Company

1.0 INTRODUCTION

1.1 BACKGROUND

The following provides Southern California Edison Company's (SCE) Proposed Study Plan for the relicensing of the Kaweah Project (Project or Kaweah Project) (FERC Project No. 298) required by Title 18 of the Code of Federal Regulations (CFR) § 5.11. To relicense the Project, SCE is using the Federal Energy Regulatory Commission's (FERC) Integrated Licensing Process (ILP) as specified in 18 CFR §§ 5.1 through 5.31.

On December 14, 2016, SCE filed a Notice of Intent (NOI) and Pre-Application Document (PAD) with FERC to seek a new license for the existing 8.85-megawatt (MW) Kaweah Project. The PAD provided FERC, federal and state agencies, and other interested parties with background information related to Project facilities, operation, and maintenance activities; summarized existing, relevant, and reasonably available information; defined pertinent Project issues; and identified potential study needs. The PAD also included 15 draft study plans that SCE determined were needed to address issues for which existing information may not be adequate. The overall objective of the studies is to develop sufficient information to identify potential Project impacts and to develop new license conditions that reasonably balance multiple resource interests.

On February 10, 2017, FERC issued a Notice of Commencement of Pre-Filing Process and Scoping Document 1 (SD1) for the Kaweah Project relicensing. FERC also requested that any individual or entity interested in providing comments on the PAD and SD1 and/or submitting formal study requests do so by April 13, 2017. During the comment period, FERC conducted a public scoping meeting on March 14, 2017 and a site visit on March 15, 2017. Transcripts of FERC's scoping meeting can be found on FERC's eLibrary at https://www.ferc.gov/docs-filing/elibrary.asp.

This document identifies study requests received from interested parties and SCE's response (Section 1.2); presents study plans proposed by SCE (Section 1.3); provides information regarding the upcoming study plan meeting (Section 1.4); defines the process for study implementation and reporting (Section 1.5); and describes the annual study plan progress report and meeting schedule (Section 1.6).

1.2 STUDY REQUESTS

The following entities filed study requests with FERC[1]:

- U.S. Department of the Interior, Bureau of Land Management
- U.S. Department of the Interior, National Park Service
- American Whitewater

[1] The State Water Resources Control Board filed comments on the PAD and SD1 which described the Agency's regulatory authority, provided general comments on the PAD and SD1, and requested reference materials. The State Water Resources Control Board did not submit any study requests.

General comments on the PAD and SD1 are not addressed in this document, however, stakeholder study requests and SCE's responses are summarized in **Table 1,** and study requests filed with FERC are included in **Appendix A**.

1.3 PROPOSED STUDY PLANS

Fifteen study plans were included in the PAD. Based on study requests filed with FERC, SCE revised one plan (REC-1) and added two plans (REC-2 and LAND-3). All other study plans remain unchanged from the PAD submittal. The proposed study plans for the Kaweah Project relicensing are listed by resource area below and included in **Appendix B** of this document.

Aquatic Resources

- AQ-1 Instream Flow
- AQ-2 Fish Population
- AQ-3 Macroinvertebrate
- AQ-4 Water Temperature
- AQ-5 Geomorphology
- AQ-6 Water Quality
- AQ-7 Special-status Amphibians and Aquatic Reptiles
- AQ-8 Fish Passage
- AQ-9 Entrainment

Cultural Resources

- CUL-1 Cultural Resources

Land Resources

- LAND-1 Transportation System
- LAND-2 Aesthetic Resources
- LAND-3 Land Use.
  - LAND-3 Land Use Technical Study Plan incorporates the suggested elements and approach included in the study request from the Bureau of Land Management.

Recreation Resources

- REC-1 Recreation Resources
  - REC-1 Recreation Resources Technical Study Plan included in the PAD was revised by removing the whitewater boating component and a new study plan focused specifically on whitewater boating in the Project area was prepared.

- REC-2 Whitewater Boating
  - REC-2 Whitewater Boating Technical Study Plan incorporates the whitewater boating components removed from the REC-1 Recreation Resources Technical Study Plan included in the PAD and incorporates suggested elements and approach included in the study requests from National Park Service and American Whitewater.

Terrestrial Resources

- TERR-1 Botanical Resources
- TERR-2 Wildlife Resources

The following presents the general content and organization of the proposed study plans contained in **Appendix B**:

- Potential Resource Issues – This section identifies the environmental or cultural resource issues that are specifically addressed in the study plan.
- Project Nexus – This section describes potential direct and indirect effects of Project operation and maintenance activities on environmental and cultural resources.
- Potential License Conditions – This section identifies potential license conditions which may be necessary in the new license (based on the Project Nexus) that are directly influenced by information developed from implementation of the study plan.
- Study Objectives – This section describes the specific study objectives or goals of the study.
- Extent of Study Area – This section clearly identifies the limits of the study area based on the potential Project Nexus for each study plan.
- Study Approach – This section provides a detailed description of the study elements and methodologies proposed to meet each study objective.
- Schedule – This section presents a detailed schedule for implementation of each study including data collection and stakeholder consultation, data analysis and report preparation, draft report distribution, stakeholder review and comment period, comment resolution, and final report distribution.

1.3.1. Other Study Plan Components

The following sections describes three additional study plan components that apply to all proposed study plans. These components are not addressed individually within each study plan.

1.3.1.1. *Relevant Resource Agency Jurisdiction/Management Goals*

Table 2 identifies relevant resource agency jurisdiction/management goals related to the operation and maintenance of the Kaweah Project. This list reflects the general content and range of management goals that may be under consideration for the Kaweah Project relicensing. For each goal, a corresponding study plan(s) is identified which would result

in the collection of sufficient information to adequately address resource agency management goals.

1.3.1.2. *Consistency with Generally Accepted Practice in the Scientific Community*

The study methodologies (including data collection and analysis techniques, field schedules, and study durations) identified in the proposed study plans are consistent with generally accepted practice in the scientific community. The proposed study plans were collaboratively developed with technical experts representing the licensee, Federal and state resource agencies, Native American tribes, non-government organizations and the public. Many of these technical experts have experience in multiple relicensing proceedings in California. The scope of each proposed study plan provided in **Appendix B** is consistent with common approaches used for other relicensing proceedings in California and the nation and, where appropriate, reference specific protocols and survey methodologies.

1.3.1.3. *Consideration of Level of Effort and Cost*

The overall objective of the proposed study plans contained in **Appendix B** is to develop sufficient information to identify potential Project impacts and to develop new license conditions that reasonably balance multiple resource interests. The proposed study plan approaches were evaluated first to verify that the desired information was focused on potential impacts associated with the Project (i.e., Project Nexus), second to confirm that the information collected would substantially influence decisions on new license conditions (i.e., clear linkage between information obtained and decision process), and third to substantiate that the study approaches and resulting level of efforts were consistent with generally acceptable practices in the scientific community. The proposed study plans included in **Appendix B** meet these evaluation criteria. **Table 3** presents the estimated level of effort and cost for completion of each proposed study plan.

1.4 STUDY PLAN MEETING

SCE will hold a study plan meeting in Visalia, California on June 21, 2017 with stakeholders to: (1) clarify SCE's Proposed Study Plan; (2) discuss information gathering or study requests from stakeholders; and (3) attempt to resolve any outstanding issues with respect to SCE's Proposed Study Plan. Meeting details are as follows:

- Date: June 21, 2017
- Time: 1:00 – 4:00 pm
- Location: Wyndham Visalia
  Cedar Room
  9000 West Airport Drive
  Visalia, CA 93277

The overall study plan development schedule is included in **Table 4**. The schedule includes timeframes for formal dispute resolution even though SCE anticipates that consensus with stakeholders on the study plans will be reached without the need for formal dispute resolution.

1.5 STUDY PLAN IMPLEMENTATION AND REPORTING

SCE has a well-defined process for the manner and extent information obtained during implementation of the study plans will be provided to stakeholders. Each proposed study plan contains a detailed schedule for data collection and analysis, development and distribution of draft study reports, and stakeholder review and comment. **Figure 1** provides an overview of these activities for each study plan. In general, a 90-day comment period is provided for stakeholder review of each draft study report. An additional 60- to 90-day period has also been allocated in the schedule to resolve stakeholder comments on the draft study reports and to develop and distribute the final study reports.

In addition to formal distribution of draft and final study reports, SCE will also present an overview of the content and key findings of each study report to stakeholders during regularly scheduled technical meetings. The timing of these meetings will be e-mailed to stakeholders in advance and posted on SCE's relicensing website http://on.sce.com/kaweah.

1.6 ANNUAL STUDY PLAN PROGRESS REPORT AND MEETING

During study implementation, SCE will file an annual study plan report with FERC and stakeholders describing overall progress in implementation of the study plans, including data collected to date, any deviations in technical approaches or schedules, and a proposed schedule for completion of the remaining study plan components. The annual study plan report will also include a description of any proposed modifications to the approved studies or new studies proposed by SCE.

Within 15 days following filing of the annual study plan report, SCE will hold a meeting with stakeholders and FERC to discuss study results and SCE's or other participant's proposals, if any, to modify the study plans in light of the progress of the study plan and data collected. Within 15 days following the meeting, SCE will file a meeting summary, including any modification to ongoing studies or new studies proposed by SCE. The timing of these activities will be e-mailed to stakeholders in advance and posted on SCE's relicensing website http://on.sce.com/kaweah.

TABLES

Table 1. Stakeholder Study Requests and Associated SCE Responses.

Date Filed with FERC	Filing Entity	Study Request	SCE Response
April 13, 2017	U.S. Department of the Interior, Bureau of Land Management	Several grazing allotments surround or are adjacent to Kaweah Project facilities. Related to these grazing allotments, BLM requested that SCE add a new study plan (LAND-3 Land Use) to allow BLM to evaluate if the planned management, operation, and maintenance by SCE of the Kaweah Project will: • Prevent such public use from affecting public land resources and uses, • Be consistent with the multi-resource objectives of the BLM Bakersfield RMP, • Reduce livestock mortality, • Improve or hinder the effectiveness of wildlife crossings (by affecting public uses there), and • Improve public health and safety.	SCE disagrees with BLM that the issues identified related to rangeland resource use and opportunities on BLM lands are related to operations and maintenance of the Kaweah Project. Specifically, as identified in PAD Map 3.10-3, BLM property only intersects the Project boundary along the Kaweah No. 2 Flowline at one location (basically at a corner of the existing BLM fence line). At that location the Project flowline is elevated. The Project flowlines are located on either SCE-owned land or private property through easements. SCE does not encourage or provide public access to the flowline. Access to land adjacent to the flowline is under direct control of the existing private landowners. It is unreasonable for BLM to expect SCE to control public access on private property or maintain exclusionary fencing to reduce operational costs for a private party leasing grazing rights from the BLM. The Kaweah No. 2 Flowline and associated wildlife bridges are Project components included in the FERC license. The only exclusionary fence constructed and maintained by SCE associated with Project flowlines is at the Kaweah No. 3 Forebay. The exclusionary fence was recently added by SCE to prevent cattle from causing erosion along the banks of the forebay (i.e., to protect SCE infrastructure). Per county ordinance, free-range grazing of cattle is allowed in most of the county, including in the vicinity of the Project, and it is the responsibility of the landowner to exclude cattle from their property, if desired. However, in response to the BLM study request, SCE has included LAND-3 Land Use Technical Study Plan to obtain more information of the potential issue for consideration during the relicensing of the Kaweah Project. The LAND-3 Land Use Technical Study Plan incorporates the suggested study approach by the BLM. Refer to Appendix B.
April 13, 2017	U.S. Department of the Interior, National Park Service	While the NPS indicated that SCE adequately described how it will collect baseline data for whitewater boating in the REC-1 Recreation Resources Technical Study Plan, NPS requested that a more comprehensive whitewater boating study be conducted to provide more reliable and comprehensive data that can be used in making recommendations on enhancing whitewater boating opportunities and experiences. Their request included a detailed phased study approach.	In response to the NPS study request, SCE revised the REC-1 Recreation Resources Technical Study Plan included in the PAD by removing the whitewater boating component and developed a new study plan focused specifically on whitewater boating in the Project area (REC-2 Whitewater Boating Technical Study Plan). The REC-2 Whitewater Boating Study Plan incorporates the suggested study approach by the NPS. Refer to Appendix B.
April 13, 2017	American Whitewater	American Whitewater also requested that a more comprehensive whitewater boating study be conducted to evaluate effects of the Kaweah Project operations on whitewater boating opportunities. Their request included a detailed phased study approach.	In response to the American Whitewater study request, SCE revised the REC-1 Recreation Resources Technical Study Plan included in the PAD by removing the whitewater boating component and developed a new study plan focused specifically on whitewater boating in the Project area (REC-2 Whitewater Boating Technical Study Plan). The REC-2 Whitewater Boating Study Plan incorporates the suggested study approach by American Whitewater. Refer to Appendix B.

Notes:

BLM = Bureau of Land Management

FERC = Federal Energy Regulatory Commission

NPS = National Park Service

PAD = Pre-Application Document

RMP = Resource Management Plan

SCE = Southern California Edison Company

Table 2. Relevant Resource Agency Jurisdiction/Management Goals.

Agency	Resource Agency Jurisdiction / Management Goals	Kaweah Project Proposed Study Plans															
		AQ-1 Instream Flow	AQ-2 Fish Population	AQ-3 Macroinvertebrate	AQ-4 Water Temperature	AQ-5 Geomorphology	AQ-6 Water Quality	AQ-7 Special-status Amphibians and Aquatic Reptiles	AQ-8 Fish Passage	AQ-9 Entrainment	CUL-1 Cultural Resources	LAND-1 Transportation System	LAND-2 Aesthetic Resources	LAND-3 Land Use	REC-1 Recreation Resources	REC-2 Whitewater Boating	TERR-1 Botanical Resources	TERR-2 Wildlife Resources
California Department of Fish and Wildlife	In the State of California, fish and wildlife resources are held in trust for the people of the state, and the California Department of Fish and Wildlife (CDFW) has statutory responsibility for managing and protecting all fish, wildlife, and habitat to support these species in the public interest (Cal. Fish and Game Code § 711.7). The CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (California Fish and Game Code § 1802).	X	X	X	X	X	X	X	X	X				X		X	X	X
California Office of Historic Preservation	The California Office of Historic Preservation (OHP) is charged with ensuring that projects and programs carried out or sponsored by federal and state agencies comply with federal and state historic preservation laws and that projects are planned in ways that avoid or minimize adverse effects to heritage resources. Federal and federally-sponsored programs and projects are reviewed pursuant to Sections 106 and 110 of the National Historic Preservation Act (NHPA). Section 106 of the NHPA, as amended, requires federal agencies to consider the effects of proposed federal undertakings on historic properties. The NHPA's implementing regulations found in 36 CFR Part 800, require federal agencies (and their designees, permitees, licensees, or grantees) to initiate consultation with the State Historic Preservation Officer (SHPO) as part of the Section 106 review process.										X							
National Park Service	The National Park Service (NPS) has authority to consult with FERC and applicants concerning a Project's effects on outdoor recreation resources under the Federal Power Act (18 CFR 4.38(a), 5.41 (f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (Public Law [PL] 88-29); the National Park Service Organic Act (39 Stat. 535); and the Wild and Scenic Rivers Act (PL 90-542). It is the policy of the NPS to represent the national interest regarding recreation, and to assure that hydroelectric projects subject to relicensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. Investigating opportunities to improve the recreation experience is consistent with NPS policy and FERC guidelines to identify future potential recreation needs.														X	X		

Table 2. Relevant Resource Agency Jurisdiction/Management Goals.

Agency	Resource Agency Jurisdiction / Management Goals	Kaweah Project Proposed Study Plans															
		AQ-1 Instream Flow	AQ-2 Fish Population	AQ-3 Macroinvertebrate	AQ-4 Water Temperature	AQ-5 Geomorphology	AQ-6 Water Quality	AQ-7 Special-status Amphibians and Aquatic Reptiles	AQ-8 Fish Passage	AQ-9 Entrainment	CUL-1 Cultural Resources	LAND-1 Transportation System	LAND-2 Aesthetic Resources	LAND-3 Land Use	REC-1 Recreation Resources	REC-2 Whitewater Boating	TERR-1 Botanical Resources	TERR-2 Wildlife Resources
State Water Resources Control Board	Before FERC can issue a new license, the Licensee must obtain water quality certification from the State Water Board pursuant to Section 401(a)(1) of the federal Clean Water Act (CWA) (33 U.S.C. § 1341 (a)(1)). Section 401 of the CWA requires any applicant for a federal license or permit, which may result in any discharge to navigable waters, to obtain water quality certification from the State Water Board that the discharge will comply with the applicable provisions of Section 301, 302, 303, 306, and 307 of the CWA. Under Section 303 of the CWA and under the Porter-Cologne Water Quality Control Act, the Central Valley Regional Water Quality Control Board adopted, and the State Water Board and United States Environmental Protection Agency (USEPA) approved, the Water Quality Control Plan for the Tulare Lake Basin (Basin Plan). The Basin Plan designated beneficial uses of waters to be protected along with the water quality objectives necessary to protect those uses. The Basin Plan identified the following beneficial uses for the Kaweah River, upstream of Lake Kaweah: municipal and domestic supply; power, contact recreation; non-contact recreation; warm freshwater habitat; cold freshwater habitat, wildlife habitat; rare, threatened, or endangered species; spawning, reproduction, and/or early development; and freshwater replenishment. These beneficial uses also apply to the tributaries of the Kaweah River.	X	X	X	X	X	X	X	X	X					X	X	X	X
U.S. Bureau of Land Management	The U.S. Bureau of Land Management (BLM) is required to satisfy the management objectives as outlined in the Federal Land Policy Management Act (FLPMA). These objectives should, among other things, protect the quality of scenic, historical, environmental values; preserve and protect public lands; and provide for outdoor recreation, human occupancy, and a variety of the actions. Pursuant to the FLPMA, the agencies should utilize the principles of multiple use and sustained yield to design their land plans. FLPMA § 102, 43 U.S.C. § 1701(a)(7)(8). BLM authorizes livestock grazing in the vicinity of the Kaweah Project in accordance with objectives of the Bakersfield Resource Management Plan.		X					X			X	X		X	X	X	X	X

Table 2. Relevant Resource Agency Jurisdiction/Management Goals.

Agency	Resource Agency Jurisdiction / Management Goals	Kaweah Project Proposed Study Plans															
		AQ-1 Instream Flow	AQ-2 Fish Population	AQ-3 Macroinvertebrate	AQ-4 Water Temperature	AQ-5 Geomorphology	AQ-6 Water Quality	AQ-7 Special-status Amphibians and Aquatic Reptiles	AQ-8 Fish Passage	AQ-9 Entrainment	CUL-1 Cultural Resources	LAND-1 Transportation System	LAND-2 Aesthetic Resources	LAND-3 Land Use	REC-1 Recreation Resources	REC-2 Whitewater Boating	TERR-1 Botanical Resources	TERR-2 Wildlife Resources
U.S. Fish and Wildlife Service	The U.S. Fish and Wildlife Service (USFWS) has adopted an ecosystem approach to fish and wildlife resource conservation. This approach requires protecting or restoring the function, structure, and species composition of an ecosystem while providing for its sustainable socioeconomic uses. The USFWS's overall goal is to restore and protect fish and wildlife resources. Included in the ecosystem approach is conservation of ecosystems that support species listed under the Endangered Species Act (ESA).	X	X	X	X	X	X	X	X	X						X	X	X

Notes:

BLM = Bureau of Land Management
CDFW = California Department of Fish and Wildlife
CWA = Clean Water Act
ESA = Endangered Species Act
FERC = Federal Energy Regulatory Commission
FLPMA = Federal Land Policy Management Act
NHPA = National Historic Preservation Act
NPS = National Park Service
OHP = Office of Historic Preservation
PL = Public Law
SHPO = State Historic Preservation Officer
USEPA = U.S. Environmental Protection Agency
USFWS = U.S. Fish and Wildlife Service

Table 3. Level of Effort and Cost for Completing Proposed Study Plans.

Study Plan	Total Estimated Cost	Total Level of Effort in Labor Hours	Breakdown of Total Labor Hours by Activity			
			Project Management	Consultation	Data Collection	Data Analysis/Report Development
Aquatic Resources Studies						
AQ-1 Instream Flow	$491,327	1,870	72	216	1,798	756
AQ-2 Fish Population	$242,957	1,509	72	72	987	378
AQ-3 Macroinvertebrate	$239,054	1,294	72	72	700	450
AQ-4 Water Temperature	$247,816	1,463	72	108	756	527
AQ-5 Geomorphology	$243,769	1,544	72	72	950	450
AQ-6 Water Quality	$156,632	748	72	72	302	302
AQ-7 Special-Status Amphibians and Aquatic Reptiles	$209,634	1,238	72	72	605	489
AQ-8 Fish Passage	$143,426	862	72	72	302	416
AQ-9 Entrainment	$523,100	3,265	72	72	2,538	583
Total	**$2,497,715**	**13,793**	**648**	**612**	**8,938**	**3,595**
Cultural Resource Studies						
CUL-1 Cultural Resources	$233,972	1,560	112	166	574	708
Total	**$233,972**	**1,560**	**112**	**166**	**574**	**708**
Land Management Studies						
LAND-1 Transportation System	$42,893	271	17	4	170	80
LAND-2 Aesthetic Resources	$44,932	287	17	40	144	86
LAND-3 Land Use	$33,166	221	15	12	154	40
Total	**$120,991**	**779**	**49**	**56**	**468**	**206**
Recreation Resources Studies						
REC-1 Recreation Resources	$82,440	722	52	22	576	72
REC-2 Whitewater Boating	$75,626	438	28	140	164	106
Total	**$158,066**	**1,160**	**80**	**162**	**740**	**178**
Terrestrial Resources Studies						
TERR-1 Botanical Resources	$155,244	1,060	46	12	818	184
TERR-2 Wildlife Resources	$272,034	1,871	112	35	1,186	538
Total	**$427,278**	**2,931**	**158**	**47**	**2,004**	**722**
Project Total	**$3,438,022**					

Table 4. Study Plan Development Schedule.

FERC Regulation 18 CFR §	Responsible Party	Action	Date
5.11(a)	Applicant	File Proposed Study Plan (PSP)	5/28/17
5.11(e)	Applicant/Stakeholders	Proposed Study Plan Meeting	6/27/17
5.12	Stakeholders	Proposed Study Plan Comments Due	8/26/17
5.13(a)	Applicant	File Revised Study Plan	9/25/17
5.13(b)	Stakeholders	Revised Study Plan Comments Due	10/10/17
5.13(c)	FERC	Director's Study Plan Determination	10/25/17
5.14(d)	FERC	Study Plan Approved, if No Disputes Filed	11/14/17
5.14(a)	*Mandatory Conditioning Agencies/ Tribes*	*Study Disputes Due*	*11/14/17*
5.14(d)	*Dispute Panel*	*Convene Dispute Resolution Panel*	*12/4/17*
5.14(i)	*Applicant*	*Study Dispute Comments Due*	*12/9/17*
5.14(j)	*Dispute Panel*	*Dispute Resolution Panel Technical Conference*	*12/14/17*
5.14(k)	*Dispute Panel*	*Dispute Resolution Panel Findings Issued*	*1/3/18*
5.14(l)	*FERC*	*Director's Study Dispute Determination*	*1/23/18*

Source: FERC, Scoping Document 1, Appendix B - Kaweah Project Process Plan and Schedule, February 10, 2017.

Notes:

Italicized actions are unnecessary if there are no study disputes.

When an activity is contingent on completion of a previous activity, the schedule assumes the previous activity is completed the latest date possible for that previous activity, unless otherwise indicated.

According to 18 CFR 385.2007(a)(2), if a filing date falls on a Saturday, Sunday, or federal legal public holiday, the deadline for filing becomes the next business day.

FIGURE

Figure 1. Study Plan Implementation Schedule.

Technical Study Plan	2017												2018												2019											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
AQ-1 Instream Flow																																				
Select Instream Flow Modeling Sites																																				
Consult with Interested Resource Agencies																																				
Conduct Field Surveys (topography, WSE, velocities, substrate/cover)																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (FLA)																																				
AQ-2 Fish Population																																				
Select Fish Population Sampling Sites																																				
Conduct Qualitative Fish Sampling (young-of-the-year emergence)																																				
Conduct Quantitative Fish Sampling (electrofishing/snorkeling) and Fish Tissue Collection																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
AQ-3 Macroinvertebrate																																				
Select Sampling Sites																																				
Conduct Benthic and Drift Sampling																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
AQ-4 Water Temperature																																				
Develop and Validate Preliminary Temperature Model																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
AQ-5 Geomorphology																																				
Conduct Sediment Survey/Hydrology Analysis																																				
Complete Data Analysis																																				
Conduct Field Surveys																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (FLA)																																				

Figure 1. Study Plan Implementation Schedule.

Technical Study Plan	2017												2018												2019											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
AQ-6 Water Quality																																				
Collect Spring Water Quality Samples																																				
Collect Coliform Samples																																				
Collect Summer Water Quality Samples																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
AQ-7 Special-Status Amphibian & Aquatic Reptile																																				
Conduct Spring Field Surveys																																				
Conduct Fall Field Surveys																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
AQ-8 Fish Passage																																				
Conduct Field Surveys																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Consult with Interested Resource Agencies																																				
Collect Additional Data/Resolve Comments/Prepare Final Report																																				
Distribute Final Report (FLA)																																				
AQ-9 Entrainment																																				
Summarize Diversion/Turbine Data and Measure Entrainment in Flowlines																																				
Summarize Fish Population Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				

Figure 1. Study Plan Implementation Schedule.

Technical Study Plan	2017												2018												2019											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
CUL-1 Cultural Resources																																				
Cultural Resource Inventory Study																																				
Consult with Stakeholders/Compile Existing Resource Information																																				
Conduct Field Surveys (cultural resources inventory)																																				
Analyze Data/Prepare Draft Cultural Resource Inventory Report																																				
Distribute Draft Cultural Resources Inventory Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report																																				
NRHP Eligibility Studies (if necessary)																																				
Assess Need for Eligibility Studies																																				
Prepare NRHP Evaluation Plan and Acquire Permits																																				
Conduct NRHP Evaluation Studies																																				
Analyze Data/Prepare Draft NRHP Evaluation Report																																				
Distribute Draft NRHP Evaluation Report in DLA																																				
Stakeholder Review																																				
Distribute Final Report (FLA) and Simultaneously Submit to SHPO																																				
LAND-1 Transportation System																																				
Consult with Stakeholders/Compile Existing Resource Information																																				
Conduct Field Surveys																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
LAND-2 Aesthetic Resources																																				
Consult with Stakeholders/Compile Existing Resource Information																																				
Conduct Field Surveys (Visual Resource & Helicopter Noise Assessments)																																				
Conduct Kaweah No. 3 Forebay Noise and Visual Assessment (concurrent with spill event)																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
LAND-3 Land Use																																				
Consult with Stakeholders/Compile Existing Resource Information																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				

Figure 1. Study Plan Implementation Schedule.

Technical Study Plan	2017												2018												2019											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
REC-1 Recreation Resources																																				
Consult with Stakeholders/Compile Existing Resource Information																																				
Conduct Visitor Counts at Kaweah No. 2 Powerhouse River Access Area																																				
Conduct Interviews with Private Property Owners																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
REC-2 Whitewater Boating																																				
Phase 1 – Develop Information																																				
Develop Information about Whitewater Boating Resources and Hydrology																																				
Prepare and Distribute Summary Report																																				
Conduct Whitewater Boater Focus Group Meeting																																				
Phase 2 – Possible Site Visit (if necessary)																																				
Conduct Site Visit																																				
Phase 3 – Possible Whitewater Boating Flow Studies (if necessary)																																				
Develop Whitewater Boating Survey Instrument																																				
Conduct Whitewater Boating Flow Study(s) (runoff dependent)																																				
Reporting																																				
Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report																																				
TERR-1 Botanical Resources																																				
Conduct Field Surveys																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				
TERR-2 Wildlife Resources																																				
Conduct Evaluation of Wildlife Use of Bridges and Escape Ramps																																				
Conduct Wildlife Reconnaissance Surveys																																				
Conduct Special-status Bat Reproductive Surveys																																				
Conduct Special-status Bat Seasonal Use Surveys and Monitoring Bridges																																				
Conduct Evaluation of Wildlife Use of Bridges and Escape Ramps																																				
Analyze Data/Prepare Draft Report																																				
Distribute Draft Report																																				
Stakeholder Review																																				
Resolve Comments/Prepare Final Report																																				
Distribute Final Report (DLA)																																				

APPENDIX A

Stakeholder Study Requests

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Bakersfield Field Office
3801 Pegasus Drive
Bakersfield, California 93308-6837

April 13, 2017

(CA-160.3) P

Kimberly D. Bose
Secretary, Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

RE: KAWEAH PROJECT (P- 298-080)

Dear Ms. Bose:

The Bureau of Land Management Bakersfield Field Office (BLM) offers the attached comments on Scoping Document 1 of the Kaweah FERC Relicensing Project. Our comments focus on whether the proposed studies will provide the information that BLM will need in order to determine if there will be impacts from the Project to BLM's resources of concern. We appreciate the opportunity to comment.

At the public meeting held on March 14, 2017, BLM requested that FERC share with us additional information on become a Cooperating Agency for this project. On March 27, James Hastreiter shared an example LOU. After reviewing this example and considering our options, BLM has decided not to become a Cooperating Agency on this project.

We respectfully request that the Bureau of Land Management Bakersfield Field Office be added to FERC's official mailing list for this project.

The BLM appreciates the opportunity to comment on SD1 and participate in the relicensing process. If you have any questions please contact Christina Castellon, Realty Specialist at (661) 391-6159 or ccastellon@blm.gov.

Sincerely,

Rebecca Brooke
Associate Field Manager
Bakersfield Field Office

LAND 3 Study Plan Comments

BLM has had multiple discussions with SCE regarding the proposed LAND 3 study plan over the past year, and feel that SCE continues to misunderstand the issues BLM has presented and how they relate to the Kaweah Project. BLM would like to submit further explanation of our issues and request that the clarified study plan be completed by SCE.

BLM authorizes livestock grazing use within grazing allotments adjacent to the Kaweah Project. Grazing allotments are areas of public and private land that are used together to manage livestock use in accordance with the objectives of the Bakersfield Resource Management Plan (RMP). In the case of the Kaweah Project, the Case Mountain allotment, #00014, surrounds the Kaweah No.1 development; the Washburn Cove allotment, #00104, is adjacent to the Kaweah No. 2 development; and the Oak Grove allotment, #00061, surrounds the Kaweah No. 3 development (see attached map).

BLM's primary issues related to the Kaweah Project and grazing allotments are:

- None of the exclusionary fencing at the Kaweah Project developments has been described or listed in the Pre-Application Document.

- Project exclusionary fencing on BLM land and private lands of the Washburn Cove grazing allotment along Kaweah No. 2 flowline has not been maintained by SCE.

- Project-induced recreation by the public with access to Kaweah No. 2 Flowline is causing further damage to the Project exclusionary fencing, especially at wildlife bridges.

- Damage or disrepair of exclusionary fencing on the north side of Kaweah No. 2 Flowline causes livestock mortality and renders the public and private lands of the Washburn Cove grazing allotment unusable for that purpose.

BLM has leased the Washburn Cove allotment for grazing use since the 1930s, however the current state of disrepair of the exclusionary fencing along the Kaweah No. 2 Flowline results in no grazing use being made available on the public or private lands of the allotment. BLM authorizes grazing use on grazing allotments in accordance with the principles of multiple use and sustained yield as mandated by the provisions of the Federal Land Policy and Management Act (FLPMA) of 1976.

In Scoping Document 1, SCE makes clear that "the Kaweah No. 2 Flowline and associated wildlife bridges are Project components included in the FERC license", but concludes that the adjacent fencing along the Kaweah No. 2 Flowline to exclude people or livestock lacks a Project nexus. This conclusion is inconsistent with the fact that SCE has installed and maintains exclusionary fencing at the Kaweah No. 3 Forebay. In addition, none of the fencing at the Kaweah No. 3 Forebay is mentioned as Project-related facilities and appurtenances either.

Although SCE does not control public access of existing private landowners along the Kaweah No. 2 Flowline, SCE does not discourage such use or warn wandering individuals of safety issues involved by being on or crossing such project related facilities. As an example of a similar

situation, in exhibit H(b)(2)(ii) of the Borel Hydroelectric Project (FERC Project No. 382) Application for License in February 2003, SCE describes "precautions taken to protect the public by the installation throughout the Project of warning signs, barbed wire and chain link fencing, and locked gates."

The following clarified technical study plan, LAND 3, will allow BLM to evaluate if the planned management, operation and maintenance by SCE of the Kaweah Project will;

- Prevent such public use from affecting public land resources and uses,
- Be consistent with the multi-resource objectives of the BLM Bakersfield Resource Management Plan (RMP),
- Reduce livestock mortality,
- Improve or hinder the effectiveness of wildlife crossings (by affecting public uses there) and,
- Improve public health and safety.

LAND 3 – LAND USE TECHNICAL STUDY PLAN

POTENTIAL RESOURCE ISSUES:

- Human safety in the vicinity of the Project,
- Effects of continued Project operation on land use in the Project area,
- Adequacy of maintenance of Project facilities and appurtenances to meet current and future land uses.

PROJECT NEXUS:

- The licensee is responsible for:
  - Addressing Project-related actions affecting other aspects of environmental quality; and
  - Maintaining Project-related facilities and appurtenances.
- Exclusionary fencing (regardless of land ownership) is a Project related appurtenance.
- Inadequate maintenance of exclusionary fencing, especially at wildlife bridges, could result in rendering adjacent and surrounding public and private grazing land unusable for that purpose.
- Project flow lines could result in mortality of livestock without adequate exclusionary fencing.

POTENTIAL LICENSE CONDITION:

- Modification of existing wildlife bridges and escape routes or development of new protective measures or exclusionary fencing designed to allow ingress/egress of pedestrians or wildlife at select locations, but prevent that of livestock.

STUDY OBJECTIVES:

- Identify the location, condition, use, and maintenance of existing fences, gates, cattle guards, bridges, watering troughs, and escape ramps in the immediate vicinity of Project facilities.
- Characterize SCE's maintenance practices and responsibilities for all exclusionary fencing regardless of land ownership.
- Assess potential safety issues and the resultant impacts to livestock grazing opportunities on adjacent lands and the surrounding livestock management areas which support those lands and operations.
- Identify measures to reduce or avoid impacts to public health and safety.

EXTENT OF STUDY AREA:

The study area includes the land surrounding the Kaweah Project Developments.

STUDY APPROACH:

Most of the land surrounding the Project facilities is privately owned, which substantially restricts public access and limits opportunities for recreational development. However, the installation of wildlife bridges along No. 2 flow line has provided pedestrian access to surrounding lands and resulted in many portions of exclusionary fencing to be damaged and left in a non-functional state.

Identify Infrastructure

- Identify and map all existing fences, gates, cattle guards, bridges, watering troughs, escape ramps in the immediate vicinity of Project facilities. All maps will be produced using data maintained in a Geographic Information System (GIS) that meets current BLM mapping standards, and will include land ownership.
- Conduct an assessment to characterize the current condition of the aforementioned infrastructure.

Characterize Maintenance Practices and Responsibilities

- Characterize SCE's maintenance practices, responsibilities, and schedules for exclusionary fencing and safety measures.
- Identify existing agreements (e.g., maintenance agreements, easements, rights of way, special use permits, including past and current water rights agreements) between SCE, the BLM, Tulare County, and private property owners, as applicable, including associated termination dates.

Assess Impacts

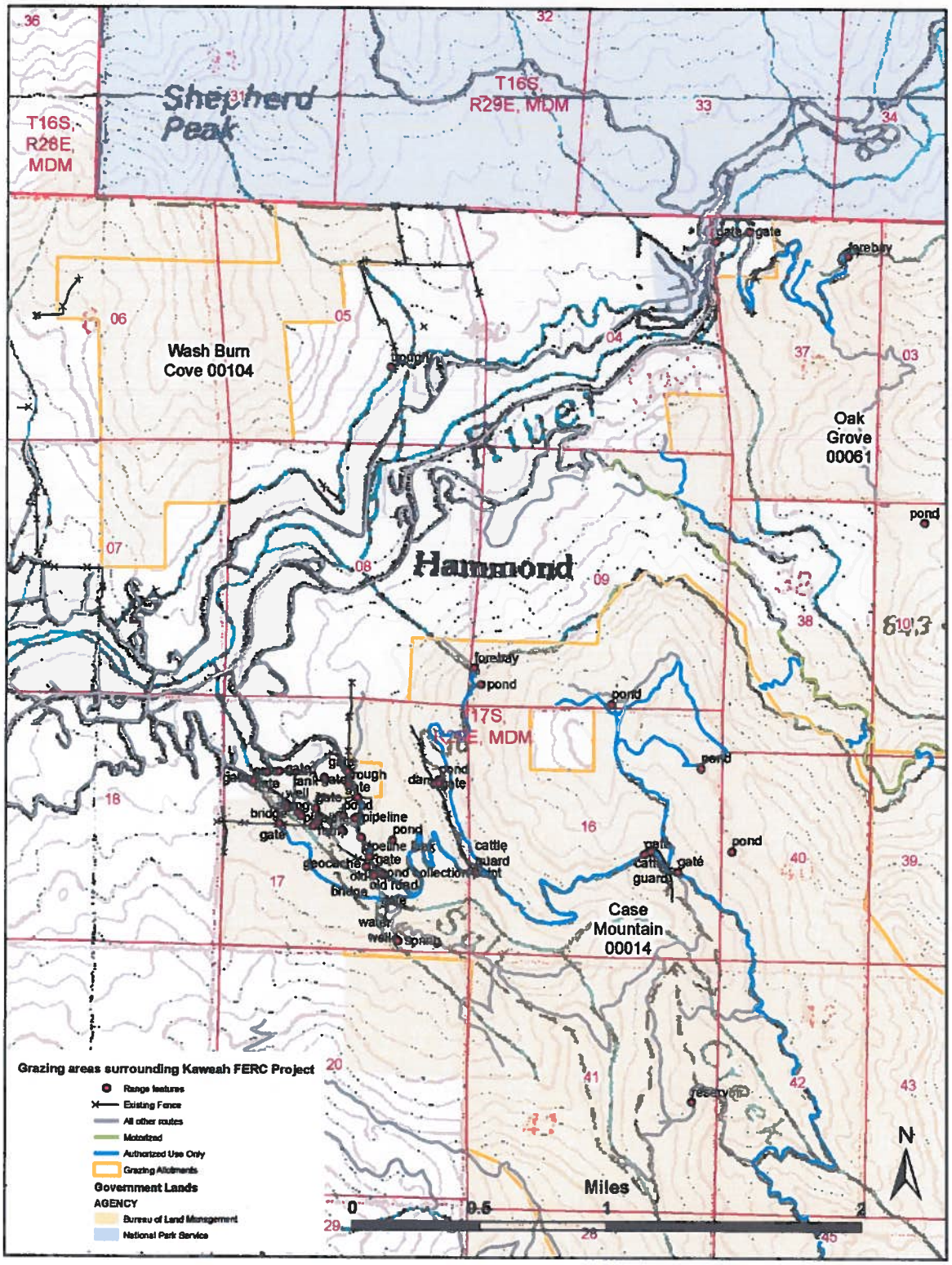
- Review mammal mortality records for incidents with livestock.
- Evaluate condition of existing infrastructure.

Identify Measures to Reduce or Avoid Impacts

- Identify and describe existing programs and measures implemented by SCE for public health and safety (i.e., fencing, barriers, gates, buoy lines, escape ropes, signage, and alarms). The inventory will include a description of the condition of the existing safety features.
- Characterize and document the number, type and location of safety incidents that have occurred in the vicinity of the Project. This effort will be conducted by reviewing existing records and databases maintained by the FERC and by consulting with Project personnel.

SCHEDULE:

Date	Activity
November 2017–April 2018	Consult with stakeholders and compile existing resource information
August 2018–February 2019	Analyze data and prepare draft report
March 2019	Distribute draft report to the stakeholders
March 2019–May 2019	Stakeholders review and provide comments on draft report (90 days)
June–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application


T16S, R28E, MDM
Shepherd Peak
T16S, R29E, MDM
Wash Burn Cove 00104
Oak Grove 00061
Hammond
Case Mountain 00014
Grazing areas surrounding Kaweah FERC Project
Range features
Existing Fence
All other routes
Motorized
Authorized Use Only
Grazing Allotments
Government Lands
AGENCY
Bureau of Land Management
National Park Service
Miles
0
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Document Content(s)

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
333 Bush Street
San Francisco, CA

4/12/2017

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington DC. 20426
Electronic Filing

Re: National Park Service's (NPS) comments on the pre-application document (PAD) and study request for the Kaweah Hydropower Project (P-298)

Dear Ms. Bose:

Thank you for the opportunity to provide comments on this project. The NPS's Hydropower Assistance Program, Pacific West Region, offers the following comments and study request in response to the Federal Energy Regulatory Commission's (FERC's) Request for Comments on the PAD for the Kaweah Hydropower Project (P-298).

The National Park Service has authority to consult with FERC and applicants concerning a project's effects on outdoor recreation resources under the Federal Power Act (18 CFR 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (Public Law [PL] 88-29), the National Park Service Organic Act (39 Stat. 535), and the Wild and Scenic Rivers Act (PL 90-542). It is the policy of the NPS to represent the national interest regarding recreation, and to assure that hydroelectric projects subject to re-licensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. Investigating opportunities to improve the recreation experience is consistent with NPS policy and FERC guidelines to identify future potential recreation needs.

The NPS has reviewed the PAD, paying specific attention to the proposed study of recreation use and opportunities in the Project Area, which is identified in the Recreation Resources Technical Study Plan (Appendix C). Our emphasis is on the whitewater boating section of that study plan. While the NPS feels that the applicants did an adequate job at describing how they will collect baseline data for whitewater boating in the Project Area, we would like to see a more formalized whitewater boating study conducted that would provide more reliable and comprehensive data that can be used in making recommendations on enhancing whitewater boating opportunities and experiences. The NPS is thus submitting a request for a whitewater boating study.

NPS Study Request: Whitewater Boating Study

The following study request addresses each of the seven study criteria as required under 18 CFR §5.9.

Criteria 1: Study Description and Objectives (§5.9(b)(1)):

The purpose of this study is to evaluate the impacts of the Project on existing and potential recreation whitewater boating use. The study focuses on the Project's two bypass reaches, plus an additional downstream reach. These are as follows:

- The East Fork Kaweah River between Kaweah No. 1 Diversion Dam and the Kaweah River confluence
- The Kaweah River between the Kaweah No. 2 Diversion Dam and the Kaweah No. 2 Powerhouse River Access Area ("Edison Beach")
- The Kaweah River between Kaweah No. 2 Powerhouse River Access Area ("Edison Beach") to the Community of Three Rivers

The components of the study should include: (1) hydrologic analysis and description of the three study reaches; (2) recreation user and stakeholder focus group; (3) the potential for a controlled flow study to determine minimum and optimal flows for boating, if warranted by findings of hydraulic analysis; and (4) report on recreation opportunity and potential improvements.

Criteria 2: Resource Management Goals (§5.9(b)(2)):

As part of the licensing effort, a comprehensive look at recreation needs should be conducted per FERC guidance to evaluate existing and potential future recreation needs (18 CFR 4.51).

The NPS has authority to consult with the FERC and applicants concerning a proposed project's effects on outdoor recreation resources under the Federal Power Act (18 CFR §§ 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (PL 88-29) and the NPS Organic Act (16 USC et seq.). The WSR Act (section 11(b)) also directs the NPS to assist, advise, and cooperate with governments, landowners, or individuals to plan, protect, and manage river and river-related resources. It is thus the policy of the NPS to represent the national interest regarding recreation and to assure that hydroelectric projects subject to licensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. FERC guidelines and the Federal Power Act, also provide direction to give equal consideration to other non-hydropower resources.

Criteria 3: Resource Agency Status of Requestor and Relevant Public Interest (§5.9(b)(3))

The NPS is a resource agency. In addition, a new project license would be in operation for the next 30-50 years. It is in the public's interest to fully document recreation opportunities and potential for improvement in this important window of relicensing.

Criteria 4: Existing Information and Need for Additional Information (§5.9(b)(4))

This study is intended to better understand the Project Area's hydrology, whitewater boating opportunities, Project operations effects on those opportunities, and how recreationists access boatable reaches in the Project Area. The proposed study of recreation use and opportunities found in the Recreation Resources Technical Study Plan in Appendix C of the PAD would do an adequate job of collecting some of the baseline data that would be similar to what the NPS is proposing in this study request. However, as identified below, the NPS's study request involves a three-level assessment based on guidelines that are consistent with generally accepted practices in the scientific community (Whittaker, Shelby, and Gangemi 2005). The proposed recreation study in the PAD would only gather information at the first level of assessment. The additional information obtained from conducting a full-scale whitewater boating study would provide additional information about potential improvements that could be made to enhance whitewater experiences, increase and diversify whitewater boating opportunities, improve access, and provide real-time flow information for boatable flows.

Criteria 5: Nexus to Project (§5.9(b)(5))

A clear nexus exists between Project operations and recreational opportunities on the Kaweah River below Kaweah No. 2 Diversion Dam and East Fork Kaweah River below Kaweah No. 1 Diversion Dam. Recreation boating opportunities currently exist at these locations. Project operations modify the flow regime in these river reaches, which has a direct effect on river flow levels, which in turn affect whitewater boating opportunities and experiences. While the PAD limits flow studies to the bypass reaches, the third reach proposed in this study request (the Kaweah River between Kaweah No. 2 Powerhouse River Access Area to the Community of Three Rivers) is also directly affected by project operations. While the bypass reaches offer Class IV-V+ whitewater boating opportunities, which are manageable by only the most experienced whitewater boaters, the third reach offers Class III-V white water boating opportunities, which are manageable yet challenging for more novice whitewater boaters.

Criteria 6: Study Methodology (§5.9(b)(6))

The recommended study methods are those presented in "Flows and Recreation: A Guide to Studies for River Professionals" (Whittaker, Shelby and Gangemi 2005). The methods described in the guide are consistent with generally accepted practices in the scientific community. This is a phased approach where the results of a "Level 1" assessment are used to determine whether "Level 2" and "Level 3" assessments are warranted.

A **Level 1 Assessment** includes:

1. **Hydrology Assessment:** Summarize hydrology for the reach and the hydrologic relationship between river gauges and the river flows of this reach. Describe how the project operations work and affect the hourly, daily, and monthly flows and potential recreation opportunities. This summary of information may also include interviews with people knowledgeable about the river system and the gauges on the river.

2. **Interviews, Recreation Focus Group, and Stakeholder Meeting**: Interviews should be conducted with key resource experts and recreation users to gain additional information about recreational opportunities and the Project's hydrology. A stakeholder and focus group meeting should be conducted with recreation users with the purpose to further identify the recreation flows, access to the project, and potential needs. The meeting should include a presentation on the results of the hydrology analysis and existing information on recreation access and boatable flows. It should also serve as a way to gather input from recreation users on use, optimum boatable flows access, and other potential needs for improvements to enhance the experience.

   The focus groups should include whitewater boaters, NGOs, and agency recreation staff. They should include questions about 1) how people use the river, with the goal to describe the character of recreation opportunities and identify flow-dependent attributes; 2) the effects of flows on those attributes and whether participants can identify specific flows that affect the quality of opportunities; and 3) how to prioritize opportunities and identify recreation users' need for improved access and flow information. Interviews with agency staff will include questions about facility and use information, as well as relevant hydrology information.

3. **Report**: The results of the two study components should be summarized in a report that describes the hydrology optimum recreation boating flows, and project effects on recreation flows; recreation access to the project; and potential improvements and information needs to consider as part of the licensing process. The report should be released in draft form to interested stakeholders with an opportunity to provide comment.

   The report should also include documentation of the recreational needs and explicit analysis for whether studies should progress to Level 2. The decision rests on the answers to these basic questions:

   a) Are there flow-dependent recreation opportunities available in the subject stream reaches?
   b) Are flow-dependent opportunities affected by project operations?
   c) Are flow-dependent recreation opportunities "important" relative to other resources or foregone generation?
   d) Does Level 1 information precisely define flow ranges?

If the answers to these questions are outstanding, a **Level 2 Assessment** will be necessary. This involves:

1. **Site Visits:** A site visit with experienced whitewater boaters will provide stakeholders with an enhanced understanding of Project operations and an opportunity for dialogue on what, if any, changes may be desirable. Participants should scout each river reach to examine the quality and characteristics of boating opportunities, estimate potential flow ranges, identify obvious hazards, and determine whether an on the water flow study is necessary to evaluate whitewater recreation opportunities.

A site visit should be planned for the spring or early summer. This will offer a greater probability of observing higher than base flow levels. It also provides sufficient time to develop preliminary hydrology information about higher flows, become familiar with the resource via interviews and existing literature, and set up logistics with local whitewater boaters who may help guide the site visit. The site visit should include evaluations of the three reaches for all recreation opportunities.

2. **Report:** The Level 2 report should include an assessment of the study participant's evaluations of the potential quality and characteristics of the boating opportunities, including difficulty, type of run, and the type of craft suitable for the run. The report should also describe potential flow ranges, obvious hazards, and recommendations for implementing an on the water flow study, if necessary.

If warranted, a **Level 3 Assessment** should involve an on the water controlled flow study where boaters can determine acceptable and optimal instream flow conditions. The Level 3 report should describe the whitewater boating attributes of the range of flows studied (including difficulty, unique features, and portage requirements), the acceptable and optimal flows for each reach, and the frequency of availability of the identified flows under current and any proposed project operation. The report should also incorporate results from the other studies that may be relevant to identifying competing uses or resource needs.

Criteria 7: Level of Effort and Cost (§5.9(b)(7)

The cost will depend on what is readily available and what requires additional work; it is roughly estimated at approximately $20,000 to 40,000. The lower estimate is based on a Level 1 Assessment being sufficient to collect the needed information, while the higher estimate is based upon the need to conduct a Level II Assessment and possibly a Level III Assessment.

Thank you for the opportunity to comment on the PAD and SD1 for the Kaweah Hydropower Project (P-298), and making a study request. If you have any questions, please contact Steve Bowes at 415-623-2321 or Barbara Rice at 415-623-2320.

Sincerely,

Barbara Rice
Program Manager
Rivers, Trails and Conservation and Hydropower Assistance Programs

Document Content(s)

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Southern California Edison Company **Kaweah Hydroelectric Project**	**FERC Project #298**

AMERICAN WHITEWATER'S STUDY REQUEST FOR SOUTHERN CALIFORNIA EDISON COMPANY PRELIMINARY APPLICATION DOCUMENT, PROPOSED TECHNICAL STUDY PLANS FOR THE KAWEAH PROJECT
(FERC PROJECT NUMBER 298)

(Submitted April 13, 2017)

I. Introduction

American Whitewater offers the following study request for Southern California Edison Company (SCE) Preliminary Application Document. Overall, it is agreeable to see an objective to "Characterize Existing Commercial and Private Whitewater Boating Opportunities and Use on the Bypass Reaches" outlined in the PAD's REC1 – Recreation Resources Technical Study Plan. However, to ensure all relevant information is gathered, American Whitewater is requesting a full whitewater boating study as provided.

II. Interest of American Whitewater

American Whitewater is a national non-profit 501 (c)(3) river conservation organization founded in 1954 with approximately 6,000 members and 100 locally-based affiliate clubs, representing whitewater enthusiasts across the nation. American Whitewater's mission is to conserve and restore America's whitewater resources and to enhance opportunities to enjoy them safely. A significant percentage of our members reside in and travel to California for its whitewater resources. As an organization that represents the conservation interests of whitewater enthusiasts, American Whitewater has an interest in the impacts of the South SWP Hydroelectric Project on the Kaweah River.

III. Study Request: Whitewater Recreation Study

The following study request addresses each of the seven study criteria as required in 18 C.F.R. §5.9(b).

§5.9(b)(1) —Describe the goals and objectives of each study proposal and the information to be obtained.

The purpose of this study is to evaluate the impacts of the hydropower project on existing and potential recreational whitewater boating use in major streams within the Project, including; the Park Boundary Run on the Kaweah River from the Sequoia National Park (SNP) Boundary to the East Fork Confluence; the Gateway Run on the Kaweah River from the East Fork Confluence to Dinely Bridge; and the East Fork Kaweah from Trailer to Dinely Bridge.

Generally, the components of the study should include: (1) an analysis of the hydrology and a description of project operations and their impact on flows in the Kaweah and East Fork Kaweah Rivers; (2) conducting recreation user and stakeholder focus groups; (3) conducting a site visit; (4) the potential for conducting a controlled flow study to determine minimum and optimal flows for boating, if warranted by findings of the hydrologic analysis; and (5) a report on the outcome of these components, describing existing and potential recreation opportunities and improvements to access.

§5.9(b)(2) —If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

The Project includes the Park Boundary Run on the Kaweah River from the SNP Boundary to the East Fork Confluence, which has portions identified by the NPS as suitable for inclusion in the Wild and Scenic River System.

The NPS has authority to consult with the FERC and applicants concerning a proposed project's effects on outdoor recreation resources under the Federal Power Act (18 CFR §§ 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (PL 88-29) and the NPS Organic Act (16 USC et seq.). The WSR Act (section 11(b)) also directs the NPS to assist, advise, and cooperate with governments, landowners, or individuals to plan, protect, and manage river and river-related resources. This is especially important for designated rivers, such as the Kaweah. It is thus the policy of the NPS to represent the national interest regarding recreation and to assure that hydroelectric projects subject to licensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. FERC guidelines and the Federal Power Act, also provide direction to give equal consideration to other non-hydropower resources.

§5.9(b)(3) —If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. To fully evaluate the Project's effect on recreation, a whitewater recreation study is relevant to the Commission's public interest determination.

Whitewater recreation takes place on the Kaweah and East Fork Kaweah rivers when flows allow, which are impacted by project operations. As part of the licensing effort, a comprehensive look at recreation needs should be conducted per FERC guidance to evaluate existing and

potential future recreation needs (18 C.F.R. 4.51).

§5.9(b)(4) — Describe existing information concerning the subject of the study proposal, and the need for additional information.

The PAD utilizes existing information from Cassidy and Calhoun's *California Whitewater. A Guide to the Rivers* and Holbeck and Stanley's *The Best Whitewater in California.* However, more current write-ups can also be found on awetstate.com.

The PAD also lacks a description of potential improvements that could be conducted to help enhance real time hydrology information on boatable flows or other options for enhancing the experience.

§5.9(b)(5) — Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Project operations impact all flow-dependent recreational opportunities and the aesthetic experience of those who engage in river-based recreation in the project area. Results from a whitewater boating study will inform relevant license requirements that could address impacts that are identified. The results will also inform the public interest determination regarding whether to relicense this project.

§5.8(b)(6) — Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field seasons(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The recommended study methodology is to follow those summarized in *Flows and Recreation: A Guide to Studies for River Professionals* (Whittaker, Shelby and Gangemi 2005). The methodology described in the guide is consistent with generally accepted practices in the scientific community. This is a phased approach where the results of a "Level 1" assessment are used to determine whether "Level 2" and "Level 3" assessments are warranted.

A **Level 1 Assessment** includes:

Hydrology Assessment. Summarize the hydrology of the Project area and the hydrologic relationship between river gages and the river flows of the relevant reaches. Describe how the project operations work and affect the hourly, daily, and monthly flows and potential recreation opportunities. This summary of information may also include interviews with people knowledgeable about the river system and the gages on the river.

Interviews, Recreation Focus Group, and Stakeholder Meetings. Interviews should be conducted with key resource experts and recreation users to gain additional information about recreational opportunities and the Project's hydrology. A stakeholder and focus group meeting should be

conducted with recreation users with the purpose further identifying recreation flows, access to the project, and potential needs. The meeting should include a presentation on the results of the hydrologic analysis and existing information on recreation access and boatable flows. It should also serve as a way to gather input from recreation users on use, optimum boatable flows, access and other potential needs for improvements to enhance the experience.

The focus groups should include whitewater boaters, NGOs, and agency recreation staff. They should include questions about 1) how people use the river, with the goal to describe the character of recreation opportunities and identify flow-dependent attributes; 2) the effects of flows on those attributes and whether participants can identify specific flows that affect the quality of opportunities; and 3) how to prioritize opportunities and identify recreation users' need for improved access and flow information. Interviews with agency staff will include questions about facility and use information, as well as relevant hydrology information.

Report. The results of the two study components should be summarized in a report that describes the hydrology, optimum recreation boating flows, and project effects on recreation flows; recreation access to the project; and potential improvements and information needs to consider as part of the licensing process. The report should be released in draft form to interested stakeholders with an opportunity to provide comment.

The report should also include documentation of the recreational needs and explicit analysis for whether studies should progress to Level 2. The decision rests on the answers to these basic questions:

1) Are there flow-dependent recreation opportunities available in the subject stream reaches?
2) Are flow-dependent opportunities affected by project operations?
3) Are flow-dependent recreation opportunities "important" relative to other resources or foregone generation?
4) Does Level 1 information precisely define flow ranges?

If the answers to these questions are outstanding, a **Level 2 Assessment** will be necessary. This involves:

Site Visits: A site visit with experienced whitewater boaters will provide stakeholders with an enhanced understanding of Project operations and an opportunity for dialogue on what, if any, changes may be desirable. Participants should scout each river reach to examine the quality and characteristics of boating opportunities, estimate potential flow ranges, identify obvious hazards, and determine whether an on the water flow study is necessary to evaluate whitewater recreation opportunities.

A site visit should be planned for the spring or early summer. This will offer a greater probability of observing higher than base flow levels. It also provides sufficient time to develop preliminary hydrology information about higher flows, become familiar with the resource via interviews and existing literature, and set up logistics with local whitewater boaters who may help guide the site visit. The site visit should include evaluations of the three reaches for all recreation

opportunities.

Report: The Level 2 report should include an assessment of the study participant's evaluations of the potential quality and characteristics of the boating opportunities, including difficulty, type of run, and the type of craft suitable for the run. The report should also describe potential flow ranges, obvious hazards, and recommendations for implementing an on the water flow study, if necessary.

If warranted, a **Level 3 Assessment** should involve an on the water controlled flow study where boaters can determine acceptable and optimal instream flow conditions. The Level 3 report should describe the whitewater boating attributes of the range of flows studied (including difficulty, unique features, and portage requirements), the acceptable and optimal flows for each reach, and the frequency of availability of the identified flows under current and any proposed project operation. The report should also incorporate results from the other studies that may be relevant to identifying competing uses or resource needs.

§5.9(b)(7) —Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost will depend on what information is readily available and what requires additional work, and is estimated to be $50,000, based upon whether or not on the water flow studies are conducted.

IV. Conclusion

American Whitewater appreciates the opportunity to submit a study request for the Kaweah Hydroelectric Project. We welcome an opportunity to engage in additional dialogue regarding the appropriate scope of a study to evaluate the impacts of the Project on whitewater recreation.

Respectfully submitted,

Theresa L. Simsiman
California Stewardship Director
American Whitewater
916-835-1460

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Southern California Edison Company **Kaweah Hydroelectric Project**	**FERC Project #298**

CERTIFICATE OF SERVICE

Pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure, I hereby certify that I have this day caused the foregoing **American Whitewater's Study Request re: the Preliminary Application Document, Proposed Technical Study Plans for the Kaweah Hydroelectric Project (P-298)** to be served upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated this 13th day of April 2017.

Megan Hooker
American Whitewater

Document Content(s)

APPENDIX B

Proposed Study Plans

Appendix B: Introduction

Southern California Edison Company (SCE) has prepared 17 draft Technical Study Plans in order to develop sufficient information to identify potential Project impacts and to develop new license conditions that reasonably balance multiple resource interests. The study plans are organized into five major resource areas – Aquatic, Cultural, Land, Recreation, and Terrestrial. The plans are identified below and are provided in their entirety herein.

Aquatic Resources

AQ-1 Instream Flow

AQ-2 Fish Population

AQ-3 Macroinvertebrate

AQ-4 Water Temperature

AQ-5 Geomorphology

AQ-6 Water Quality

AQ-7 Special-status Amphibians and Aquatic Reptiles

AQ-8 Fish Passage

AQ-9 Entrainment

Cultural Resources

CUL-1 Cultural Resources

Land Resources

LAND-1 Transportation System

LAND-2 Aesthetic Resources

LAND-3 Land Use

Recreation Resources

REC-1 Recreation Resources

REC-2 Whitewater Boating

Terrestrial Resources

TERR-1 Botanical Resources

TERR-2 Wildlife Resources

AQ-1 Instream Flow

POTENTIAL RESOURCE ISSUE:

- Modification of aquatic and riparian habitat.

PROJECT NEXUS:

- Project operations modify the flow regime in the bypass reaches. The modified flow regime may affect the amount and distribution (temporal and spatial) of aquatic and riparian habitat.

POTENTIAL LICENSE CONDITION:

- Instream flow releases.

STUDY OBJECTIVES:

- The overall study objective is to characterize aquatic and riparian habitat as a function of flow using ecological principles and site-specific hydraulic and habitat modeling (e.g., Bovee et al. 1998). The information developed from this study, in combination with other resource studies (e.g., water temperature, fish passage, fish population, and special-status amphibian and reptile studies), will provide a basis for streamflow-related resource management decisions.
- The specific objectives of the study include:
    - Delineate the bypass rivers into segments with similar hydrology and channel characteristics (e.g., slope, channel dimensions, channel pattern);
    - Map the mesohabitat types (e.g., pool, run, riffle) in the bypass river segments;
    - Quantify the habitat versus flow relationships for fish, special-status amphibian, benthic macroinvertebrate, and riparian resources in the bypass river segments;
    - Use the habitat versus flow relationships to develop a time series analysis of aquatic habitat under existing and unimpaired flow scenarios for the bypass river segments;
    - Identify the time periods, flow conditions, and life stages when habitat may be a limiting factor for fish, benthic macroinvertebrate, special-status amphibian, and riparian populations for the existing and unimpaired scenarios; and
    - Provide information necessary to quantify the potential effects of other alternative flow scenarios on aquatic and riparian habitat.

EXTENT OF STUDY AREA:

- The study area includes the active channel and floodplain in the bypass river segments and selected riparian vegetation reference reaches outside the influence of the Project. The study area is identified in Table AQ 1-1 and Map AQ 1-1. Some portions of the study area in the East Fork Kaweah River may be difficult to access due to the rugged terrain (see Map AQ 1-1) and, therefore, field data will only be collected in portions of the study area that are reasonably safe to access. The riparian vegetation reference reaches outside of the bypass river segments will be used to interpret riparian vegetation versus flow relationships; therefore, instream flow and riparian vegetation data collection in these reaches will be limited to that purpose.
- It should be noted that the majority of lands along the bypass river segments are privately owned and outside the FERC Project boundary. For the purposes of this instream flow

study described herein, SCE will take the following steps to obtain approval to conduct field studies on private property:

- Provide notification to landowner of Project relicensing and request authorization to enter property to conduct field studies.
- If authorization is obtained, SCE will complete field studies as described in this technical study plan.
- If authorization is not obtained, SCE will limit field studies to only those lands where landowners have provided access.

STUDY APPROACH:

The following describes the general instream flow modeling approach which includes: (1) target species and/or guilds; (2) habitat suitability criteria (HSC); (3) study area stratification and study site selection; (4) coordination of study site selection; (5) study site modeling; (6) hydrodynamics modeling; and (7) habitat modeling. Modeling associated with the AQ-1 TSP will be completed by a contractor with extensive experience in aquatic habitat modeling. The contractor will be selected by Southern California Edison after submittal of the Pre-Application Document.

Target Species and/or Guilds

- A species distribution map for fish, special-status amphibians and reptiles, and riparian resources within the bypass river segments will be generated from the results of the AQ 2 – Fish Population Technical Study Plan (TSP), AQ 7 – Special-Status Amphibian and Aquatic Reptile TSP, and TERR 1 – Botanical Resources TSP. Existing information (e.g., literature and agency consultation) and pertinent study results will be used to develop a life stage periodicity chart (i.e., season of occurrence) for the aquatic species and riparian vegetation present in each study reach.
- The species and life stages (and/or guilds) used for instream flow habitat modeling will be selected in collaboration with the interested resource agencies based on management importance and/or sensitivity to Project operations. Southern California Edison (SCE) proposes that rainbow trout and brown trout[1] life stages would be modeled in the bypass reaches where water temperature is potentially suitable (juvenile rearing, adult rearing, spawning/incubation). Hardhead (juvenile and adult life stages) and foothill yellow-legged frogs (FYLF) (breeding and larval development) would also be modeled, if these species are present or potentially present in the study area. All other aquatic species/life stages are proposed to be modeled using a guild approach.

Habitat Suitability Criteria

- Extensive development of HSC for west-slope Sierra Nevada species/life stages (trout, FYLF, hardhead, native species guilds) was recently conducted in collaboration with resource agencies for the Placer County Water Agency (PCWA) Middle Fork Project relicensing (PCWA 2011). It is proposed that these HSC be used for habitat modeling.

Stratification and Study Site Selection

- Channel characteristics (slope, channel dimensions, channel pattern), hydrology, and mesohabitat (e.g., run, pool, and riffle) data will be used to stratify the bypass reaches. Instream flow data will be collected and analyzed within these strata. The largest strata,

[1] Where brown trout have been targeted as a management objective.

river segments, will be based on channel characteristics and hydrology. Within these river segments, the river will be further stratified based on mesohabitat types. All accessible bypass river segments will be mesohabitat mapped (typed) (either by helicopter or foot travel) using the detailed level of mesohabitat typing outlined in McCain et al. (1990) (i.e., a potential of 22 mesohabitat types). These habitat types will be collapsed into a lower level of detail to facilitate river stratification for instream flow modeling. SCE proposes to aggregate the McCain et al. (1990) mesohabitat types into approximately five types (pool, run, low-gradient riffle, high-gradient riffle, and cascade) for stratification of the study sites and river segments.

- Study sites selected to represent the different river segments will be representative reaches stratified by mesohabitat type. The stratified representative reaches will be at least 20 to 40 channel widths in length (or longer) and will contain a full complement of mesohabitat types that are representative of the larger river segment. Where possible, the sites will overlap the other aquatic study sites (e.g., fish population, macroinvertebrates, special-status amphibians and reptiles, etc.).
- The preliminary river segments and locations of the study sites within the river segments are shown in Table AQ 1-1 and Map AQ 1-1. The specific locations and lengths of the representative reach study sites will be selected in the field in consultation with interested resource agencies. Prior to study site selection in the field, SCE will summarize the mesohabitat characterization data and make a preliminary selection of study site locations. A field trip will be scheduled with interested resource agencies to select study sites and specific habitat units and transects to model (also see Study Site Modeling below).

Coordination of Study Site Selection

- Study site selection will be coordinated with the AQ 7 – Special-Status Amphibian and Aquatic Reptile TSP to include FYLF habitat, where appropriate, within the study sites. In addition, if unique locations (e.g., breeding sites) are identified by the AQ 7 – Special-Status Amphibian and Aquatic Reptile TSP then these sites will be modeled as part of the AQ 1 – Instream Flow TSP. Study sites will also be selected to include riparian vegetation representative of the river segments.

Study Site Modeling

- Aquatic habitat modeling will be accomplished by sampling and modeling representative mesohabitat types in each study site with one-dimensional hydrodynamics and habitat models. The results for each mesohabitat type will be weighted and combined to develop a representation of hydrodynamics and habitat for the larger river segment. The weighting will be based on the percentage of each mesohabitat within the river segment.
- Within a study site, mesohabitat types will be sampled approximately in proportion to their abundance. Adjustments to the proportional sampling may be made based on the importance or variability of particular mesohabitat types. Typically, 10 mesohabitat units within a geomorphic river segment will be sampled (modeled). This provides enough sampling to replicate each major mesohabitat type (e.g., two mesohabitat samples of each type) and provides for additional sampling in abundant and/or important mesohabitat types (e.g., 3 or more mesohabitat samples of abundant and/or important types). Each major mesohabitat type (greater than approximately 5-10% of the geomorphic/hydrologic reach) will be modeled. Rare mesohabitat types (<5%) that provide unique or important habitat (e.g., spawning, passage) will be modeled if present in the study site. In particular, patches of spawning gravel may be important habitat features to sample in the study sites.

Mesohabitat types (e.g., cascades) that do not contain significant habitat for the primary target species or rare mesohabitat types (<5%) that do not have unique habitat importance will not be modeled.

- The stratified representative reach study sites may contain more mesohabitat units than will be modeled. The specific mesohabitat units selected for modeling will be those that are most representative of the mesohabitats in the geomorphic/hydrologic river segment. Results from mesohabitat mapping will be used to compare (e.g., average length, width, depth, and substrate) mesohabitat types in the geomorphic river segment with the mesohabitats in the study site. These data, along with a visual assessment of the representativeness of the mesohabitat units within the study site, will be used to select units to model. Final selection of the habitat units will be completed in the field in collaboration with interested resource agencies. SCE does not recommend random sampling of mesohabitat units because unrepresentative results could occur.
- For one-dimensional modeling, typically three cross-sections will be visually placed in the mesohabitat units to best represent the habitat over a range of flows. Fewer cross-sections may be placed in simple mesohabitat units with little variability or where the cross-sections are being placed to sample a variety of mesohabitat units of a particular type and not necessarily to fully characterize particular mesohabitat units. In some cases, additional cross-sections may be placed in highly variable mesohabitat units, if appropriate. Concurrence regarding cross-section placement within mesohabitat units will be obtained from interested resource agencies.
- Overall, for the one-dimensional modeling sites (not including the riparian comparison sites) the target total number of modeling cross-sections will be 18-24 cross-sections for each of the geomorphic river segments.

Hydrodynamics Modeling

- PHABSIM (e.g., Milhouse et al. 1989) or equivalent one-dimensional hydraulics modeling procedures, as appropriate for the study site and specific objectives for the site, will be used for modeling water surface elevations and velocities across each cross-section. These procedures include stage-discharge regressions, Manning's equations, backwater step models (e.g., WSP, HecRas), and IFG4.
- Hydrodynamics (depth, velocity, water surface elevations) will be modeled over a wide range of discharges, appropriate to the Project hydrology of each reach. Specific data to be collected using standard techniques include:
    - Channel topography will typically be in the form of cross-sections (1-D). Cross-sections will be marked with semi-permanent headpins and approximate GPS locations will be recorded.
    - For one-dimensional modeling, empirical water surface elevations will be measured (surveyed) for at least three calibration discharges at each cross-section. The discharges will span the range of flows of interest (Table AQ 1-1). The calibration flows will be determined in consultation with interested resource agencies once the hydrology has been compiled.
    - Empirical velocity data will be collected across each cross-section (15-20 locations) at the high calibration discharge (or middle calibration discharge if determined by the interested resource agencies to be the most appropriate discharge). Table AQ 1-1 shows the target calibration discharges. All velocities will be collected with calibrated

velocity meters. Discharges will be measured using standard gaging techniques (Rantz 1982) and/or an acoustic doppler current profiler (ADCP).

Habitat Modeling

- Habitat modeling will be conducted using an approach consistent with the Instream Flow Incremental Methodology (IFIM) approach (Bovee et al. 1998). The specific details of the habitat modeling will be developed in consultation with the interested resource agencies. The general approach will be as follows:
  - Collect substrate and cover information for habitat modeling across each cross-section (1-D) that is compatible with the HSC criteria developed in consultation with the interested resource agencies.
  - Collect appropriate riparian vegetation information (e.g., polygons of vegetation type, age) at the study sites.
  - Develop habitat modeling algorithms or approaches appropriate for each selected species and life stage or guild in consultation with the interested resource agencies.
  - Develop habitat versus flow relationships for each species life stage or guild over a wide range of flows (15 to 30 flows).
  - Complete a habitat time series analysis comparing the seasonal and daily distribution of habitat for the existing and unimpaired Project hydrology over the period of record (e.g., 1975 to present). Compare and contrast the amount of habitat during different biologically significant time periods (e.g., reproduction, rearing) and identify potential habitat limiting factors and time periods.
  - Coordinate with the AQ 7 – Special-Status Amphibian and Aquatic Reptile TSP to identify outputs from the instream flow modeling that will assist in analyzing the relationship between instream flow and FYLF habitat.

SCHEDULE:

Date	Activity
October/November 2017	Select instream flow modeling sites
November 2017–February 2018	Consult with the interested resource agencies regarding: habitat suitability criteria, periodicity charts, and habitat modeling methods
March–October 2018	Conduct field surveys (topography, water surface elevations, velocities, substrate/cover data collection)
November 2018–June 2019	Analyze data and prepare draft report
June 2019	Distribute draft report to the stakeholders
July–September 2019	Stakeholders review and provide comments on draft report (90 days)
October–December 2019	Resolve comments and prepare final report
December 2019	Distribute final report in Final License Application

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Milhous, R.T., M.A. Updike, and D.M. Schneider. 1989. Physical habitat simulation system reference manual -- version II. Washington, DC: U.S. Fish and Wildlife Service. Biological Report 89(16).1-403p.

Placer County Water Agency (PCWA). 2011. Application for New License. Middle Fork American River Project (FERC Project No. 2079). AQ 1 – Instream Flow Technical Study Report (2010). Exhibit E, Volume 3, Supporting Document B. Filed with FERC February 23, 2011.

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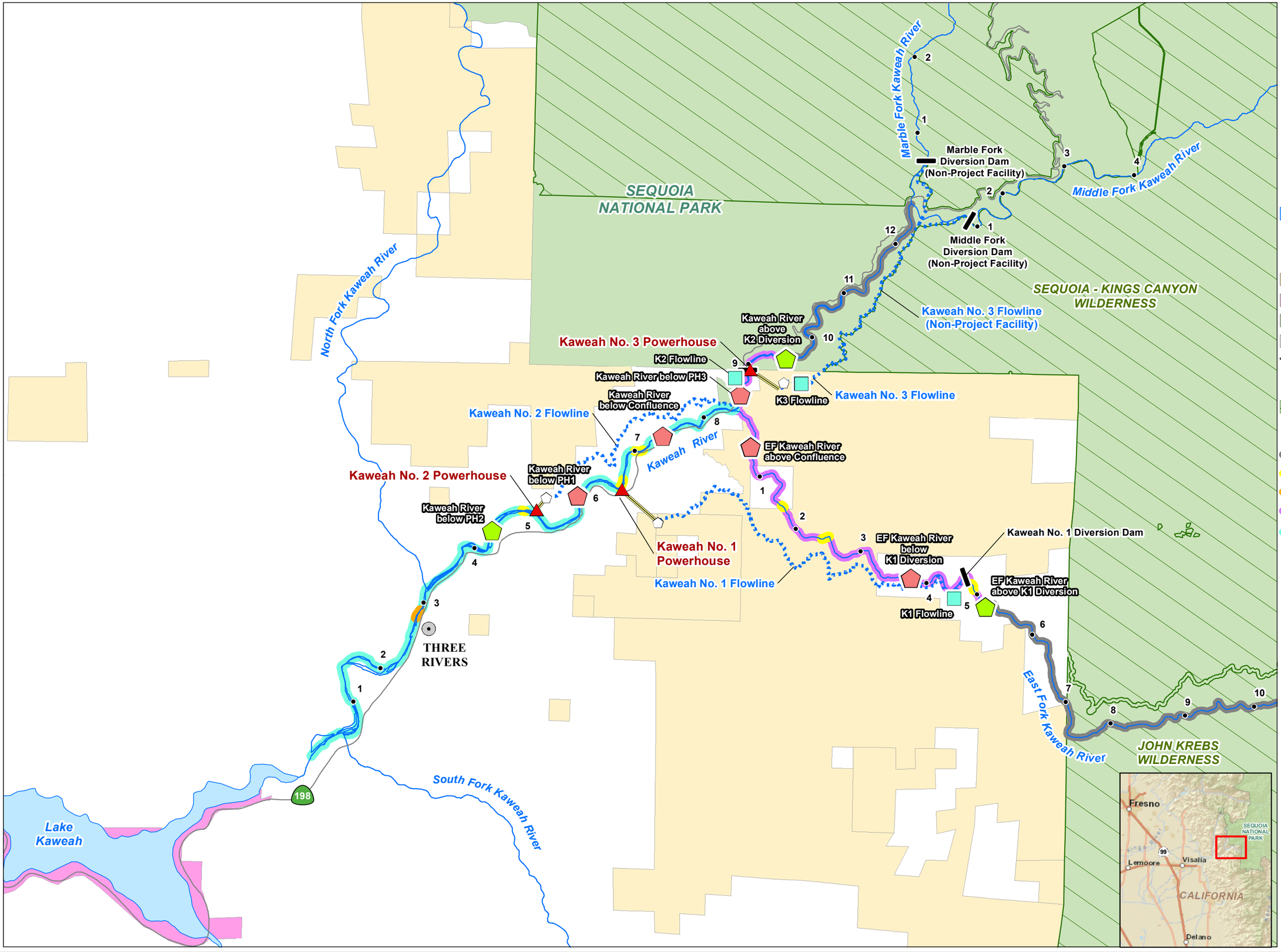
TABLE

Table AQ 1-1. Instream Flow Study Reaches and Modeling Methods.

Study River Segments/Sites	Bypass River Segment	Reaches Upstream of Project Facilities	Site Name	Approximate Number of Mesohabitat Units to Sample [1]	Approximate Discharges for Model Calibration (cfs)[2]				Modeling Methods
					Aquatic Habitat Modeling			Extra High for Riparian /Geomorphic Modeling	
					Base	Med	High		
Kaweah River									
Kaweah River Upstream of Kaweah No. 3 Powerhouse		●	IF K9.5	1-3	5-10	30-40	90-110	Based on availability of spring high flows (HF[3])	Develop stage-discharge relationship for riparian vegetation comparisons
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	●		IF K8.7	10	5-10	30-40	90-110	HF[3]	1D
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	●		IF K7.3	5	5-10	30-40	90-110	HF[3]	1D (results from K7.3 and K6.9 will be combined)
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	●		IF K6.9	5	5-10	30-40	90-110	HF[3]	
Kaweah River Downstream of Kaweah No. 2 Powerhouse	●		IF K4.3	1-3	5-10	30-40	90-110	HF[3]	1D
East Fork Kaweah River									
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion		●	IF EFK5.2	1-3	5-7	10-20	30-50	HF[3]	Develop stage-discharge relationship for riparian vegetation comparisons
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	●		IF EFK3.8	5	5-7	10-20	30-50	HF[3]	1D (results from EFK3.8 and EFK0.7 will be combined)
			IF EFK0.7	5	5-7	10-20	30-50	HF[3]	

[1]Number of habitat units to model in some reaches may be modified due to circumstances in the particular reach. See text for details.
[2]The discharges are approximate (or target discharges) and the exact discharge may vary depending on circumstances during the study period (e.g., ability to accurately release flows, weather, etc.). The intent of the target discharges is to provide water surface elevations and a velocity data set to calibrate the hydraulic models. Velocity will not be collected at the extra high data set.
[3]Based on availability of spring high flows.

MAP



Facilities
- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock

Other Features
- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*
- Bureau of Land Management
- U.S. Army Corps of Engineers
- National Park Service
- Private

*SOURCE: BLM 2012

Land Management
- National Wilderness Area

Channel Characterization
- NA
- bedrock
- bedrock/cascade
- bedrock/step-pool/cascade
- pool-riffle/plane-bed

Sampling Locations
- Entrainment Monitoring (flowlines)
- Fish, BMI, FYLF, Riparian
- Fish, BMI, FYLF, Riparian, Instream Flow

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Eastern Hydro Generation

Map AQ 1-1

Kaweah Project
Aquatic and Riparian Sampling Locations

0 0.25 0.5 1 Miles

Projection: UTM Zone 11
Datum: NAD 83

Date: 12/8/2015

C:\GIS\ENTRIX\30735240_SCE_EasternHydro\map\Kaweah\SCE_Eastern_KAWEAH_AQTSPs_Locs_Sampling_AQ_RIP_17i11i_01.mxd

AQ-2 Fish Population

POTENTIAL RESOURCE ISSUE:

- Fish species composition, distribution, and abundance.

PROJECT NEXUS:

- Project operations modify the flow regime and fish habitat in the bypass river reaches.

POTENTIAL LICENSE CONDITION:

- Instream flow releases.

STUDY OBJECTIVES:

- Document fish species composition, distribution, and abundance in the bypass river reaches.
- Characterize fish growth, condition factor, and population age structure in the bypass river reaches.

EXTENT OF STUDY AREA:

The study area includes the bypass river reaches and comparison reaches upstream of Project diversions. Specific study areas are identified in Table AQ 2-1 and Map AQ 2-1. Some portions of the East Fork Kaweah River are difficult to access due to the rugged terrain (see Map AQ 2-1). Field data will only be collected in portions of the river that are accessible.

It should be noted that the majority of lands along the bypass reaches are privately owned and outside the FERC Project boundary. For the purposes of the fish population study described herein, SCE will take the following steps to obtain approval to conduct field studies on private property:

- Provide notification to landowner of Project relicensing and request authorization to enter property to conduct the field studies.
- If authorization is obtained, SCE will complete field studies as described in this technical study plan.
- If authorization is not obtained, SCE will limit field studies to only those lands where land owners have provided access.

STUDY APPROACH:

Study Sites

The general locations of study sites for developing fish standing crop estimates (fish per mile and/or pounds (lbs.) per acre) are shown in Table AQ 2-1 and Map AQ 2-1. River sampling sites (electrofishing and/or snorkeling) will generally be a minimum of 100 meters (m) long. Some of the larger river sites (e.g., Kaweah River) may require sampling sites up to 300 meters to include multiple habitat types. The specific locations of the sampling sites will be determined in the field in coordination with the interested resource agencies. The AQ 1 – Instream Flow Technical Study Plan (TSP) microhabitat mapping will be used to identify representative reach sampling sites with mesohabitat types in similar proportion to the larger geomorphic river segments. Where possible, sampling sites will be chosen that overlap with the instream flow study sites (see the AQ 1 –

Instream Flow TSP) and historic sampling sites. Sampling sites will be chosen far enough upstream or downstream of access locations to minimize the effects of fishing on fish population results, where applicable. Where comparisons likely are to be made between locations upstream and downstream of Project facilities, comparison study sites will be located in sections of river with similar habitat types and similar sampling methods will be used (see below). Table AQ 2-2 shows the specific location, length, and sampling methods (table details to be completed in consultation with interested resource agencies).

River Sampling

The river study sites will be sampled in Year One to identify the spatial distribution and abundance of fish species. Quantitative river sampling will be conducted during the late summer/early fall base flow period using a combination of electrofishing (shallow water) and/or snorkeling (deep water) (Table AQ 2-2). 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 representative reach study site. Where possible, the representative reach sampling sites will be partitioned into mesohabitat types for sampling using block nets. Captured fish from each pass will be kept in separate live wells or buckets. Fish will be anesthetized (CO_2), enumerated, identified to species, measured (fork length and weight), and scale samples will be obtained. 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. Very small hardhead or pikeminnow that cannot be identified to species will be recorded as hardhead/pikeminow guild. Very small fish of all species that cannot be identified to species (or family) will be recorded as fry.

Snorkeling (e.g., Dolloff et al. 1996) will be used to assess fish populations in deep water habitats (≥ 1.5 m) at each representative reach study site (Table AQ 2-2). Snorkelers will survey in lanes along the river and will identify, count, and estimate the length of each fish observed. Fish data will be recorded by habitat unit type. Snorkeling protocols and field data forms will be consistent with those in Flosi et al. 1998. Juvenile hardhead and pikeminnow (less than approximately 10 inches) will be recorded as a single category, hardhead/pikeminnow guild, where identification is uncertain. Very small fish of all species that cannot be identified will be recorded as fry.

Along the river segments, between or above the quantitative study sites (QSS), qualitative presence/absence sampling will be used to identify the distribution of fish species. Snorkeling or qualitative electrofishing will be used, as needed, to spot check between the study sites to identify the approximate late summer/early fall distribution of hardhead and or trout.

Special Purpose Qualitative Sampling

Qualitative sampling using electrofishing and/or seining gear will also be used to collect seasonal information on emergence of fry (i.e., to identify timing of spawning and early fry rearing). This sampling will be used to identify the timing and abundance of fry in the vicinity of Project diversions. Three samplings will be equally spaced through the early May to early July time period.

Data Reporting

- Summarize fish standing crop estimates for each species at each study site in terms of density (e.g., fish/ft² and fish/mile) and biomass (lbs/acre and lbs/mile).

- Identify appropriate fish standing crop comparison datasets in collaboration with the interested resource agencies.
- 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 for each study reach based on available literature, consultation with qualified fisheries biologists, and the fish population sampling data.
- Develop length frequency histograms of sampled fish and examine distribution modality, in conjunction with scale data, to determine the age structure of fish populations.
- Summarize fish growth and age data using length frequency and scale analysis.
- Calculate fish condition factors using measured weight and length data.
- Provide an electronic database (Excel spreadsheet) of all fish sampling data (date, location, fish species, fish size, sampling pass, etc.) to BLM, resource agencies, and interested stakeholders.

SCHEDULE:

Date	Activity
April–May 2018	Select fish population sampling sites in collaboration with interested resource agencies
May–June 2018	Conduct qualitative fish sampling (young-of-the-year [YOY] emergence)
Late August–November 2018	Conduct quantitative fish sampling (electrofishing/ snorkeling) and fish tissue collection for water quality study, as needed
December 2018–February 2019	Analyze data and prepare draft report
February 2019	Distribute draft report to the stakeholders
March–May 2019	Stakeholders review and provide comments on draft report (90 days)
June–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

Dolloff, A., J. Kershner, and R. Thurow. 1996. Underwater Observation. Pages 533-554 in B.R. Murphy and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey and B. Collins. 1998. California Salmonid Steam Restoration Manual, Third Edition. State of California, The Resources Agency, California Department of Fish and Game, Inland Fisheries Division, Sacramento, CA.

Placer County Water Agency (PCWA). 2007. Middle Fork American River Project (FERC 2079) 2006 Draft Physical Habitat Characterization Study. April, 2007.

Rexstad, E. and K. Burnham. 1992. User's Guide for Interactive Program CAPTURE. Colorado Cooperative Fish and Wildlife Research Unit, Colorado State University, Fort Collins, CO.

Reynolds, J.B. 1996. Electrofishing. Pages 83-120 in B.R. Murphy and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Van Deventer, J.S. and W.S. Platts. 1989. Microcomputer software system for generating population statistics from electrofishing data-User's guide for MicroFish 3.0. US Department of Agriculture, Forest Service. Intermountain Research Station, General Technical Report INT-254.

TABLES

Table AQ 2-1. Fish Population River Sampling Reaches.

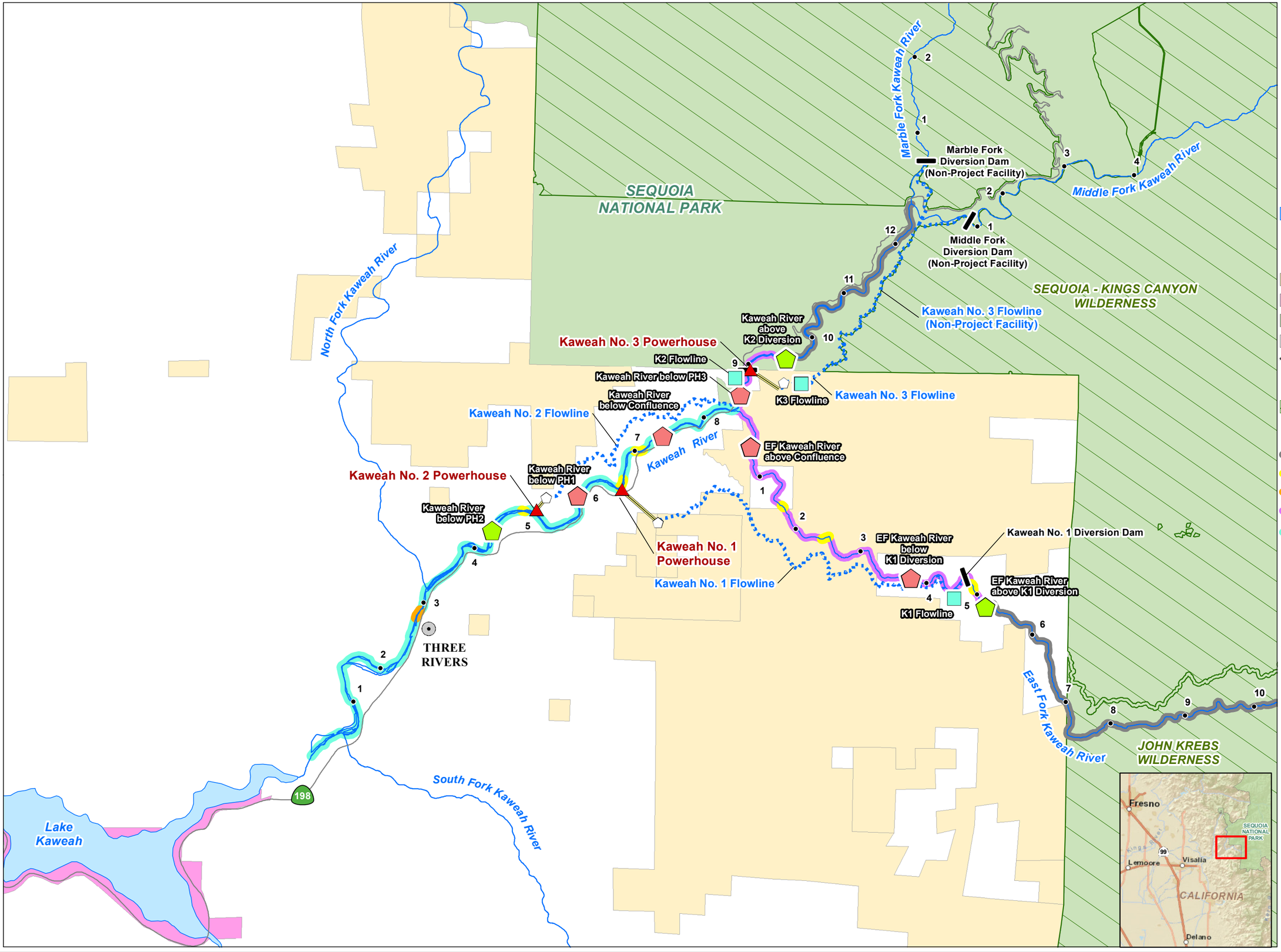
Study Reach	Site ID	Bypass Reaches	Reaches Upstream of Project Facilities or Comparison Reaches	Number of Fish Population Sampling Sites
Kaweah River				
Kaweah River Upstream of Kaweah No. 3 Powerhouse	K9.5		●	1
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	K8.7	●		1
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	K7.3	●		1
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	K6.9	●		1
Kaweah River Downstream of Kaweah No. 2 Powerhouse	K4.3		●	1
East Fork Kaweah River				
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion	EFK5.2		●	1
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	EFK3.8	●		1
East Fork Kaweah River Upstream of Confluence with Kaweah River	EFK0.7	●		1

Table AQ 2-2. Fish Population River Sampling Locations[1].

Study River and Site ID	Sampling Location		Site Length (m)	Sampling Dates	Sampling Method	Comments
	River Miles	GPS at Downstream Starting Location				
Kaweah River						
K9.5	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	
K8.7	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	
K7.3	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	
K6.9	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	
K4.3	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	
East Fork Kaweah River						
EFK5.2	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	
EFK3.8	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	
EFK0.7	TBD	TBD	100	Fall 2016	Electrofishing/Snorkeling	

[1]All information is tentative. Information to be determined in the field and completed in coordination with interested resource agencies.

MAP



Facilities

- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*

- Bureau of Land Management
- U.S. Army Corps of Engineers
- National Park Service
- Private

*SOURCE: BLM 2012

Land Management

- National Wilderness Area

Channel Characterization

- NA
- bedrock
- bedrock/cascade
- bedrock/step-pool/cascade
- pool-riffle/plane-bed

Sampling Locations

- Entrainment Monitoring (flowlines)
- Fish, BMI, FYLF, Riparian
- Fish, BMI, FYLF, Riparian, Instream Flow

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Map AQ 2-1
Kaweah Project
Aquatic and Riparian Sampling Locations

Date: 12/8/2015

0 0.25 0.5 1 Miles

Projection: UTM Zone 11
Datum: NAD 83

AQ-3 Macroinvertebrate

POTENTIAL RESOURCE ISSUE:

- Macroinvertebrate community composition and abundance.

PROJECT NEXUS:

- Project operations modify the flow regimes and water quality (including water temperature) in the bypass reaches, potentially affecting the macroinvertebrate community and food availability for fish.

POTENTIAL LICENSE CONDITIONS:

- Instream flow releases.
- Site-specific water quality measures.

STUDY OBJECTIVES:

- Document the density and size distribution of drifting macroinvertebrates in selected bypass river reaches for input to bioenergetics growth analysis.
- Document the benthic macroinvertebrate community in the bypass reaches and reference reaches to characterize general habitat conditions.

EXTENT OF STUDY AREA:

- The study area includes the bypass river segments and comparison reaches identified in Table AQ 3-1 and Map AQ 3-1.

STUDY APPROACH:

Macroinvertebrate Drift Sampling for Input to Bioenergetics Analysis

- Collect drift samples at select AQ 1 – Instream Flow TSP sites (Table AQ 3-1 and Map AQ 3-1). Identify two representative riffles and sample drift at the downstream end of each riffle. Collect three drift samples at each riffle using a sampling methodology similar to that used in Hayes et al. 2000. Daytime only drift samples will be collected.
- Collect drift samples two times during the late summer/fall (August-October) to identify base invertebrate drift densities. Process samples based on average drift density (number/m^3) at each site by 2 mm prey size classes (e.g., lengths 1-3 mm, 3-5 mm, 5-7 mm, etc.). Use general aquatic invertebrate length versus weight relationships to convert macroinvertebrate drift to energy equivalents (joules/m^3/size class) for bioenergetics analysis.
- Compare/contrast drift density and size between the study reaches and with the literature.
- Use the drift density information as an input to bioenergetics growth analysis to assist in the identification of limiting factors related to fish growth (food, water temperature, habitat).

Benthic Macroinvertebrate Sampling for General Habitat Conditions

In the bypass and comparison reaches collect benthic samples and inventory data following the Surface Water Ambient Monitoring Program (SWAMP) (Ode 2007) protocols. Collect the composite benthic samples and physical habitat assessment data using the SWAMP methodology and process macroinvertebrate taxonomy to Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) level 2 (Richards and Rogers 2006). Include in the analysis

available historical benthic macroinvertebrate data. Report benthic macroinvertebrate metrics as outlined in Rehn et al. (2007) as part of the data summary and provide other benthic macroinvertebrate metrics as requested by the resource agencies. Statistically compare/contrast SWAMP and historical sampling results between reaches and with data reported in the literature. Proposed sampling sites for benthic macroinvertebrates are identified in Table AQ 3-1 and Map AQ 3-1.

Data

All data (drift and benthic invertebrate) will be provided to BLM, resource agencies, and interested stakeholders in an Excel spreadsheet electronic format.

SCHEDULE:

Date	Activity
June 2018	Select macroinvertebrate sampling sites in consultation with interested resource agencies
August–October 2018	Conduct benthic and drift sampling
November 2018–February 2019	Analyze data and prepare draft report
February 2019	Distribute draft report to the stakeholders
March–May 2019	Stakeholders review and provide comments on draft report (90 days)
June–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

Hayes, J.W., J.D. Stark, K.A. Shearer. 2000. Development and test of a whole-lifetime foraging and bioenergetics growth model for drift-feeding brown trout. Trans. Am. Fish. Soc. 129:315-332.

Ode, P.R. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.

California Department of Fish and Game (CDFG). 2003. California stream bioassessment procedure (Protocol brief for biological and physical/habitat assessment in wadeable streams).

Rehn, A. C., N. Ellenrieder, and P. R. Ode. 2007. Assessment of Ecological Impacts of Hydropower Projects on Benthic Macroinvertebrate Assemblages: A Review of Existing Data Collected for FERC Relicensing Studies. California Energy Commission, contract #500-03-017.

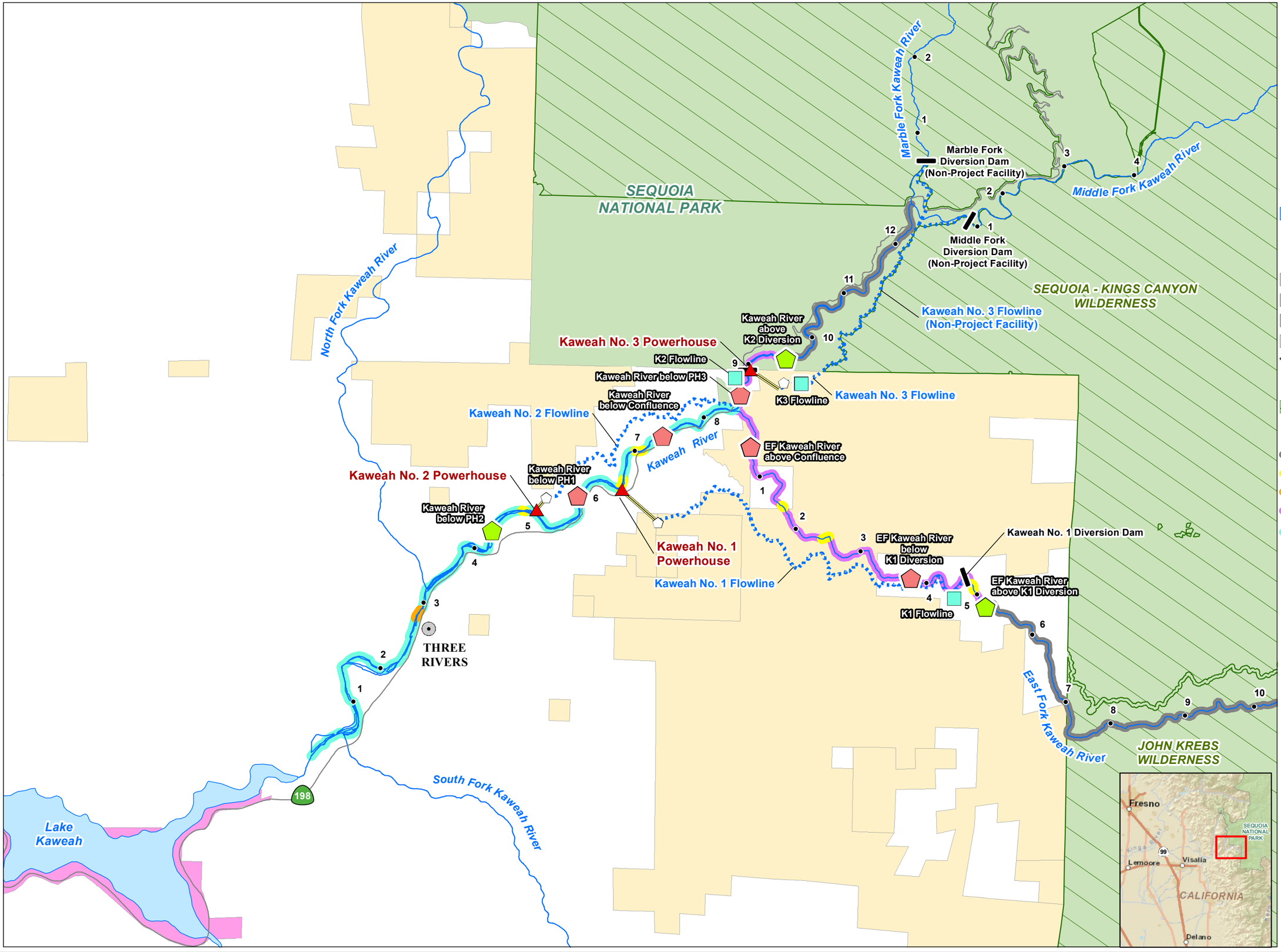
Richards, A. B. and D. C. Rogers. 2006. List of Freshwater Macroinvertebrate Taxa from California and Adjacent States including Standard Taxonomic Effort Levels. Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT). 215 pp.

TABLE

Table AQ 3-1. Macroinvertebrate Sampling Reaches.

Study Reach	Site ID	Bypass Reaches	Reaches Upstream of Project Facilities or Comparison Reaches	Number of SWAMP Benthic Macroinvertebrate Sample Locations	Number of Drift Macroinvertebrate Sample Locations
Kaweah River					
Kaweah River Upstream of Kaweah No. 3 Powerhouse	K9.5		●	1	1
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	K8.7	●		1	1
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	K7.3	●		1	1
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	K6.9	●		1	1
Kaweah River Downstream of Kaweah No. 2 Powerhouse	K4.3		●	1	1
East Fork Kaweah River					
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion	EFK5.2		●	1	1
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	EFK3.8	●		1	1
East Fork Kaweah River Upstream of Confluence with Kaweah River	EFK0.7	●		1	1

MAP



Facilities
- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock

Other Features
- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*
- Bureau of Land Management
- U.S. Army Corps of Engineers
- National Park Service
- Private

*SOURCE: BLM 2012

Land Management
- National Wilderness Area

Channel Characterization
- NA
- bedrock
- bedrock/cascade
- bedrock/step-pool/cascade
- pool-riffle/plane-bed

Sampling Locations
- Entrainment Monitoring (flowlines)
- Fish, BMI, FYLF, Riparian
- Fish, BMI, FYLF, Riparian, Instream Flow

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Map AQ 3-1

Kaweah Project

Aquatic and Riparian Sampling Locations

Date: 12/8/2015

0 0.25 0.5 1 Miles

Projection: UTM Zone 11
Datum: NAD 83

AQ-4 Water Temperature

POTENTIAL RESOURCE ISSUE:

- Aquatic habitat quantity and quality.
- Basin Plan objectives compliance.

PROJECT NEXUS:

- Project operations modify the flow regime in the bypass river reaches thereby influencing instream water temperatures.

POTENTIAL LICENSE CONDITION:

- Instream flow releases.

STUDY OBJECTIVES:

- Characterize the relationship between flow and water temperature in bypass river reaches using an appropriate model supported by existing water temperature data.
- Assess the potential effects of increased air temperature due to global warming on water temperatures over the term of the new Federal Energy Regulatory Commission (FERC) license.
- Document the availability of cold water temperature refugia in bypass river reaches.

EXTENT OF STUDY AREA:

- The study area for water temperature modeling includes the Kaweah River and East Fork Kaweah River bypass river reaches (Table AQ 4-1 and Map AQ 4-1).

STUDY APPROACH:

General Modeling

- Summarize water temperature and meteorological data (relative humidity, wind speed, solar radiation, air temperature) collected as part of SCE's early data collection (2016), including seasonal patterns and daily averages, minimums, and maximums as a function of time and location in the bypass river reaches and comparison reaches. Continue to collect water temperature and meteorological data through the summer of 2017 to provide boundary conditions and model calibration data for water temperature modeling.
- Establish a Water Temperature Modeling Group (WTMG) to provide oversight and technical review of modeling procedures/decisions.
- Select and develop appropriate river water temperature models with seasonal, daily, and within-day temperature modeling capability, as necessary for specific study reaches. HEC-RAS (Brunner 2010) or RMA-2 and RMA-11 (King 1994; King 1997) are proposed for the river temperature modeling. Both have dynamic flow routing capability and within-day temperature modeling capability. HEC-RAS will be investigated in collaboration with the WTMG as the primary modeling platform
- The water temperature model(s) will be developed to simulate average, maximum, and minimum daily water temperature during the summer months when water temperature are of most concern to aquatic species. Modeling development steps to be completed in collaboration with the WTMG include:

- Collect/develop model inputs including channel geometry data, solar shading data (topographic and riparian), meteorological data (air temperature, wind speed, relative humidity, solar radiation), hydrology data, and boundary condition flow and water temperature data for the modeled river reaches.
  - Develop channel slopes and reservoir geometry using United States Geological Survey (USGS) Digital Elevation Model (DEM) data.
  - Generate daily and seasonal topographic solar shading data using Geographic Information System (GIS) algorithms and USGS DEM data.
  - Use the measured Project meteorological data and, if possible, extend the measured meteorological data to a longer period of record through correlation with a long-term meteorological station. Suitable meteorological stations will be identified and the correlation results will be evaluated as part of this study.
  - Hydrology data will be generated from the operating flow gages during the study period and the Project Operations modelling.
  - Channel cross-section data will be collected in the AQ 1 - Instream Flow Technical Study Plan (TSP) and extended to the study river segments, as appropriate, using mesohabitat mapping data collected as part of the AQ 1 - Instream Flow TSP.
- Calibrate and validate the hydrodynamics and heat budget portions of the water temperature model(s) with empirical water temperature and meteorological data. Calibrate water travel time in the bypass reach using any flow fluctuation travel time data available in the gaging records.

Characterize modeled water temperatures (i.e., seasonal, daily, within-day temperatures) for existing and alternative flow conditions. For alternative flow conditions, model a range of flow releases determined by the WTMG.

Climate Change

Incorporate available literature predictions of changes in air temperature as a result of global warming into a limited number of model runs (2-3) to evaluate the resulting effect on water temperature over the anticipated term of the new FERC license period (30-50 years).

Cold Water Refugia

In selected bypass reaches of the Kaweah River and East Fork Kaweah River collect water temperature data at tributary inflows and in deep pools to identify the potential availability of water temperature refugia for trout. In particular, review the 2014-2015 water temperature data to identify river reaches with summer temperatures above 20°C. Within these reaches, identify any potential groundwater or tributary cold water inflows and characterize the extent of the cold water refugia (e.g., amount of tributary habitat, extent of influence in the main channel). Identify two deep pools upstream and two downstream of the tributary and collect water temperature profiles to examine potential thermal stratification.

SCHEDULE:

Date	Activity
November 2017–March 2018	Develop and validate preliminary temperature model in collaboration with the WTMG
April–October 2018	Analyze data, develop the water temperature analysis in collaboration with the WTMG, and prepare draft report
November 2018	Distribute draft report to the stakeholders
December 2018–February 2019	Stakeholders review and provide comments on draft report (90 days)
March–May 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

Brunner, G. W. 2010. HEC-RAS River Analysis System User's Manual (Version 4.1). US Army Corps of Engineers Hydrologic Engineering Center (HEC).

King, I.P. 1994. RMA-2: A Two-Dimensional Finite Element Model for Flow in Estuaries and Streams, Version 5.1. Department of Civil and Environmental Engineering, University of California, Davis.

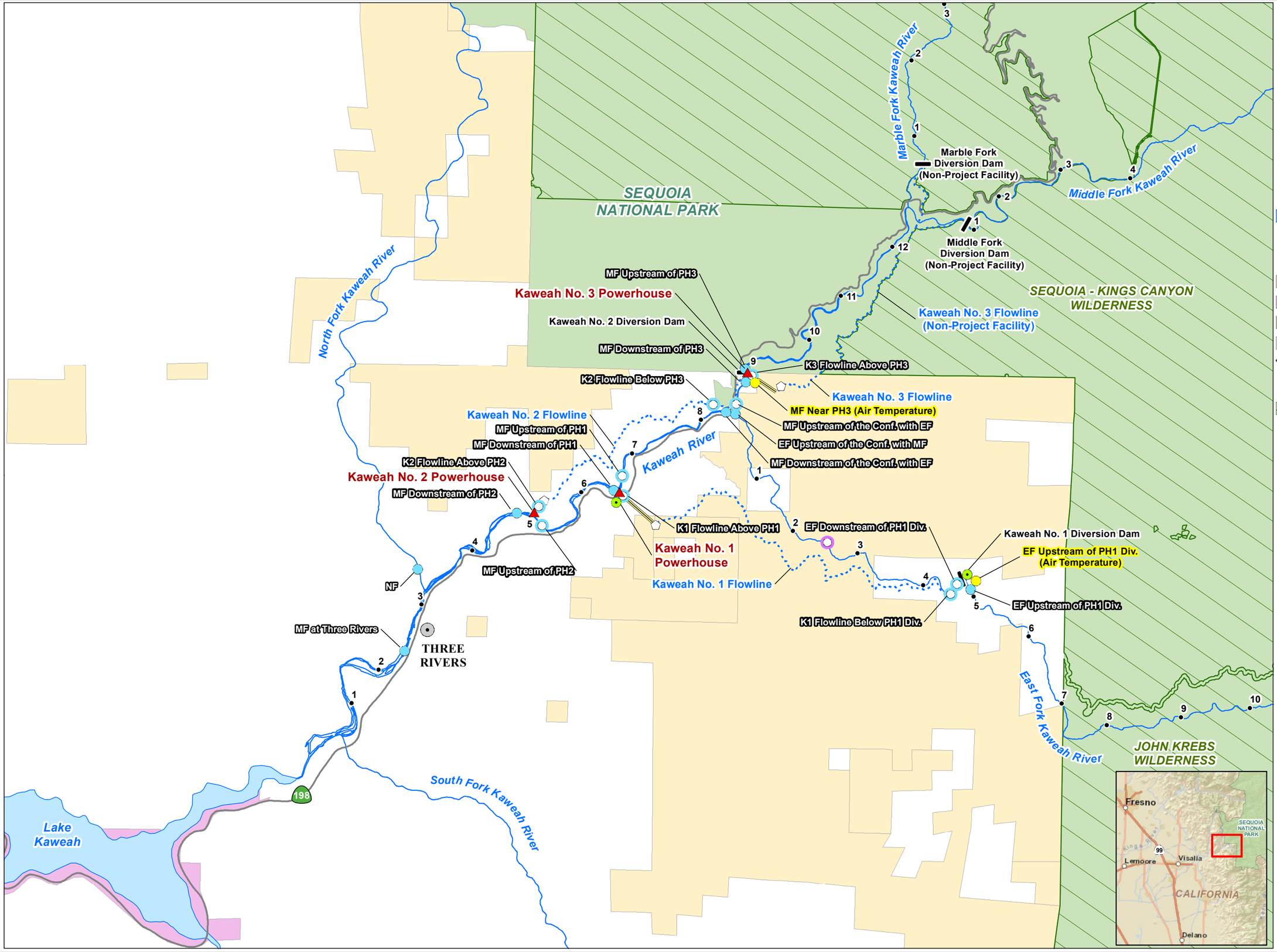
King, I.P. 1997. RMA-11: A Three Dimensional Finite Element Model for Water Quality in Estuaries and Streams – Documentation Version 2.5. Department of Civil and Environmental Engineering, University of California, Davis.

TABLE

Table AQ 4-1. Water Temperature Modeling Reaches.

Study Reach	Bypass Reaches	Reaches Upstream of Project Facilities or Comparison Reaches	Water Temperature Modeling
Kaweah River			
Kaweah River Upstream of Kaweah No. 3 Powerhouse		●	No
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	●		Yes
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	●		Yes
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	●		Yes
Kaweah River Downstream of Kaweah No. 2 Powerhouse		●	No
East Fork Kaweah River			
East Fork Kaweah River upstream of the Kaweah No. 1 Diversion		●	No
East Fork Kaweah River downstream of the Kaweah No. 1 Diversion	●		Yes

MAP



Facilities

- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*

- Bureau of Land Management
- U.S. Army Corps of Engineers
- National Park Service
- Private

*SOURCE: BLM 2012

Land Management

- National Wilderness Area

Monitoring Locations

- Water Quality and Water Temperature Monitoring (exisiting water temperature data site)
- Water Quality and Water Temperature Monitoring
- Water Temperature Monitoring (only)
- Meteorological Monitoring Location
- Air Temperature Monitoring Location

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Map AQ 4-1

Kaweah Project
Water Quality, Water Temperature and Meteorological Monitoring Locations

0 0.25 0.5 1 Miles

Projection: UTM Zone 11
Datum: NAD 83

Date: 12/8/2015

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AQ-5 Geomorphology

POTENTIAL RESOURCE ISSUE:

- Stable channel form and fluvial processes.

PROJECT NEXUS:

- Project operations modify the flow regime in the bypass river reaches and capture sediment in diversion pools, potentially resulting in changes to channel morphology and fluvial processes.

POTENTIAL LICENSE CONDITIONS:

- Channel riparian maintenance flows.
- Sediment Management Plan.

STUDY OBJECTIVES:

- Document sediment conditions in the bypass river reaches.
- Characterize sediment capture in diversion pools.
- Develop information to assist in the identification of flows necessary to maintain geomorphic processes in the bypass river reaches.
- Identify sources of sediment (major gullies, areas of vegetation and soil loss, and hillslope destabilization and erosion), including documentation of erosion resulting from spills from Project forebays and historic flume failures.

EXTENT OF STUDY AREA:

- The study area will include the bypass river reaches, comparison river reaches, and Project flowlines/flumes and Project forebay spill channels (Table AQ 5-1).
- It should be noted that the majority of lands along the bypass reaches are privately owned and outside the FERC Project boundary. For the purposes of the geomorphic studies described herein, SCE will take the following steps to obtain approval to conduct field studies on private property:
    - Provide notification to landowner of Project relicensing and request authorization to enter property to conduct the field studies.
    - If authorization is obtained, SCE will complete field studies as described in this technical study plan.
    - If authorization is not obtained, SCE will limit field studies to only those lands where landowners have provided access.

STUDY APPROACH:

The following describes the geomorphology study approach which includes data collection and analyses for: (1) evaluating sediment conditions in the bypass river reaches; (2) evaluating sediment capture in Project diversions; (3) identifying flows necessary to maintain geomorphic processes; and (4) identifying sediment sources and Project-related erosion areas.

Sediment Conditions in the Bypass River Reaches

The amount of fine sediment in pools and the particle size composition and fine sediment content of spawning gravels will be determined in the bypass river reaches, as described below.

Fine Sediment in Pools

A quantitative analysis of fine sediment in pools, V* (Hilton and Lisle, 1993), will be conducted.

- Conduct quantitative visual estimates of residual fine sediment in 5 to 10 pools, V* (Hilton and Lisle, 1993), at each of the sampling locations in the bypass river reaches and in comparison river reaches (Table AQ 5-1). Pools with V* values that are relatively low (less than 0.1) can be reasonably approximated by visual estimation (Hilton and Lisle, 1993). If there are problems completing the V* estimates (for example, due to excessive pool depths or V* values exceed 0.1), then this will be immediately communicated to the resource agencies for further consultation.
    - Visual estimates of V* will be made using a snorkel and mask. The visual surveys will be supported by a combination of photographic documentation of pool bottom sediments and sketch maps, and measurements of the surface area and depth of any fine sediment patches observed.

Particle Size Composition and Fine Sediment Content of Spawning Gravels

- Determine particle size distribution and fine sediment content of spawning gravels in the bypass river reaches and comparison reaches using bulk sampling techniques (McNeil and Ahnell, 1960). The locations are listed in Table AQ 5-1.
    - Collect bulk samples using a modified McNeil sampler (i.e., bottomless bucket) to depths that approximate that of a trout egg pocket. Coarse sediments will be sieved and weighed on-site. Finer sediments will be packaged for transport from the field site and later dried, sieved, and weighed.
    - One “side-by-side” replicate pair of bulk samples will be taken in each of the study sites to provide a measure of the variability in particle size composition within the same gravel deposit to characterize an expected range of natural variability.
- Plot particle size composition of spawning gravel samples as cumulative distribution curves and histograms. Statistically analyze the particle size composition as represented by the D50, D16, and D84.
- Compare particle size composition and fine sediment content to standards from the scientific literature (Kondolf, 1988 and 2000) and, where applicable, to the relevant comparison streams.

Sediment Capture in Project Diversions

The capture of sediment in Project diversion pools (Kaweah No. 1 and Kaweah No. 2 diversion pools) will be evaluated based on a review of existing sediment management information and data collected from field studies, as described below.

- Obtain information on sediment management practices implemented at Project diversions.
    - Summarize existing sediment management conducted by SCE Operations and Maintenance personnel.

  - Obtain historic information, as available, pertaining to volume of sediments excavated and frequency of maintenance, for each facility.

- Determine the particle size composition of captured sediments using sub-surface bulk sampling and sieving/particle size analysis.

Identify Flows Necessary to Maintain Geomorphic Processes in Bypass River Reaches

Information regarding flows that are necessary to maintain geomorphic processes in the bypass reaches will be developed by comparing impaired and unimpaired hydrologic regimes and evaluating sediment transport conditions under different flow regimes in the bypass river reaches, as outlined below.

Compare Impaired and Unimpaired Hydrologic Regimes

- Compare impaired and unimpaired hydrologic regimes (high-flow magnitude, duration, and frequency) in bypass river reaches using methods outlined in Guidelines for determining flood flow frequency: Bulletin 17B of the Hydrology Subcommittee, Interagency Advisory Committee on Water Data (USGS 1982) and Flood Frequency Analyses, Manual of Hydrology (Dalrymple 1960).
  - Determine unimpaired flood flow frequency from existing gaging records.

Evaluate Initiation of Sediment Transport Conditions under Different Flow Regimes at Selected Quantitative Study Sites

- Identify initiation of sediment transport flows at the geomorphic and riparian quantitative transects and instream flow transects using the hydraulic models developed for the AQ 1 – Instream Flow Technical Study Plan (TSP).
  - Collect stage-discharge data at high flows at geomorphic and riparian transects in select reaches to calibrate the hydraulic model.
    - For purposes of the sediment transport assessment, the range of flows used for stage-discharge calibration will be extended into higher discharges than typically required for aquatic habitat instream flow modeling. Stage data (i.e., water surface elevations) will be collected either by field observations during high flows (e.g., flagging water surface elevation on the banks, or from pre-installed staff gages) or by installation of automated pressure transducers that provide continuous water depth measurements.
  - Coordinate hydraulic modeling for sediment transport with the AQ 1 – Instream Flow TSP. The sediment transport modeling will be based on the hydraulic modeling described in the AQ 1 – Instream Flow TSP. The study sites on the bypass river reaches and comparison river reaches proposed for the AQ 1 – Instream Flow TSP will be evaluated for sediment transport conditions in this study (Table AQ 5-1).
  - Derive channel hydraulic conditions, including flow depth, velocity, energy slope, and bed shear stress, from the models for a range of high flows.
    - Bed shear stress, which is calculated as a depth-slope product, will be obtained as an output from the AQ 1 – Instream Flow TSP modeling. Bed shear stress (τ) will be expressed as an average force (lbs/sq. ft.) over the transect width.

- Determine the shear stress required to initiate motion for a given particle size from the Shield's criterion that defines the critical shear stress (τ^*_{ci}, the shear stress threshold at which incipient motion occurs). The bed shear stress obtained from the model and the Shield's criterion will be used to determine the particle sizes that are mobilized over the range of flows. Shield's relationship for critical shear stress is defined as, $\tau^*_{ci} = \beta (\gamma_s - \gamma) d_{50}$. Where: β = Shield's parameter (a dimensionless variable) γ, γ_s = specific weight of the fluid and sediment, respectively, and d_{50} = median particle diameter.
- A range of commonly accepted values from the geomorphic and engineering literature will be documented and used for Shield's parameter (β). A range of critical shear stress and corresponding range of discharge values at which initiation of motion occurs for a given particle size will be presented.

o Determine particle sizes in the channel from pebble counts performed for the Rosgen Level II channel classification, and/or bulk sediment samples, or from data collected as part of the AQ 1 – Instream Flow TSP.

Identify Sources of Sediment and Document Project Related Erosion

- The location and relative abundance of sediment recruitment to channels from hillslope mass-wasting and bank erosion processes in the bypass river reaches will be documented. Significant sediment recruitment, mass wasting, and/or bank erosion sites will be mapped via aerial reconnaissance, ground survey, and/or aerial photography.
- Historic and/or ongoing erosion resulting from spills at the Project forebays, existing canal and flume releases, or historic flume failures will be mapped via aerial reconnaissance, ground survey, and/or aerial photography.

SCHEDULE:

Date	Activity
November 2017–August 2018	Conduct sediment survey and hydrology analysis
September–October 2018	Complete data analysis
March–October 2018	Conduct sediment transport field surveys in coordination with instream flow surveys
November 2018–June 2019	Analyze data and prepare draft report
June 2019	Distribute draft report to the stakeholders
July–September 2019	Stakeholders review and provide comments on draft report (90 days)
October–December 2019	Resolve comments and prepare final report
December 2019	Distribute final report in Final License Application

REFERENCES:

Dalrymple, Tate. 1960. Flood frequency analyses, Manual of Hydrology: Part 3. U.S. Geological Survey Water Supply Paper 1543-A.

Hilton, Sue, and Thomas E. Lisle, 1993. Measuring the fraction of pool volume filled with fine sediment. Res. Note PSW-RN-414. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.

Kondolf, G.M. 1988. Salmonid spawning gravels: A geomorphic perspective on their size distribution, modification by spawning fish, and criteria for gravel quality. PhD thesis. Johns Hopkins University, Baltimore.

Kondolf, G.M. 2000. Assessing salmonid spawning gravel quality. Transactions American Fisheries Society, 129: 262-281.

McNeil, W.J. and W.H. Ahnell. 1960. Measurement of gravel composition of salmon stream beds. University of Washington Fish. Res. Inst. Circ. No.120.

U.S. Geological Survey (USGS). 1982. Guidelines for Determining Flood Flow Frequency: Bulletin 17B of the Hydrology Subcommittee, Interagency Advisory Committee on Water Data.

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TABLES

Table AQ 5-1. V*, Bulk Spawning Gravel, and Sediment Transport Hydraulic Model Locations.

River/Reach	Bypassed Reach	Reaches Upstream of Project Facilities or Comparison Reaches	Initiation of Motion Sediment Transport Modeling Site	Number of Bulk Spawning Gravel Samples	Number of V* Pools
Kaweah River					
Kaweah River Upstream of Kaweah No. 3 Powerhouse		●	Yes	4	10
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	●		Yes	4	10
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	●		Yes	4	5
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	●		Yes	4	5
Kaweah River Downstream of Kaweah No. 2 Powerhouse	●		Yes	4	10
East Fork Kaweah River					
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion		●	Yes	4	10
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	●		Yes	4	5
East Fork Kaweah River Upstream of Confluence with Kaweah River	●		Yes	4	5

Table AQ 5-2. Geomorphology Study Detailed Site Information[1].

Geomorphic Reach	Site Name	River Mile Location of Site	UTM Coords at Beginning of Site (Downstream River Mile) (Zone 10N, NAD83)	Number of						Comments
				Mesohabitats (Cross-sections)					Special Purpose Cross-sections	
				Total	HGR	LGR	RUN	POOL		
Kaweah River										
Kaweah River Upstream of Kaweah No. 3 Powerhouse	K9.5	9.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	K8.7	8.7	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	K7.3	7.3	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	K6.9	6.9	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
Kaweah River Downstream of Kaweah No. 2 Powerhouse	K4.3	4.3	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
East Fork Kaweah River										
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion	EFK5.2	5.2	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	EFK3.8	3.8	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
East Fork Kaweah River Upstream of Confluence with Kaweah River	EFK0.7	0.7	TBD	TBD	TBD	TBD	TBD	TBD	TBD	

[1]All information is tentative. Information to be determined in the field and completed in coordination with interested resource agencies.

AQ-6 Water Quality

POTENTIAL RESOURCE ISSUE:

- Water quality compliance.

PROJECT NEXUS:

- Project operations could affect water quality.

POTENTIAL LICENSE CONDITIONS:

- Instream flow releases.
- Best management practices (BMPs).
- Spill Prevention Control Countermeasure (SPCC) Plan.

STUDY OBJECTIVE:

- Characterize physical, chemical, and bacterial water quality conditions in the bypass river reaches and comparison reaches, and compare to the Water Quality Control Plan for the Tulare Lake Basin (CVRWQCB 2004) objectives and water quality standards.

EXTENT OF STUDY AREA:

- The study area will include the bypass river reaches and comparison river reaches (Table AQ 6-1, Map AQ 6-1).
- It should be noted that the majority of lands along the bypass reaches are privately owned and outside the FERC Project boundary. For the purposes of the water quality studies described herein, SCE will take the following steps to obtain approval to conduct field studies on private property:
    - Provide notification to landowner of Project relicensing and request authorization to enter property to conduct the field studies.
    - If authorization is obtained, SCE will complete field studies as described in this technical study plan.
    - If authorization is not obtained, SCE will limit field studies to only those lands where landowners have provided access.

STUDY APPROACH:

The following describes the water quality sampling field program which includes *in-situ* water quality measurements; general water quality sampling; fecal coliform sampling; and laboratory analysis and reporting.

In-situ Field Measurements

- Collect *in-situ* water quality measurements (dissolved oxygen [DO], pH, specific conductance, and water temperature) at sampling locations listed in Table AQ 6-1 using a YSI® meter. Samples will be collected once during the spring runoff (April or May, access permitting), and once during the summer low-flow or base-flow period (August or September). Pre- and post-sampling calibration of *in-situ* instrumentation will be conducted following the manufacturer's instructions.

- Document if the results of the *in-situ* monitoring meet the water quality objectives identified in the Water Quality Control Plan for the Tulare Lake Basin (CVRWQCB 2004).

General Water Quality Sampling

- Collect general water quality samples at sampling locations listed in Table AQ 6-1 and depicted on Map AQ 6-1. Samples will be collected twice, once during the spring runoff and once during the summer low-flow or base-flow period to screen for potential water quality issues. If potential water quality issues are identified, additional follow-up sampling may be necessary. Additional sampling, if necessary, would be determined in consultation with BLM and other interested resource agencies. Collect samples using methods consistent with the Environmental Protection Agency (EPA) 1669 sampling protocol *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria*. Water quality samples collected from streams will be analyzed for the parameters listed in Table AQ 6-2, which include general parameters, total mercury, a suite of dissolved metals, and total and fecal coliform.
- Water quality samples will be decanted into laboratory-supplied sample containers. The sample containers will be labeled with the date and time that the sample is collected and the sampling site or identification label. The sample container will be preserved (as appropriate), stored, and delivered to a State-certified water quality laboratory for analyses in accordance with maximum holding periods. A chain-of-custody record will be maintained with the samples at all times. The sampling site location will be recorded using a Global Positioning System (GPS) unit and the coordinates will be recorded in a field log book.

Coliform Sampling

- Conduct additional total and fecal coliform sampling to determine if study waters meet objectives for contact recreational activities identified in the Water Quality Control Plan for the Tulare Lake Basin (CVRWQCB 2004). Samples will be collected at a near-shore location immediately above and below the river access area near Kaweah No. 2 Powerhouse ("Edison Beach") where contact recreation (e.g., swimming) occurs. Fecal coliform samples will be collected no less than five times within a thirty-day period beginning approximately on July 4. Samples will be collected in the afternoon when the access area is open (Monday – Thursday; 8 am – 7 pm).

Laboratory Analysis and Reporting

- Water quality samples collected during the field program will be processed by a State-certified laboratory approved by the State Water Resources Control Board for chemical analysis. The laboratory will report each chemical parameter analyzed with the laboratory method detection limit, reporting limit, and practical quantification limit. The laboratory will attempt to attain reporting detection limits that are at or below the applicable regulatory criteria. The parameters to be analyzed by the analytical laboratory are provided in Table AQ 6-2.

SCHEDULE:

Date	Activity
April/May 2018	Collect spring water quality samples
July/August 2018	Collect coliform samples
August/September 2018	Collect summer water quality samples
October 2018–January 2019	Analyze data and prepare draft report
February 2019	Distribute draft report to the stakeholders
March–May 2019	Stakeholders review and provide comments on draft report (90 days)
June–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

Central Valley Regional Water Quality Control Board (CVRWQCB). 2004. Water Quality Control Plan for the Tulare Lake Basin, Second Edition. Revised January 2004.

TABLES

Table AQ 6-1. Water Quality Monitoring and Sampling Locations.

Study River Segment	No. of Water Quality Sampling Sites	Water Quality Monitoring and Sampling Locations
Kaweah River		
Kaweah River Upstream of Kaweah No. 3 Powerhouse	2	K3 Flowline Above PH3 KR Upstream of PH3
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	3	K2 Flowline Below PH3 KR Downstream of PH3 KR Upstream of the Conf. with EF
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	3	KR Downstream of the Conf. with EF KR Upstream of PH1 K1 Flowline Above PH1
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	3	KR Downstream of PH1 K2 Flowline Above PH2 KR Upstream of PH2
Kaweah River Downstream of Kaweah No. 2 Powerhouse	1	KR Downstream of PH2
East Fork Kaweah River		
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion	1	EF Upstream of PH1 Div.
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	2	EF Downstream of PH1 Div. K1 Flowline Below PH1 Div.
East Fork Kaweah River Upstream of Confluence with Kaweah River	1	EF Upstream of the Conf. with KR

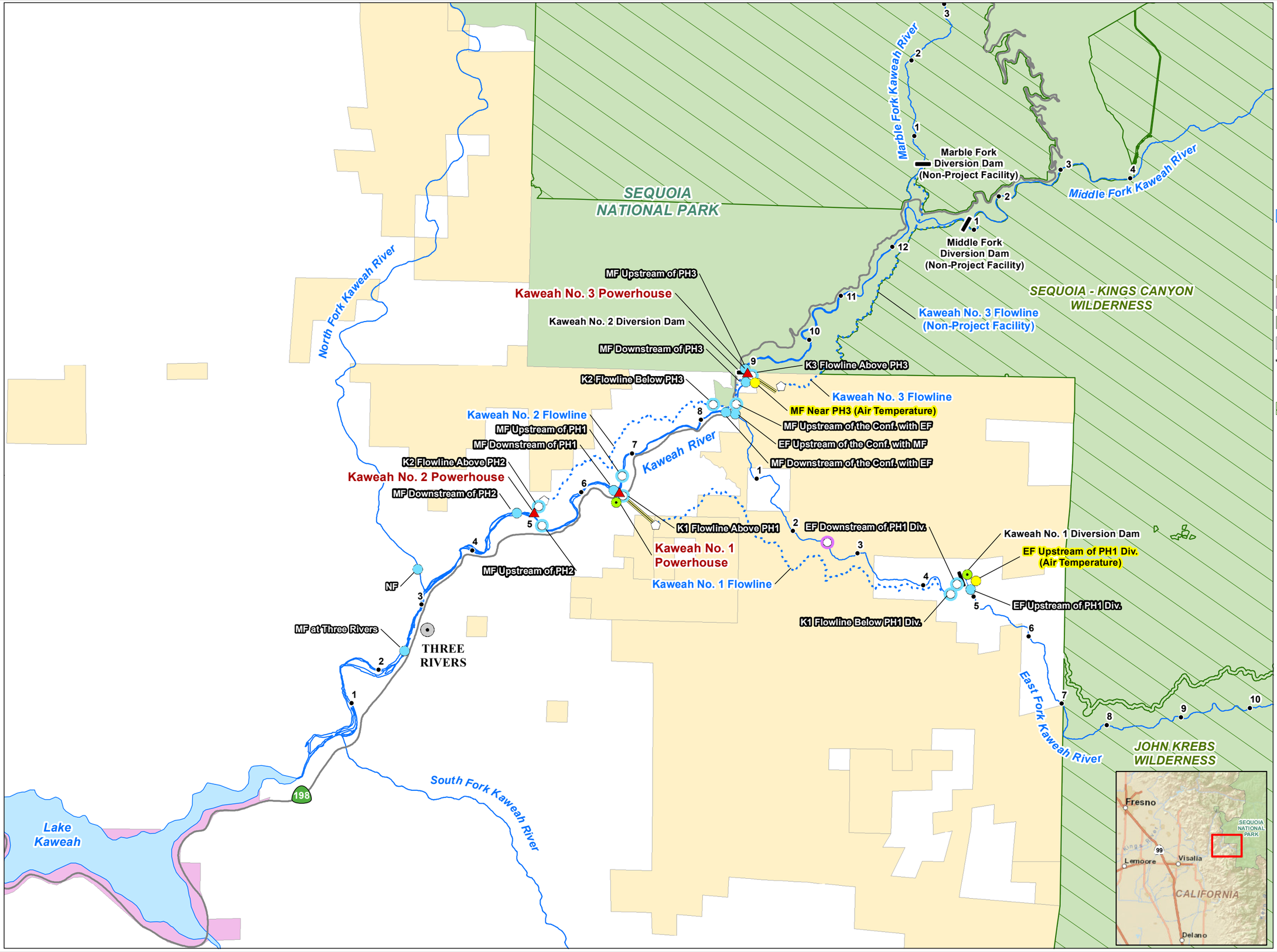
Table AQ 6-2. Parameters for Water Quality Monitoring and Laboratory Analysis.

Parameter	Analysis Method	Sample Holding Times	Sample Locations to be Analyzed
Water Quality Monitoring Parameter			
In-Situ Measurements			
Dissolved Oxygen (DO)	Water Quality Meter	Not Applicable	All
Secchi Depth	Secchi Disk	Not Applicable	Reservoir
PH	Water Quality Meter	Not Applicable	All
Water Temperature	Water Quality Meter	Not Applicable	All
Specific Conductance	Water Quality Meter	Not Applicable	All
Laboratory Analysis Parameter			
General Parameters			
Calcium	EPA - 200.7	180 days	All
Chloride	EPA - 300.0	28 days	All
Hardness	EPA - 130.2	180 days	All
Magnesium	EPA - 200.7	180 days	All
Nitrate/Nitrite	EPA - 353.2	48 hours	All
Ammonia as N	EPA - 350.1	28 days	All
Total Kjeldahl Nitrogen	EPA - 351.2	28 days	All
Total Phosphorus	EPA - 365.2	28 days	All
Ortho-phosphate	EPA - 365.1	48 hours	All
Potassium	EPA - 200.7	180 days	All
Sodium	EPA - 200.7	180 days	All
Sulfate	EPA - 300.0	180 days	All
Total Dissolved Solids	EPA - 160.1	7 days	All
Total Suspended Solids	EPA - 160.2	7 days	All
Turbidity	EPA - 180.1		All
TOC	EPA - 415.1	28 days	All
Total Alkalinity	EPA - 310.1	14 days	All
Metals – Dissolved			
Arsenic	EPA - 1638	48 hours	All
Cadmium	EPA - 1638	48 hours	All
Copper	EPA - 1638	48 hours	All
Iron	EPA -1638	48 hours	All
Lead	EPA - 1638	48 hours	All

Table AQ 6-2. Parameters for Water Quality Monitoring and Laboratory Analysis (continued).

Parameter	Analysis Method	Sample Holding Times	Sample Locations to be Analyzed
Laboratory Analysis Parameter (continued)			
Manganese	EPA - 1638	48 hours	All
Nickel	EPA - 1638	48 hours	
Chromium	EPA - 1638	48 hours	
Metals – Total			
Mercury	EPA - 1631e	48 hours	All
Hydrocarbons			
Methyl-tertiary Butyl Ether (MtBE)	EPA - 8260	14 days	Reservoir
Total Petroleum Hydrocarbons	EPA - 8020	14 days	Reservoir
Oil and Grease	EPA - 1664	48 hours	Reservoir
Bacteria			
Total Coliform	EPA - SM9222B	24 hours	All
Fecal Coliform	EPA - SM922B	24 hours	All

MAP



Facilities

- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*

- Bureau of Land Management
- U.S. Army Corps of Engineers
- National Park Service
- Private

*SOURCE: BLM 2012

Land Management

- National Wilderness Area

Monitoring Locations

- Water Quality and Water Temperature Monitoring (exisiting water temperature data site)
- Water Quality and Water Temperature Monitoring
- Water Temperature Monitoring (only)
- Meteorological Monitoring Location
- Air Temperature Monitoring Location

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Map AQ 6-1

Kaweah Project
Water Quality, Water Temperature and Meteorological Monitoring Locations

0 0.25 0.5 1 Miles

Date: 12/8/2015

Projection: UTM Zone 11
Datum: NAD 83

C:\GIS\ENTRIX\30735240_SCE_EasternHydro\map\Kaweah\SCE_Eastern_KAWEAH_AQTSPs_Locs_Monitoring_WQ_MET_17i11i_01.mxd

AQ-7 Special-status Amphibians and Aquatic Reptiles

POTENTIAL RESOURCE ISSUE:

- Special-status amphibians and aquatic reptiles and their habitat.

PROJECT NEXUS:

- Project operations and maintenance activities could result in direct and indirect effects on special-status amphibians and aquatic reptiles and their habitat.
- For foothill yellow-legged frog (FYLF), flow conditions in the bypass river reaches could affect habitat availability and suitability (e.g., water temperature) for all life stages. Project operations that result in flow fluctuations could create changes in water stage and velocity that may scour or strand egg masses and tadpoles. Water temperature regimes downstream of Project facilities could alter the timing of breeding and subsequent tadpole development.
- For western pond turtle (WPT), flow conditions in the bypass river reaches could affect habitat availability and suitability (e.g., water temperature) and affect potential nesting habitat (e.g., inundation of nesting habitat).

POTENTIAL LICENSE CONDITIONS:

- Instream flow releases.
- Vegetation and Integrated Pest Management Plan.
- Special-status amphibian and aquatic reptile protection measures.

STUDY OBJECTIVES:

- Identify and map potential habitat for FYLF in the study area.
- Document the distribution and abundance of FYLF populations in the study area.
- Document the timing and length of FYLF breeding season, if FYLF are present.
- Characterize the water stage, velocity, and temperature of various flow regimes as it relates to FYLF habitat through coordination with the instream flow and water temperature studies.
- Document the presence of WPT during FYLF surveys.
- Document the presence of potential WPT nesting habitat.

EXTENT OF STUDY AREA:

- The study area for FYLF and WPT is the bypass river reaches and comparison river reaches.
- The study area for WPT also includes off-channel ponds and wetlands that may be present within the following study areas around Project facilities where maintenance activities occur (Table AQ 7-1).
- It should be noted that the majority of lands along the bypass reaches and around select Project facilities are privately owned and outside the FERC Project boundary. For the purposes of the special-status amphibian and reptile surveys described herein, SCE will take the following steps to obtain approval to conduct field studies on private property:

- Provide notification to landowner of Project relicensing and request authorization to enter property to conduct field studies.
- If authorization is obtained, SCE will complete field studies as described in this technical study plan.
- If authorization is not obtained, SCE will limit field studies to only those lands where landowners have provided access.

STUDY APPROACH:

The study approaches for each species are provided below.

Foothill Yellow-legged Frog (FYLF)

Study Sites

- In order to determine the distribution and abundance of FYLF within the bypass river reaches and comparison river reaches, different types of sampling sites will be selected. These include representative sites, tributary confluence sites, and comparison sites. A stratified sampling approach was used to select representative sampling sites by geomorphic stream type. Additional sampling sites were selected at the confluences of accessible perennial tributaries where potential breeding habitat may exist. Comparison sampling sites were selected in non-Project affected reaches. In addition, qualitative observations will be completed during other studies, particularly mesohabitat mapping (AQ 1 – Instream Flow Study Technical Study Plan [TSP]) to expand the habitat areas searched. Map AQ 7-1 provides the locations of all amphibian and reptile study sites. Table AQ 7-2 lists each study site.

Methods

- The following describes the approach to meet each of the study objectives: (1) identify and map potential habitat; (2) determine the distribution and abundance of FYLF in the study area; (3) determine the timing and length of the breeding season; and (4) characterize the potential effects of stage and velocity fluctuations on FYLF and their habitat through coordination with the AQ 1 – Instream Flow TSP.

Habitat Characterization:

- Identify and map potential breeding and rearing habitat for FYLF in collaboration with resource agencies in the bypass river reaches based on review of aerial photography and helicopter surveys. Potential breeding and rearing habitat are defined as:

  Breeding Habitat – Shallow, near-shore areas of low velocity with cobble/boulder substrate in open, sunny areas with little riparian vegetation; often adjacent to low gradient cobble/boulder bars, tributary confluences, side and backwater pools, or pool tail-outs with coarse substrates.

  Rearing Habitat – Similar to breeding habitats early in the season; but tadpoles may distribute to shallow, warm, low-velocity near-shore habitats with smaller substrate (i.e., gravel/sand) as the season progresses.

- Complete a habitat characterization of the study sites and comparison sites (see Map AQ 7-1) in the field during distribution and abundance surveys that includes information on the presence of predators and food availability. This information will be used to extrapolate observed habitat conditions to potential habitats identified during helicopter surveys and review of existing data.
- Following completion of habitat mapping, develop a GIS map of potential FYLF habitat.

Distribution and Abundance Surveys:

- Identify and map known occurrences of FYLF within the study area based on agency consultation and a review of existing information.
- Conduct surveys at study sites and comparison sites identified on Map AQ 7-1 to determine the distribution and abundance of FYLF. Surveys will follow the Visual Encounter Protocol described in *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians* (Heyer et al. 1994; Appendix AQ 7-A) and will incorporate United States Fish and Wildlife Service (USFWS) decontamination guidelines (USFWS 2005 [Appendix B]). Specifically, two surveyors will search stream banks, back channel areas, and potential instream habitats for FYLF progressing in a slow, methodical fashion. To aid in the detection of eggs and tadpoles, surveyors will use a viewing box in shallow margin areas and snorkel in deeper water where needed and possible. During surveys, a minimum of 1,000 meters (m) will be surveyed. For sites located at tributary confluences, a minimum of 1,000 m will be surveyed in the mainstem as well as 1,000 m up the tributary where possible. Data collected during each survey includes:
    - Sampling Site: time of survey (start, end and total search effort), GPS locations (start and end), weather conditions, and water and air temperatures (at start, mid-day, and end of survey) in both the channel margin and main channel; and
    - Observation: lifestage, sex, size, and GPS location.
- Three quantitative surveys (i.e., 1,000 m each) will be conducted; two surveys in the spring/early summer for the detection of eggs and early tadpoles (onset of breeding), and one in the late summer/early fall to detect older tadpoles and young-of-the-year. The first spring visit will be completed when river temperatures have reached a daily average of 11ºC and/or when breeding has been verified in one or more rivers in Sierran watersheds.
- In addition, qualitative surveys will be conducted once during breeding season and once during the fall to detect young-of-the-year at up to three additional high likelihood breeding sites identified by agencies and/or the FYLF surveying crew leader after a review of aerial photography and after viewing the river habitat during the first spring/early summer ground surveys. The qualitative sampling is designed to provide additional FYLF detection coverage in the Project area.
- Prepare and submit a California Native Species Field Survey Form for all FYLF recorded to the California Natural Diversity Database (CNDDB).
- Provide an electronic database (Excel spreadsheet) of FYLF sampling data (date, location, species) to BLM, resource agencies, and interested stakeholders.

Timing and Length of Breeding Season:

- If FYLF are found breeding during the spring/early summer surveys (described above) and breeding does not appear to be finished following completion of the two Distribution

and Abundance Surveys (i.e., fresh 1-2 day old eggs are found during the second survey), then a third visit will be completed at up to three breeding sites to identify the end of the breeding season. The third survey visit at the selected breeding sites will follow the same survey methods as described above under Distribution and Abundance Surveys.

- Because the timing and length of breeding can vary from year to year depending on climatic and hydrologic factors, data collected during the study will be compared to ongoing studies in other Sierra watersheds to determine if breeding in the study area is coincident to breeding in other watersheds. This data will be used to help determine a range of dates when breeding is likely to occur.

Coordination to Determine Stage and Velocity Effects

- Use Habitat Suitability Criteria (HSC) information for eggs and tadpoles developed as part of the Middle Fork Project (PCWA 2011) for modeling. Adjust HSC information based on habitat availability (Appendix AQ 7-B).
- Develop a life stage periodicity chart for FYLF that identifies the season of the year (time period) when each life stage is likely to be present within the study area. This data will be used to determine when the HSC information is applicable in evaluating effects of flow alterations on potential FYLF habitat.
- Coordinate with the instream flow modeling effort (AQ 1 – Instream Flow TSP) to evaluate habitat suitability for FYLF egg masses and tadpoles under alternative flow regimes. Specific objectives for the FYLF modeling effort include:
    - Determine the range of flows that create suitable breeding habitat and suitable basking habitat below the riparian vegetation line.
    - Assess the potential effects of seasonal flow changes on breeding and rearing habitat connectivity.
- FYLF modeling sites will be identified in coordination with the resource agencies as part of the AQ 1 – Instream Flow TSP study site selection process that includes field visits during the summer.
- Evaluate output from the AQ 4 – Water Temperature Modeling TSP and compare changes in average, maximum, and minimum daily temperatures in FYLF breeding and rearing habitat between alternative flow regimes.

<u>Western Pond Turtle (WPT)</u>

- Identify and map known occurrences of WPT within the study area, based on agency consultation and a review of existing information.
- Record sightings of WPT during implementation of aquatic technical studies. In particular, surveyors will be visually inspecting pools and backwaters for WPT at each study site during the FYLF surveys and during other field studies, particularly the mesohabitat mapping (AQ 1 – Instream Flow TSP).
- Develop a GIS map of potential WPT nesting habitat locations in the study area. GIS selection criteria include:
    - Slope of 15 degrees or less;
    - Southeast, south or southwest aspect;

  - 150-foot buffer around perennial streams and reservoirs; and
  - Below 6,000 feet in elevation.
- Conduct a field reconnaissance survey of potential nesting locations identified in the GIS map near Project facilities (Table AQ 7-1).
- Evaluate output from the AQ 4 – Water Temperature Modeling TSP and compare changes in water temperature (average, maximum, and minimum) near potential nesting habitats between unimpaired and impaired flow regimes.
- Prepare and submit a California Native Species Field Survey Form for all WPT recorded to the CNDDB.
- Provide an electronic database (Excel spreadsheet) of WPT sampling data (date, location, species) to BLM, resource agencies, and interested stakeholders.

SCHEDULE:

Date	Activity
May–June 2018	Conduct spring field surveys
August–September 2018	Conduct fall field surveys
October–December 2018	Analyze data and prepare draft report
January 2019	Distribute draft report to the stakeholders
February–April 2019	Stakeholders review and provide comments on draft report (90 days)
May–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

Ashton, D.T., A.J. Lind, and K.E. Schlick. 1997. Western Pond Turtle (*Clemmys marmorata*). Natural History. USDA Forest Service, Pacific Southwest Research Station, Arcata, CA.

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Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, USA.

Placer County Water Agency (PCWA). 2011. Application for New License. Middle Fork American River Project (FERC Project No. 2079). AQ 1 – Instream Flow Technical Study Report (2010). Exhibit E, Volume 3, Supporting Document B. February 2011.

United States Fish and Wildlife Service (USFWS). 2005. *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog, August 2005.*

TABLES

Table AQ 7-1. Survey Areas for Western Pond Turtle around Project Facilities[1].

Project Facility	Survey Area[2]
Diversion Dams and Pools	15 feet around the perimeter
Flowlines[1]	20 feet on either side
Forebays/Forebay Tank	20 feet around the perimeter
Penstocks	15 feet on either side
Powerhouses and Switchyards	Within and up to 15 feet around the perimeter fence
Transmission, Power, and Communication Lines	25 feet on either side
Gages	10 feet around gages
Project Access Roads	20 feet on either side
Project Trails	15 feet on either side
Ancillary and Support Facilities	
Kaweah No. 1 Powerhouse Campus	Within the developed campus
Repeaters and Solar Panels	15 feet around the perimeter
River Access Parking	10 feet around parking area and beach

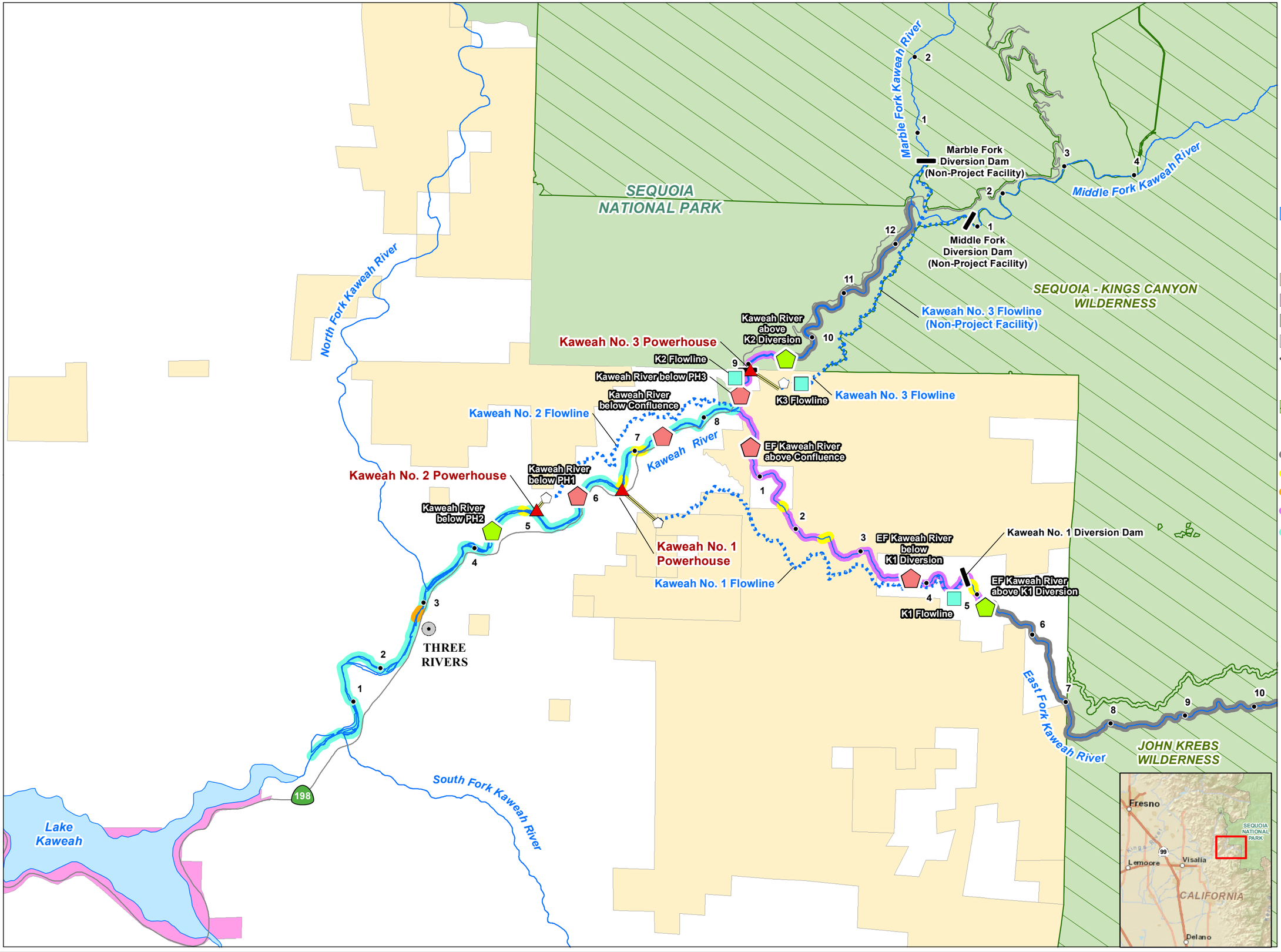
[1]Includes off-channel ponds and wetlands that may be present around Project facilities.

[2]Survey areas represent locations where potential operation and maintenance activities occur.

Table AQ 7-2. Foothill Yellow-Legged Frog Sampling Sites.

Study Reach	Site ID	Bypass Reaches	Reaches Upstream of Project Facilities or Comparison Reaches	Study Site Type
Kaweah River				
Kaweah River Upstream of Kaweah No. 3 Powerhouse	K9.5		●	Mainstem
Kaweah River Downstream of Kaweah No. 3 Powerhouse and Upstream of the East Fork Kaweah River Confluence	K8.7	●		Mainstem/ Tributary Confluence
Kaweah River Downstream of East Fork Kaweah Confluence and Upstream of Kaweah No. 1 Powerhouse	K7.3	●		Mainstem
Kaweah River Downstream of Kaweah No. 1 Powerhouse and Upstream of Kaweah No. 2 Powerhouse	K6.9	●		Mainstem
Kaweah River Downstream of Kaweah No. 2 Powerhouse	K4.3		●	Mainstem/ Tributary Confluence
East Fork Kaweah River				
East Fork Kaweah River Upstream of the Kaweah No. 1 Diversion	EFK5.2		●	Mainstem
East Fork Kaweah River Downstream of the Kaweah No. 1 Diversion	EFK3.8	●		Mainstem
East Fork Kaweah River Upstream of Confluence with Kaweah River	EFK0.7	●		Mainstem

MAP



Facilities
- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock

Other Features
- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*
- Bureau of Land Management
- U.S. Army Corps of Engineers
- National Park Service
- Private

*SOURCE: BLM 2012

Land Management
- National Wilderness Area

Channel Characterization
- NA
- bedrock
- bedrock/cascade
- bedrock/step-pool/cascade
- pool-riffle/plane-bed

Sampling Locations
- Entrainment Monitoring (flowlines)
- Fish, BMI, FYLF, Riparian
- Fish, BMI, FYLF, Riparian, Instream Flow

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Map AQ 7-1

Kaweah Project
Aquatic and Riparian Sampling Locations

Date: 12/8/2015

0 0.25 0.5 1 Miles

Projection: UTM Zone 11
Datum: NAD 83

APPENDIX AQ 7-A

Visual Encounter Survey Protocol

Visual Encounter Survey Protocol for *Rana boylii* in Streams

Standard VES (Heyer et al. 1994) with augmented field datasheets
Yarnell, S. 2007.

This Visual Encounter Survey (VES) protocol and associated datasheet are for use in stream reaches up to several thousand feet in length where information on all lifestages and the micro-habitat associations of each individual is desired. The data from this survey protocol is intended to 1) describe the abundance, distribution and micro-habitat associations of *R. boylii*, and 2) provide the data necessary to coordinate with other stream reach study efforts, such as instream flow studies where hydrodynamic modeling will be used.

The VES protocol is as described in Heyer et al. (1994), and is summarized for stream habitats as follows. Habitats are searched along a several meter wide transect parallel to the stream at the water's edge, and the number of animals encountered over a period of time is recorded. Using a moderate level of search effort, individuals active on the surface of the ground, on rocks, or at the water's edge are identified, and captured and measured if possible. Rocks, logs and other surface cover objects are also overturned in search of individuals, then returned to their original position to minimize disturbance to the habitat. Habitats are not systematically destroyed in order to find animals, and voucher specimens are not collected unless absolutely necessary for identification. In shallow water habitats, hand dip nets are used to capture individual adults and sub-adults, and to seine the channel bottom to collect tadpoles. This search effort in shallow water habitats is balanced to minimize habitat disturbance, but adequately sift through any silt, gravel or vegetation where individuals may be hiding. Use of a viewing box in shallow, wadeable areas to help in detection of egg and tadpole lifestages is recommended. Likewise, where safe and possible, snorkeling in deeper water (0.5-2m deep) adjacent to good breeding habitat (e.g. edges of cobble bars) can greatly aid in detection of egg masses, and is recommended during spring surveys. To effectively survey stream segments, both banks are walked with a minimum of two surveyors. Wherever possible, surveys are completed walking upstream so that as individuals seek cover in the stream, often swimming downstream, they are not counted twice. In addition, eggmasses are generally attached to the downstream side of cobbles and are easier to detect when walking upstream. However, surveys could proceed in the downstream direction if surveyors are well-practiced in identification, are manually feeling and checking behind cobbles and boulders for eggmasses, and can adequately keep track of any downstream migrating individuals.

A list of field equipment required to complete the surveys is attached at the end of this protocol. In general, equipment should be selected to be lightweight and compact enough to fit within a daypack so that surveyors can be fully mobile.

The associated datasheet was developed to document the additional microhabitat data needed at each observation. It is similar to datasheets used in previous academic research and hydropower relicensing studies (Lind, 1997; PG&E 2002; Yarnell, 2005). In order to simplify the complications and potential errors associated with multiple datasheets each for a different lifestage, a single datasheet is used for each survey, regardless of time of year and focus of survey (ex: breeding surveys in spring vs. tadpole/rearing surveys in summer). The data for each lifestage observed during the survey is recorded on a single row. The microhabitat data collected for each lifestage may differ and as a result, some fields in the row may be marked as N/A (ex: depth at eggmass for an adult observation). Small modifications to the datasheet may be made to accommodate unique survey situations (such as associated mesohabitat number rather than

associated GPS point when identifying observation location), but these should be kept to a minimum.

Note that the datasheet is designed to be printed in landscape format on 8x14 paper with the code list printed on the back side of the page (see FYLF VES survey datasheet.xls file). Details on recording data are provided below. The datasheet is designed for collection of data in metric units, so use of English units must be explicitly noted.

General Data

Site: Name of stream and reach to be surveyed. If sub-reaches are used, clarify which sections are to be surveyed. For example: South Yuba River, Reach A-1, river mile 12.5-13.5.

Start/End UTM: Coordinates of start and end survey locations on the stream in NAD27 datum (designate other datum if needed). Record saved waypoint (wypt) number accuracy of point (in meters).

Elevation: Record from Topo map or GPS and circle source (note range of error)

Photo numbers: Record digital photo ID numbers for photos taken throughout survey. Include photos of the start and end locations, typical mid-channel habitat, typical edgewater and backwater habitats, examples of breeding habitat (occupied or otherwise), example individuals where possible (adults, juveniles, eggs and tadpoles) and any other interesting or unique habitat features.

Observers(s): Names of surveyors

Date: Month, Day, Year

Survey Start/End Time: Record start/end times of survey (note time of breaks for lunch, etc on bottom of sheet if necessary). This should reflect actual survey/search time.

Weather: Describe general cloud cover; enter code from list:

C	Clear
PC	Partly Cloudy
MC	Mostly Cloudy
O	Overcast
R	Rainy

Start/End Temp (C): Record temperature of air (in the shade) and water (thalweg and edgewater) at start, mid-day (if applicable) and end of survey. Edgewater temp should be within 0.3m of shore in a shallow slow-moving location.

Bullfrogs? Fish? Note presence/absence of bullfrogs, fish or crayfish anywhere in survey reach. If needed, add notes at bottom of page.

Field sketch completed? At the bottom of the page, note whether a rough field sketch was completed on the back of the datasheet. The sketch serves as rough indicator of habitat throughout the survey reach and can be used to delineate which portions of the reach may *not* have been surveyed (e.g. very deep or fast areas near a steep heavily vegetated bank).

Detailed Data

***Note: Microhabitats are defined as the immediate/local habitat surrounding the observation site of the individual. This may be the shallow side habitat or backwater where eggs and tads occur or the habitat immediately adjacent to an adult perch site. Measurements should be made as near to the individual as possible but still describing the average conditions of the immediately adjacent habitat. On average, but not always, the microhabitat would be within a 0.5m or so of the observation.

***Note: Some fields are applicable only to certain lifestages. Be sure to record N/A in the datasheet field for field not appropriate to the observation. Do not leave fields blank.

Life Stage/Sex: Note life stage of individual; enter code from list:

AF Adult Female
AM Adult Male
AU Adult Unknown
J Juvenile/Sub-adult
Y Young of Year/metamorph (newly emerged – fall only)
T Tadpole
E Egg mass

Total #: Number of individuals noted in a single micro-habitat (ex: 1 adult male on emergent boulders in a riffle vs. 50 tadpoles in a single small side channel pool)

Length (mm): Snout to vent length for adults/sub-adults; Total length for tadpoles; Diameter for egg masses

Developmental Stage: Gosner stage for egg masses and tadpoles. If categorized, then note categories on back of datasheet.

Mesohabitat Type: Local larger-scale habitat where individual was observed based on USFSR5 meso-habitat types (see USFSR5 publication for more info on defining mesohabitats); enter code from list:

CAS Cascade
- jumbled steep reaches with either coarse substrate or bedrock

SPO Step-pool
- includes steep reaches with plunge pools and vertical scour pools

SCP Side-channel Pool
- includes eddies, backwater pools, lateral scour pools, corner pools

POO Pool
- includes flatwater, dammed pools, confluence pools, mid-channel pools and pool tail-outs

EDG Edgewater
- shallow edgewater habitat adjacent to riffles, runs

RUN Run
- slow gently moving flow, faster than a pool, slower than a riffle

HGR High Gradient Riffle/Rapid
- rippled swift water, rapids of high gradient (~ >2%)

LGR Low Gradient Riffle
- rippled swift water of low gradient (~ <2%)

OTH Other
- describe either in same field or in comments field

Riparian Type: Describe dominant riparian/adjacent channel vegetation based on Lind 1997 to provide data on vegetation encroachment; enter code from list:

GCBar	Gravel/Cobble Bar (side or mid channel, clear of veg)
WIL	Pure Willow
WIL/ALD	Willow/Alder Mix
MRIP	Mature Riparian
BDX	Bedrock (clear of veg)

Canopy Cover Class: Cover directly above microhabitat where individual was noted; enter code from list:

1	0 – 25%
2	25 – 50%
3	50 – 75%
4	75 – 100%

Distance to Shore (m): Distance from observation perpendicular to water's edge at closest shore. Primarily important for eggs/tadpoles.

Microhabitat Substrate: Dominant substrate type near perch for adults/sub-adults, microhabitat substrate for tadpoles or egg masses

SLT	Silt
SND	Sand (< 2mm)
GRV	Gravel (2 – 64 mm)
COB	Cobble (64 – 256 mm)
BLD	Boulder (> 256 mm)
BDX	Bedrock
MXD	Mixed (describe how mixed – GC or CG with dominant size first)

Attach/Perch Substrate: Substrate size of perch for adults/sub-adults/juveniles or attachment site for egg masses (N/A for tadpoles)

SLT	Silt
SND	Sand (< 2mm)
GRV	Gravel (2 – 64 mm)
COB	Cobble (64 – 256 mm)
BLD	Boulder (> 256 mm)
BDX	Bedrock
VEG	Vegetation/LWD - specify

Total Depth (m): For all lifestages, record average total depth of the microhabitat

Depth to eggs/tads (m): For egg masses, record depth to center of egg mass; for tadpoles, record depth to tads if different than average total depth of microhabitat, if it's the same, note 'same'.

Mid-column Velocity (m/s): For all lifestages, record average local mid-column flow velocity of the microhabitat. Mid-column velocity should be taken at 0.6 times the total depth for depths < 1m. For depths > 1m, record the average of the velocity at 0.2 times the depth and 0.8 times the depth. For egg masses, this should be directly above or immediately adjacent to the oviposition site.

Velocity at eggs/tads (m/s): For egg masses, record velocity at/adjacent to center of egg mass; for tadpoles, record velocity at tads if different than mid-column velocity of microhabitat, if it's the same, note 'same'.

Local Water Temp (C): Temperature of water in local microhabitat

Location of Observation: Code or some identifier of location in survey reach where observation was recorded. Could be a GPS waypoint number or an associated meso-habitat number correlating to another study.

Comments: Include here any information on local habitat condition, species condition, presence of non-natives, photo description, etc.

References:

Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek and M. S. Foster, Eds. (1994). Measuring and monitoring biological diversity: Standard methods for amphibians. Biological Diversity Handbook Series. Washington D.C., Smithsonian Institution Press.

Lind, A.J. (1997). Survey Protocol for Foothill Yellow-legged Frogs (*Rana boylii*) in Streams. USDA Forest Service, Pacific Southwest Research Station, Arcata, CA. DG:S27L01A.

Seltenrich, C.P. and Pool, A.C. (2002). A Standardized Approach for Habitat Assessments and Visual Encounter Surveys for the Foothill Yellow-legged Frog (*Rana boylii*). Pacific Gas & Electric Company.

Yarnell, S. M. (2005). Spatial Heterogeneity of *Rana boylii* Habitat: Physical Processes, Quantification and Ecological Meaningfulness. PhD Dissertation. Hydrologic Sciences, University of California, Davis.

USFSR5 meso-habitat types

Field Equipment List

Required:
Field notebook
Datasheets (w/copy of survey protocol) and clipboard
Clean copies of study site aerial/topo maps (for sketching habitats, etc.)
Pencil, pen, sharpie
Stopwatch
Flagging
Thermometer
Binoculars
Dip net or small handheld net for scooping tadpoles and catching individuals
Clear see-thru rulers (marked in metric) to measure individual length
Small clear plastic vial or wide-mouth bottle to capture tads for identification
Camera – extra batteries, memory card
Scale for pictures (ruler, pencil of known length, etc)
Handheld GPS – extra batteries
Velocity meter w/wading rod or other stick/device to measure depth – Marsh McBirney recommended – need accuracy in low velocities - +/- 0.01 m/s ideal.
Waders
First Aid kit
Personal – water, food, sunscreen, bug juice, etc

Recommended:

Viewing box (ideal if made of plexiglass, but could be lightweight plastic with clear plastic affixed to hole in bottom)
Snorkeling gear – drysuit, mask/snorkel, shoes
Rope to tie off and use in swift water
Hand lens (aid in identifying mouth parts on tadpoles)
30m tape – w/metric markings

Optional:

Range finder – to record large scale distances (river width, length of bar, etc)
Compass
Walkie talkies
Inflatable kayak, inner tube, or some means of floating river if needed – includes lifejackets, dry bags, paddles, ropes, etc.

Site (stream/reach/subreach)_____ Date: _____ Page _____ of _____

Start North UTM: WYPT: East UTM: Accuracy:	Elevation: GPS Topo	Photo #s: start: end: breeding: Other: mid-channel: Edgwtr: adults: eggs/tads:		Observer(s):
End North UTM: WYPT: East UTM : Accuracy:	Survey Start Time: End Time:	Weather:	Start Temp (C) - Air: Thalweg: Edgwtr:	End Temp (C) - Air: Thalweg: Edgwtr:	Bullfrogs? Fish? Crayfish?

Life Stage /Sex	Total #	Length (mm)	Develop. Stage	Meso-habitat Type	Riparian Type	Canopy Cover Class	Dist to Shore (m)	Microhabitat Substrate (mm)	Attach/Perch Substrate (mm)	Total Depth (ft)	Dist. From Surface to Eggs/Tads (ft)	Mean Column Velocity* (ft/s)	Velocity at Eggs/Tads (ft/s)	Local Water Temp (C)	Location of Observation	Comments

* If depth is ≤ 2.5 ft then measure velocity at 0.6 of depth from the surface. If depth is ≥ 2.5 ft than measure velocity at 0.8 and 0.2 of depth from the surface.

Foothill Yellow-legged Frog VES Survey Form CODES

VARIABLE	CODE	Description	Comments
Life Stage/Sex	AF	Adult - Female	
	AM	Adult - Male	
	AU	Adult - Unknown	
	J	Juvenile/Sub-adult	
	Y	Young of Year/Metamorph (fall only)	
	T	Tadpole	
	E	Egg Mass	
Length (mm)	Snout to vent length for adults/sub-adults; Total length for tadpoles; Diameter for egg masses		
Mesohabitat Type	CAS	Cascade	jumbled steep reaches with either coarse substrate or bedrock
	SPO	Step-pool	includes steep reaches with plunge pools and vertical scour pools
	SCP	Side-channel Pool	includes eddies, backwater pools, lateral scour pools, corner pools
	POO	Pool	includes flatwater, dammed pools, edgewater, confluence pools, mid-channel pools and pool tailouts
	EDG	Edgewater	shallow edgewater habitat adjacent to riffles, runs
	RUN	Run	slow gently moving flow, faster than a pool, slower than a riffle
	HGR	High Gradient Riffle/Rapid	riffles, rapids of high gradient (~ > 2%)
	LGR	Low Gradient Riffle	riffles of low gradient (~ < 2%)
	OTH	Other	describe in comments field
Riparian Type	GCBar	gravel/cobble bar (no veg)	
(stage of succession)	WIL	pure willow	
	WIL/ALD	willow/alder mix	
	MRIP	mature riparian	
	BDX	Bedrock (little/no veg)	
Microhabitat Substrate	SLT	silt	
	SND	sand (< 2mm)	
	GRV	gravel (2 - 64 mm)	
	COB	Cobble (64 - 256 mm)	
	BLD	Boulder (> 256 mm)	
	BDX	Bedrock	
	MXD	Mixed	describe how mixed - e.g. GC for dominant gravel, secondary cobble
Microhabitat Depth	TOTAL Depth of microhabitat (m)		
Depth at Eggs/Tads	Eggs - depth to center of egg mass; Tads - depth to tads if diff than average total depth		
Microhabitat Velocity	Average MID-COLUMN velocity of microhabitat (m/s)		
Velocity at Eggs/Tads	Eggs - velocity at/adjacent to center of egg mass; Tads - velocity at tads if diff than mid-column velocity		
Local Water Temp	Water Temperature in microhabitat		
Distance to Shore (m)	Distance from observation perpendicular to water's edge on nearest shore		

VARIABLE	CODE	Description
Developmetal Stage		Gosner stage for egg masses and tadpoles.
Eggs	1	New 1-3 days old - compact, blue, no silt, small eggs
	2	~ 1 week old - looser, some silt on eggs, water in eggs
	3	~2 wks old (close to hatching) - very loose, eggs detaching, start to see tail in embryos, possibly strung out if subject to slight flow
Tadpoles	1	
	2	
	3	
	4	
	5	
Canopy Cover Class	1	0-25%
	2	25-50%
	3	50-75%
	4	75-100%
Attach/Perch Substrate	SLT	silt
	SND	sand (< 2mm)
	GRV	gravel (2 - 64 mm)
	COB	Cobble (64 - 256 mm)
	BLD	Boulder (> 256 mm)
	BDX	Bedrock
	VEG	Vegetation/LWD - specify veg type

Rough field sketch - delineate areas NOT surveyed (too deep/fast, heavy veg)

APPENDIX AQ 7-B

Habitat Availability Survey Protocol

Habitat Availability Survey Protocol for *Rana boylii* in Streams, Yarnell, S. 2007.

This protocol is for determining the amount of available habitat in a survey reach potentially suitable for *R. boylii* egg and tadpole lifestages. It is intended to provide habitat availability data that can be used with habitat suitability data collected for eggs and tadpoles in order to minimize bias in developing suitability curves.

The associated datasheet is used to record data on point depth and velocity measurements throughout the survey reach. The associated field sketch form is used to create a scaled map of the survey reach, showing locations of control points, point measurements and general habitat characteristics (geomorphic features, mesohabitat type, substrate, etc). Data from both forms are then used to calculate the area of hydraulic habitats defined in a specified series of depth/velocity bins.

Details on the protocol and filling out the datasheets are provided below.

Note that the datasheet and field sketch form are designed to be printed in landscape format on 8.5x14 paper with the codes and description boxes printed on the back side of the page (see files: FYLF VES survey datasheet.xls and Habitat sketch form.pdf). The datasheet is designed for collection of data in metric units, so use of English units must be explicitly noted.

PROTOCOL

1. *Complete a scaled sketch of the survey reach*. Be sure to include:
   - Control points throughout the reach were possible for measuring distances and determining an appropriate map scale
   - Outlines of basic geomorphic features
   - Outlines/shading of mesohabitat unit types
   - Outlines/shading of substrate size patches
   - Outlines of large, dense vegetation patches
   - Locations of point depth/velocity measurements and/or cross-section transects depending on resolution of map

2. *Take point measurements of depth and velocity across the specified range.* Using the datasheet, record the location of each point measurement (longitudinal distance from control point, cross-sectional distance from longitudinal line if using scope and rod; survey point numbers if using a total station), total depth, mid-column velocity and substrate size. Measurements should be taken throughout the survey reach in an effort to equalize area surveyed in the following depth/velocity categories:

	Depth (m)			
Velocity (m/s)	0.0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0
0.0 - 0.1	x	x	x	x
0.1 - 0.2	x	x	x	x
0.2 - 0.4	x	x	x	x
0.4 - 0.6	x	x	x	x

In order to maximize efficiency, select a cross-section across a mesohabitat. With the tape zeroed on a longitudinal tape line or perpendicular to the water's edge, start at the water's edge and take a point measurement where the velocity first reaches 0.1 m/s. Continue along the cross-section, taking point measurements when velocity reaches 0.2 m/s, 0.4 m/s and 0.6 m/s. Data is not needed at velocities higher than 0.6m/s. Continue in this fashion until a series of cross-sections have been completed throughout the reach.

3. *Calculate the area surveyed within each bin.* Using locations of point measurements recorded on the field sketch map, trace contours at each velocity level and draw polygons around each the area representing each depth-velocity bin. Count squares to determine the area within each bin and record in the depth-velocity bin table on the back of the field sketch form. If some bins are underrepresented (area too low in relation to others), select additional point measurement locations throughout the reach in an effort to equalize area sampled across the range of bins.

Point measurement datasheet details

Control Point:	Code for specific control point from which longitudinal and cross-sectional distances are measured or point used as a benchmark if using a total station. Descriptions of control points, including an assigned code, are to be recorded on the back of the field sketch form. A list of the codes can be added to the back of the datasheet for reference if needed.
Survey Point:	Number of point taken with a total station. If using a scope and rod, record station point number for cross-reference to a field notebook with the details on station and elevation information.
Mesohabitat Unit Type	Based on USFSR5 mesohabitat unit designations. See codes on the back of the VES survey datasheet.
Depth (m)	Total depth at measurement point
Velocity (m/s)	Mid-column velocity at measurement point
Substrate	Categorical size of substrate at measurement point. See categories listed on back of datasheet.
Notes	Record any anomalies or error in measurements; describe any local influences on the measurement (ex: boulder just upstream, etc)

Site (stream/reach/subreach):____

Date: Page _____ of _____

Start North UTM: East UTM:	WYPT: Accuracy:	End North UTM: East UTM:	WYPT: Accuracy:	Weather:
Elevatoin: GPS Topo	Survey Start Time: End Time:		Assoc. Field Sketch Form: Assoc. Photo #s:	
Discharge:	Observers:	Notes:		

Survey Point	Mesohabitat Unit Type	Depth (m)	Velocity (m/s)	Substrate	Notes

Notes on Collecting Habitat Suitability Criteria (HSC) availability data

Data is collected to determine range of depths and velocities available throughout the survey reach, and will be used to develop HSC curves for FYLF eggs and tadpole lifestages.

Control Point - Code for contol points identified at each site. Describe control points in description box below.

Survey Point - Point number from Total Station (**If scope and rod used instead, then reference where in field notebook details on station, elevation, etc

Mesohabitat Unit Type - Based on USFSR5 mesohabitat unit designations. See codes for VES datasheet.

Depth (m) - Total Depth at measurement point

Velocity (m/s) - Mid-column velocity at measurement point

Substrate - Categorical size of substrate at measurement point:

Silt/fines	Small Cobble (64-128n Large Boulder (>512mm)
Sand (<2mm)	Large Cobble (128-256 Bedrock
Gravel (2-64mm)	Small Boulder (256-512mm)

Notes - Any anomalies, errror or description pertaining to that measurement point

CONTROL POINTS

Code	Description

AQ-8 Fish Passage

POTENTIAL RESOURCE ISSUE:

- Fish passage/migration.

PROJECT NEXUS:

- Project facilities and operations may affect fish passage/migration.

POTENTIAL LICENSE CONDITIONS:

- Instream flow releases.
- Facility modifications.

STUDY OBJECTIVES:

- Document the location, nature, and characteristics of fish barriers in bypass river reaches.
- Identify Project facilities and operations (e.g., diversion structures, instream flow releases) that may affect fish passage.

EXTENT OF STUDY AREA:

- The study area includes the bypass river reaches and Project diversion dams and pools.

STUDY APPROACH:

- Identify and classify potential fish passage barriers in bypass river reaches.
    - Use the AQ 1 – Instream Flow Technical Study Plan (TSP) mesohabitat mapping to identify the location and nature (natural or Project-related) of potential barriers (e.g., natural falls, tributary junctions, road crossings, shallow riffles, and diversion or dam structures) in the bypass river reaches.
    - Classify each potential barrier identified in the field mapping into the falls, chute, and cascade types defined by Powers and Orsborn (1985) or as critical riffles (Thompson 1972).
    - For stream crossings, use a classification approach consistent with Flosi, et al. (2010).
    - Summarize fish passage data collected at the barriers during field mapping (e.g., fall height, plunge pool depth, photographs, and field biologist observations).
- Evaluate fish passage at the potential Project-related fish barriers during the base-flow (low-flow) period using the following information:
    - Leaping and swimming capabilities of the fish based on the literature (Powers and Orsborn 1985; Hoar et al. 1978) and fish size and water temperature information from the AQ 2 – Fish Population TSP and the AQ 4 – Water Temperature Modeling TSP;
    - Physical and hydraulic characterization of potential barriers based on measurements from the field and/or Project engineering drawings;
    - The fish passage assessment methodology outlined in Powers and Orsborn (1985) and Thompson (1972) modified, where necessary, for the specific species (e.g., rainbow trout, brown trout, and hardhead) and barriers within the study area; and
    - For stream crossings, evaluate fish passage consistent with Flosi, et al. (2010).

- In collaboration with resource agencies, identify Project-related barriers, if any, which require hydrodynamics modeling to assess fish passage over a range of flows. Only barriers that prevent access to sections of river with important spawning or rearing habitat (as determined in collaboration with the resource agencies) would be considered for modeling. If there are barriers that require hydrodynamics modeling:
  - Characterize the seasonality, magnitude, and frequency of flows at the barrier over a range of water year types using the existing and unimpaired flow information; and
  - Coordinate with the AQ 1 – Instream Flow TSP to provide hydrodynamics data and modeling to estimate fish passage over the range of flows determined by the interested resource agencies.

SCHEDULE:

Date	Activity
March–October 2018	Conduct field surveys
November 2018–February 2019	Analyze data and prepare draft report
March 2019	Distribute draft report to the stakeholders
April–June 2019	Stakeholders review and provide comments on draft report (90 days)
June 2019	Meet with resource agencies to determine if there are any Project-related barriers that require hydrodynamics modeling
July–October 2019	Collect hydrodynamics data, if necessary, and resolve comments and prepare final report
December 2019	Distribute final report in Final License Application

REFERENCES:

Flosi, G., S. Downi, J. Hopelain, M. Bird, R. Coey, and B. Collins. 2010. California Salmonid Stream Habitat Restoration Manual Vol. II, Part IX, Fish Passage Evaluation at Stream Crossings. California Department of Fish and Game.

Hoar, W. S. and D. J. Randall (ed). 1978. Fish Physiology. Academic Press New York.

Powers, P. D. and J. F. Orsborn. 1985. Analysis of Barriers to Upstream Migration: An Investigation of the Physical and Biological Conditions Affecting Fish Passage Success at Culverts and Waterfalls. BPA Report No. DOE/BP-36523-1.

Thompson, K. 1972. Determining Stream Flows for Fish Life in Pacific Northwest River Basins Commission Instream Flow Requirement Workshop, March 15-16, 1972.

AQ-9 Entrainment

POTENTIAL RESOURCE ISSUE:

- Fish mortality or translocation associated with flow diversion, intake structures or powerhouse facilities.

PROJECT NEXUS:

- Project diversions could result in non-lethal or lethal entrainment of fish species at Project powerhouses and diversion facilities.

POTENTIAL LICENSE CONDITIONS:

- Modification of Project facilities or operations.
- Offset mitigation.

STUDY OBJECTIVES:

- Characterize Project diversions, flowlines, powerhouse turbines, and operations in relation to factors that may affect entrainment or mortality.
- Directly estimate the potential for entrainment and mortality by sampling fish entrainment in the Project flowlines.
- Develop the information necessary to assess the potential fish population/production effects of entrainment.

EXTENT OF STUDY AREA:

- The study area for characterization of the Project diversions and powerhouse turbines includes the three Project flowlines (Kaweah Nos. 1, 2, and3) and powerhouses (Kaweah Powerhouse Nos. 1, 2, and 3).

STUDY APPROACH:

- Characterize Project diversion structures and intakes, flowlines, diversion operations, and powerhouse turbines. Provide either calculated or measured intake velocity fields at each intake structure over the range of potential inflows. Characterize the powerhouse turbine fish survival using literature-based turbine fish survival estimates.
- Directly estimate entrainment and mortality.
    - During five representative time periods, when the Project diversions are operating, quantify fish entrainment into each of the Project flowlines (Kaweah Nos. 1, 2, and 3) using standard fish sampling gear used successfully in numerous entrainment studies (e.g., NID and PG&E 2011; Vogel 2013). Identify the representative sampling periods in consultation with agency biologists/staff. The feasibility of sampling each location will need to be made prior to study implementation, but initially it appears high quality sampling is possible.
        - Sample entrainment for three consecutive days during each sample period.
        - Sample using a modified Kodiak trawl or fyke net in each flowline. Measure the proportion of flow sampled by the net, if the entire flow is not sampled. In the unlikely event high quality net sampling is not feasible, sample the flow field with a combination of video/sonar.

    - Identify, enumerate, and measure the length of entrained fish and record their status (uninjured, injured, and killed).

- Evaluate the potential fish population and production effects of entrainment at the Project diversions using Project operations data, fish population data obtained from the AQ 2 – Fish Population Technical Study Plan (TSP), and literature information.

SCHEDULE:

Date	Activity
November 2017–August 2018	Summarize Project diversion and turbine information, and directly measure entrainment in Project flowlines
September–November 2018	Summarize fish population data and potential effects of entrainment on fish populations/production and prepare draft report
December 2018	Distribute draft report to the stakeholders
December 2018–February 2019	Stakeholders review and provide comments on draft report (90 days)
March–April 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

Nevada Irrigation District and Pacific Gas & Electric Company (NID and PG&E). 2011. Technical Memorandum 3-5, Fish Entrainment. Yuba-Bear FERC Project No. 2266-096 and Drum-Spaulding FERC Project No. 2310-173.

Vogel, D. 2013. Evaluation of Fish Entrainment in 12 Unscreened Sacramento River Diversions. Prepared for the CVPIA Anadromous Fish Screen Program and the Ecosystem Restoration Program.

CUL-1 Cultural Resources

POTENTIAL RESOURCE ISSUE:

- Protection of cultural resources that are listed in, or eligible for listing in, the National Register of Historic Places (NRHP).

PROJECT NEXUS:

- Operation and maintenance of Southern California Edison's (SCE) Kaweah Hydroelectric Project (Kaweah Project or Project) could potentially affect objects, sites, buildings, structures, or districts that comprise archaeological and historic resources and traditional cultural properties/places (TCPs) that may qualify for listing in the NRHP.

- Under Section 106 of the National Historic Preservation Act (NHPA), the FERC is required to ensure that their decision to relicense the Project will not adversely affect cultural resources.

POTENTIAL LICENSE CONDITION:

- Update SCE's existing Cultural Resources Management Plan (CRMP) for the Kaweah Project, including:
  - Incorporate information about new historic properties that are identified within the Federal Energy Regulatory Commission (FERC) Project boundary;
  - Identify measures to avoid adverse effects (impacts) to these historic properties;
  - Modify existing measures, as needed; and
  - Identify any new monitoring and/or consultation requirements.

STUDY OBJECTIVES:

- Identify all known and currently undiscovered cultural resources that could potentially be affected by Project operation and maintenance activities.
- Evaluate newly discovered cultural resources to determine if they are eligible for listing in the NRHP.

EXTENT OF STUDY AREA:

The Kaweah River Watershed will be used to develop ethnographic information (Map 3.2-1). For the purposes of field surveys, the Study Area is equivalent to the Area of Potential Effects (APE), which includes:

- All Project facilities and lands located within the existing FERC Project boundary and any other lands where operations and/or maintenance activities are conducted.
- For surveys at or around Project facilities that are located outside of the current FERC Project Boundary and on private land, SCE will take the following steps to obtain approval to survey on private property:
  - Notify the landowner of Project relicensing and request authorization to enter the property to conduct surveys.
  - If authorization is obtained, SCE will complete surveys as described in this technical study plan.

- If authorization is not obtained, SCE will not complete surveys at these locations.

In cases where SCE has obtained permission to survey on private lands, the survey area will be limited to the immediate area surrounding the facility, plus a defined buffer area, depending upon facility type, as summarized in Table CUL 1-1. The primary facilities associated with the Kaweah Project and existing FERC Project boundary are shown on Map CUL 1-1a-g. All facilities associated with the Kaweah Project are identified on Table CUL 1-2.

Note that the Study Area does not include Project facilities or associated lands that are located within the boundaries of Sequoia Kings Canyon National Park (SKCNP). Project facilities located within the SKCNP are operated under a Special Use Permit issued by the National Park Service (NPS) and are not under FERC jurisdiction.

STUDY APPROACH:

The FERC is required to follow regulations that are designed to identify and address the potential effects that a hydroelectric project may have on cultural resources. These regulations are contained in Title 36 of the Code of Federal Regulations (CFR), Part 800 (36 CFR 800), and provide direction to federal agencies regarding the implementation of Section 106 of the NHPA. SCE is required by FERC to carry out studies that are consistent with these regulations. Consequently, the CUL 1 – Cultural Resources Technical Study Plan (TSP) outlined below follows the steps defined in the regulations and is applicable to all types of cultural resources that may be associated with the Project. SCE will request that the FERC authorize SCE as their federal designee to help facilitate consultation with the resource agencies, Tribes, and the State Historic Preservation Officer (SHPO) under Section 106 of the NHPA.

The Kaweah Project facilities that are under FERC jurisdiction are situated on private land or on land managed by the U.S. Bureau of Land Management (BLM). Therefore, the study approach also considers the BLM's requirements for identifying and evaluating cultural resources on BLM land outlined in the following documents:

- 2014 California BLM State Protocol Agreement (BLM et. al. 2014);
- Manual 8110 – Identifying and Evaluating Cultural Resources (BLM 2004);
- California BLM Guidelines for a Cultural Resources Inventory (BLM undated); and
- Special Permit Conditions Continuation Sheet: California Conditions (BLM 2007).

It is important to note that SCE conducted cultural resources surveys in 1989, as part of the previous Kaweah Project relicensing effort (Taylor 1989). As part of this effort, SCE conducted extensive research and consultation to identify known cultural resources in the vicinity of the Kaweah Project. In addition, SCE conducted intensive pedestrian surveys in the vicinity of most Project facilities, with the following exceptions: some roads, primarily those located on private property, where SCE has limited control; areas with impenetrable vegetation; and project facilities situated on slopes exceeding 30%, where the presence of archaeological resources is considered unlikely (Taylor 1989). Four resources that could potentially be affected by Project operation and maintenance activities were subsequently evaluated to determine their eligibility for the NRHP (Wickstrom et al. 1990, Lehman et al. 1990). The evaluation studies concluded that two archeological sites and one multi-component archaeological/historic site are eligible for inclusion in the NRHP. In addition, select elements associated with the Kaweah No. 3 Project (but not Kaweah No. 1 or No. 2) were determined eligible for inclusion on the NRHP as a Historic District. Accordingly, SCE developed a Cultural Resource Management Plan (CRMP) that identifies

measures to avoid adverse impacts to NRHP eligible sites, including the Kaweah No. 3 Project facilities that could be affected by operation and maintenance of the Kaweah Project and/or emergency circumstances (SCE 1992). The approach presented in this TSP is designed to build on and augment the survey and evaluation work completed in 1989 and 1990, respectively.

Cultural Resource Inventory

SCE will develop ethnographic information for the Kaweah River Watershed and will identify and inventory cultural resources in the Study Area (defined above) using existing literature and site records and by conducting field surveys in previously unsurveyed areas, as outlined in the following.

Develop Ethnographic Information

- Obtain, compile, review, and summarize existing ethnographic information available for the Kaweah River Watershed, including:
    - ethnographic field notes from previous studies (e.g., Latta, Gayton, Kroeber, and others), as available;
    - published ethnographic literature;
    - ethnographic information held at various tribal repositories; and
    - archival and historic photographs.
- Conduct a Sacred Lands File search with the Native American Heritage Commission to determine if any known places of importance to Native American groups are present within the Study Area (i.e. the APE), or in the immediate vicinity.
- Consult with appropriate Tribal representatives to identify properties, plants and other resources of traditional cultural or religious importance to Native Americans (including "traditional cultural properties" as discussed in National Register Bulletin No. 38) that may be present in the Study Area (i.e. the APE). This consultation effort will be limited to Tribes with direct historical ties to the lands located within the Study Area. Consultation may include a combination of written correspondence and follow up interviews by a qualified ethnographer, depending upon the results of the initial literature review and research efforts.
- Ethnographic information developed through this effort will be used to develop background and contextual information. Detailed information that is developed through this effort, especially information that identifies the location of sacred sites, TCPs and other culturally sensitive resources will be documented in a confidential technical report that will only be submitted to select Tribal representatives and resource agencies.

Identify and Relocate Known Cultural Resources

- Conduct a records search to obtain and update information about known cultural resources located within the Study Area (i.e. the APE), including resources that may have been identified since the previous relicensing studies. Records searches will be conducted at:
    - BLM's Bakersfield Field Office;

  - Tulare County Historical Society; and
  - California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC).
- Review archival material and records maintained by SCE, including reports and records prepared during the previous Kaweah relicensing effort.
- Identify Kaweah Project facilities and features that may not have been evaluated for the NRHP during the previous relicensing effort.
- Conduct a site visit to relocate all known cultural resources located within the Study Area.
  - Document existing condition of known cultural resources.
  - Accurately map features, artifacts, and site boundaries, if necessary, using sub-meter Global Positioning System (GPS) technology. All GPS data will subsequently by incorporated into a Geographic Information System (GIS).
  - Update site records, as necessary. All updated records will be submitted to the CHRIS – SSJVIC and to the BLM.

Conduct Pedestrian Surveys in Areas not Previously Surveyed

- Identify and map portions of the Study Area that have not been previously surveyed for cultural resources.
- Conduct field surveys in areas not previously surveyed to identify any new cultural resources.
  - Conduct pedestrian surveys in all previously unsurveyed areas located within the Study Area, excluding areas that are unsafe due to excessively steep slopes and/or covered by dense, impenetrable vegetation.
  - To the extent possible, field surveys will utilize a BLM Class III survey strategy (intensive) with thorough (complete) coverage within the APE. General or cursory coverage will be utilized in areas that physical obstructions (e.g., steep slopes, dense brush) and/or visual constraints (excessive grass or duff cover) preclude complete coverage.
  - The pedestrian surveys will be conducted by walking over the area to be examined in evenly-spaced transects not to exceed 30 meters, while examining the ground surface for objects and features that might show evidence of archaeological or historic sites.
  - The field surveys will not involve ground-disturbing activities such as excavation or shovel probes.
  - Site boundaries and feature locations will be mapped using a portable sub-meter GPS unit and all data collected in the field will be subsequently incorporated into a GIS.
  - Any artifacts or features that are discovered will be documented in notebooks and with photographs and sketches, as appropriate and left in place.
  - Information regarding new resources discovered through field surveys will be recorded on standardized 523 forms produced by the Department of Parks and Recreation (DPR), Office of Historic Preservation. All new records will be submitted to the CHRIS – SSJVIC and to the BLM.

- For surveys conducted on BLM land, a Fieldwork Authorization will be obtained from the BLM (CA State Office and Bakersfield Field Office).
- All surveys conducted on federal lands will be performed in accordance with a permit(s) obtained from the BLM, with respect to specific conditions outlined in the permit, including those outlined in the Special Permit Conditions Continuation Sheet: California Conditions.

Prepare and Distribute CUL-1 Cultural Resource Inventory Report

- Prepare a Cultural Resource Inventory Report.
  - The report will include contextual background information, including ethnographic information.
  - The report will document all known and newly discovered cultural resources located within the Study Area.
  - The report will describe all study methods and results, including a thorough description of the survey strategies and coverage types that were utilized to conduct the surveys.
  - The report will include detailed maps, photographs and sketches, as necessary and any associated documentation such as site records.
  - A draft report will be distributed for review and comment and any comments received will be addressed in a final report, as appropriate.
  - Note that information about cultural resources, especially locational information, is considered confidential and cannot be distributed to the general public. Therefore, the CUL-1 Cultural Resource Inventory Report that is distributed to the public will exclude locational and other sensitive information. The resource agencies and Tribes will be provided with a complete report marked “Confidential – Not for Public Distribution”.

NRHP Eligibility Studies

Assess the Need for Eligibility Studies

- Utilize the results of the Cultural Resource Inventory Study (described above) to assess whether there are any cultural resources within the Study Area (i.e., APE) that should be evaluated to determine if they are eligible to be included in the NRHP per Section 106 of the NHPA. This assessment would be made in consultation with the resource agencies and Tribes.

Conduct NRHP Evaluation Studies, if needed

- If eligibility studies are needed, prepare a NRHP Eligibility Evaluation Plan that identifies the specific resources to be evaluated and the evaluation methods.
- Obtain permit(s) from the BLM, as appropriate.
- Conduct studies to evaluate the NRHP eligibility of appropriate cultural resources located in the APE, including an evaluation of any Kaweah Project facilities that may not have been evaluated during the previous relicensing effort. Evaluation methods may include:
  - Consulting with stakeholders and others regarding the historical significance of affected cultural resources;

  - Conducting archaeological test excavations;
  - Collecting and analyzing archaeological materials;
  - Conducting focused historical research pertaining to specific resources; and/or
  - Detailed recordation of historic buildings or structures associated with the Kaweah Project.
- Prepare a report describing the evaluation methods, results and recommendations.
  - Consult with the resource agencies and Tribes, as appropriate, regarding the eligibility results and recommendations.
  - Sensitive information will be documented in a separate, confidential report.
- Provide the NRHP Eligibility Evaluation Report and any associated documentation to the State Historic Preservation Officer (SHPO) for review and concurrence.

SCHEDULE:

Date	Activity
Cultural Resource Inventory Study	
November 2017–March 2018	Consult with stakeholders and compile existing resource and ethnographic information
April–May 2018	Conduct field surveys
May–June 2018	Analyze data and prepare Draft Cultural Resource Inventory Report
July 2018	Distribute Draft Cultural Resources Inventory Report to stakeholders
July–September 2018	Stakeholders review and provide comments on draft report (90 days)
October 2018	Resolve comments and prepare final report
November 2018	Distribute final report to the stakeholders
NRHP Eligibility Studies (if necessary)	
November 2018–January 2019	Assess need for eligibility studies in consultation with stakeholders
February 2019–March 2019	Prepare NRHP Evaluation Plan in consultation with stakeholders and acquire permits, if necessary
April–May 2019	Conduct NRHP Evaluation Studies
June–July 2019	Analyze data and prepare Draft NRHP Evaluation Report
August 2019	Distribute Draft NRHP Evaluation Report to stakeholders in Draft License Application
August–October 2019	Stakeholders review and provide comments on draft report (90 days)
December 2019	Distribute final report to stakeholders in Final License Application and simultaneously submit to SHPO for review/concurrence

REFERENCES:

Lehman, Susan C., Williams, James C., Hicks, Robert A., Blount, Clinton M. 1990. A History and Significance Evaluation of the Kaweah Hydroelectric System, Tulare County, California. Submitted to Environmental Affairs Division, Southern California Edison Company, Rosemead, California. February 1990.

Southern California Edison (SCE). 1992. Cultural Resources Management Plan for Southern California Edison Company's Kaweah Hydroelectric Project Tulare County, California, FERC Project No. 298. November 1992.

Taylor, Tom. 1989. Archaeological Survey and Reconnaissance Report, Kaweah Hydroelectric Project, Tulare County, California. On file at Southern California Edison Company. Rosemead: Environmental Affairs Division.

Taylor, T. and Jackson, T., 1989a. Archaeological Site Record for CA-TUL-1478. Recorded August 10, 1989.

Taylor, T. and Jackson, T., 1989b. Archaeological Site Record for CA-TUL-1480/H. Recorded August 11, 1989.

U.S. Bureau of Land Management (BLM). 2004. Manual 8110. Identifying and Evaluating Cultural Resources.

____. 2007. Special Permit Conditions Continuation Sheet: California Conditions.

____. Undated. California BLM Guidelines for a Cultural Resources Inventory.

U.S. BLM, California SHPO, Nevada SHPO (BLM et al). 2014. State Protocol Agreement Among the California State Director of the BLM and the California SHPO and the Nevada SHPO regarding the Manner in which the BLM will meet its Responsibilities under the National Historic Preservation Act and the National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.

Wickstrom Brian P., C Kristina Roper, and Thomas L. Jackson. 1990. Archaeological Survey Test Excavation and Evaluation of CA-TUL-232, CA-TUL-1478, and CA-Tul-1480/H near Three Rivers, Tulare County, California. On file at Southern California Edison Company.

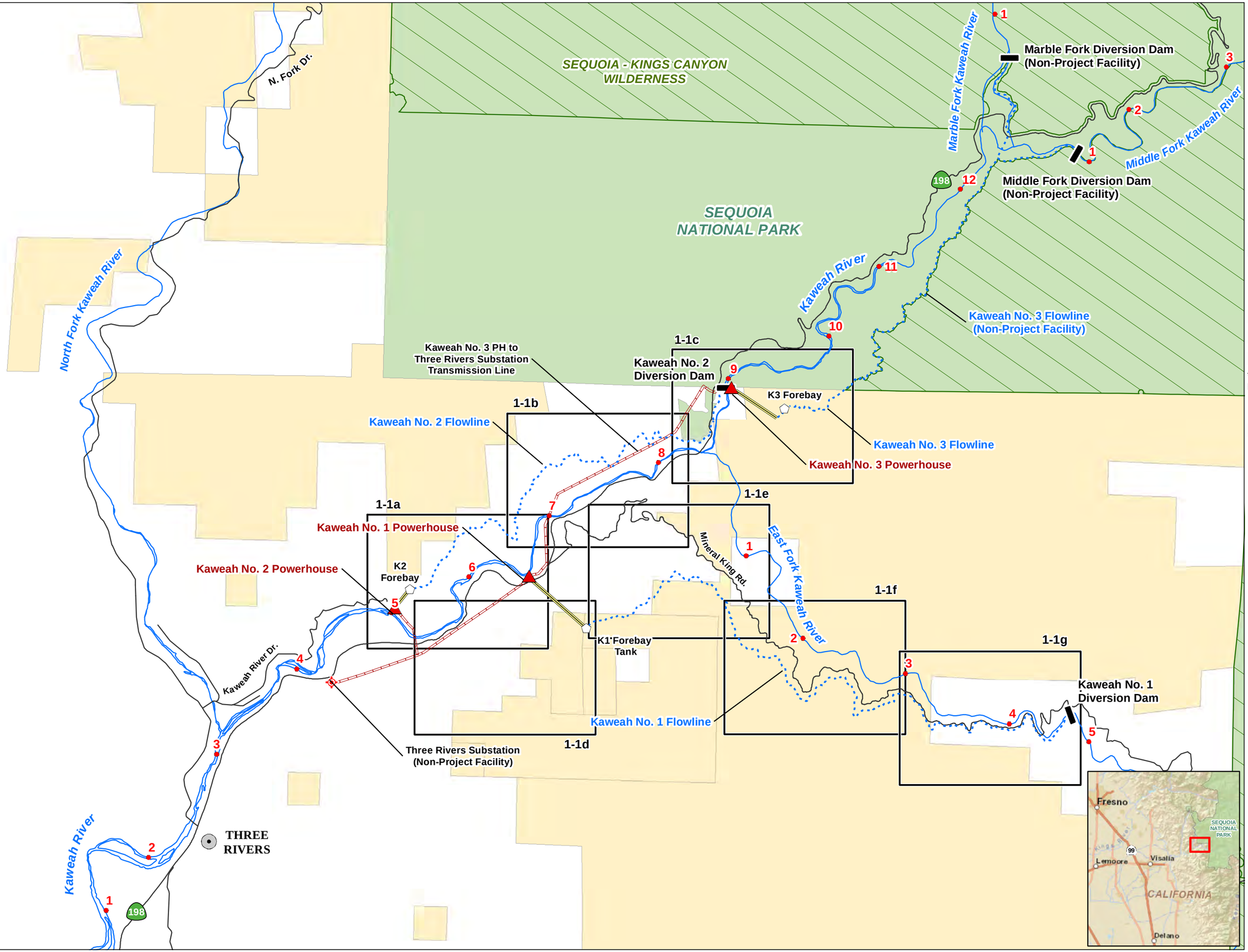
TABLES

Table CUL 1-1. Cultural Resource Survey Area for Facilities that Lie Outside of the Existing FERC Project Boundary.

Project Facility	Survey Area
Diversion Dams and Pools	15 feet around the perimeter
Flowlines[1]	20 feet on either side
Forebays/Forebay Tank	20 feet around the perimeter
Penstocks	15 feet on either side
Powerhouses and Switchyards	Within and up to 15 feet around the perimeter fence
Transmission, Power, and Communication Lines	25 feet on either side
Gages	10 feet around gages
Project Access Roads	20 feet on either side
Project Trails	15 feet on either side
Ancillary and Support Facilities	
Kaweah No. 1 Powerhouse Campus	Within the developed campus
Repeaters and Solar Panels	15 feet around the perimeter
River Access Parking	10 feet around parking area and beach

[1]Footbridges, wildlife bridges, and wildlife escape ramps are located on Project flowlines and will be surveyed concurrently with the flowlines.

MAPS



Facilities

- Powerhouse
- Diversion
- Utility
- Forebay
- Flowline
- Penstock
- Transmission Line

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*

- Bureau of Land Management
- National Park Service
- Private (Blank)

*SOURCE: BLM 2012.
Kaweah Project entirely within Tulare County.

Land Management

- National Wilderness Area

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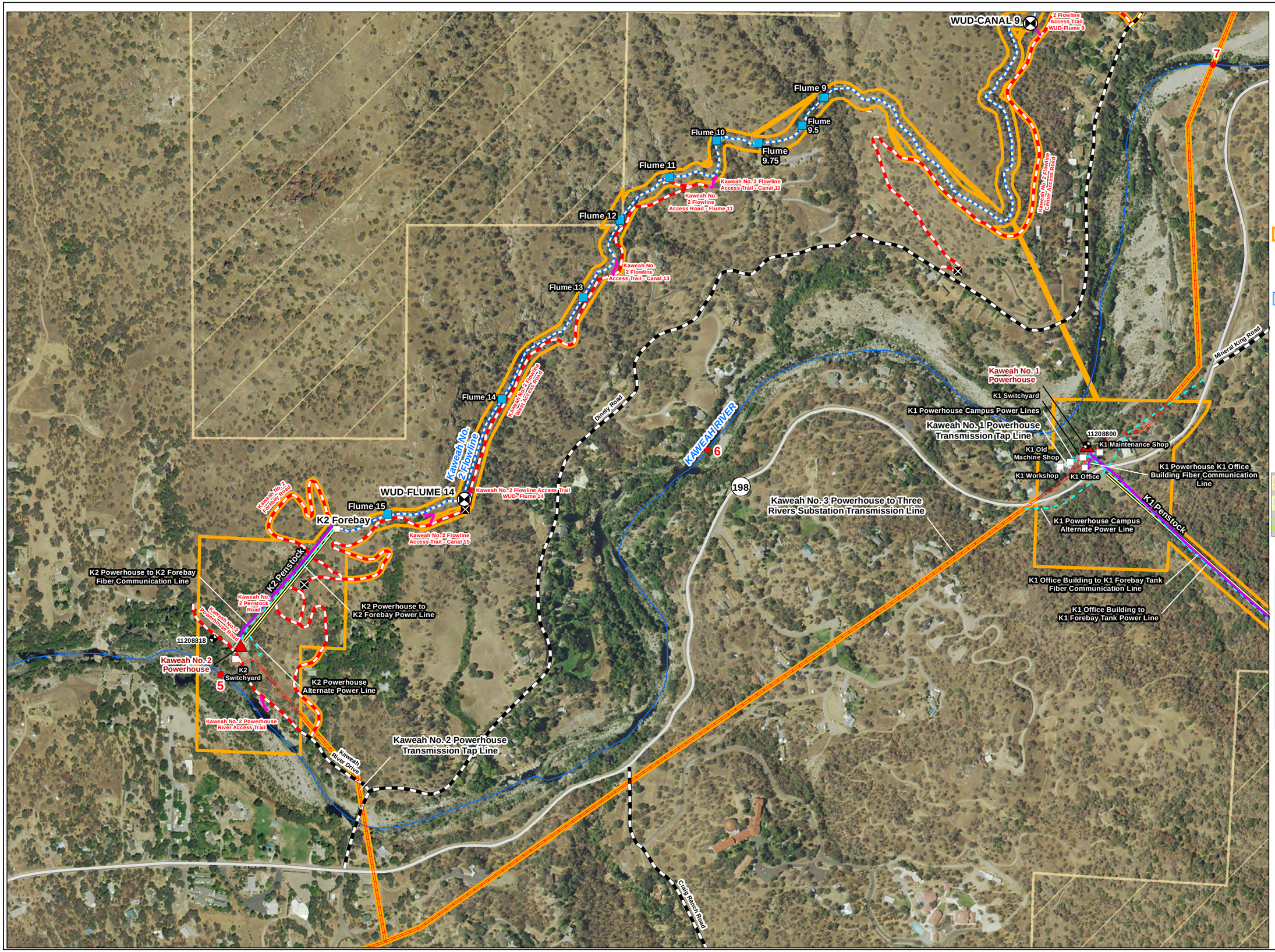
Map CUL 1-1

Kaweah Project Index Map

0 0.25 0.5 Miles

Date: 12/3/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

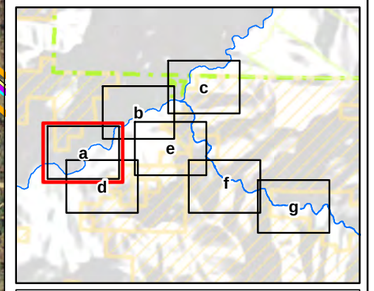
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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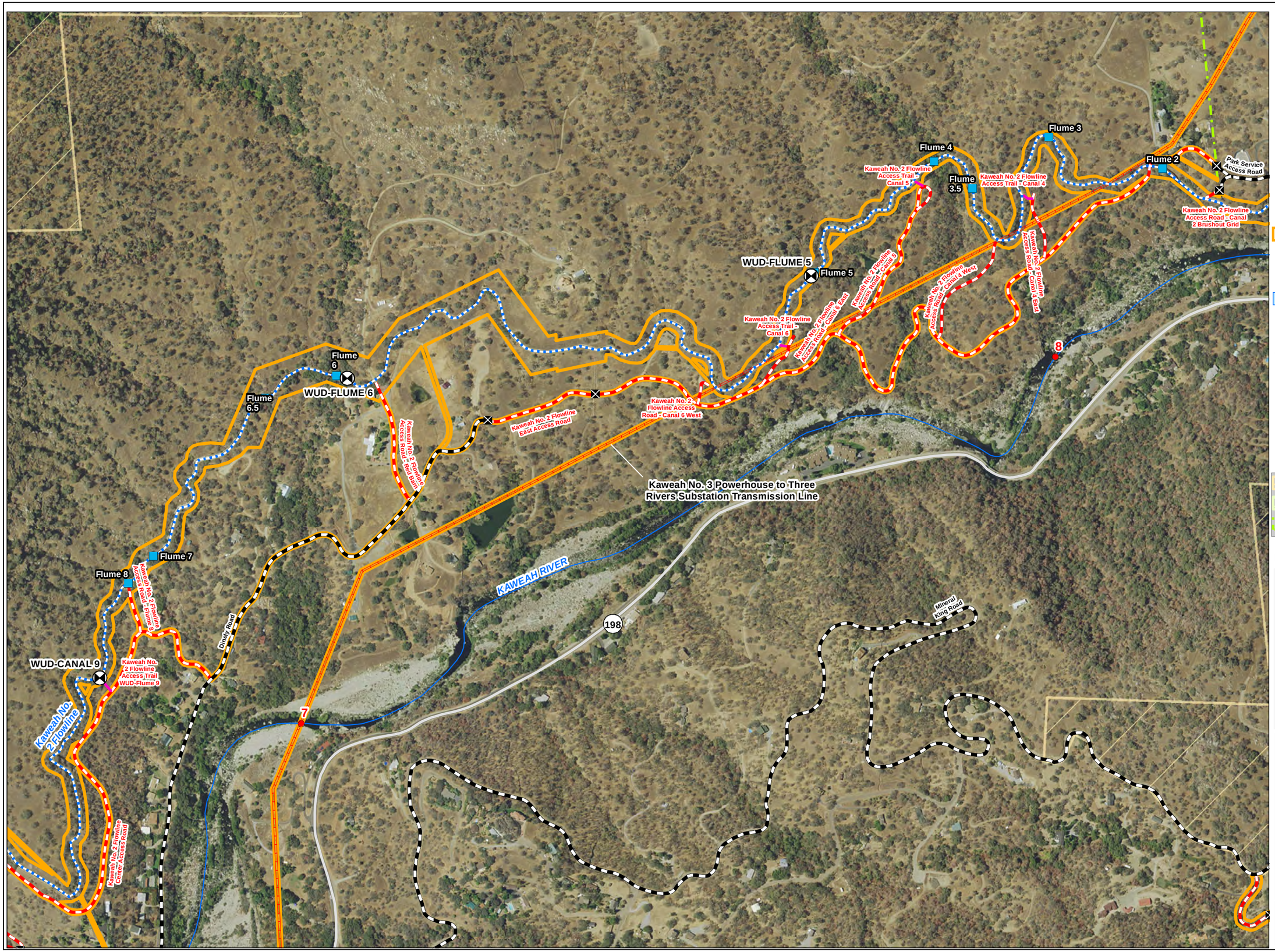
Map CUL 1-1a
Kaweah Project

0 250 500 Feet

Date: 12/3/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

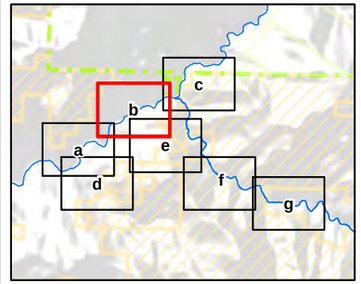
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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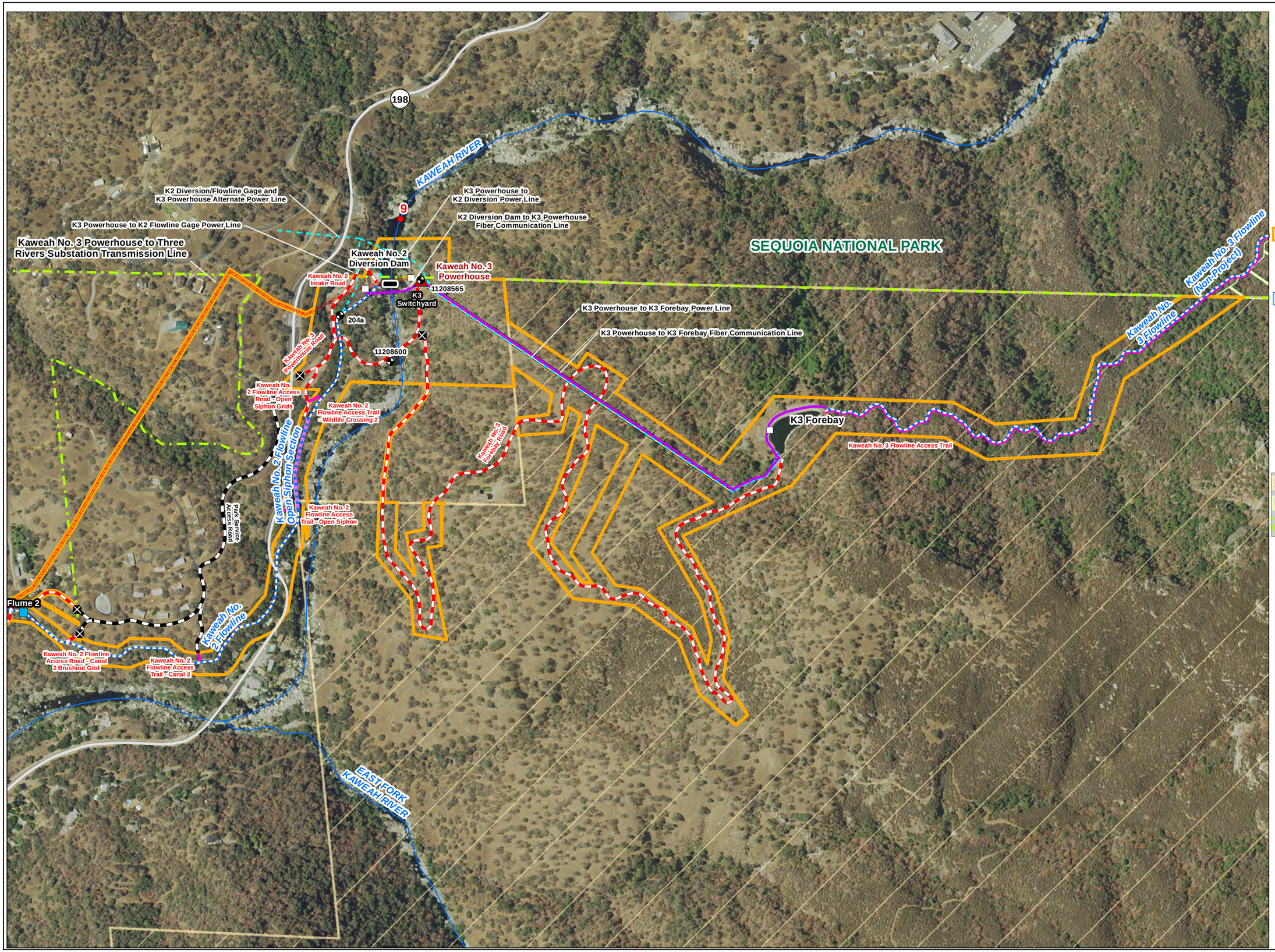
Map CUL 1-1b
Kaweah Project

0 250 500 Feet

Date: 12/3/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

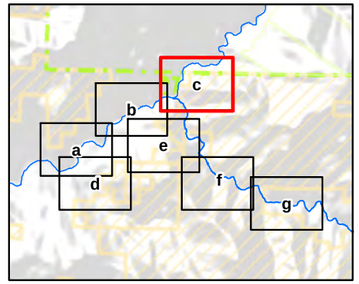
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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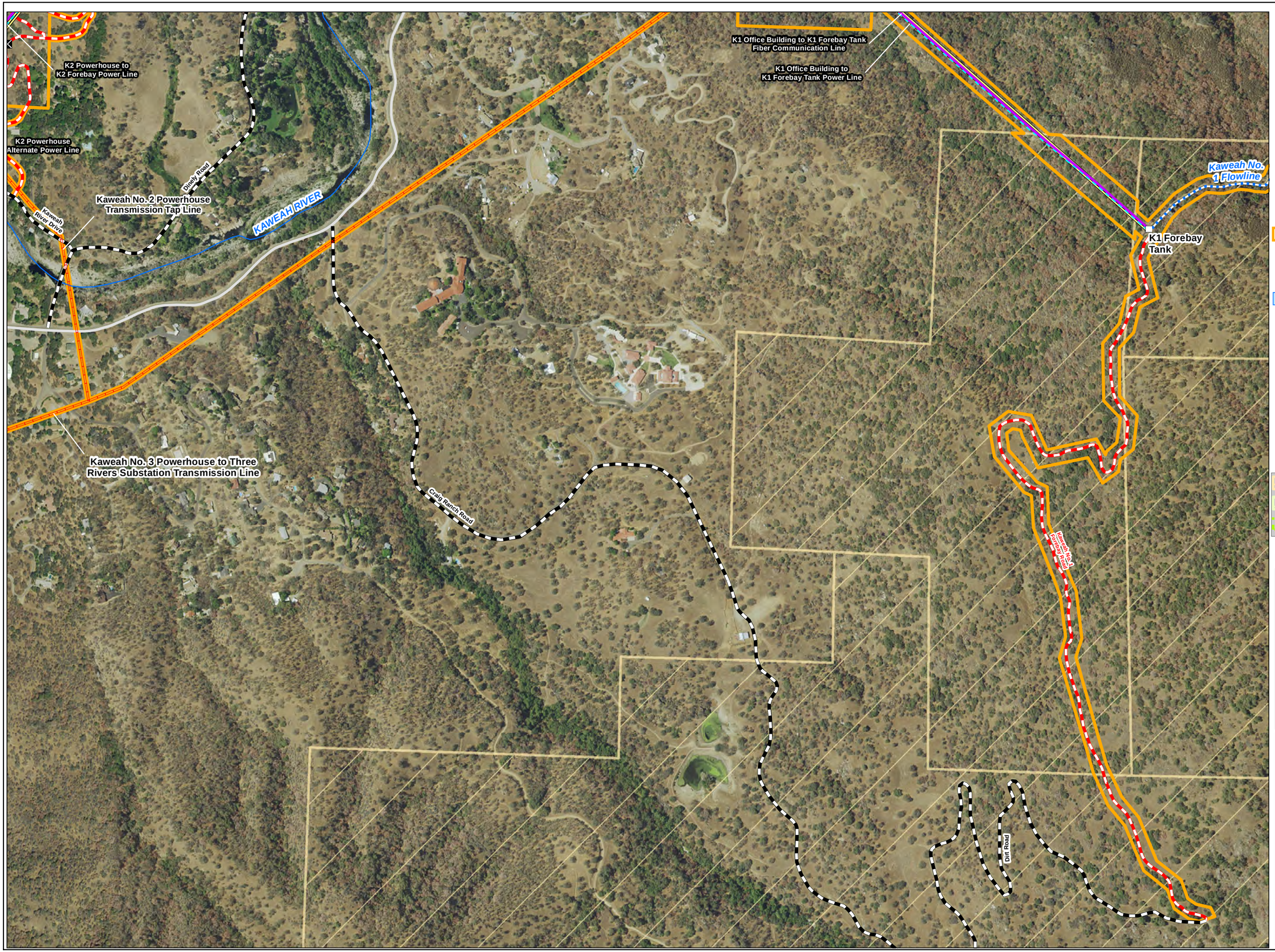
Map CUL 1-1c
Kaweah Project

0 250 500 Feet

Date: 12/3/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

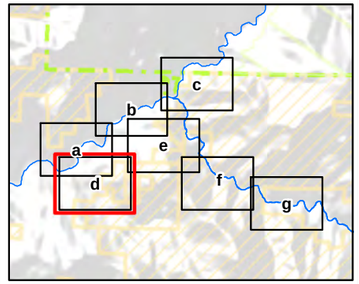
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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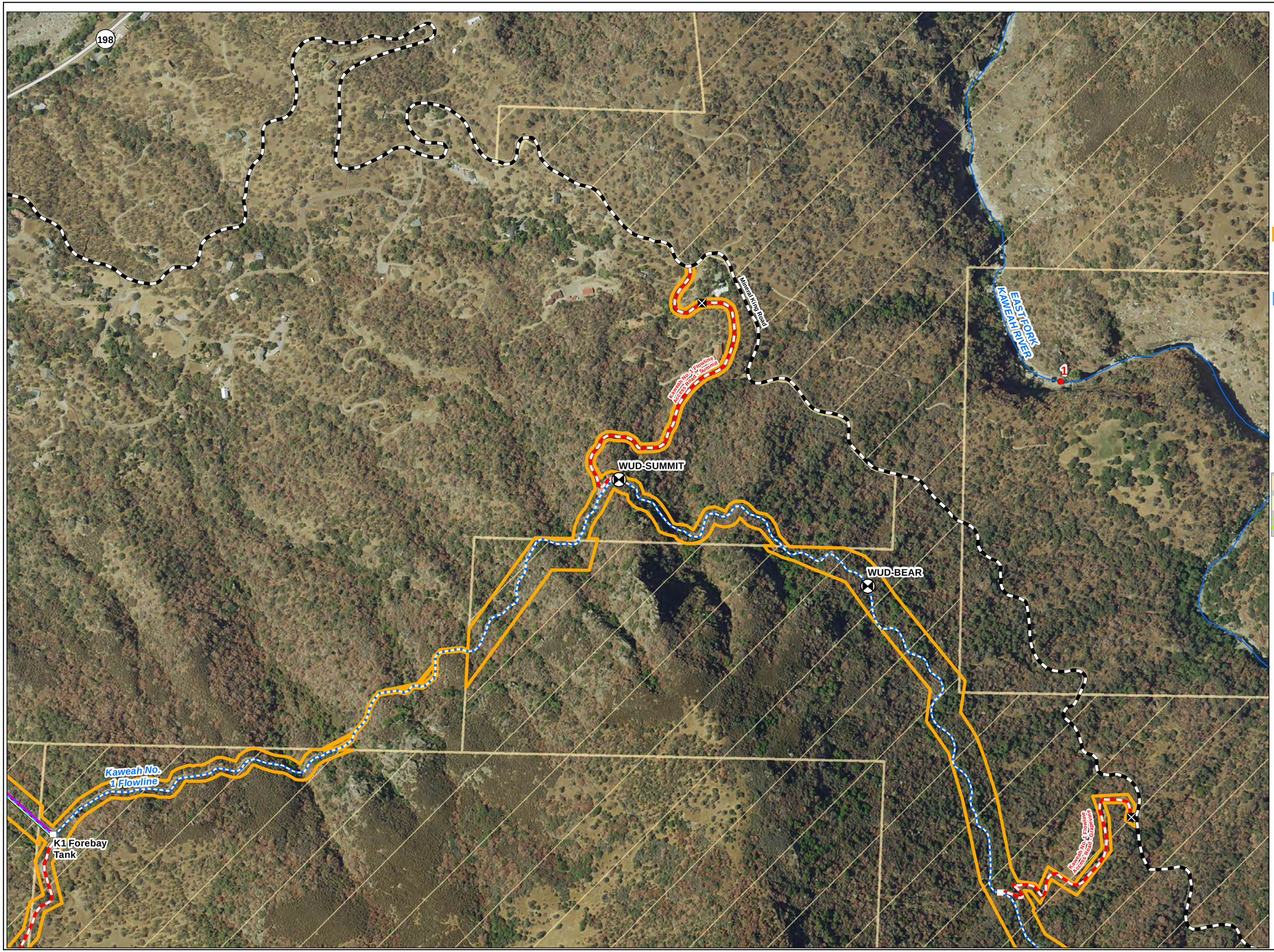
Map CUL 1-1d
Kaweah Project

0 250 500 Feet

Date: 12/3/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

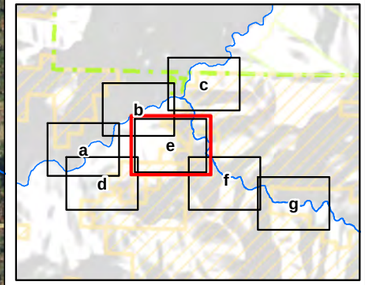
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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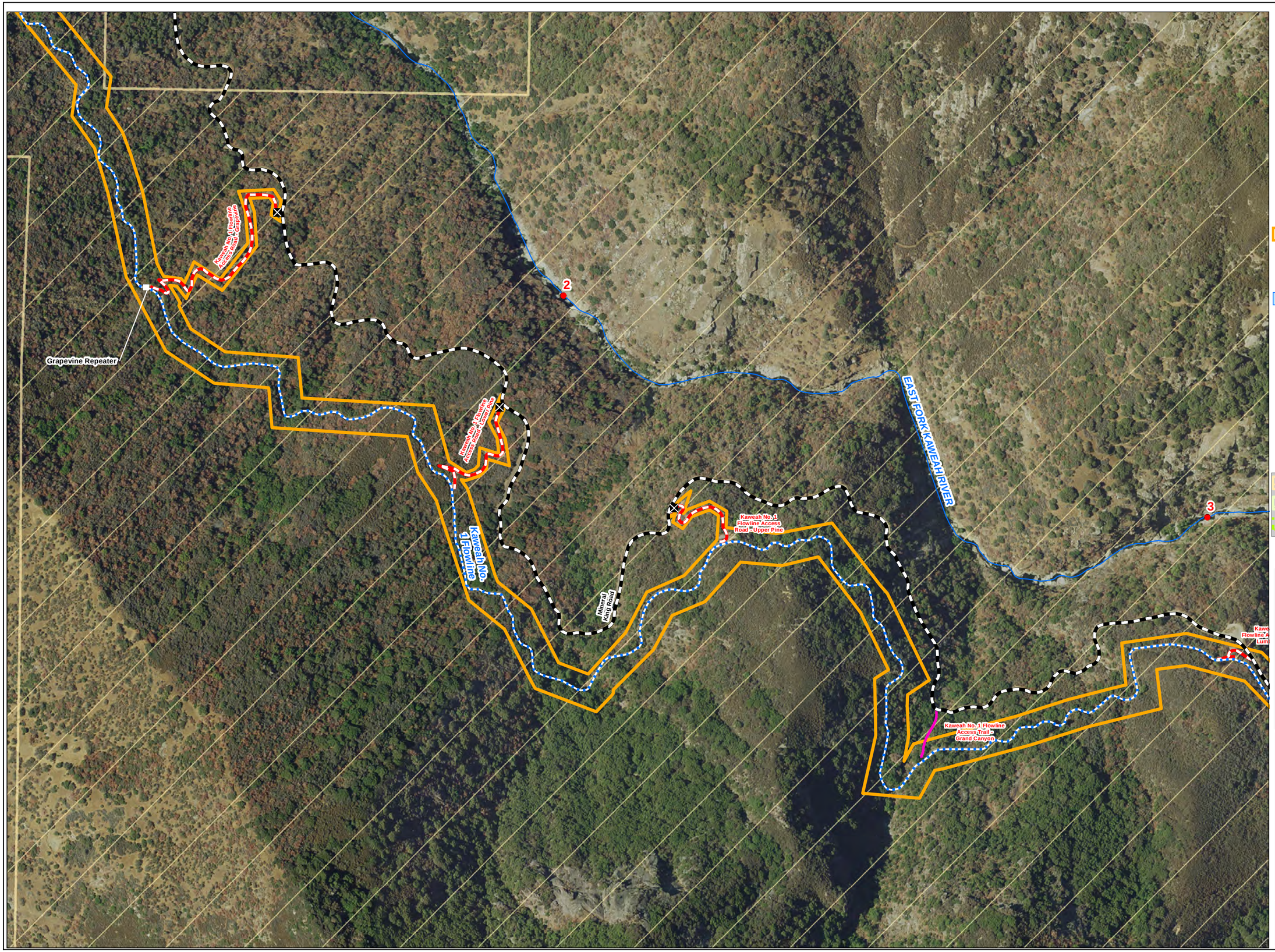
Eastern Hydro Generation

Map CUL 1-1e
Kaweah Project

0 250 500 Feet

Date: 12/3/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

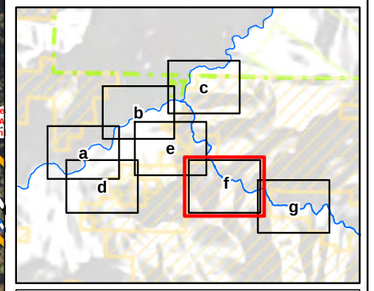
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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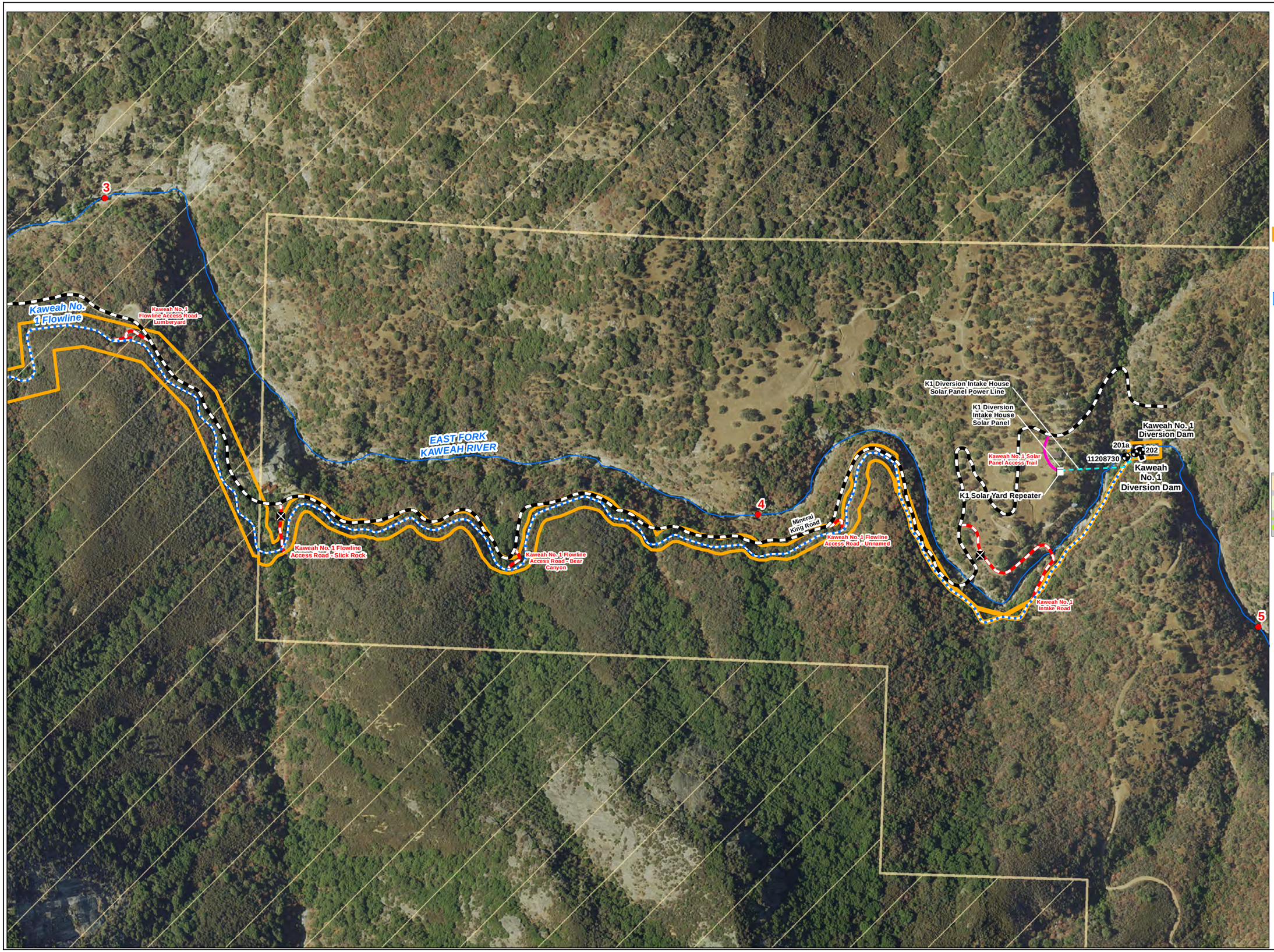
Eastern Hydro Generation

Map CUL 1-1f
Kaweah Project

0 250 500 Feet

Projection: UTM Zone 11
Datum: NAD 83

Date: 12/3/2015



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

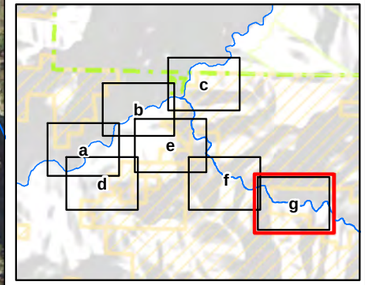
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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Map CUL 1-1g
Kaweah Project

0 250 500 Feet

Date: 12/3/2015

Projection: UTM Zone 11
Datum: NAD 83

LAND-1 Transportation System

POTENTIAL RESOURCE ISSUES:

- Adequate maintenance of Project roads and trails used by Southern California Edison Company (SCE) to access the Kaweah Project (Kaweah Project or Project) facilities; and
- Protection of environmental and cultural resources during maintenance activities.

PROJECT NEXUS:

- SCE is responsible for maintaining Project roads and trails.

POTENTIAL LICENSE CONDITION:

- Develop a Transportation System Management Plan (TSMP) that specifies SCE's responsibilities regarding the management and maintenance of Project roads and trails, including resource protection.

STUDY OBJECTIVES:

- Inventory and assess condition of Project roads and trails.
- Characterize SCE's use of Project roads and trails, including season of use and level of use.
- Characterize SCE's current maintenance practices and responsibilities.
- Identify existing agreements related to Project roads and trails (e.g., maintenance agreements, easements, rights of way, special use permits).
- Identify the location, condition, use, and maintenance of helicopter landing sites utilized for routine operation and maintenance of the Project.

EXTENT OF STUDY AREA:

The Study Area includes:

- All Project roads and trails located within the existing Federal Energy Regulatory Commission (FERC) Project boundary and those outside the existing FERC Project boundary used for operation and/or maintenance of the Project.
- For surveys along Project roads or trails that are located outside of the current FERC Project Boundary and on private land, SCE will take the following steps to obtain approval to survey on private property:
    - Notify the landowner of Project relicensing and request authorization to enter the property to conduct surveys.
    - If authorization is obtained, SCE will complete surveys as described in this technical study plan.
    - If authorization is not obtained, SCE will not complete surveys at these locations.

In cases where SCE has obtained permission to survey on private lands, the survey area will be limited to the immediate area surrounding the road or trail, plus a defined buffer area, depending upon feature type. The Project roads and trails included in the Study Area are identified on Table LAND 1-1 and are shown on Map LAND 1-1a-g.

Note that the Study Area does not include roads and trails located within the boundaries of the Sequoia and Kings Canyon National Park (SKCNP). Roads and trails located within the SKCNP are operated and maintained under a special use permit issued by the National Park Service and are not under FERC jurisdiction.

STUDY APPROACH:

Project Roads and Trails

The Project roads and trails cross private land and land under the jurisdiction of the Bureau of Land Management (BLM). For consistency, SCE will inventory and assess all Project roads and trails in accordance with BLM road and trail assessment protocols (e.g., BLM 2006, 2012, 2015). As part of this effort, SCE will:

- Identify and map all Project roads and trails used by SCE to access Project facilities. All maps will be produced using data maintained in a Geographic Information System (GIS) that meets current BLM mapping standards, and will include land ownership.
- Consult with the BLM to determine if any of the Project roads and trails have been previously inventoried and assessed by the BLM and included in the BLM's asset management system. Updated data and information about roads and trails that is developed as part of this study will be provided to the BLM, as appropriate.
- Conduct an assessment to characterize the current condition of Project roads and trails, and their associated drainage features. The inventory and assessment will include the following information for each asset (road, primitive road, or trail) or asset segment:
    - Asset type (road, primitive road, or trail);
    - Latitude, longitude, meridian, township, range, section, aliquot part;
    - Land ownership/jurisdiction;
    - Functional class;
    - Route, road, or spur number (and common name, if applicable);
    - Beginning and end points, and overall length;
    - Segments, if applicable;
    - Maintenance responsibility;
    - Maintenance level;
    - Condition;
    - Surface type (e.g., paved, gravel, dirt);
    - Average width;
    - Overall road condition, including identification of issues pertaining to condition such as potholes, ruts, loose aggregate, missing aggregate, cracking, debris, and excessive vegetation;
    - Location, size , and condition of culverts and other drainage features;
    - Location of bridge crossings;
    - Location and condition of erosion control features;

  - Estimated useful remaining life span of surface treatments and erosion and drainage features;
  - Location and condition of safety, traffic control, and informational signs and access control features such as gates and other closure methods;
  - Potential natural resource issues that may occur along Project roads and trails, such as stream crossings and riparian areas; and
  - Potential traffic safety concerns such as blind spots, poor sight distance, inadequate signage, and hazard trees.
- Characterize SCE's use of Project roads and trails, including season of use and level of use.
- Characterize other uses of Project roads and trails.
- Characterize SCE's maintenance practices, responsibilities, and schedules.
- Identify existing agreements (e.g., maintenance agreements, easements, rights of way, special use permits) between SCE, the BLM, Tulare County, and private property owners, as applicable, including associated termination dates.

Helicopter Landing Sites

- Identify and map the location, and document the condition, of helicopter landing sites that are used for routine operation and maintenance of the Project, including sites used for snow surveys and other data gathering activities.
- Characterize the frequency and seasonality of their use, and describe any associated Project-related maintenance activities.

SCHEDULE:

Date	Activity
November 2017–March 2018	Consult with stakeholders and compile existing resource information
April–June 2018	Conduct field surveys
July–October 2018	Analyze data and prepare draft report
November 2018	Distribute draft report to the stakeholders
December 2018–February 2019	Stakeholders review and provide comments on draft report (90 days)
March–May 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

U.S. Bureau of Land Management (BLM). 2006. Travel and Transportation Management. Planning and Conducting Route Inventories. Technical Reference 9113-1.

____. 2012. H-9115-2 – Primitive Roads Inventory and Condition Assessment Guidance and Instructions Handbook. Released March 6, 2012.

____. 2015. H-9113-2 – Road Inventory and Condition Assessment Guidance & Instructions. Released May 4, 2015.

TABLE

Table LAND 1-1. Description of Project Access Roads and Trails.

Name	Start	End	Length - Ft (Approximate)	Width - Ft (Approximate)	Surface (Unconfirmed)	Comments
Project Access Roads						
Kaweah No. 1 Development						
Kaweah No. 1 Flowline Access Road - Bear Canyon	Mineral King Road	Kaweah No. 1 Flowline	165	12	Paved	Bear Canyon Road
Kaweah No. 1 Flowline Access Road - Grapevine	Mineral King Road	Kaweah No. 1 Flowline	1,662	12	Aggregate	Grapevine Road
Kaweah No. 1 Flowline Access Road - Lower Pine	Mineral King Road	Kaweah No. 1 Flowline	1,023	16	Aggregate	Lower Pine Road
Kaweah No. 1 Flowline Access Road - Lumberyard	Mineral King Road	Kaweah No. 1 Flowline	300	16	Aggregate	Lumberyard Road
Kaweah No. 1 Flowline Access Road - Slick Rock	Mineral King Road	Kaweah No. 1 Flowline	310	16	Aggregate	Slick Rock Road
Kaweah No. 1 Flowline Access Road - Summit	Mineral King Road	Kaweah No. 1 Flowline	2,554	16	Paved/Aggregate	Summit Road
Kaweah No. 1 Flowline Access Road - Unnamed	Mineral King Road	Kaweah No. 1 Flowline	135	12	Native	Private but used - non-SCE gate
Kaweah No. 1 Flowline Access Road - Upper Pine	Mineral King Road	Kaweah No. 1 Flowline	724	16	Aggregate	Upper Pine Road
Kaweah No. 1 Forebay Road	Craig Ranch Road	Kaweah No. 1 Flowline	6,125	12	Aggregate	
Kaweah No. 1 Intake Road	Mineral King Road	Kaweah No. 1 Flowline	1,155	12	Paved	
Kaweah No. 2 Development						
Kaweah No. 2 Flowline Access Road - Canal 2 Brushout Grid	Canyon View Drive Spur	Kaweah No. 2 Flowline	90	12	Native	Brushout grid access
Kaweah No. 2 Flowline Access Road - Canal 4 East	Kaweah No. 2 Flowline East Access Road	Kaweah No. 2 Flowline	386	12	Native	Canal 4 access
Kaweah No. 2 Flowline Access Road - Canal 4 West	Kaweah No. 2 Flowline East Access Road	Kaweah No. 2 Flowline	688	12	Native	Canal 4 access
Kaweah No. 2 Flowline Access Road - Canal 5	Kaweah No. 2 Flowline East Access Road	Kaweah No. 2 Flowline	1,215	12	Native	Referred to as "Flume 4 Jumpup"
Kaweah No. 2 Flowline Access Road - Canal 6 East	Kaweah No. 2 Flowline East Access Road	Kaweah No. 2 Flowline	341	12	Native	
Kaweah No. 2 Flowline Access Road - Canal 6 West	Kaweah No. 2 Flowline East Access Road	Kaweah No. 2 Flowline	167	12	Native	
Kaweah No. 2 Flowline Access Road - Flume 8	Kaweah No. 2 Flowline Center Access Road	Kaweah No. 2 Flowline	277	12	Native	
Kaweah No. 2 Flowline Access Road - Flume 11	Kaweah No. 2 Flowline West Access Road	Kaweah No. 2 Flowline	195	16	Native	Split to access Flume 11
Kaweah No. 2 Flowline Access Road - Open Siphon Grids	Kaweah No. 3 Powerhouse Road	Kaweah No. 2 Flowline	301	24	Aggregate	
Kaweah No. 2 Flowline Access Road - Red Barn	Dinely Road	Kaweah No. 2 Flowline	703	20	Paved	
Kaweah No. 2 Flowline Center Access Road	Dinely Road	Dinely Road	4,642	16	Paved/Aggregate/Native	Access Road - Connects to Dinely Road on both ends
Kaweah No. 2 Flowline East Access Road	Dinely Road	Canyon View Drive	5,751	12	Paved/Aggregate	
Kaweah No. 2 Flowline West Access Road	Kaweah River Drive	Kaweah No. 2 Flowline Access Road - Flume 11	6,331	16	Paved/Aggregate/Native	
Kaweah No. 2 Forebay Road	Kaweah No. 2 Flowline West Access Road	Kaweah No. 2 Forebay	1,561	16	Paved/Aggregate/Native	Split from Kaweah No. 2 West Access Road to Forebay
Kaweah No. 2 Intake Road	Kaweah No. 3 Powerhouse Road	Kaweah No. 2 Intake	603	16	Paved	
Kaweah No. 2 Penstock Road	Kaweah No. 2 Flowline West Access Road	Kaweah No. 2 Penstock	444	12	Paved/Native	
Kaweah No. 2 Powerhouse Road	Kaweah River Drive	Kaweah No. 2 Powerhouse	1,068	16	Paved	
Kaweah No. 3 Development						
Kaweah No. 3 Forebay Road	Kaweah No. 3 Powerhouse Road	Kaweah No. 3 Forebay	8,704	12	Aggregate	
Kaweah No. 3 Powerhouse Road	State Highway 168	Kaweah No. 3 Powerhouse	1,165	20	Paved	
		TOTAL:	**48,785**			
Project Trails						
Kaweah No. 1 Development						
Kaweah No. 1 Flowline Access Trail - Grand Canyon	Mineral King Road	Kaweah No. 1 Flowline	317	4	Aggregate	Grand Canyon Trail
Kaweah No. 1 Solar Panel Access Trail	Mineral King Road	Kaweah No. 1 Solar Panel	256	4	Native	
Kaweah No. 2 Development						
Kaweah No. 2 Flowline Access Trail - Canal 11	Kaweah No. 2 Flowline West Access Road	Kaweah No. 2 Flowline	89	4	Native	
Kaweah No. 2 Flowline Access Trail - Canal 13	Kaweah No. 2 Flowline West Access Road	Kaweah No. 2 Flowline	94	4	Native	
Kaweah No. 2 Flowline Access Trail - Canal 15	Kaweah No. 2 Flowline West Access Road	Kaweah No. 2 Flowline	114	4	Native	
Kaweah No. 2 Flowline Access Trail - Canal 2	Canyon View Drive Spur	Kaweah No. 2 Flowline	39	4	Native	Canal 2 Footbridge Access Trail
Kaweah No. 2 Flowline Access Trail - Canal 4	Kaweah No. 2 Flowline Access Road - Canal 4 East	Kaweah No. 2 Flowline	52	4	Native	Canal 4 Access Trail
Kaweah No. 2 Flowline Access Trail - Canal 5	Kaweah No. 2 Flowline Access Road - Canal 5	Kaweah No. 2 Flowline	44	4	Native	"Flume 4 Jumpup"
Kaweah No. 2 Flowline Access Trail - Canal 6	Kaweah No. 2 Flowline Access Road - Canal 6 East	Kaweah No. 2 Flowline	40	4	Native	
Kaweah No. 2 Flowline Access Trail - Open Siphon	State Highway 168	Kaweah No. 2 Flowline	86	4	Native	
Kaweah No. 2 Flowline Access Trail - Water User 14	Kaweah No. 2 Flowline West Access Road	Kaweah No. 2 Flowline	49	4	Native	
Kaweah No. 2 Flowline Access Trail - Water User 9	Kaweah No. 2 Flowline Center Access Road	Kaweah No. 2 Flowline	85	4	Native	
Kaweah No. 2 Flowline Access Trail - Wildlife Crossing 2	Kaweah No. 2 Flowline Access Road - Open Siphon Grids	Kaweah No. 2 Flowline	72	4	Native	Wildlife Crossing 2 Access Trail
Kaweah No. 2 Powerhouse River Access Trail	Kaweah No. 2 Powerhouse Road	Kaweah No. 2 Powerhouse River Access	95	4	Native	Kaweah No. 2 Powerhouse River Access
Kaweah No. 3 Development						
Kaweah No. 3 Flowline Access Trail	Kaweah No. 3 Forebay	Sequoia National Park Boundary	2947	4	Native	
		TOTAL:	**4,379**			

MAPS

SEQUOIA - KINGS CANYON WILDERNESS

SEQUOIA NATIONAL PARK

N. Fork Dr.

North Fork Kaweah River

Marble Fork Kaweah River

Marble Fork Diversion Dam (Non-Project Facility)

Middle Fork Kaweah River

Middle Fork Diversion Dam (Non-Project Facility)

Kaweah River

Kaweah No. 3 Flowline (Non-Project Facility)

Kaweah No. 3 PH to Three Rivers Substation Transmission Line

Kaweah No. 2 Diversion Dam

K3 Forebay

Kaweah No. 2 Flowline

Kaweah No. 3 Flowline

Kaweah No. 3 Powerhouse

Kaweah No. 1 Powerhouse

Kaweah No. 2 Powerhouse

K2 Forebay

K1 Forebay Tank

Mineral King Rd.

East Fork Kaweah River

Kaweah River Dr.

Kaweah No. 1 Flowline

Three Rivers Substation (Non-Project Facility)

Kaweah No. 1 Diversion Dam

THREE RIVERS

Kaweah River

2-2a

2-2b

2-2c

2-2d

2-2e

2-2f

2-2g

198

Facilities

- Powerhouse
- Diversion
- Utility
- Forebay
- Flowline
- Penstock
- Transmission Line

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

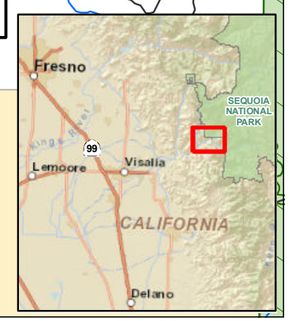
Land Jurisdiction*

- Bureau of Land Management
- National Park Service
- Private (Blank)

*SOURCE: BLM 2012.
Kaweah Project entirely within Tulare County.

Land Management

- National Wilderness Area



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An EDISON INTERNATIONAL® Company

Eastern Hydro Generation

Map LAND 1-1

Kaweah Project Index Map

Date: 8/12/2015

0 0.25 0.5 Miles

Projection: UTM Zone 11
Datum: NAD 83

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WUD-CANAL 9
WUD-Flume 9 Access Trail
7
Flume 9
Flume 9.5
Flume 9.75
Flume 10
Flume 11
Kaweah No. 2 Flowline Access Trail - Canal 11
Kaweah No. 2 Flowline Access Road - Flume 11
Kaweah No. 2 Flowline
Kaweah No. 2 Flowline Canal Access Road
Flume 12
Kaweah No. 2 Flowline Access Trail - Canal 13
Flume 13
Flume 14
Kaweah No. 2 Flowline West Access Road
Dinely Road
6
Kaweah No. 1 Powerhouse
K1 Switchyard
K1 Powerhouse Campus Power Lines
Kaweah No. 1 Powerhouse Transmission Tap Line
11208800
K1 Maintenance Shop
K1 Old Machine Shop
K1 Workshop
K1 Office
K1 Powerhouse K1 Office Building Fiber Communication Line
K1 Penstock
198
Kaweah No. 3 Powerhouse to Three Rivers Substation Transmission Line
K1 Powerhouse Campus Alternate Power Line
K1 Office Building to K1 Forebay Tank Fiber Communication Line
K1 Office Building to K1 Forebay Tank Power Line
Mineral King Road
WUD-FLUME 14
Kaweah No. 2 Flowline Access Trail - WUD-Flume 14
Flume 15
Kaweah No. 2 Flowline Access Trail - Canal 15
Kaweah No. 2 Forebay Road
K2 Penstock
K2 Powerhouse to K2 Forebay Fiber Communication Line
Kaweah No. 2 Penstock Road
Kaweah No. 2 Powerhouse Road
K2 Powerhouse to K2 Forebay Power Line
11208818
Kaweah No. 2 Powerhouse
K2 Switchyard
5
K2 Powerhouse Alternate Power Line
Kaweah No. 2 Powerhouse River Access Trail
Kaweah No. 2 Powerhouse Transmission Tap Line
Kaweah River Drive
KAWEAH RIVER
Craig Ranch Road

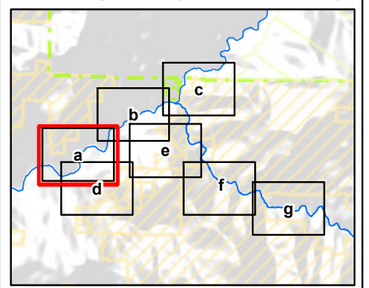
Facilities
- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features
- Watercourse
- Water Body
- Water User Diversion
- River Mile

Transportation
- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*
- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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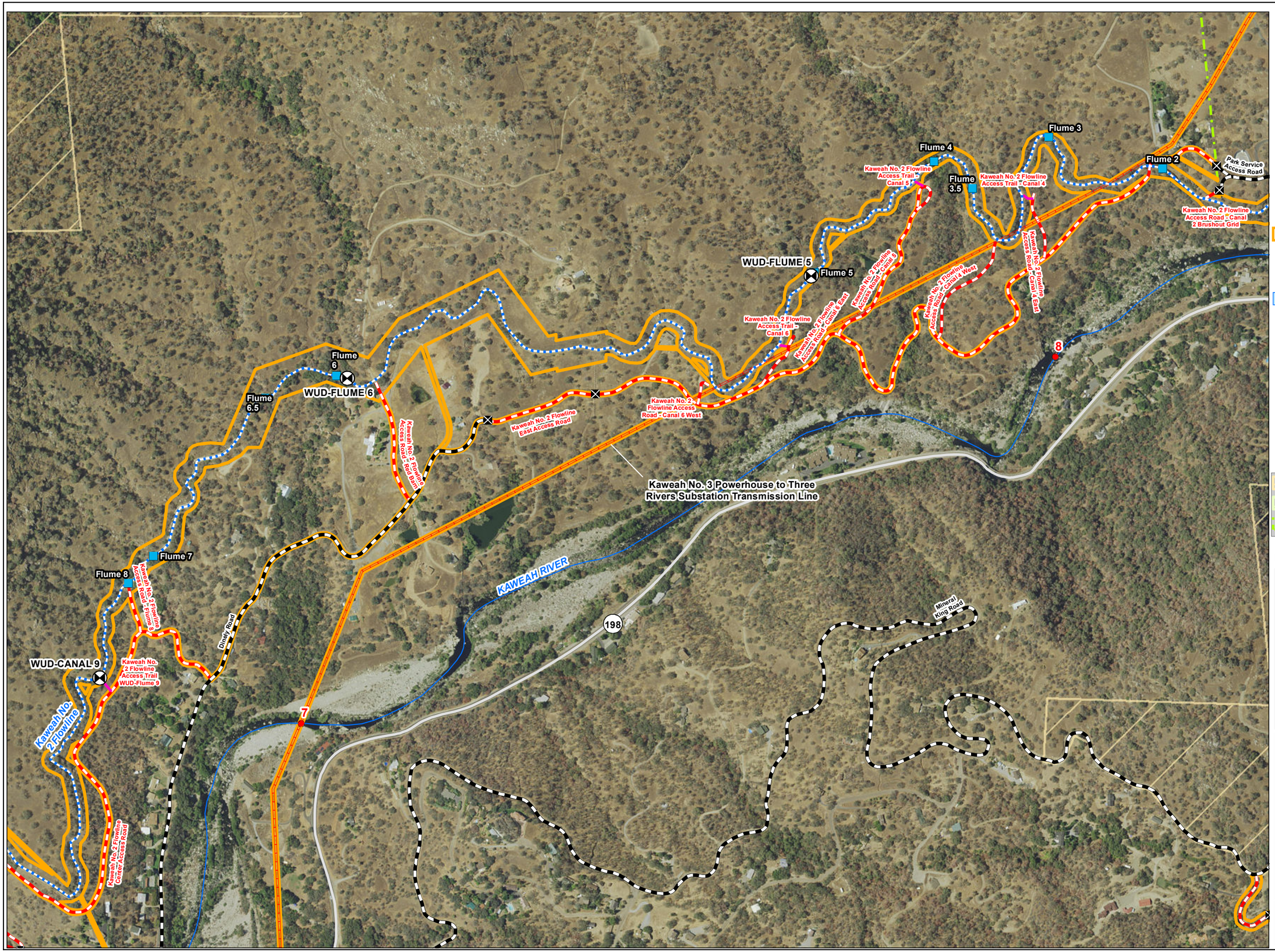
Eastern Hydro Generation

Map LAND 1-1a
Kaweah Project

0 250 500 Feet

Date: 9/1/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

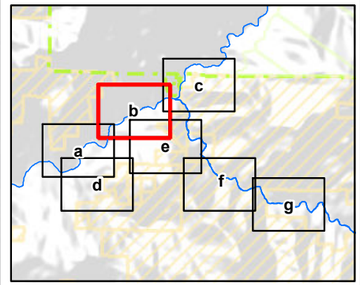
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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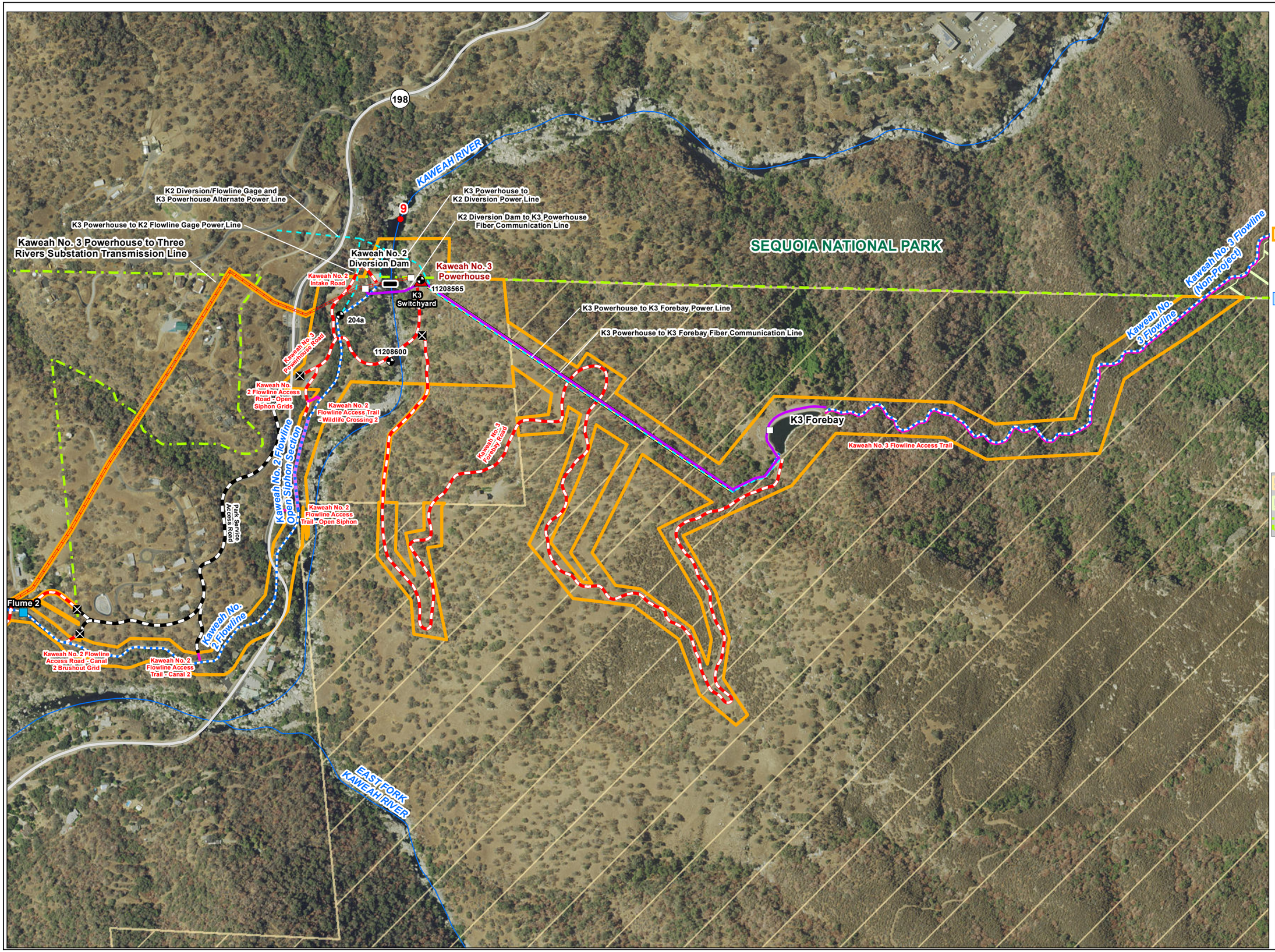
Eastern Hydro Generation

Map LAND 1-1b
Kaweah Project

0 250 500 Feet

Date: 9/1/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

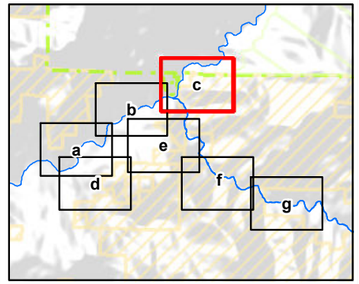
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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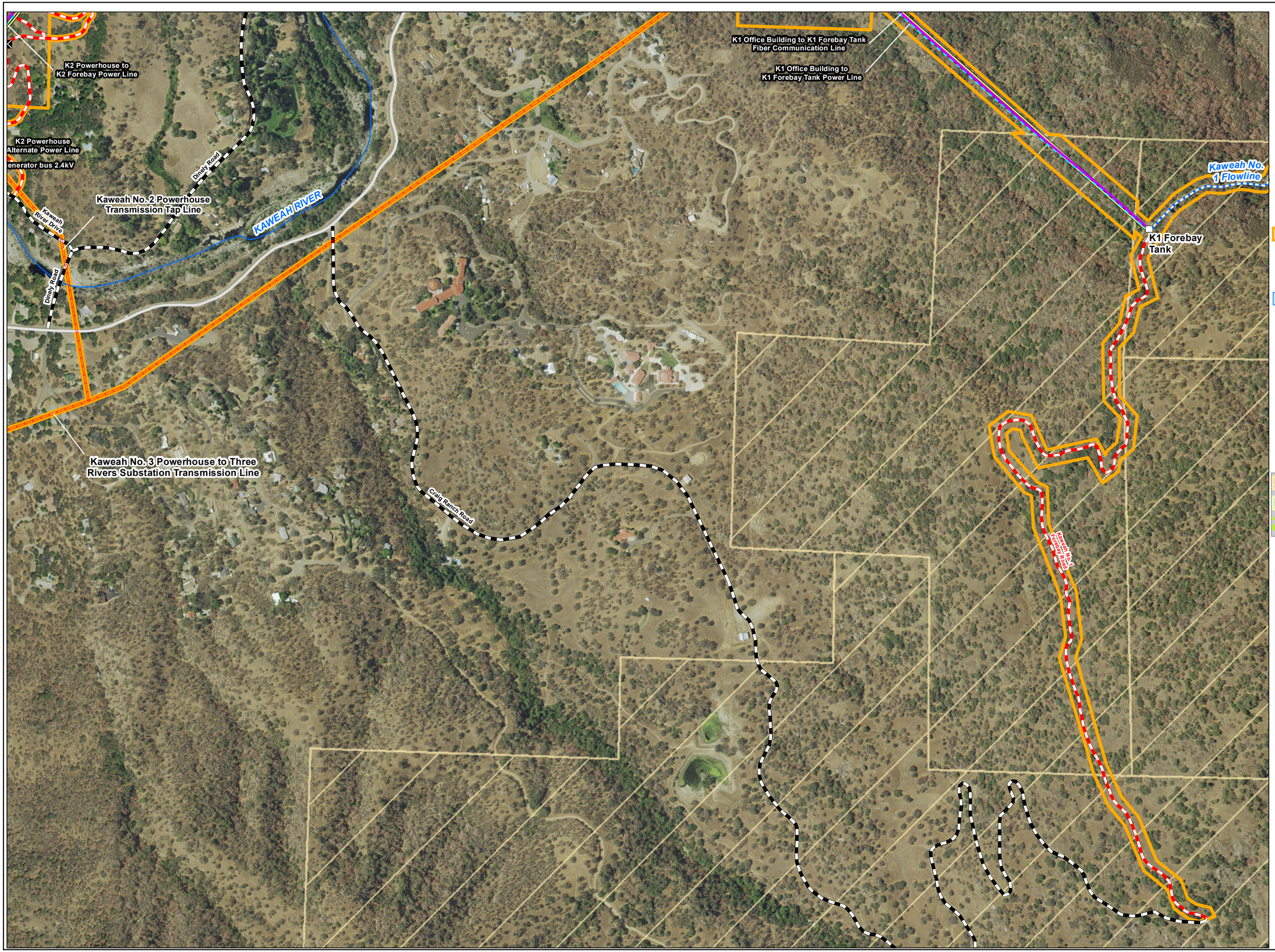
Eastern Hydro Generation

Map LAND 1-1c
Kaweah Project

0 250 500 Feet

Date: 9/1/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

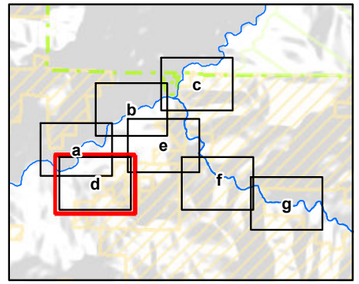
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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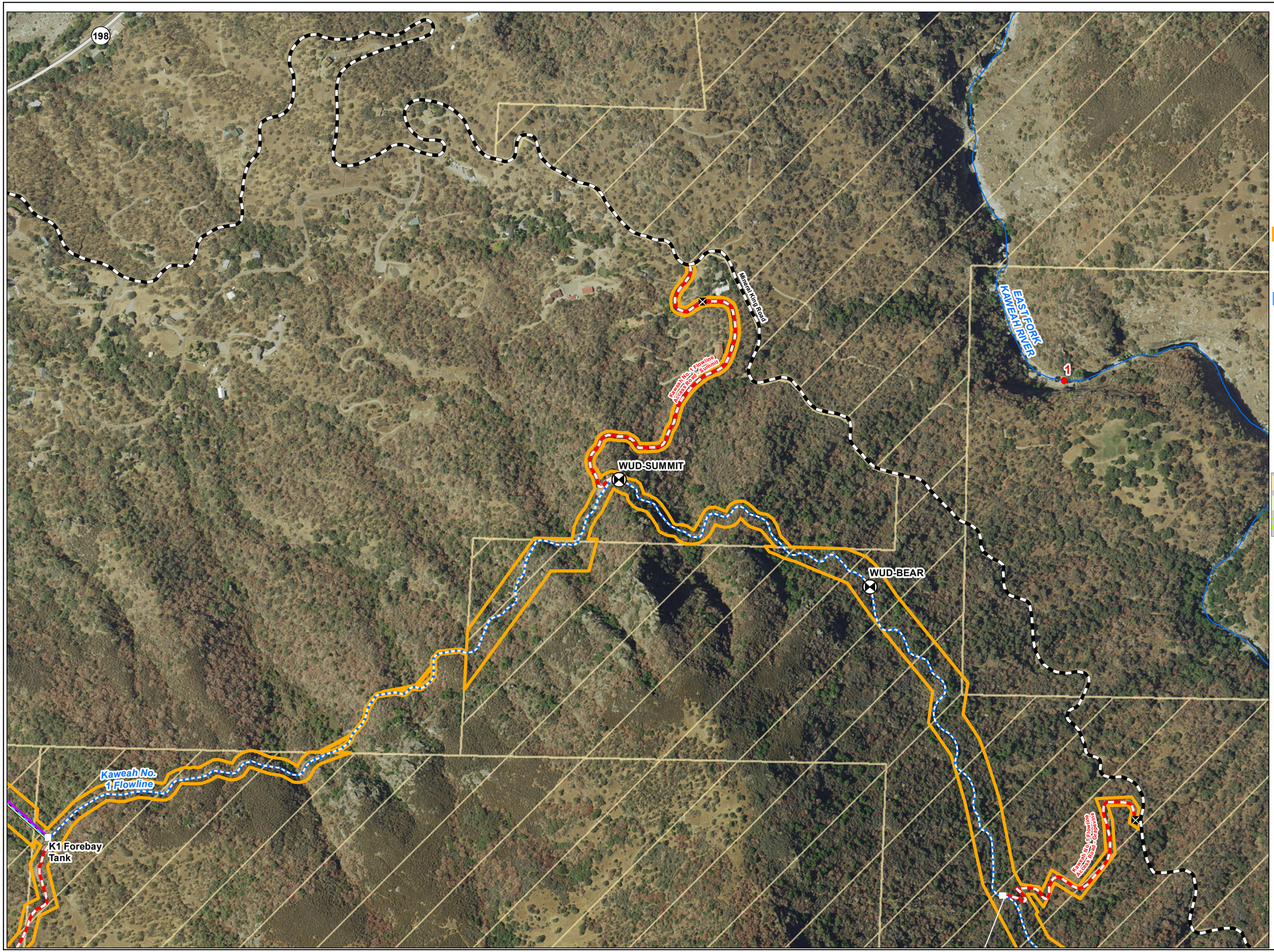
Eastern Hydro Generation

Map LAND 1-1d
Kaweah Project

0 250 500 Feet

Date: 9/1/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

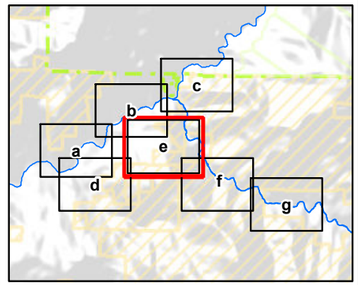
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



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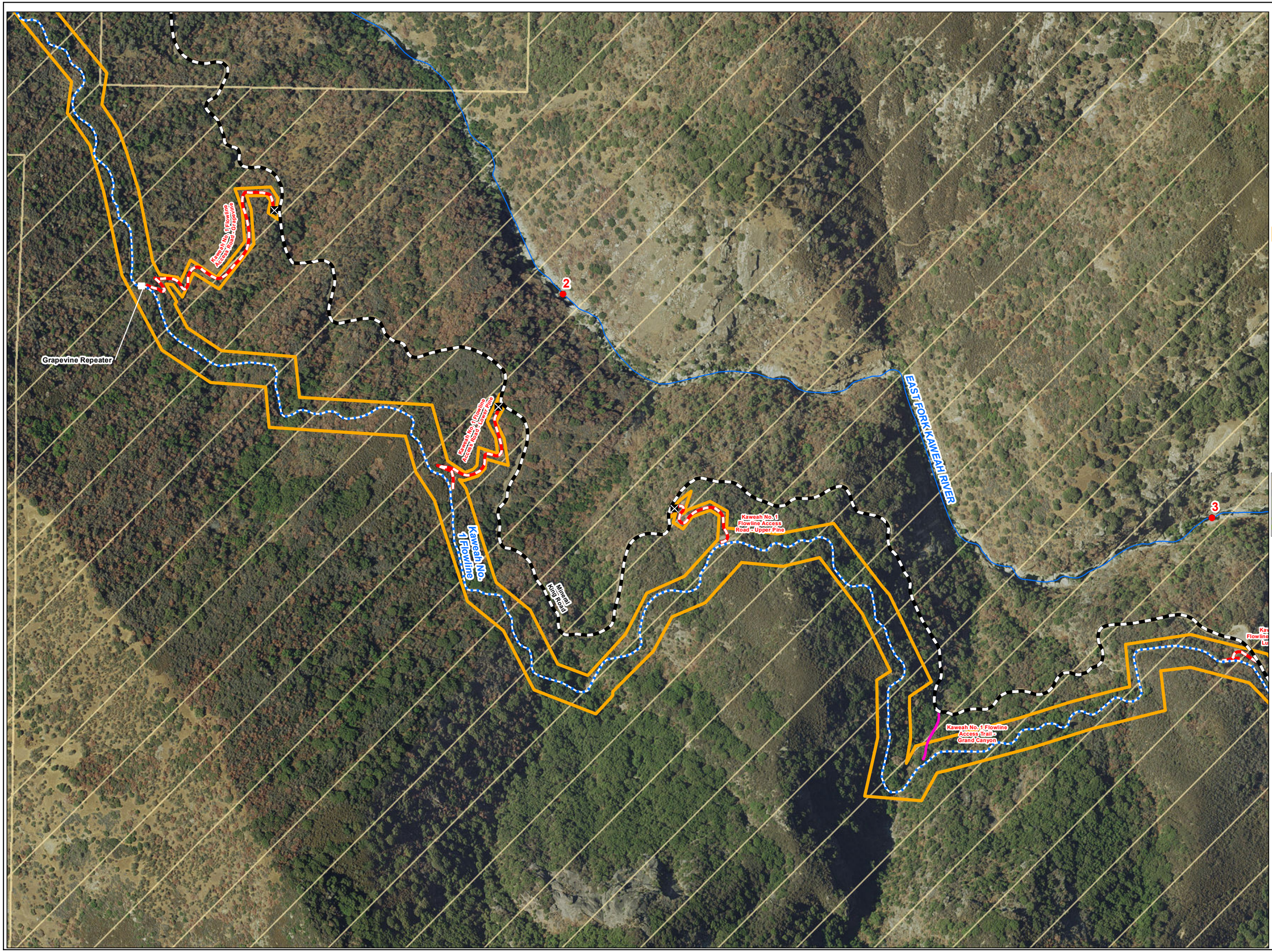
Eastern Hydro Generation

Map LAND 1-1e
Kaweah Project

0 250 500 Feet

Date: 9/1/2015

Projection: UTM Zone 11
Datum: NAD 83



Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

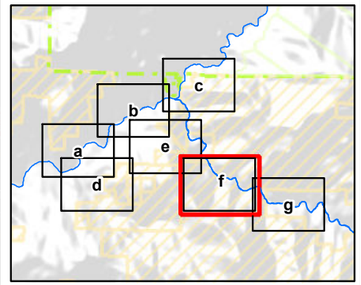
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



SOUTHERN CALIFORNIA EDISON®
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Eastern Hydro Generation

Map LAND 1-1f
Kaweah Project

0 250 500 Feet

Date: 9/1/2015

Projection: UTM Zone 11
Datum: NAD 83

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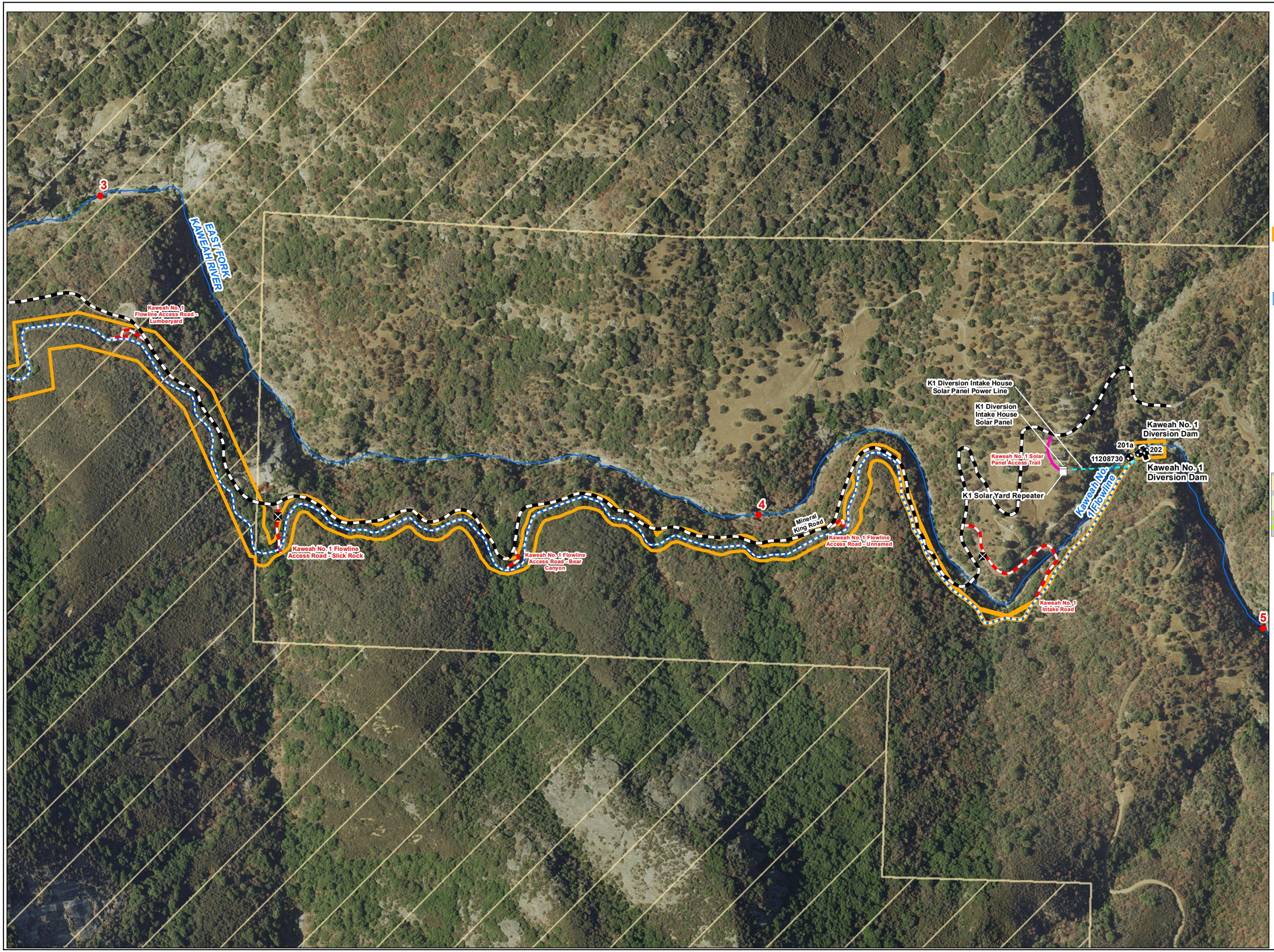


Facilities

- Powerhouse
- Diversion
- Flowline
- Penstock
- Flume Segment
- Ancillary Facility
- Gage
- Transmission Line
- Power Line
- Communication Line
- FERC Boundary

Other Features

- Watercourse
- Water Body
- Water User Diversion
- River Mile

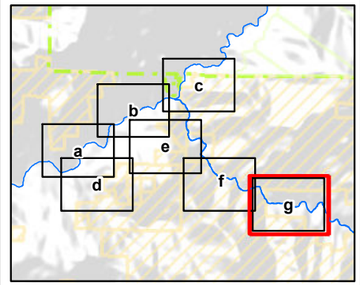
Transportation

- Project Road
- Project Trail
- Non-Project General Access Road
- Gate

Land Jurisdiction*

- Bureau of Land Management
- Wilderness Area
- National Park Service

*SOURCE: BLM 2012
Kaweah Project entirely within Tulare County



SOUTHERN CALIFORNIA EDISON®
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Eastern Hydro Generation

Map LAND 1-1g
Kaweah Project

0 250 500 Feet

Date: 9/1/2015

Projection: UTM Zone 11
Datum: NAD 83

LAND-2 Aesthetic Resources

POTENTIAL RESOURCE ISSUE:

- Aesthetic conditions, including visual quality and noise.

PROJECT NEXUS:

- The presence of Project facilities could affect visual resources.
- Helicopter use for routine operations and maintenance projects may have noise effects (NPS 2015).
- Spills from Kaweah No. 3 Forebay may have visual and noise effects (NPS 2015).

POTENTIAL LICENSE CONDITIONS:

- Visual Resources Management Plan.
- Specific measures designed to reduce noise effects associated with helicopter use, to the extent practicable.
- Specific measures to reduce visual and noise effects associated with spills from Kaweah No. 3 Forebay.

STUDY OBJECTIVES:

- Identify and map visual resources in the vicinity of the Kaweah Project, including visual management objectives established by the Bureau of Land Management (BLM), Tulare County, and/or the National Park Service (NPS), as appropriate.
- Document the existing visual condition (EVC) of Project facilities from Key Observation Points (KOPs) established in consultation with the BLM, Tulare County, and/or the NPS, as appropriate.
- Determine whether the Project facilities meet established BLM, Tulare County, and/or NPS visual resource management objectives and assess compatibility of Project facilities with surrounding landscape.
- Assess helicopter noise associated with routine operation and maintenance of the Project.
- Assess visual condition and noise associated with spills from the Kaweah No. 3 Forebay.

EXTENT OF STUDY AREA:

Visual Resource Study

The Study Area for the visual resource study includes the Project facilities identified in Table LAND 2-1 and their associated viewsheds. The viewsheds include primary travel routes, recreation areas, and water bodies from which the existing Project facilities are visible to the public.

Helicopter Noise Study

The study area for helicopter noise study includes the area around the existing landing pad and other sensitive areas with sensitive receptors that may be affected by helicopter noise associated with routine operations and maintenance of the Project, to be determined in consultation with the NPS.

Kaweah No. 3 Forebay Spill Study

The study area associated with the assessment of Kaweah No. 3 Forebay spills will be limited to areas in the immediate vicinity of the spill channel where the public can either view and/or hear the spill. These areas will be identified in consultation with the NPS.

STUDY APPROACH:

The Kaweah Project facilities are located on private land managed by Tulare County and on public land managed by the BLM. Therefore, aesthetic resources will primarily be assessed with respect to management objectives established by Tulare County and/or the BLM. Although none of the Project facilities are located within the boundaries of the Sequoia Kings Canyon National Park (SKCNP), some are visible or can be heard from locations within the SKCNP. Therefore, this study will consider National Park Service (NPS) visual and noise management objectives, where appropriate.

Visual Resource Study

A thorough visual resource study was conducted in 1989 as part of the previous relicensing effort (KEA 1989). That study assessed the visual compatibility of the Kaweah Project facilities with respect to the surrounding landscape using the BLM's Visual Resources Management (VRM) System, following the Visual Resource Inventory guidelines outlined in BLM Manual Handbook 8410-1 (BLM 1986a) and the visual contrast rating system guidelines outlined in the BLM's Visual Resource Contrast Rating Manual H-8431-1 (BLM 1986b). These guidelines are the same as those used today.

All of the primary Project facilities that are readily visible from public viewing locations were systematically evaluated as part of the Visual Resource Study conducted in 1989. Therefore, Project facilities that were evaluated in 1989 will not be reevaluated as part of this study. The current study will utilize and build on information that was developed in 1989, and will focus on assessing any facilities that were constructed or substantially modified after the 1989 study was completed. The facilities requiring an updated visual assessment include:

- Kaweah No. 1 Powerhouse Campus
- Kaweah No. 2 Diversion Dam and connecting flowline

The following methods will be utilized to inventory visual resources in the vicinity of the Kaweah Project and to assess the EVC and compatibility of Project facilities constructed or substantially modified since 1989 with respect to the surrounding landscape.

- Compile and summarize pertinent BLM, Tulare County and NPS management direction regarding visual resources, including direction contained in the following documents:
  - BLM Bakersfield Field Office Approved Resource Management Plan (BLM 2014);
  - Tulare County General Plan 2030 Update and pertinent area plans (e.g., Three Rivers Area Plan); and
  - Sequoia & Kings Canyon General Management Plan (NPS 2012).
- Prepare maps showing the Project facilities with respect to visual resource inventory information and corresponding tables.

- Evaluate the EVC of any newly constructed or substantially modified Project facilities (i.e., post-1989) with respect to the existing landscape.
    - Identify and map KOPs in consultation with BLM, Tulare County, and NPS visual resource specialists. KOPs will be located along commonly traveled routes or other likely observation points.
    - Photograph the Project facilities from established KOPs.
    - Document the EVC of the Project facilities from established KOPs using the BLMs Visual Resource Contrast Rating system (BLM 1986).
    - For consistency, the Project facilities will be assessed using the BLMs Visual Contrast Rating System, regardless of land jurisdiction.
    - As outlined in BLM guidance manual 8431-1 (BLM 1986), the Visual Contrast Rating will consider form, line, color, texture, scale and space.
- Use the contrast ratings to determine whether the EVC of Project facilities meets the established visual resource management objectives. In cases where the objectives are not met, the reasons why the objectives are not met will be documented.
- Use the contrast ratings to determine visual compatibility with the surrounding landscape, based on visual resource inventory information (e.g., visual sensitivity and distance zones from KOPs).

Helicopter Noise Study

- Identify and document Tulare County, BLM, and NPS noise policies and noise criteria.
- Identify specific noise-sensitive locations in consultation with the NPS.
- Describe SCE routine operation and maintenance activities that involve helicopters, including timing, duration, location, season of use, and distance from sensitive receptors.
- Measure noise levels at sensitive locations for comparison to established noise criteria.

Kaweah No. 3 Forebay Spill Study

- Describe circumstances under which spill from Kaweah No. 3 Forebay occurs, including historic frequency and duration.
- Consult with NPS to identify specific location(s) where spill noise and/or visual condition is a concern (study locations).
- Measure noise levels during spill events at study locations to document actual noise levels.
- Photo document visual conditions during spill events. Compare with photographs taken during non-spill events.

SCHEDULE:

Date	Activity
November 2017–March 2018	Consult with stakeholders and compile existing resource information
April–June 2018	Conduct field surveys (visual resource and helicopter noise assessments)
Concurrent with spill event	Conduct Kaweah No. 3 Forebay noise and visual assessment
July–October 2018	Analyze data and prepare draft report
November 2018	Distribute draft report to the stakeholders
December 2018–February 2019	Stakeholders review and provide comments on draft report (90 days)
March–May 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

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TABLE

Table LAND 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Diversion Dams and Pools				
Kaweah No. 1 Diversion Dam and Pool (East Fork Kaweah River)	X			
Kaweah No. 2 Diversion Dam and Pool (Kaweah River)	X			
Flowlines				
Kaweah No. 1 Flowline	X			
Kaweah No. 2 Flowline	X			
Kaweah No. 3 Flowline	X			
Forebays				
Kaweah No. 1 Forebay Tank and Spillway	X			
Kaweah No. 2 Forebay and Spillway	X			
Kaweah No. 3 Forebay and Spillway	X			
Penstocks				
Kaweah No. 1 Penstock	X			
Kaweah No. 2 Penstock	X			
Kaweah No. 3 Penstock	X			
Powerhouses and Switchyards				
Kaweah No. 1 Powerhouse and Switchyard	X			
Kaweah No. 2 Powerhouse and Switchyard	X		X (Tailrace Only)	
Kaweah No. 3 Powerhouse and Switchyard	X			
Transmission Lines and Transmission Tap Lines				
Kaweah No. 3 Powerhouse to Three Rivers Substation Transmission Line	X			
Kaweah No. 1 Powerhouse Transmission Tap Line	X			
Kaweah No. 2 Powerhouse Transmission Tap Line	X			
Power Lines				
Kaweah No. 1 Diversion Intake House Solar Panel to Kaweah No. 1 Diversion Dam Power Line (solar)	X		X	
Kaweah No. 1 Switchyard to Kaweah No. 1 Maintenance Building Power Line	X			
Kaweah No. 1 Switchyard to Kaweah No. 1 Office Building Power Line	X			
Kaweah No. 1 Switchyard to Kaweah No. 1 Old Machine Shop Power Line	X			
Kaweah No. 1 Switchyard to K1 Workshop Power Line	X			
Kaweah No. 1 Office Building to K1 Forebay Tank Power Line	X			

Table LAND 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Power Lines (continued)				
Kaweah No. 1 Powerhouse Campus Alternate Power Line	X			
Kaweah No. 2 Diversion/Flowline Gage and Kaweah No. 3 Powerhouse Alternate Power Line	X			X
Kaweah No. 2 Powerhouse Alternate Power Line	X			
Kaweah No. 2 Powerhouse to Kaweah No. 2 Forebay Power Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 2 Diversion Power Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 2 Flowline Gage Power Line	X			X
Kaweah No. 3 Powerhouse to Kaweah No. 3 Forebay Power Line	X			
Communication Lines				
Kaweah No. 1 Powerhouse to Kaweah No. 1 Office Building Fiber Communication Line	X			
Kaweah No. 1 Office Building to Kaweah No. 1 Forebay Tank Fiber Communication Line	X			
Kaweah No. 2 Diversion Dam to Kaweah No. 3 Powerhouse Fiber Communication Line	X			
Kaweah No. 2 Powerhouse to Kaweah No. 2 Forebay Fiber Communication Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 3 Forebay Fiber Communication Line	X			
Kaweah No. 3 Forebay to Kaweah No. 3 Forebay Inlet Fiber Communication Line	X			
Stream Gages				
East Fork Kaweah River Conduit 1 at Power Plant near Hammond CA (USGS Gage No. 11208800) (SCE Gage No. 200a)	X			
East Fork Kaweah River near Three Rivers CA (USGS Gage No. 11208730) (SCE Gage No. 201)	X			
Kaweah No. 1 Minimum Instream Flow Release (SCE Gage No. 201a)	X			
East Fork Kaweah River Conduit 1 near Three Rivers CA (SCE Gage No. 202)	X			
Kaweah River below Conduit No. 2 near Hammond CA (USGS Gage No. 11208600) (SCE Gage No. 203)	X			
Kaweah River Conduit No. 2 near Hammond CA (SCE Gage No. 204a)	X			
Kaweah River Conduit No. 2 at Power Plant near Hammond CA (USGS Gage No. 11208818) (SCE Gage No. 205a)	X			

Table LAND 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Stream Gages (continued)				
Middle Fork Kaweah River Conduit No. 3 at Power Plant near Hammond CA (USGS Gage No. 11208565) (SCE Gage No. 206a)	X			
Project Access Roads				
Kaweah No. 1 Development				
Kaweah No. 1 Flowline Access Road – Bear Canyon	X		X	
Kaweah No. 1 Flowline Access Road – Grapevine	X			
Kaweah No. 1 Flowline Access Road – Lower Pine	X			
Kaweah No. 1 Flowline Access Road – Lumberyard	X			
Kaweah No. 1 Flowline Access Road – Slick Rock	X		X	
Kaweah No. 1 Flowline Access Road – Summit	X			
Kaweah No. 1 Flowline Access Road – Unnamed	X		X	
Kaweah No. 1 Flowline Access Road – Upper Pine	X			
Kaweah No. 1 Forebay Road	X			
Kaweah No. 1 Intake Road	X		X	
Kaweah No. 2 Development				
Kaweah No. 2 Flowline Access Road – Canal 2 Brushout Grid	X		X	
Kaweah No. 2 Flowline Access Road – Canal 4 East	X		X	
Kaweah No. 2 Flowline Access Road – Canal 4 West	X		X	
Kaweah No. 2 Flowline Access Road – Canal 5	X		X	
Kaweah No. 2 Flowline Access Road – Canal 6 East	X		X	
Kaweah No. 2 Flowline Access Road – Canal 6 West	X		X	
Kaweah No. 2 Flowline Access Road – Flume 8	X			
Kaweah No. 2 Flowline Access Road – Flume 11	X		X	
Kaweah No. 2 Flowline Access Road – Open Siphon Grids	X			
Kaweah No. 2 Flowline Access Road – Red Barn	X		X	
Kaweah No. 2 Flowline Center Access Road	X		X	
Kaweah No. 2 Flowline East Access Road	X			
Kaweah No. 2 Flowline West Access Road	X		X	
Kaweah No. 2 Forebay Road	X			
Kaweah No. 2 Intake Road	X			X

Table LAND 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Project Access Roads (continued)				
Kaweah No. 2 Development (continued)				
Kaweah No. 2 Penstock Road	X			
Kaweah No. 2 Powerhouse Road	X			
Kaweah No. 3 Development				
Kaweah No. 3 Forebay Road	X		X	
Kaweah No. 3 Powerhouse Road	X			
Project Trails				
Kaweah No. 1 Development				
Kaweah No. 1 Flowline Access Trail – Grand Canyon	X		X	
Kaweah No. 1 Solar Panel Access Trail		X		
Kaweah No. 2 Development				
Kaweah No. 2 Flowline Access Trail – Canal 11	X		X	
Kaweah No. 2 Flowline Access Trail – Canal 13	X			
Kaweah No. 2 Flowline Access Trail – Canal 15	X			
Kaweah No. 2 Flowline Access Trail – Canal 2	X			
Kaweah No. 2 Flowline Access Trail – Canal 4	X			
Kaweah No. 2 Flowline Access Trail – Canal 5	X			
Kaweah No. 2 Flowline Access Trail – Canal 6	X			
Kaweah No. 2 Flowline Access Trail – Open Siphon	X			
Kaweah No. 2 Flowline Access Trail – Water User 14	X			
Kaweah No. 2 Flowline Access Trail – Water User 9	X		X	
Kaweah No. 2 Flowline Access Trail – Wildlife Crossing 2	X			
Kaweah No. 2 Powerhouse River Access Trail	X			
Kaweah No. 3 Development				
Kaweah No. 3 Flowline Access Trail	X			
Ancillary and Support Facilities				
Kaweah No. 1 Forebay Tank Repeater	X			
Kaweah No. 1 Powerhouse Campus	X			
Kaweah No. 1 Diversion Intake House Solar Panel		X		
Kaweah No. 1 Solar Yard Satellite Repeater		X		

Table LAND 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Ancillary and Support Facilities (continued)				
Kaweah No. 1 Grapevine Satellite Repeater	X			
Kaweah No. 2 Powerhouse River Access Parking	X			
Kaweah No. 2 Wildlife Bridges	X			
Kaweah No. 2 Wildlife Escape Ramps	X			
Kaweah No. 2 Footbridges	X			
Kaweah No. 3 Wildlife Bridges	X			
Kaweah No. 3 Wildlife Escape Ramps	X			
Kaweah No. 3 Footbridges	X			

Notes:
Property jurisdiction based on multiple sources. Some data has been modified to account for known errors.

Sources:
1. FERC boundary Exhibit G sheets obtained from SCE (Dec. 2014). Sheets filed with FERC in 2009; Sheets 4-6 updated and filed with FERC 2012.
2. Digital FERC boundary obtained from SCE but heavily modified to account for known errors (Dec. 2014)
3. Digital parcel boundary for Tulare County purchased from OGInfo.com LLC (May 2015)
   Parcel Vintage: 02/12/2013
   Attribute Vintage: 02/17/2015

LAND-3 Land Use

POTENTIAL RESOURCE ISSUES:

- Effects of continued project operation on land use and public safety in the Project area; and
- Adequacy of maintenance of Project facilities and appurtenances to meet current and future land uses.

PROJECT NEXUS:

- The licensee is responsible for:
  - Addressing Project-related actions affecting aspects of environmental quality; and
  - Maintaining Project-related facilities and appurtenances.
- Wildlife bridges provide wildlife, cattle and the public access across the Project flowlines.
- Project flowlines could result in mortality of livestock.

POTENTIAL LICENSE CONDITION:

- Modification of existing wildlife bridges and escape routes or development of new protective measures or exclusionary fencing designed to allow ingress/egress of pedestrians or wildlife at select locations, but prevent that of livestock.

STUDY OBJECTIVES:

- Identify the location, condition, use, and maintenance of existing fences, gates, cattle guards, bridges, watering troughs, and escape ramps in the immediate vicinity of Project facilities.
- Characterize SCE's maintenance practices and responsibilities for all exclusionary fencing regardless of land ownership.
- Assess potential safety issues and the resultant impacts to livestock grazing opportunities on adjacent lands and the surrounding livestock management areas which support those lands and operations.
- Identify measures to reduce or avoid impacts to public health and safety.

EXTENT OF STUDY AREA:

The study area includes the land surrounding the Kaweah No. 2 Flowline and Forebay and the Kaweah No. 3 Flowline and Forebay within FERC jurisdiction.

It should be noted that the majority of lands along the bypass reaches and around select Project facilities are privately owned and outside the Federal Energy Regulatory Commission (FERC) Project boundary. For the purposes of the land use study described herein, Southern California Edison (SCE) will take the following steps to obtain approval to conduct studies on private property:

- Notify the landowner of Project relicensing and request authorization to enter property to conduct the field studies.
- If authorization is obtained, SCE will complete studies as described in this technical study plan.

- If authorization is not obtained, SCE will limit field studies to only those lands where landowners have authorized access.

STUDY APPROACH:

Identify Infrastructure

- Identify and map all existing fences, gates, cattle guards, bridges, watering troughs, escape ramps in the immediate vicinity of Project facilities. All maps will be produced using data maintained in a Geographic Information System (GIS) that meets current BLM mapping standards, and will include land ownership.
- Conduct an assessment to characterize the current condition of the aforementioned infrastructure.

Characterize Maintenance Practices and Responsibilities

- Characterize SCE's maintenance practices, responsibilities, and schedules for exclusionary fencing and safety measures.
- Identify existing agreements (e.g., maintenance agreements, easements, rights of way, and special use permits) between SCE, the BLM, Tulare County, and private property owners, as applicable, including associated termination dates.

Assess Livestock Mortality

- Review mammal mortality records for livestock incidents.

Identify Public Safety Measures

- Identify and describe existing programs and measures implemented by SCE for public health and safety (i.e., fencing, barriers, gates, buoy lines, escape ropes, signage, and alarms). The inventory will include a description of the condition of the existing safety features.
- Characterize and document the number, type and location of safety incidents that have occurred in the vicinity of the Project. This effort will be conducted by reviewing existing records and databases maintained by the FERC and by consulting with Project personnel.

SCHEDULE:

Date	Activity
November 2017–April 2018	Consult with stakeholders and compile existing resource information
August 2018–February 2019	Analyze data and prepare draft report
March 2019	Distribute draft report to the stakeholders
March 2019–May 2019	Stakeholders review and provide comments on draft report (90 days)
June–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REC-1 Recreation Resources

POTENTIAL RESOURCE ISSUES:

- Recreation use and opportunities in the vicinity of the Project; and
- Public safety.

PROJECT NEXUS:

- The licensee is responsible for:
  - Addressing Project-related recreational needs; and
  - Maintaining public safety associated with operations and maintenance of the Project.

POTENTIAL LICENSE CONDITION:

- Develop a Recreation Plan that includes measures that are designed to:
  - Address Project-related recreational needs, as appropriate; and
  - Maintain Project-related public safety.

STUDY OBJECTIVES:

- Identify, map and describe all developed recreation facilities (public and private) in the vicinity of the Kaweah Project, including capacity and ownership;
- Identify, map and describe any existing Project-related recreation facilities/area (i.e., "Edison Beach"), including capacity, condition, user conflicts, consistency with applicable accessibility requirements, and operation and maintenance responsibilities;
- Characterize recreation use and opportunities in the immediate vicinity of the Project facilities and in the bypass reaches, including along the Kaweah No. 2 Flowline;
- Document recreation needs identified in current relevant State or local recreation plans and determine whether those needs can be accommodated by existing recreation facilities; and
- Document potential safety issues and existing features or measures that are implemented to protect the public.

EXTENT OF STUDY AREA:

The study area generally includes the Kaweah River Watershed (Watershed). Focused studies will be limited to a small access point located on the Kaweah River near the Kaweah No. 2 Powerhouse referred to as "Edison Beach" and the bypass reaches, which are defined as follows:

- East Fork Kaweah River between the Kaweah No. 1 Diversion Dam and the Kaweah River confluence; and
- Kaweah River between the Kaweah No. 2 Diversion Dam and the Kaweah No. 2 Powerhouse Tailrace.

Edison Beach and the bypass reaches are shown on Map REC 1-1.

It should be noted that the majority of lands along the bypass reaches and around select Project facilities are privately owned and outside the Federal Energy Regulatory Commission (FERC)

Project boundary. For the purposes of the recreation studies described herein, Southern California Edison (SCE) will take the following steps to obtain approval to conduct studies on private property:

- Notify the landowner of Project relicensing and request authorization to enter property to conduct the field studies.
- If authorization is obtained, SCE will complete studies as described in this technical study plan.
- If authorization is not obtained, SCE will limit field studies to only those lands where landowners have authorized access.

STUDY APPROACH:

Most of the land surrounding the Project facilities and bypass reaches is privately owned, which substantially restricts public access and limits opportunities for recreational development. As such, FERC did not require SCE to construct or maintain any developed recreational facilities or trails in the existing license for the Project. SCE does maintain one informal access point to the Kaweah River (Kaweah No. 2 Powerhouse River Access Area), referred to by the local community as "Edison Beach". This access point is located adjacent to the Kaweah No. 2 Powerhouse and consists of a small parking area with six parking stalls, one of which is accessible. Due to concerns by local residents, use of this site between Memorial Day and Labor Day is only allowed Monday through Thursday between the hours of 8:00 a.m. and 7:00 p.m. At all other times of the year, the Kaweah No. 2 River Access Area is open seven days per week between the hours of 8:00 a.m. and 7:00 p.m. When the river access is closed, an A-frame sign is posted at the entrance providing hours of operation and entry is blocked by a barrier. The following describes the recreation resources study approach.

<u>Inventory Existing Recreation Facilities/Areas</u>

- Identify all developed recreation facilities located in the Kaweah River Watershed, including: privately operated facilities; facilities owned and operated by the Bureau of Land Management (BLM); and facilities located within the boundaries of the Sequoia-Kings Canyon National Park (SKCNP).
- Utilize existing information sources to briefly describe each recreation facility, including ownership (public or private), facility capacity, and types of recreational uses supported by each facility. This information will be used for contextual purposes.
- Prepare Geographic Information System (GIS)-based maps showing the location of existing developed recreation facilities/area in the Kaweah River Watershed relative to the Kaweah Project.
- Describe SCE's Kaweah No. 2 Powerhouse River Access Area (Edison Beach), including facility capacity, amenities, use restrictions, and operation and maintenance responsibilities.
- Assess the condition of the Kaweah No. 2 Powerhouse River Access Area (Edison Beach) relative to current Tulare County design and accessibility standards.

<u>Characterize Existing Use and Opportunities in the Vicinity of the Kaweah Project</u>

- Utilize existing information available from SCE, Tulare County and the BLM to characterize recreation opportunities and use levels in the immediate vicinity of the

Kaweah Project facilities and along the bypass reaches, including along the Kaweah No. 2 Flowline.

- Determine frequency and timing of non-motorized use of Craig Ranch Road/Salt Creek Road and the Project access road to the Kaweah No. 1 Forebay Tank within BLM's Case Mountain Extensive Recreation Management Area (ERMA).
    - Monitor use along Craig Ranch Road/Salt Creek Road using trail cameras installed at the gate (transition to BLM property) and at the intersection of Salt Creek Road and the Kaweah No. 1 Forebay Tank Road.
    - Download data weekly between Memorial Day and Labor Day and every other week the remainder of the survey period (in conjunction with user counts at the Kaweah No. 2 Powerhouse River Access described below).
- Estimate recreation use at SCE's Kaweah No. 2 Powerhouse River Access Area (Edison Beach).
    - Use counts will be conducted on one randomly-selected day every week during the 14-week period between Memorial Day and Labor Day (i.e., the peak recreation season), limited to the specific days and times that the parking area is open to the public. During the peak recreation season, counts will be conducted during one of three randomly selected time blocks, defined as follows: Block 1 – 8:00 a.m. to 12:00 p.m.; Block 2 – 12:00 p.m. to 4:00 p.m.; and Block 3 – 4:00 p.m. to close.
    - For the remainder of the year (Labor Day through Memorial Day), use counts will be conducted on one randomly-selected day every other week, limited to the specific days and times that the parking area is open to the public. During the non-peak seasons, counts will be conducted during one of two randomly selected time blocks defined as follows: Block 1 – 8:00 a.m. to 12:00 p.m.; and Block 2 – 12:00 p.m. to close.
    - The following information will be recorded: number of vehicles present in the parking lot; number of people present in the parking lot; number of people present at the river in the immediate vicinity of the beach; and the types of activities those people are participating in, based on visual observations (as opposed to surveys).
    - All data collected through this effort will be entered into a database and used to determine recreation use in daytime visits. Overnight use is not allowed at the access area.

<u>Characterize Potential User Conflicts</u>

- Interview Tulare County land use/recreation planners to identify concerns related to conflicts between recreation users and private property owners in the vicinity of the Kaweah Project.
- Interview property owners to identify and document potential concerns and issues related to recreation use at SCE's Kaweah No. 2 Powerhouse River Access Area.
- During data downloading at Craig Ranch Road/Salt Creek Road monitoring sites, if recreation users are encountered, interview and document any concerns and issues related to motorized use along this section of road.

Estimate Future Recreation Needs in the Vicinity of the Project

- Utilize census data and information available in current relevant federal, State, and local comprehensive plans to identify population projections and to document outdoor recreation use trends and needs.
- Utilize use estimates along with trends and population projections to estimate future recreation needs over the license period (assumed to be 50 years).
- Determine whether future recreation needs can be met in vicinity of Project.

Identify Public Safety Measures

- Identify and describe existing programs and measures implemented by SCE for public health and safety (i.e., buoy lines, escape ropes, signage, and alarms). The inventory will include a description of the condition of the existing safety features.
- Identify and map the locations of existing designated helicopter landing sites in the vicinity of the Project.
- Characterize and document the number, type and location of safety incidents that have occurred in the vicinity of the Project. This effort will be conducted by reviewing existing records and databases maintained by the FERC and by consulting with Project personnel.

SCHEDULE:

Date	Activity
November 2017–April 2018	Consult with stakeholders and compile existing resource information
January–December 2018	Conduct visitor counts at Kaweah No. 2 Powerhouse River Access Area
May–July 2018	Conduct interviews with private property owners.
August 2018–February 2019	Analyze data and prepare draft report
March 2019	Distribute draft report to the stakeholders
March 2019–May 2019	Stakeholders review and provide comments on draft report (90 days)
June–July 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

MAP

SEQUOIA - KINGS CANYON WILDERNESS

SEQUOIA NATIONAL PARK

N. Fork Dr.

North Fork Kaweah River

Marble Fork Kaweah River

Marble Fork Diversion Dam (Non-Project Facility)

Middle Fork Kaweah River

Middle Fork Diversion Dam (Non-Project Facility)

Kaweah River

Kaweah No. 3 Flowline (Non-Project Facility)

Kaweah No. 3 PH to Three Rivers Substation Transmission Line

Kaweah No. 2 Diversion Dam

K3 Forebay

Kaweah No. 2 Flowline

Kaweah No. 3 Flowline

Kaweah No. 3 Powerhouse

Kaweah No. 1 Powerhouse

Kaweah No. 2 Powerhouse

K2 Forebay

Mineral King Rd.

East Fork Kaweah River

K1 Forebay Tank

Kaweah River Dr.

Kaweah No. 2 Powerhouse River Access Area ("Edison Beach")

Kaweah No. 1 Flowline

Kaweah No. 1 Diversion Dam

Three Rivers Substation (Non-Project Facility)

THREE RIVERS

Kaweah River

198

99

Facilities

- Powerhouse
- Diversion
- Utility
- Forebay
- Flowline
- Penstock
- Transmission Line

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*

- Bureau of Land Management
- National Park Service
- Private (Blank)

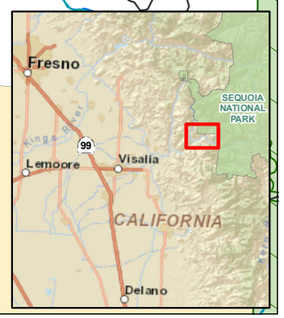
*SOURCE: BLM 2012.
Kaweah Project entirely within Tulare County.

Land Management

- National Wilderness Area

Study Area

- Bypass Reaches



SOUTHERN CALIFORNIA EDISON®
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Eastern Hydro Generation

Map REC 1-1

Recreation Resources Study Area

0 0.25 0.5 Miles

Date: 12/30/2015

Projection: UTM Zone 11
Datum: NAD 83

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REC-2 Whitewater Boating

POTENTIAL RESOURCE ISSUES:

- Whitewater boating opportunities.

PROJECT NEXUS:

- Project operations modify the flow regime in the bypass reaches, potentially affecting whitewater boating opportunities.

POTENTIAL LICENSE CONDITIONS:

- Modify Project operations to enhance whitewater boating opportunities;
- Provide real-time flow information; and
- Improve public access.

STUDY OBJECTIVES:

- Characterize commercial and private whitewater boating opportunities and use levels in the bypass reaches;
- Identify the range of flows in the bypass reaches that accommodate whitewater boating; and
- Identify opportunities for disseminating real-time flow information to the public.

EXTENT OF STUDY AREA:

The study area includes the following three whitewater boating runs located on the bypass reaches:

- Park Boundary Run – Kaweah River from the Sequoia National Park (SNP) Boundary to the East Fork Kaweah River Confluence;
- Gateway Run – Kaweah River from the East Fork Kaweah River Confluence to Dinely Bridge; and
- East Fork Kaweah River from near Oak Grove Bridge to Gateway Bridge at Highway 198.

The locations of these three runs are shown on Map REC 2-1.

It should be noted that the majority of lands along the bypass reaches and around select Project facilities are privately owned and outside the Federal Energy Regulatory Commission (FERC) Project boundary. For the purposes of the recreation studies described herein, Southern California Edison (SCE) will take the following steps to obtain approval to conduct studies on private property, if necessary:

- Notify the landowner of Project relicensing and request authorization to enter property to conduct the field studies.
- If authorization is obtained, SCE will complete studies as described in this technical study plan.
- If authorization is not obtained, SCE will limit field studies to only those lands where landowners have authorized access.

STUDY APPROACH:

The study approach will generally follow the methods summarized in the following document: *Flows and Recreation: A guide to Studies for River Professionals* (Whittaker, Shelby and Gangemi 2005). The methods outlined in this document generally follow a three-phase approach where the results of the first phase (also referred to as Level 1) are used to determine whether the subsequent phases (also referred to as Levels 2 and 3) are warranted.

Phase 1 – Develop Information about Whitewater Resources and Hydrology

- Characterize existing whitewater boating opportunities and use on the bypass reaches, based on existing published information sources.
    - Describe and characterize the three whitewater boating runs on the bypass reaches using existing information contained in published whitewater guide books and available on the internet at www.cacreeks.com, www.awa.org, and www.awetstate.com, augmented by information collected through targeted phone interviews with experienced commercial boating outfitters and private boaters.
    - Document access points (put-in and take-out), shuttle routes, length of run, gradient, portages, level of difficulty, types of water craft, published boatable flow ranges, support facilities, safety concerns, and any known limiting factors.
- Summarize commercial and private whitewater boating use on the bypass reaches.
    - Quantify commercial whitewater boating use on the Kaweah River using records available from Tulare County and/or provided by commercial outfitters holding permits to conduct whitewater boating operations on the Kaweah River.
    - Characterize private boating use on the Project bypass reaches by consulting Tulare County and BLM land use/recreation planners, by examining information that may be available on websites maintained by the boating community, and by conducting interviews with local boaters.
- Conduct hydrology assessment.
    - Identify, map, and characterize existing stream gaging stations in the Watershed, including location, equipment, and data collection capabilities.
    - Summarize the hydrology (impaired and unimpaired) on the river reaches associated with the Kaweah Project.
    - Utilize boatable flow ranges, in combination with hydrologic data, to determine the number of boating days that are available on the bypass reaches under impaired and unimpaired conditions during different water year types.
- Identify flow dissemination mechanisms.
    - Characterize the type of flow information that is currently available to the public through, for example, existing web sites and flow phones.
- Prepare and distribute summary report.
    - Summarize existing information on whitewater boating opportunities and distribute to stakeholders for review prior to the Whitewater Boating Focus Group Meeting.

- Conduct Whitewater Boating Focus Group meeting.
    - Conduct a Whitewater Boater Focus Group meeting to develop additional information about whitewater boating opportunities in the bypass reaches. The Focus Group will include commercial and private whitewater boaters, non-governmental agencies (NGOs), and resource agency recreation staff, hereafter referred to as "stakeholders".
    - The meeting will include a presentation that summarizes existing information about the three runs in the bypass reaches and the results of the hydrologic assessment.
    - This discussion will focus on developing additional details about the boating runs, existing and potential uses, access conditions or constraints, boatable flow ranges, types of watercraft used, and timing (i.e., boating season).
    - Based on the Focus Group discussion, determine whether a site visit and/or whitewater flow study is necessary to develop additional information.

Phase 2 – Potential Site Visit

- If necessary, conduct site visit.
    - Conduct a site visit with experienced commercial and private whitewater boaters, as appropriate, to develop an enhanced understanding of Project operations, the quality and characteristics of the boating runs, discuss boatable flow ranges, identify obvious hazards, and determine whether a whitewater boating flow study(s) is necessary.
    - The site visit would be completed the day following the Whitewater Focus Group Meeting.

Phase 3 – Potential Whitewater Boating Flow Studies

- If necessary, conduct whitewater boating flow studies.
    - Develop a whitewater boating survey instrument in consultation with the stakeholders. The survey instrument will be used to obtain information on physical logistics and the experiential values of whitewater boating runs under different flows.
    - Conduct whitewater flow studies to refine boatable flow ranges for a variety of watercraft used by both commercial and private boaters, representing a range of interests and skill levels.
    - The Project does not include storage reservoirs. Therefore, SCE's ability to manipulate flows for controlled flow studies are limited to the capacity of the Kaweah No. 1 and Kaweah No. 2 flowlines (24 and 87 cubic feet per second [cfs], respectively). Accordingly, if flow studies are necessary, they will likely be conducted on natural flows, depending upon the target flow ranges that are identified in consultation with the stakeholders, and with consideration to SCE's operational constraints.
    - Utilize the information developed during the flow study(s) and hydrologic information to refine the whitewater boating flow range in the bypass reaches under impaired and unimpaired flows in different water year types.

SCHEDULE:

Date	Activity
Phase 1 – Develop Information about Whitewater Resources and Hydrology	
November 2017–March 2018	Develop information about whitewater boating resources and hydrology
April 2018	Prepare and distribute summary report
April 2018	Conduct Whitewater Boater Focus Group meeting
Phase 2 – Possible Site Visit (if necessary)	
April 2018	Conduct site visit to develop additional whitewater boating information, if necessary
Phase 3 – Possible Whitewater Boating Flow Studies (if necessary)	
April–May 2018	Develop Whitewater Boating Survey Instrument
May–June 2018 (runoff dependent)	Conduct Whitewater Boating Flows Study(s)
Reporting	
July–September, 2018	Prepare and distribute draft report
October 2018	Distribute draft report to the stakeholders
October–December 2018	Stakeholders review and provide comments on draft report (90 days)
January–February 2019	Resolve comments and prepare final report
March 2019	Distribute final report

MAP

SEQUOIA NATIONAL PARK

Kaweah No. 3 Flowline (Non-Project Facility)

Kaweah No. 2 Diversion Dam

K3 Forebay

Gateway Bridge

Kaweah No. 3 Powerhouse

Kaweah No. 3 Flowline

Kaweah No. 2 Flowline

Kaweah River

Kaweah No. 1 Powerhouse

Kaweah No. 2 Powerhouse

K2 Forebay

Dinely Rd

Dinely Bridge

K1 Forebay Tank

Mineral King Rd

198

Kaweah No. 1 Flowline

East Fork Kaweah River

Kaweah No. 1 Diversion Dam

Oak Grove Bridge

10 9 8 7 6 5 4 3 2 1

Facilities

- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body
- River Mile

Land Jurisdiction*

- Bureau of Land Management
- National Park Service
- Private (Blank)

*SOURCE: BLM 2016.
Kaweah Project entirely within Tulare County.

Land Management

- National Wilderness Area

Whitewater Boating Runs

Kaweah River

- Park Boundary Run
- Gateway Run

East Fork Kaweah River

- East Fork Kaweah River Run

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Map REC 2-1

Whitewater Boating Study Runs

Date: 5/1/2017

0 0.25 0.5 Miles

Projection: UTM Zone 11
Datum: NAD 83

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TERR-1 Botanical Resources

POTENTIAL RESOURCE ISSUES:

- Protection of vegetation alliances and associated wildlife habitats;
- Protection of special-status plant, lichen, and moss populations; and
- Prevention of the introduction or spread of non-native invasive plants (NNIPs).

PROJECT NEXUS:

- Project operations and maintenance could result in direct loss or degradation of vegetation alliances and wildlife habitats, including communities afforded special recognition by state and federal agencies (e.g., riparian areas and jurisdictional Waters of the United States).
- Project maintenance activities could result in removal or disturbance of special-status plant, lichen, and moss populations.
- Project maintenance activities could result in introduction or spread of NNIPs.

POTENTIAL LICENSE CONDITION:

- Vegetation and Integrated Pest Management Plan

STUDY OBJECTIVES:

- Document vegetation alliances and wildlife habitats adjacent to Project facilities.
- Document riparian vegetation alliances along bypass reaches and Project diversion pools and forebays.
- Document special-status plant and moss populations at Project facilities.
- Document NNIPs at Project facilities.

Information on the relationship between flow and riparian vegetation in the bypass reaches is provided in AQ-1 Instream Flow Technical Study Plan (TSP).

EXTENT OF STUDY AREA:

Vegetation Alliances and Wildlife Habitats

- For vegetation alliances and wildlife habitats, the study area is 1 mile around Project facilities (see Table TERR 1-1); and
- For riparian vegetation alliances, the study area includes streambanks of the bypass reaches and the shoreline of Project diversion pools and forebays.

Special-Status Plants and Non-Native Invasive Plants

For the purposes of the special-status plants and NNIP studies, the study area includes:

- All public lands within the Federal Energy Regulatory Commission (FERC) Project boundaries where operations and/or maintenance activities are conducted, plus a protective buffer. Refer to Table TERR 1-2 for the survey area by facility type.

- For surveys at or around Project facilities that are located outside of the FERC Project Boundary and on private property, SCE will take the following steps to obtain approval prior to implementation of studies:
    - Provide notification to landowner of Project relicensing and request authorization to enter property to conduct surveys.
    - If authorization is obtained, SCE will complete surveys as described in this TSP.
    - If authorization is not obtained, SCE will not complete surveys at these locations.

STUDY APPROACH:

Vegetation Alliances and Wildlife Habitats

- Develop vegetation alliance maps of the study area based on Classification and Assessment with LANDSAT of Visible Ecological Groupings (CALVEG) mapping and vegetation alliance descriptions.[1]
    - Preliminary vegetation alliance information is presented in the Kaweah Project (FERC No. 298) Draft Existing Resource Information Report (SCE 2015), including the following:
        - Chapter 3.6 (Botanical and Wildlife Resources) provides a draft map of CALVEG vegetation alliances within 1 mile of Project facilities; and
        - Chapter 3.9 (Riparian Resources) provides a draft map showing CALVEG riparian vegetation alliances along the bypass reaches.
- Verify the accuracy of CALVEG data and update vegetation alliances using recent aerial photographs.
- Conduct ground-truthing of vegetation alliances within 0.25-mile of Project facilities, concentrating in areas where concerns about vegetation community identification or boundaries arise from review of aerial photographs. Inaccessible areas will not be ground-truthed. Ground-truthing will only be completed on lands within the FERC Project boundary or on private property where SCE has obtained land owner authorization.
- Cross-reference CALVEG vegetation alliances with California Wildlife Habitat Relationship (CWHR) System wildlife habitats, using the CALVEG–CWHR Crosswalk (U.S. Department of Agriculture – Forest Service [USDA-FS] 2014). This crosswalk was developed by USDA-FS and the California Department of Fish and Wildlife (CDFW) as a way to determine which wildlife habitats are likely to be present based on existing vegetation alliances and forest structural characteristics. Preliminary information is presented in the Kaweah Project (FERC No. 298) Draft Existing Resource Information Report, Chapter 3.6 (Botanical and Wildlife Resources) (SCE 2015).

[1]The CALVEG system was developed by U.S. Department of Agriculture – Forest Service (USDA-FS) to classify existing vegetation present on federally managed forestlands based on LANDSAT color infrared satellite imagery. Data are verified using soil-vegetation maps and professional guidance from various sources statewide. CALVEG data for the Southern Sierra were updated by USDA-FS in 2014.

- Develop a Geographic Information System (GIS) map of vegetation alliances and wildlife habitats and overlay information on Project facilities.
- Develop a GIS map of riparian vegetation alliances and overlay information along the bypass reaches and Project diversion pools and forebays.

Special-Status Plants

For the purposes of this study plan, a special-status plant is defined as any plant or moss species that is granted protection by a federal or state agency. Federally listed plant species granted status by the United States Fish and Wildlife Service (USFWS) under the Federal Endangered Species Act (ESA) include threatened (FT), endangered (FE), proposed threatened or endangered (FPT, FPE), candidate (FC), or listed species proposed for delisting (FPD).

The Bureau of Land Management (BLM) also maintains lists of sensitive plant species (BLMS) that are designated by the BLM State Director for special management consideration (BLM 2013). In California, this includes all plants on BLM lands that are listed as FC, California state threatened (ST), endangered (SE), and rare (SR); all plants that have a California Rare Plant Rank (CRPR) of 1B; and any other plants that the State Director has determined to warrant status.

State of California listed plant species, which are granted status by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act (CESA) include ST, SE, SR, and California Species of Special Concern (CSC).

Under the California Environmental Quality Act (CEQA), special-status plants are also defined to include those species identified in the California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) system as rare, threatened, or endangered plants in California. This includes the following CRPR:

- 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); and
- 2B (rare, threatened, or endangered in California, but common elsewhere).

The study approach for special-status plants is provided below.

- Identify and map known occurrences of special-status plants within the study area, based on agency consultation and a review of existing information. Preliminary information is presented in the Kaweah Project (FERC No. 298) Draft Existing Resource Information Report, Chapter 3.6 (Botanical and Wildlife Resources) (SCE 2015).
- Develop a list of special-status plant species potentially occurring in the Project area based on literature review and agency consultation. A preliminary list is provided in the Kaweah Project (FERC No. 298) Draft Existing Resource Information Report, Chapter 3.6 Botanical and Wildlife Resources, Table 3.6-2 (SCE 2015).
- Conduct focused special-status plant surveys, according to the *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2009).

  - Field surveys will be conducted at the proper time of year when rare, threatened, or endangered species are both evident and identifiable. Generally, this is when the plants are flowering. Based on the blooming periods for plants known or potentially occurring within the Project vicinity, two surveys will be conducted, one in April and one in June (Table TERR 1-3).
  - Timing of surveys will be verified based on reference population monitoring. Agencies will be notified of survey population monitoring results and proposed survey dates prior to implementation of surveys.
  - Systematic field techniques will be implemented (e.g., zigzag patterns, random meandering, and linear transects) in the study area.
  - If a special-status plant species population is identified on the perimeter of the study area, the study area will be expanded to document the full extent of the population.
  - Surveys will be floristic in nature and taxonomy will be based on The Jepson Manual (Baldwin et al. 2012). A comprehensive list of species observed during field surveys will be compiled.
  - Digital photographs, Global Positioning System (GPS) information, an estimate of the number of individuals present, and a description of associated vegetation alliance will be collected for each special-status plant population observed.
  - Moss specimens will be collected and labeled with the date and collection location. Moss specimens will later be identified to species by a qualified bryologist.
- Develop a GIS map of special-status plant populations and overlay information on Project facilities.
- Prepare and submit California Native Species Field Survey Forms for all special-status plant populations recorded to California Natural Diversity Database (CNDDB).

Non-Native Invasive Plants

The California Invasive Council (Cal-IPC) defines NNIPs as plants that 1) are not native to, yet can spread into, wildland ecosystems, and that also 2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes (Cal-IPC 2006).

The study approach for NNIPs is provided below.

- Identify and map known occurrences of NNIPs based on agency consultation and a review of existing information. Preliminary information is presented in the Kaweah Project (FERC No. 298) Draft Existing Resource Information Report, Chapter 3.6, Botanical and Wildlife Resources (SCE 2015).
- Develop a list of priority NNIPs for focused NNIP surveys. This list will incorporate priority NNIPs identified through consultation with agencies.
- Conduct focused NNIP surveys in conjunction with special-status plant surveys.
- Collect data and report survey results as follows:
  - Data collected will include species, location, and number of acres infested by NNIPs.
  - If a NNIP population is identified on the perimeter of the study area, the study area will be expanded to document the extent of the population.

  - Levels of infestation will be reported as: low (<5% cover); moderate (6–25% cover), and high (>25% cover). Areas that have been surveyed and found to be weed-free will also be identified.

- Develop a GIS map of noxious weeds and invasive non-native plants and overlay information on Project facilities.

SCHEDULE:

Date	Activity
April and June 2018	Conduct field surveys
July–October 2018	Analyze data and prepare draft report
November 2018	Distribute draft report to stakeholders
December 2018–February 2019	Stakeholders review and provide comments on draft report (90 days)
March–May 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

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TABLES

Table TERR 1-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Diversion Dams and Pools				
Kaweah No. 1 Diversion Dam and Pool (East Fork Kaweah River)	X			
Kaweah No. 2 Diversion Dam and Pool (Kaweah River)	X			
Flowlines				
Kaweah No. 1 Flowline	X			
Kaweah No. 2 Flowline	X			
Kaweah No. 3 Flowline	X			
Forebays				
Kaweah No. 1 Forebay Tank and Spillway	X			
Kaweah No. 2 Forebay and Spillway	X			
Kaweah No. 3 Forebay and Spillway	X			
Penstocks				
Kaweah No. 1 Penstock	X			
Kaweah No. 2 Penstock	X			
Kaweah No. 3 Penstock	X			
Powerhouses and Switchyards				
Kaweah No. 1 Powerhouse and Switchyard	X			
Kaweah No. 2 Powerhouse and Switchyard	X		X (Tailrace Only)	
Kaweah No. 3 Powerhouse and Switchyard	X			
Transmission Lines and Transmission Tap Lines				
Kaweah No. 3 Powerhouse to Three Rivers Substation Transmission Line	X			
Kaweah No. 1 Powerhouse Transmission Tap Line	X			
Kaweah No. 2 Powerhouse Transmission Tap Line	X			
Power Lines				
Kaweah No. 1 Diversion Intake House Solar Panel to Kaweah No. 1 Diversion Dam Power Line (solar)	X		X	
Kaweah No. 1 Switchyard to Kaweah No. 1 Maintenance Building Power Line	X			
Kaweah No. 1 Switchyard to Kaweah No. 1 Office Building Power Line	X			
Kaweah No. 1 Switchyard to Kaweah No. 1 Old Machine Shop Power Line	X			
Kaweah No. 1 Switchyard to K1 Workshop Power Line	X			
Kaweah No. 1 Office Building to K1 Forebay Tank Power Line	X			

Table TERR 1-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Power Lines (continued)				
Kaweah No. 1 Powerhouse Campus Alternate Power Line	X			
Kaweah No. 2 Diversion/Flowline Gage and Kaweah No. 3 Powerhouse Alternate Power Line	X			X
Kaweah No. 2 Powerhouse Alternate Power Line	X			
Kaweah No. 2 Powerhouse to Kaweah No. 2 Forebay Power Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 2 Diversion Power Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 2 Flowline Gage Power Line	X			X
Kaweah No. 3 Powerhouse to Kaweah No. 3 Forebay Power Line	X			
Communication Lines				
Kaweah No. 1 Powerhouse to Kaweah No. 1 Office Building Fiber Communication Line	X			
Kaweah No. 1 Office Building to Kaweah No. 1 Forebay Tank Fiber Communication Line	X			
Kaweah No. 2 Diversion Dam to Kaweah No. 3 Powerhouse Fiber Communication Line	X			
Kaweah No. 2 Powerhouse to Kaweah No. 2 Forebay Fiber Communication Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 3 Forebay Fiber Communication Line	X			
Kaweah No. 3 Forebay to Kaweah No. 3 Forebay Inlet Fiber Communication Line	X			
Stream Gages				
East Fork Kaweah River Conduit 1 at Power Plant near Hammond CA (USGS Gage No. 11208800) (SCE Gage No. 200a)	X			
East Fork Kaweah River near Three Rivers CA (USGS Gage No. 11208730) (SCE Gage No. 201)	X			
Kaweah No. 1 Minimum Instream Flow Release (SCE Gage No. 201a)	X			
East Fork Kaweah River Conduit 1 near Three Rivers CA (SCE Gage No. 202)	X			
Kaweah River below Conduit No. 2 near Hammond CA (USGS Gage No. 11208600) (SCE Gage No. 203)	X			
Kaweah River Conduit No. 2 near Hammond CA (SCE Gage No. 204a)	X			
Kaweah River Conduit No. 2 at Power Plant near Hammond CA (USGS Gage No. 11208818) (SCE Gage No. 205a)	X			

Table TERR 1-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Stream Gages (continued)				
Middle Fork Kaweah River Conduit No. 3 at Power Plant near Hammond CA (USGS Gage No. 11208565) (SCE Gage No. 206a)	X			
Project Access Roads				
Kaweah No. 1 Development				
Kaweah No. 1 Flowline Access Road – Bear Canyon	X		X	
Kaweah No. 1 Flowline Access Road – Grapevine	X			
Kaweah No. 1 Flowline Access Road – Lower Pine	X			
Kaweah No. 1 Flowline Access Road – Lumberyard	X			
Kaweah No. 1 Flowline Access Road – Slick Rock	X		X	
Kaweah No. 1 Flowline Access Road – Summit	X			
Kaweah No. 1 Flowline Access Road – Unnamed	X		X	
Kaweah No. 1 Flowline Access Road – Upper Pine	X			
Kaweah No. 1 Forebay Road	X			
Kaweah No. 1 Intake Road	X		X	
Kaweah No. 2 Development				
Kaweah No. 2 Flowline Access Road – Canal 2 Brushout Grid	X		X	
Kaweah No. 2 Flowline Access Road – Canal 4 East	X		X	
Kaweah No. 2 Flowline Access Road – Canal 4 West	X		X	
Kaweah No. 2 Flowline Access Road – Canal 5	X		X	
Kaweah No. 2 Flowline Access Road – Canal 6 East	X		X	
Kaweah No. 2 Flowline Access Road – Canal 6 West	X		X	
Kaweah No. 2 Flowline Access Road – Flume 8	X			
Kaweah No. 2 Flowline Access Road – Flume 11	X		X	
Kaweah No. 2 Flowline Access Road – Open Siphon Grids	X			
Kaweah No. 2 Flowline Access Road – Red Barn	X		X	
Kaweah No. 2 Flowline Center Access Road	X		X	
Kaweah No. 2 Flowline East Access Road	X			
Kaweah No. 2 Flowline West Access Road	X		X	
Kaweah No. 2 Forebay Road	X			
Kaweah No. 2 Intake Road	X			X

Table TERR 1-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Project Access Roads (continued)				
Kaweah No. 2 Development (continued)				
Kaweah No. 2 Penstock Road	X			
Kaweah No. 2 Powerhouse Road	X			
Kaweah No. 3 Development				
Kaweah No. 3 Forebay Road	X		X	
Kaweah No. 3 Powerhouse Road	X			
Project Trails				
Kaweah No. 1 Development				
Kaweah No. 1 Flowline Access Trail – Grand Canyon	X		X	
Kaweah No. 1 Solar Panel Access Trail		X		
Kaweah No. 2 Development				
Kaweah No. 2 Flowline Access Trail – Canal 11	X		X	
Kaweah No. 2 Flowline Access Trail – Canal 13	X			
Kaweah No. 2 Flowline Access Trail – Canal 15	X			
Kaweah No. 2 Flowline Access Trail – Canal 2	X			
Kaweah No. 2 Flowline Access Trail – Canal 4	X			
Kaweah No. 2 Flowline Access Trail – Canal 5	X			
Kaweah No. 2 Flowline Access Trail – Canal 6	X			
Kaweah No. 2 Flowline Access Trail – Open Siphon	X			
Kaweah No. 2 Flowline Access Trail – Water User 14	X			
Kaweah No. 2 Flowline Access Trail – Water User 9	X		X	
Kaweah No. 2 Flowline Access Trail – Wildlife Crossing 2	X			
Kaweah No. 2 Powerhouse River Access Trail	X			
Kaweah No. 3 Development				
Kaweah No. 3 Flowline Access Trail	X			
Ancillary and Support Facilities				
Kaweah No. 1 Forebay Tank Repeater	X			
Kaweah No. 1 Powerhouse Campus	X			
Kaweah No. 1 Diversion Intake House Solar Panel		X		
Kaweah No. 1 Solar Yard Satellite Repeater		X		

Table TERR 1-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Ancillary and Support Facilities (continued)				
Kaweah No. 1 Grapevine Satellite Repeater	X			
Kaweah No. 2 Powerhouse River Access Parking	X			
Kaweah No. 2 Wildlife Bridges	X			
Kaweah No. 2 Wildlife Escape Ramps	X			
Kaweah No. 2 Footbridges	X			
Kaweah No. 3 Wildlife Bridges	X			
Kaweah No. 3 Wildlife Escape Ramps	X			
Kaweah No. 3 Footbridges	X			

Notes:
Property jurisdiction based on multiple sources. Some data has been modified to account for known errors.

Sources:
1. FERC boundary Exhibit G sheets obtained from SCE (Dec. 2014). Sheets filed with FERC in 2009; Sheets 4-6 updated and filed with FERC 2012.
2. Digital FERC boundary obtained from SCE but heavily modified to account for known errors (Dec. 2014)
3. Digital parcel boundary for Tulare County purchased from OGInfo.com LLC (May 2015)
   Parcel Vintage: 02/12/2013
   Attribute Vintage: 02/17/2015

Table TERR 1-2. Survey Area for Special-Status Plant and Non-Native Invasive Plants.

Project Facility	Survey Area[1]
Diversion Dams and Pools	15 feet around the perimeter
Flowlines[2]	20 feet on either side
Forebays/Forebay Tank	20 feet around the perimeter
Penstocks	15 feet on either side
Powerhouses and Switchyards	Within and up to 15 feet around the perimeter fence
Transmission, Power, and Communication Lines	25 feet on either side
Gages	10 feet around gages
Project Access Roads	20 feet on either side
Project Trails	15 feet on either side
Ancillary and Support Facilities	
Kaweah No. 1 Powerhouse Campus	Within the developed campus
Repeaters and Solar Panels	15 feet around the perimeter
River Access Parking	10 feet around parking area and beach

[1]Survey areas represent locations where potential operation and maintenance activities occur.

[2]Footbridges, wildlife bridges, and wildlife escape ramps are located on Project flowlines and will be surveyed concurrently with the flowlines.

Table TERR 1-3. Blooming Periods for Special-Status Plants Identified by Resource Agencies as Potentially Occurring in the Kaweah Project Vicinity.

Scientific/Common Name	Blooming Period											
	January	February	March	April	May	June	July	August	September	October	November	December
Brodiaea insignis Kaweah brodiaea				■	■	■						
Eriogonum nudum var. murinum mouse buckwheat						■	■	■	■	■	■	
Iris munzii Munz's iris				■								
Brasenia schreberi Watershield				■	■	■	■	■	■	■		
Carex praticola northern meadow sedge					■	■	■					
Caulanthus californicus California jewelflower[1]		■	■	■								
Clarkia springvillensis Springville clarkia[1]					■	■	■					
Delphinium purpusii rose-flowered larkspur			■	■	■							
Delphinium recurvatum recurved larkspur[1]			■	■	■	■						
Eremalche (=Malvastrum) kernensis[1]			■	■	■							
Eryngium spinosepalum spiny-sepaled button-celery[1]				■	■	■	■					
Fritillaria striata striped adobe-lily		■	■	■								
Glyceria grandis American manna grass						■	■	■				
Leptosiphon serrulatus Madera leptosiphon					■	■						
Mimulus norrisii Kaweah monkeyflower			■	■	■							
Mimulus pictus calico monkeyflower			■	■	■							
Pseudobahia peirsonii San Joaquin adobe sunburst			■	■								
Ribes menziesii var. ixoderme aromatic canyon gooseberry				■								
Sidalcea keckii Keck's checker-mallow				■	■							

[1] Species is unlikely to occur. Project area outside species' known range (per BLM communication April 2016).

TERR-2 Wildlife Resources

POTENTIAL RESOURCE ISSUES:

- Protection of special-status wildlife species and their habitats.
- Effectiveness of wildlife bridges and escape ramps.

PROJECT NEXUS:

- Project operations and maintenance activities could disturb or result in direct loss of special-status wildlife species or their habitat.
- Project flowlines could result in mortality of wildlife.

POTENTIAL LICENSE CONDITIONS:

- Vegetation and Integrated Pest Management Plan.
- Special-status bat protection measures.
- Special-status wildlife protection measures.
- Modification of existing wildlife bridges and escape routes or development of new protective measures.

STUDY OBJECTIVES:

- Identify special-status wildlife species potentially occurring in California Wildlife Habitat Relationships (CWHR) habitats documented as part of the TERR 1 – Botanical Resources Technical Study Plan (TSP).
- Determine whether Project transmission line, transmission tap line, and power line configurations are consistent with guidelines for the avoidance of avian mortalities.
- Document use of Project facilities by special-status bats during reproduction or other seasonal use.
- Evaluate the use of wildlife bridges and escape ramps by mule deer and other animals, including livestock.
- Document mortality of wildlife/livestock in Project flowlines.

EXTENT OF STUDY AREA:

Special-Status Wildlife Surveys

- For identification of special-status species potentially occurring in CWHR habitats, the study area is 1 mile around Project facilities (see Table TERR 2-1); and
- For wildlife reconnaissance surveys, the study area is the area where operations and/or maintenance occurs around Project facilities, plus a protective buffer. Refer to Table TERR 2-2 for the survey area by facility type.

Evaluation of Transmission Line, Transmission Tap Line, and Power Line Configurations

- For the evaluation of consistency with guidelines for the avoidance of avian mortalities, the study area is Project transmission lines, transmission tap lines, and power lines (see Table TERR 2-1).

Special-Status Bat Reproductive and Seasonal Use Surveys

- For special-status bat reproductive and seasonal use surveys, the study area is the Project facilities listed in Table TERR 2-3 and shown in Map TERR 2-1.

Evaluation of Wildlife Use of Wildlife Bridges and Escape Ramps

- For the evaluation of the use of wildlife bridges and escape ramps, the study area is the wildlife monitoring sites at the wildlife bridges and wildlife escape ramps shown in Map TERR 2-2.

Evaluation of Wildlife/Livestock Mortality in Project Flowlines

- For the evaluation of mortality of wildlife/livestock, the study area includes all portions of the Project flowlines under FERC jurisdiction (see Table TERR 2-1).

STUDY APPROACH:

For the purposes of this study, a special-status wildlife species is defined as any animal species that is granted status by a federal or state agency. Federally listed species granted status by the U.S. Fish and Wildlife Service (USFWS) under the ESA include Federal Threatened (FT), Federal Endangered (FE), Federal Proposed Threatened or Endangered (FPT, FPE), candidates for listing (FC), or proposed for delisting (FPD). Also included are those species listed by USFWS as Birds of Conservation Concern (BCC) which include "species, subspecies, and populations of all migratory nongame birds that, without additional conservation action, are likely to become candidates for listing under the ESA of 1973" (USFWS 2008).

The Bureau of Land Management (BLM) also maintains lists of BLM sensitive species (BLMS) that are not federally listed but that are designated by the BLM State Director for special management consideration.

State of California listed wildlife species which are granted status by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act (CESA) include threatened (ST), endangered (SE), Fully Protected species (CFP), and California Species of Special Concern (CSC).

The study approach for special-status wildlife surveys; evaluation of Project transmission line, transmission tap line, and power line configurations; special-status bat surveys, and the evaluation of the effectiveness of wildlife bridges and escape ramps is provided below.

Special-Status Wildlife Surveys

- Identify and map known occurrences of special-status wildlife species within 0.25 mile of Project facilities and bypass reaches based on agency consultation and a review of existing information. Preliminary information is presented in the Kaweah Project (FERC No. 298) Draft Existing Resource Information Report, Chapter 3.6, Botanical and Wildlife Resources (SCE 2015).
- Identify special-status wildlife species potentially occurring within CWHR designations based on A Guide to Wildlife Habitats of California (Meyer and Laudenslayer 1988). Preliminary information is presented in the Kaweah Project (FERC No. 298) Draft Existing Resource Information Report, Chapter 3.6, Botanical and Wildlife Resources (SCE 2015).

  - Vegetation alliances and CWHR habitats will be documented as part of the TERR 1 – Botanical Resources TSP.

- Conduct wildlife reconnaissance surveys in conjunction with special-status plant surveys. Refer to the Table TERR 2-2 for the survey area for special-status plants.
  - Species will be recorded as present if they are observed, species-specific vocalizations are heard, or if diagnostic field signs are found (e.g., scat, tracks, pellets).
  - Wildlife taxonomy will be based on California's Wildlife, Volumes I, II, and III (Zeiner et al. 1988-1990).
  - Survey methods will include both zigzag and linear transects depending on the survey area and terrain. Zigzag transects cover more ground and work well in larger habitat areas (e.g., mixed conifer forest) while linear transects work well in narrow habitats (e.g., riparian).
  - For each special-status species observed, a California Natural Diversity Database (CNDDB) field survey form will be completed and submitted to CDFW.
  - Provide an electronic database (Excel spreadsheet) of special-status wildlife to BLM, resource agencies, and interested stakeholders.
- Record incidental observations of any special-status species during all field surveys completed in support of the relicensing of the Kaweah Project.

Evaluation of Transmission Line, Transmission Tap Line, and Power Line Configurations

- Map the location of Project transmission lines, transmission tap lines, and power lines.
- Document the configuration of transmission line, transmission tap line, and power line poles and evaluate their consistency with Avian Power Line Interaction Committee (APLIC) guidelines.
- Document any past avian electrocutions and mortalities on Project transmission lines, transmission tap lines, and power lines based on SCE and resource agency consultation.
- Provide an electronic database (Excel spreadsheet) of avian electrocutions and mortalities to BLM, resource agencies, and interested stakeholders.

Special-Status Bat Reproductive and Seasonal Use Surveys

Conduct reproductive surveys (including roost surveys, acoustic sampling, and mist nest sampling) and seasonal use surveys, as described below.

Reproductive Surveys

Reproductive surveys include roost surveys, acoustic sampling, and mist nest sampling. SCE will provide an electronic database (Excel spreadsheet) of special-status bat survey data to BLM, resource agencies, and interested stakeholders. Each of these surveys is described below.

Roost Surveys

- Conduct roost surveys at Project facilities potentially supporting roosting bats (refer to Table TERR 2-3). Surveys will be conducted during the summer reproductive season (August through September) when maternal colonies may be present.
- Facilities will be searched for bats or bat sign (e.g., guano and culled insect parts). Any location where bat species cannot be determined from visual evaluations will be monitored at emergence time using mist netting and acoustic equipment.

Acoustic Sampling

- Conduct acoustic sampling (i.e., sampling of echolocation calls) during the summer reproductive season at the locations identified on Map TERR 2-1, as well as any additional locations where bats were detected during roost surveys, but were not identified to species.
    - Acoustic sampling will be conducted using an Anabat II bat detector system (Titley Electronics) to identify bat species. The Anabat system detects bat ultrasonic echolocation calls in the field and uses a z-caim unit to convert the detected signals into time/frequency (kilohertz (kHz)) graphs on a laptop computer. Acoustic units (Anabat bat detector, z-caim, and laptop) will be placed in appropriate settings to collect bat calls.
    - The acoustic units will be operated at the selected sites for five nights from sunset until sunrise.

Mist Net Sampling

- Conduct nighttime mist net sampling at the locations at the locations identified on Map TERR 2-1 (as well as any additional locations where bats were detected during roost surveys, but were not identified to species) to determine species assemblage during the reproductive season.
    - Mist nets will be set up for one night, from sunset to 1 AM, in locations where active roosts are identified.
    - Captured bats will be identified to species. Other information collected will include sex, age (juvenile or adult), reproductive status, and forearm measurements.
- Captured bats will be released on-site and echolocation calls recorded at the time of release.

Seasonal Use Surveys

- Conduct an additional survey in October at those locations where active roosts were identified and/or within flight corridors between roost sites and potential foraging habitat to determine seasonal patterns of use. This survey will include using mist nets and acoustic equipment as described above.
- Develop a Geographic Information System (GIS) map of special-status bat roosts and overlay information on Project facilities.

Evaluation of Wildlife Use of Wildlife Bridges and Escape Ramps

Document use of wildlife bridges and escape ramps by mule deer and other animals crossing the Kaweah No. 2 and 3 flowlines. Refer to Map TERR 2-2 for the location of wildlife bridges and escape ramps.

- Monitor wildlife movements using game tracking cameras installed at selected wildlife monitoring locations. The wildlife monitoring locations, shown on Map TERR 2-2, were selected considering the following:
  - Locations where wildlife bridges and escape ramps are co-located, and therefore can be evaluated simultaneously.
  - Locations in Important Winter Range for the Kaweah Mule Deer Herd (refer to Map TERR 2-2). Monitoring sites both within and outside of Important Winter Range were selected.
  - Sites across vegetation alliances.
- Conduct monitoring for 5 weeks in late November/early December and 5 weeks in late March/early April during seasonal movements of the Kaweah Mule Deer Herd.
  - At each monitoring site, cameras will be mounted to maximize the potential to detect and record wildlife movements in the vicinity of the selected wildlife bridges and escape ramps. Cameras will be installed based on site-specific characteristics including, but not limited to, the range and sensitivity of the camera, the length/span of the wildlife bridge, location of trees or other objects potentially obscuring the view of the camera, and the slope of the site.
- Download data from cameras on a weekly basis. The following data will be recorded:
  - Date and time of photograph.
  - Species shown in photograph.
  - Action documented in photograph (e.g., successful or unsuccessful use of wildlife bridge or escape ramp).
- Provide an electronic database (Excel spreadsheet) of wildlife use of bridges and escape ramps to BLM, resource agencies, and interested stakeholders.

Evaluation of Wildlife/Livestock Mortality in Project Flowlines

- Review and summarize historic information on wildlife/livestock mortality in Project flowlines and update through study implementation period.

SCHEDULE:

Date	Activity
March–April 2018	Conduct evaluation of wildlife use of bridges and escape ramps
June 2018	Conduct wildlife reconnaissance surveys in conjunction with late-season special-status plant surveys and monitor use of wildlife bridges
August/September 2018	Conduct special-status bat reproductive surveys
October 2018	Conduct special-status bat seasonal use surveys and monitor use of wildlife bridges
November–December 2018	Conduct evaluation of wildlife use of bridges and escape ramps and analyze data, summarize historic information on wildlife/livestock mortality in Project flowlines, and prepare draft report
January 2019	Distribute draft report to stakeholders
February–April 2019	Stakeholders review and provide comments on draft report (90 days)
April–May 2019	Resolve comments and prepare final report
August 2019	Distribute final report in Draft License Application

REFERENCES:

Mayer, K.E., and W.F. Laudenslayer. 1988. A Guide to Wildlife Habitats of California. State of California, Department of Fish and Game. Sacramento, CA.

Southern California Edison Company (SCE). 2015. Kaweah Project (FERC No. 298) Draft Existing Resource Information Report.

Zeiner, D., W. Laudenslayer, Jr., K. Mayer, and M. White, eds. 1988-1990. California's Wildlife Volumes I, II, and III. California Department of Fish and Game, Sacramento, California.

TABLES

Table TERR 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Diversion Dams and Pools				
Kaweah No. 1 Diversion Dam and Pool (East Fork Kaweah River)	X			
Kaweah No. 2 Diversion Dam and Pool (Kaweah River)	X			
Flowlines				
Kaweah No. 1 Flowline	X			
Kaweah No. 2 Flowline	X			
Kaweah No. 3 Flowline	X			
Forebays				
Kaweah No. 1 Forebay Tank and Spillway	X			
Kaweah No. 2 Forebay and Spillway	X			
Kaweah No. 3 Forebay and Spillway	X			
Penstocks				
Kaweah No. 1 Penstock	X			
Kaweah No. 2 Penstock	X			
Kaweah No. 3 Penstock	X			
Powerhouses and Switchyards				
Kaweah No. 1 Powerhouse and Switchyard	X			
Kaweah No. 2 Powerhouse and Switchyard	X		X (Tailrace Only)	
Kaweah No. 3 Powerhouse and Switchyard	X			
Transmission Lines and Transmission Tap Lines				
Kaweah No. 3 Powerhouse to Three Rivers Substation Transmission Line	X			
Kaweah No. 1 Powerhouse Transmission Tap Line	X			
Kaweah No. 2 Powerhouse Transmission Tap Line	X			
Power Lines				
Kaweah No. 1 Diversion Intake House Solar Panel to Kaweah No. 1 Diversion Dam Power Line (solar)	X		X	
Kaweah No. 1 Switchyard to Kaweah No. 1 Maintenance Building Power Line	X			
Kaweah No. 1 Switchyard to Kaweah No. 1 Office Building Power Line	X			
Kaweah No. 1 Switchyard to Kaweah No. 1 Old Machine Shop Power Line	X			
Kaweah No. 1 Switchyard to K1 Workshop Power Line	X			
Kaweah No. 1 Office Building to K1 Forebay Tank Power Line	X			

Table TERR 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Power Lines (continued)				
Kaweah No. 1 Powerhouse Campus Alternate Power Line	X			
Kaweah No. 2 Diversion/Flowline Gage and Kaweah No. 3 Powerhouse Alternate Power Line	X			X
Kaweah No. 2 Powerhouse Alternate Power Line	X			
Kaweah No. 2 Powerhouse to Kaweah No. 2 Forebay Power Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 2 Diversion Power Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 2 Flowline Gage Power Line	X			X
Kaweah No. 3 Powerhouse to Kaweah No. 3 Forebay Power Line	X			
Communication Lines				
Kaweah No. 1 Powerhouse to Kaweah No. 1 Office Building Fiber Communication Line	X			
Kaweah No. 1 Office Building to Kaweah No. 1 Forebay Tank Fiber Communication Line	X			
Kaweah No. 2 Diversion Dam to Kaweah No. 3 Powerhouse Fiber Communication Line	X			
Kaweah No. 2 Powerhouse to Kaweah No. 2 Forebay Fiber Communication Line	X			
Kaweah No. 3 Powerhouse to Kaweah No. 3 Forebay Fiber Communication Line	X			
Kaweah No. 3 Forebay to Kaweah No. 3 Forebay Inlet Fiber Communication Line	X			
Stream Gages				
East Fork Kaweah River Conduit 1 at Power Plant near Hammond CA (USGS Gage No. 11208800) (SCE Gage No. 200a)	X			
East Fork Kaweah River near Three Rivers CA (USGS Gage No. 11208730) (SCE Gage No. 201)	X			
Kaweah No. 1 Minimum Instream Flow Release (SCE Gage No. 201a)	X			
East Fork Kaweah River Conduit 1 near Three Rivers CA (SCE Gage No. 202)	X			
Kaweah River below Conduit No. 2 near Hammond CA (USGS Gage No. 11208600) (SCE Gage No. 203)	X			
Kaweah River Conduit No. 2 near Hammond CA (SCE Gage No. 204a)	X			
Kaweah River Conduit No. 2 at Power Plant near Hammond CA (USGS Gage No. 11208818) (SCE Gage No. 205a)	X			

Table TERR 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Stream Gages (continued)				
Middle Fork Kaweah River Conduit No. 3 at Power Plant near Hammond CA (USGS Gage No. 11208565) (SCE Gage No. 206a)	X			
Project Access Roads				
Kaweah No. 1 Development				
Kaweah No. 1 Flowline Access Road – Bear Canyon	X		X	
Kaweah No. 1 Flowline Access Road – Grapevine	X			
Kaweah No. 1 Flowline Access Road – Lower Pine	X			
Kaweah No. 1 Flowline Access Road – Lumberyard	X			
Kaweah No. 1 Flowline Access Road – Slick Rock	X		X	
Kaweah No. 1 Flowline Access Road – Summit	X			
Kaweah No. 1 Flowline Access Road – Unnamed	X		X	
Kaweah No. 1 Flowline Access Road – Upper Pine	X			
Kaweah No. 1 Forebay Road	X			
Kaweah No. 1 Intake Road	X		X	
Kaweah No. 2 Development				
Kaweah No. 2 Flowline Access Road – Canal 2 Brushout Grid	X		X	
Kaweah No. 2 Flowline Access Road – Canal 4 East	X		X	
Kaweah No. 2 Flowline Access Road – Canal 4 West	X		X	
Kaweah No. 2 Flowline Access Road – Canal 5	X		X	
Kaweah No. 2 Flowline Access Road – Canal 6 East	X		X	
Kaweah No. 2 Flowline Access Road – Canal 6 West	X		X	
Kaweah No. 2 Flowline Access Road – Flume 8	X			
Kaweah No. 2 Flowline Access Road – Flume 11	X		X	
Kaweah No. 2 Flowline Access Road – Open Siphon Grids	X			
Kaweah No. 2 Flowline Access Road – Red Barn	X		X	
Kaweah No. 2 Flowline Center Access Road	X		X	
Kaweah No. 2 Flowline East Access Road	X			
Kaweah No. 2 Flowline West Access Road	X		X	
Kaweah No. 2 Forebay Road	X			
Kaweah No. 2 Intake Road	X			X

Table TERR 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Project Access Roads (continued)				
Kaweah No. 2 Development (continued)				
Kaweah No. 2 Penstock Road	X			
Kaweah No. 2 Powerhouse Road	X			
Kaweah No. 3 Development				
Kaweah No. 3 Forebay Road	X		X	
Kaweah No. 3 Powerhouse Road	X			
Project Trails				
Kaweah No. 1 Development				
Kaweah No. 1 Flowline Access Trail – Grand Canyon	X		X	
Kaweah No. 1 Solar Panel Access Trail		X		
Kaweah No. 2 Development				
Kaweah No. 2 Flowline Access Trail – Canal 11	X		X	
Kaweah No. 2 Flowline Access Trail – Canal 13	X			
Kaweah No. 2 Flowline Access Trail – Canal 15	X			
Kaweah No. 2 Flowline Access Trail – Canal 2	X			
Kaweah No. 2 Flowline Access Trail – Canal 4	X			
Kaweah No. 2 Flowline Access Trail – Canal 5	X			
Kaweah No. 2 Flowline Access Trail – Canal 6	X			
Kaweah No. 2 Flowline Access Trail – Open Siphon	X			
Kaweah No. 2 Flowline Access Trail – Water User 14	X			
Kaweah No. 2 Flowline Access Trail – Water User 9	X		X	
Kaweah No. 2 Flowline Access Trail – Wildlife Crossing 2	X			
Kaweah No. 2 Powerhouse River Access Trail	X			
Kaweah No. 3 Development				
Kaweah No. 3 Flowline Access Trail	X			
Ancillary and Support Facilities				
Kaweah No. 1 Forebay Tank Repeater	X			
Kaweah No. 1 Powerhouse Campus	X			
Kaweah No. 1 Diversion Intake House Solar Panel		X		
Kaweah No. 1 Solar Yard Satellite Repeater		X		

Table TERR 2-1. Project Facilities and Relationship to FERC Project Boundary.

Project Facility	Within FERC Project Boundary	Portion of Facility Outside FERC Project Boundary		
		Entirely on Private Property	Partially on Private Property	Partially on NPS Property
Ancillary and Support Facilities (continued)				
Kaweah No. 1 Grapevine Satellite Repeater	X			
Kaweah No. 2 Powerhouse River Access Parking	X			
Kaweah No. 2 Wildlife Bridges	X			
Kaweah No. 2 Wildlife Escape Ramps	X			
Kaweah No. 2 Footbridges	X			
Kaweah No. 3 Wildlife Bridges	X			
Kaweah No. 3 Wildlife Escape Ramps	X			
Kaweah No. 3 Footbridges	X			

Notes:
Property jurisdiction based on multiple sources. Some data has been modified to account for known errors.

Sources:
1. FERC boundary Exhibit G sheets obtained from SCE (Dec. 2014). Sheets filed with FERC in 2009; Sheets 4-6 updated and filed with FERC 2012.
2. Digital FERC boundary obtained from SCE but heavily modified to account for known errors (Dec. 2014)
3. Digital parcel boundary for Tulare County purchased from OGInfo.com LLC (May 2015)
   Parcel Vintage: 02/12/2013
   Attribute Vintage: 02/17/2015

Table TERR 2-2. Survey Area for Special-Status Plant and Non-Native Invasive Plants.

Project Facility	Survey Area[1]
Diversion Dams and Pools	15 feet around the perimeter
Flowlines[2]	20 feet on either side
Forebays/Forebay Tank	20 feet around the perimeter
Penstocks	15 feet on either side
Powerhouses and Switchyards	Within and up to 15 feet around the perimeter fence
Transmission, Power, and Communication Lines	25 feet on either side
Gages	10 feet around gages
Project Access Roads	20 feet on either side
Project Trails	15 feet on either side
Ancillary and Support Facilities	
Kaweah No. 1 Powerhouse Campus	Within the developed campus
Repeaters and Solar Panels	15 feet around the perimeter
River Access Parking	10 feet around parking area and beach

[1]Survey areas represent locations where potential operation and maintenance activities occur.

[2]Footbridges, wildlife bridges, and wildlife escape ramps are located on Project flowlines and will be surveyed concurrently with the flowlines.

Table TERR 2-3. Special-Status Bat Roost Reproductive Survey Locations.

Diversion Dams and Pools
Kaweah No. 1 Diversion Dam and Pool (East Fork Kaweah River)
Kaweah No. 2 Diversion Dam and Pool (Kaweah River)
Flowlines
Kaweah No. 1 Flowline (flume section only)
Kaweah No. 2 Flowline (flume section only)
Powerhouses and Switchyards
Kaweah No. 1 Powerhouse and Switchyard
Kaweah No. 2 Powerhouse and Switchyard
Kaweah No. 3 Powerhouse and Switchyard
Stream Gages
East Fork Kaweah River Conduit 1 at Power Plant near Hammond CA (USGS Gage No. 11208800) (SCE Gage No. 200a)
East Fork Kaweah River near Three Rivers CA (USGS Gage No. 11208730) (SCE Gage No. 201)
Kaweah No. 1 Minimum Instream Flow Release (SCE Gage No. 201a)
East Fork Kaweah River Conduit 1 near Three Rivers CA (SCE Gage No. 202)
Kaweah River below Conduit No. 2 near Hammond CA (USGS Gage No. 11208600) (SCE Gage No. 203)
Kaweah River Conduit No. 2 near Hammond CA (SCE Gage No. 204a)
Kaweah River Conduit No. 2 at Power Plant near Hammond CA (USGS Gage No. 11208818) (SCE Gage No. 205a)
Middle Fork Kaweah River Conduit No. 3 at Power Plant near Hammond CA (USGS Gage No. 11208565) (SCE Gage No. 206a)
Ancillary and Support Facilities
Kaweah No. 1 Powerhouse Campus
Kaweah No. 2 Wildlife Bridges
Kaweah No. 2 Wildlife Escape Ramps
Kaweah No. 2 Footbridges
Kaweah No. 3 Wildlife Bridges
Kaweah No. 3 Wildlife Escape Ramps
Kaweah No. 3 Footbridges

MAPS

Marble Fork Kaweah River
Marble Fork Diversion Dam (Non-Project Facility)
Middle Fork Kaweah River
SEQUOIA NATIONAL PARK
Middle Fork Diversion Dam (Non-Project Facility)
SEQUOIA - KINGS CANYON WILDERNESS
North Fork Kaweah River
Kaweah No. 3 Powerhouse
Kaweah No. 2 Diversion Dam
Kaweah No. 3 Flowline (Non-Project Facility)
Kaweah No. 2 Flowline
Kaweah No. 3 Flowline
Kaweah River
Kaweah No. 2 Powerhouse
Kaweah No. 1 Powerhouse
Kaweah No. 1 Diversion Dam
Kaweah No. 1 Flowline
Three Rivers Substation (Non-Project Facility)
THREE RIVERS
East Fork Kaweah River
JOHN KREB WILDERNES
198
South Fork Kaweah River
Lake Kaweah
Fresno
SEQUOIA NATIONAL PARK
99
Lemoore
Visalia
CALIFORNIA
Delano

Facilities
- Powerhouse
- Diversion
- Utility
- Forebay
- Flowline
- Penstock
- Transmission Line

Other Features
- Major City/Town
- Highway
- Watercourse
- Water Body

Land Jurisdiction*
- Bureau of Land Management
- U.S. Army Corps of Engineers
- National Park Service
- Private

*SOURCE: BLM 2012

Land Management
- National Wilderness Area

Terrestrial
- Bat Sampling Location

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Eastern Hydro Generation

Map TERR 2-1

Special-Status Bat Acoustics and Mist Net Sampling Locations

0 0.25 0.5 1 Miles

Projection: UTM Zone 11
Datum: NAD 83

Date: 12/9/2015

Z:\GIS\Entrix\30735240_SCE_EasternHydro\map\Kaweah\SCE_Eastern_KAWEAH_BatSamplingLocs_17i11i_01.mxd

CALVEG Vegetation Alliances*

- Barren (BA)
- Chamise Alliance (CA)
- Ceanothus Chaparral Alliance (CC)
- Wedgeleaf Ceanothus Alliance (CL)
- Lower Montane Mixed Chaparral Alliance (CQ)
- Whiteleaf Manzanita Alliance (CW)
- Upper Montane Mixed Chaparral Alliance (CX)
- Annual Grasses and Forbs Alliance (HG)
- Perennial Grasses and Forbs Alliance (HM)
- Incense Cedar Alliance (MD)
- Mixed Conifer-Pine Alliance (MP)
- Riparian Mixed Hardwood Alliance (NR)
- Interior Mixed Hardwood Alliance (NX)
- Canyon Live Oak Alliance (QC)
- Blue Oak Alliance (QD)
- White Alder Alliance (QE)
- California Buckeye Alliance (QI)
- Black Oak Alliance (QK)
- California Sycamore Alliance (QP)
- Interior Live Oak Alliance (QW)
- Soft Scrub-Mixed Chaparral Alliance (SQ)
- Chaparral Yucca Alliance (SY)
- Willow (Shrub) Alliance (WL)
- Birchleaf Mountain Mahogany Alliance (WM)

*CALVEG Data (Updated May, 2014)

Kaweah No. 2 Flowline
Kaweah River
198
Kaweah No. 3 Flowline (Non-Project)
Kaweah No. 3 Powerhouse
Kaweah River
Kaweah No. 2 Diversion Dam
K3 Forebay
Kaweah No.3 Flowline
East Fork Kaweah River
K2 Forebay
Kaweah No. 1 Powerhouse
Kaweah No. 2 Powerhouse
K1 Forebay Tank
Kaweah No. 1 Flowline
K3 Forebay
Kaweah No.3 Flowline

SCE Facilities

- Powerhouse
- Diversion
- Forebay
- Flowline
- Penstock
- Transmission Line
- FERC Boundary

Other Features

- City/Town
- Highway/Road
- Watercourse
- Water Body

Wildlife Features*

- Wildlife Bridge
- Wildlife Bridge Monitoring Locations
- Wildlife Escape Ramp

*All escape ramps are equipped with hazers and flashers

Deer Range

- Key Winter Range
- Important Winter Range

SOUTHERN CALIFORNIA EDISON®
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Eastern Hydro Generation

Map TERR 2-2

Wildlife Bridge Monitoring Locations

0 0.05 0.1 0.2 Miles

Date: 12/23/2015

Projection: UTM Zone 11
Datum: NAD 83

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