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August 27, 2018

E-Filing

Kimberly D. Bose, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, N.E., Docket Room
Washington, D.C. 20426-0001

**Re: FERC Project No. 96-045 – Kerckhoff Hydroelectric Project
Revised Study Plan**

Dear Secretary Bose:

On April 30, 2018, Pacific Gas and Electric Company (PG&E) filed with the Federal Energy Regulatory Commission (FERC) its Proposed Study Plan (PSP) for the Kerckhoff Hydroelectric Project, FERC Project No. 96 (Project). 18 CFR § 5.12 provides for participants in the Project's relicensing proceeding to file comments on PG&E's PSP, including any revised information or study requests, within 90 days after PG&E's PSP is filed. Four parties filed comments on the PSP pursuant to the July 29, 2018 filing deadline. As set forth in 18 CFR § 5.13, PG&E must file a Revised Study Plan (RSP) with FERC within 30 days of the deadline for parties to file comments on PG&E's PSP. Through this letter, PG&E is submitting the RSP.

In accordance with 18 CFR § 5.11(e), PG&E convened fifteen study plan meetings between May and August 2018, including eight conference calls, with resource agencies, tribes, and other interested parties to discuss PG&E's proposed studies, information gathering or study requests by others, and to resolve outstanding issues regarding PG&E's proposed studies. PG&E worked collaboratively with resource agencies, tribes, and other interested parties to modify the proposed study plans and develop new study plans, including three new study plans related to bioaccumulation in Kerckhoff Reservoir, rare aquatic species, and benthic macroinvertebrates¹. As a result, consensus was reached on 23 of 25 study plans included with the RSP. The remaining two plans, *CUL 1 – Cultural Resources* and *CUL 2 – Tribal Resources*, were generally accepted by the resource agencies, tribes, and other interested parties at a study plan meeting on August 13, 2018, but several revisions were completed following that meeting. Although there was insufficient time to document consensus prior to the RSP filing deadline, consensus for these two study plans will be filed with FERC once documentation is completed.

¹ The new study plans related to bioaccumulation in Kerckhoff reservoir and rare aquatic species were added to the PSP as part of PG&E's response to comments on the Pre-Application Document. The new study plan related to benthic macroinvertebrates was added to the RSP as part of PG&E's response to comments on the PSP.

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PG&E believes the information developed through this RSP, in combination with existing data as summarized in PG&E's Pre-Application Document, will provide the information needed to evaluate issues that may arise during the relicensing process for ongoing Project operations. Information obtained through the RSP, when combined with existing data, will provide the basis for assessing the adequacy of existing protection, mitigation, and enhancement measures (PM&E), and if needed, developing new PM&E measures to be included in a new Project license.

The RSP is directly available on FERC's eLibrary. A link to the RSP is available at www.pge.com/kerckhoff.

PG&E looks forward to working with FERC and other parties on the relicensing of the Project. If you have any questions concerning this letter, please do not hesitate to contact me either by phone at (415) 973-7465, or by e-mail at Lisa.Whitman@pge.com.

Sincerely,



Lisa Whitman
Project Manager

Attachments

cc: Mr. Evan Williams, Environmental Biologist, FERC
via email (without Attachments): evan.williams@ferc.gov

Interested Parties list via email or hardcopy (without Attachments)

Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
FERC Project No. 96



Revised Study Plan

August 2018



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PACIFIC GAS AND ELECTRIC COMPANY

Kerckhoff Hydroelectric Project **FERC Project No. 96**

REVISED STUDY PLAN

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Prepared For:

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San Francisco, CA 94105

August 2018



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Kerckhoff Hydroelectric Project
FERC Project No. 96

Revised Study Plan

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Definitions of Terms, Acronyms, and Abbreviations

Term	Definition
C	
CFR	Code of Federal Regulations
F	
FERC	Federal Energy Regulatory Commission
I	
ILP	Integrated Licensing Process
N	
NOI	Notice of Intent
P	
PAD	Pre-Application Document
PG&E	Pacific Gas and Electric Company
PM&E	Protection, Mitigation, and Enhancement Measures
PSP	Proposed Study Plan
R	
RSP	Revised Study Plan
S	
SD1	Scoping Document 1
SD2	Scoping Document 2



1 Introduction

The following provides Pacific Gas and Electric Company's (PG&E) Revised Study Plan (RSP) for the relicensing of the Kerckhoff Project (Project) (FERC Project No. 96) required by Title 18 of the Code of Federal Regulations (CFR) § 5.13.

2 Background

On November 16, 2017, PG&E filed a Notice of Intent (NOI) and Pre-Application Document (PAD) with the Federal Energy Regulatory Commission (FERC) to seek a new license using the FERC's Integrated Licensing Process (ILP) as specified in 18 CFR §§ 5.1 through 5.31. The PAD provides FERC, federal and state resource agencies, tribes, and other interested parties with background information related to Project facilities, operation, and maintenance activities; summarizes existing, relevant, and reasonably available information; defines pertinent Project issues; and identifies potential study needs. Section 6 of the PAD identified 22 potential studies to address data gaps associated with the evaluation of potential impacts of continued operation and maintenance of the Project. Appendix D of the PAD included draft proposed study plans in an effort to facilitate collaboration between PG&E, resource agencies, tribes, and other interested parties, and reach timely agreement on the studies needed for relicensing.

In response to comment letters and meetings with the resource agencies, tribes, and other interested parties, PG&E modified a majority of the study plans and developed two new study plans: *Study AQ 6 Rare Aquatic Species* and *Study WQ 3 Bioaccumulation in Kerckhoff Reservoir*. PG&E's Proposed Study Plan (PSP) was filed with FERC on April 30, 2018, and included 24 study plans.

Between May and August 2018, PG&E convened fifteen study plan meetings, including eight conference calls and the meeting required under 18 CFR § 5.11[e], to discuss comments on the PSP and worked collaboratively with the resource agencies, tribes, and other interested parties to modify the proposed study plans and develop a new study plan. As a result, PG&E reached consensus with the resource agencies, tribes, and other interested parties on 23 of 25 study plans included with the RSP, including one new study plan related to benthic macroinvertebrates. The two study plans for which consensus has not been documented are *Studies CUL 1 – Cultural Resources* and *CUL 2 – Tribal Resources*. At the August 13, 2018 study plan meeting, there was general agreement with the plan, but several revisions were completed following the August 13, 2018 study plan meeting, and there was insufficient time to document consensus prior to the RSP filing deadline. Consensus for these two study plans will be filed with FERC once documentation is completed.

Below is a summary of the PG&E's filings and notable activities:

- **November 16, 2017.** PG&E filed the NOI and PAD with FERC.
- **January 16, 2018.** FERC issued Scoping Document 1 (SD1) to Interested Parties in accordance with 18 CFR § 5.8. SD1 provided the resource agencies, tribes, and other interested parties with FERC's preliminary list of issues and alternatives to be addressed in an Environmental Assessment analyzing conditions of a new Project license.



- **February 13, 2018.** FERC conducted two Public Scoping meetings. Transcripts of FERC's scoping meetings can be found on FERC's eLibrary web site at: <https://www.ferc.gov/docs-filing/elibrary.asp>
- **February 14, 2018.** FERC conducted Project site visit.
- **March 17, 2018.** FERC deadline to submit comments on the PAD, SD1, and/or study requests. PG&E filed comments to SD1, including comments regarding potential study plans.
- **April 30, 2018.** PG&E filed the PSP for the Project and responses to comments.
- **April 30, 2018.** FERC issued Scoping Document 2 (SD2) as a result of the scoping meetings and comments received during the scoping process.
- **May through August, 2018.** PG&E hosted fifteen study plan meetings, including eight conference calls, to discuss proposed study plans and to review comments on the PSP.
- **July 29, 2018.** FERC deadline to submit comments on the PSP.

PG&E believes the information developed through implementation of the RSP, when combined with existing data as summarized in the PAD, will provide the information needed to identify and evaluate potential resource issues from ongoing operation and maintenance of the Project. Results of studies also will be used to assess the adequacy of existing protection, mitigation, and enhancement (PM&E) measures and, if needed, to evaluate potential new PM&E measures for consideration in a new Project license.

This RSP filing:

- Provides information regarding study plan meetings conducted and the study plan development process (Section 3)
- Summarizes and addresses comments filed by resource agencies, tribes, and other interested parties, and the Licensee's response (Section 4, **Appendix A**)
- Includes revised study plans proposed by PG&E (Section 6, **Appendix B**)
- Provides key resource agencies' emails confirming consensus on four of the study plans and supporting their early implementation. (Section 5, **Appendix C**)
- Defines the process and schedule for study implementation and reporting (Section 7)
- Describes the process associated with FERC's annual study report and meeting (Section 8)
- Provides study plan meeting summaries (**Appendix D**)



3 Study Plan Meetings

In accordance with 18 CFR § 5.11(e), PG&E held a study plan meeting in Fresno, California, on May 21, 2018, with resource agencies, tribes, and other interested parties to: (1) clarify PG&E's PSP, (2) clarify information gathering or study requests submitted by resource agencies, tribes, and other interested parties during the comment period; and (3) begin to resolve outstanding issues with respect to the PSP through dialog and collaboration.

In addition, PG&E convened a series of study plan meetings and conference calls from May through August 2018, with resource agencies, tribes, and other interested parties, which successfully resolved a substantial number of differences between the PSP and participants' study plan requests.

Table 1 shows activities associated with study plan development, including the dates of study plan meetings. The schedule includes time frames for Formal Dispute Resolution, if needed.

4 PSP Comments Filed and PG&E's Response

A total of four comment letters were filed with FERC by the July 29, 2018, deadline. The letters included comments on the PSP, FERC's SD2, new study requests, and interest statements. This RSP filing only addresses comments on the PSP and new study requests. Copies of the comment letters can be found on FERC's eLibrary at: <https://www.ferc.gov/docs-filing/elibrary.asp>.

The following four agencies and organizations filed comments (FERC filing number noted for reference). Refer to **Appendix A** for the PG&E's responses to these comments.

- Bureau of Land Management, Bakersfield Field Office (FERC# 20180726-5065)
- State Water Resource Control Board (FERC# 20180730-5052)
- United States Forest Service (FERC# 20180723-5208)
- National Park Service (FERC# 20180524-5177)

The RSP reflects a collaboration with resource agencies, tribes, other interested parties, and PG&E to resolve outstanding issues regarding the Licensee's PSP. Since the comment letters on the PSP were filed in July, PG&E has continued to work with the resource agencies, tribes, and other interested parties to reach consensus on the study plans. The RSP incorporates the written comments filed on the PSP and verbal communication during study plan meetings held between May and August. As a result of the consultation, PG&E, resource agencies, tribes, and other interested parties reached consensus on 23 study plans included with the RSP, and general agreement (without documentation of consensus) on the remaining two study plans¹.

¹ Consensus for these two study plans will be filed with FERC once documentation is completed.

**Table 1 Study Plan Development Process from the Filing of Proposed Study Plan**

FERC Regulation 18 CFR §	Responsible Party	Action¹	Date
5.11(a)	Licensee	File Proposed Study Plan	04/30/2018
5.11(e)	Licensee	Meeting to discuss PSP (As required under 18 CFR § 5.11(e))	05/21/2018
5.11(e)	Licensee/participants	Conference call to discuss AQ 7	05/29/2018
5.11(e)	Licensee/participants	Conference call to discuss WQ 1, WQ 2, AQ 6	06/08/2018
5.11(e)	Licensee/participants	Meeting to discuss WQ 2, WQ 3, AQ 7	06/08/2018
5.11(e)	Licensee/participants	Conference call to discuss GEO 2	06/14/2018
5.11(e)	Licensee/participants	Meeting to discuss REC 1, REC 3, REC 4, LAND 1, GEO 2, GEO 3	06/19/2018
5.11(e)	Licensee/participants	Conference call to discuss AQ 5	06/21/2018
5.11(e)	Licensee/participants	Conference call to discuss GEO 2	06/21/2018
5.11(e)	Licensee/participants	Meeting to discuss CUL 1, CUL 2	06/25/2018
5.11(e)	Licensee/participants	Meeting to discuss AQ 2, AQ 5, AQ 6, AQ 7, GEO 2, WQ 1, WQ 2, WQ 3	06/28/2018
5.11(e)	Licensee/participants	Conference call to discuss AQ 2 and WQ 3	07/09/2018
5.11(e)	Licensee/participants	Conference call to discuss CUL 1 and CUL 2	07/13/2018
5.11(e)	Licensee/participants	Meeting to discuss REC 1, REC 3, REC 4, WQ 3, GEO 2, AQ 2, AQ 6, BOT 1, WILD 1, LAND 1, GEO 3, CUL1, CUL 2	07/17/2018
5.12	Participants	File Comments on Proposed Study Plan	07/29/2018
5.11(e)	Licensee/participants	Meeting to discuss REC 3, REC 4, CUL 1, CUL 2	08/13/2018
5.11(e)	Licensee/participants	Conference call to discuss CUL 1, CUL 2	08/16/2018
5.13(a)	Licensee	File Revised Study Plan	08/28/2018
5.13(b)	Participants	File Comments on Revised Study Plan	09/12/2018
5.13(c)	FERC	Director's Study Plan Determination	09/27/2018
5.14(a)	<i>Mandatory Conditioning Agencies/Tribes</i>	<i>File Notice of Study Dispute</i>	10/17/2018
5.14(d)	<i>Dispute Panel</i>	<i>Convene Dispute Resolution Panel</i>	11/06/2018
5.14(i)	<i>Licensee</i>	<i>File Study Dispute Comments</i>	11/11/2018
5.14(k)	<i>Dispute Panel</i>	<i>Dispute Resolution Panel Findings Issued</i>	12/06/2018
5.14(l)	<i>FERC</i>	<i>Director's Study Dispute Determination</i>	12/26/2018

Source: FERC, SD2, Appendix B – Kerckhoff Hydroelectric Project Process Plan and Schedule, April 30, 2018.

Notes:

¹Refer to Appendix B for the description of each study plan.

Italicized actions are unnecessary if there are no study disputes.

When an activity is dependent on completion of a previous activity, the schedule assumes the previous activity is completed the latest date possible, 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.



5 Early Implementation Studies

PG&E has proposed early implementation of four of the studies in 2018, rather than in 2019. These four studies (*AQ 1 Aquatic Habitat Mapping*, *GEO 1 Channel Form and Fluvial Processes*, *GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir*, and *BOT 2 Riparian and Wetland Resources*) will inform implementation of the remainder of the studies in 2019. To manage risks associated with early implementation of select studies, PG&E requested key resource agencies provide emails confirming their consensus on these four study plans and supporting their early implementation. These emails are appended in **Appendix C**.

6 Revised Study Plan

This section identifies the revised studies proposed by PG&E to address significant data gaps. Proposed revisions are based on a review of existing resource information and stakeholder comments. The overall objective of the studies is to develop sufficient information to identify and evaluate potential Project impacts and potential new license conditions which reasonably balance multiple resource interests.

During preparation of the RSP, PG&E reviewed the following material:

- FERC's ILP regulations (18 CFR Part 5)
- FERC's SD1 and SD2
- PG&E's PSP
- PG&E's PAD
- Transcripts of FERC's February 13, 2018, scoping meeting
- Comment letters filed in response to FERC's SD1, SD2 and PG&E's PAD, including study requests made by resource agencies, tribes, and other interested parties in their comment letters
- Comments received on the PSP
- Comments received during the study plan meeting on May 21, 2018, as well as several additional meetings with resource agencies, tribes, and other interested parties conducted by PG&E from May through August 2018
- Relicensing studies conducted for other hydroelectric projects in California
- Scientific literature

Based on this review, PG&E proposes 25 studies organized into nine major resource areas to support relicensing the Project (**Table 2**). The complete text of the revised studies is included in **Appendix B**.

**Table 2 List of Revised Studies**

<p>Aquatic Resources</p> <ul style="list-style-type: none"> Study AQ 1 – Aquatic Habitat Mapping Study AQ 2 – Fish Populations Study AQ 3 – Mussels and Aquatic Molluscs Study AQ 4 – Entrainment Study AQ 5 – Western Pond Turtles Study AQ 6 – Rare Aquatic Species Study AQ 7 – Benthic Macroinvertebrates
<p>Botanical Resources</p> <ul style="list-style-type: none"> Study BOT 1 – Plant Communities, Special-Status Plants, and Invasive Weeds Study BOT 2 – Riparian and Wetland Resources
<p>Cultural Resources</p> <ul style="list-style-type: none"> Study CUL 1 – Cultural Resources Study CUL 2 – Tribal Resources
<p>Geological Resources</p> <ul style="list-style-type: none"> Study GEO 1 – Channel Form and Fluvial Processes Study GEO 2 – Project-related Sediment Management Practices in Kerckhoff Reservoir Study GEO 3 – Project Road-Related Erosion
<p>Hydrological Resources</p> <ul style="list-style-type: none"> Study HYD 1 – Operations Simulation Model Study HYD 2 – Hydrology with and without the Project
<p>Land Resources</p> <ul style="list-style-type: none"> Study LAND 1 – Project Roads and Trails Assessment
<p>Recreation Resources</p> <ul style="list-style-type: none"> Study REC 1 – Whitewater Boating Assessment Study REC 2 – Recreation Facility Assessment Study REC 3 – Recreation Visitor Use Study REC 4 – Recreation Visitor Use Surveys
<p>Water Quality</p> <ul style="list-style-type: none"> Study WQ 1 – Water Temperature in Kerckhoff Reservoir and Project Bypass Reach Study WQ 2 – Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir Study WQ 3 – Bioaccumulation in Kerckhoff Reservoir
<p>Wildlife Resources</p> <ul style="list-style-type: none"> Study WILD 1 – Special-Status Wildlife Species



6.1 Requested Studies Not Adopted

As required by 18 CFR § 5.13(a), if an applicant does not adopt a requested study included in comments on the PSP, the applicant shall provide in its RSP an explanation of why the request was not adopted with reference to the criteria set forth in 18 CFR § 5.9(b). There were no stand-alone study plans requested in comments on the PSP², and therefore no remaining study plan requests are outstanding.

There were study plan elements requested by resource agencies, tribes, and other interested parties in their comments on the PSP. These comments were discussed with the requester and generally resulted in additions or modifications to some study plans. Resource agencies, tribes, and other interested parties' comments, and PG&E's responses to those comments, are included in **Appendix A**.

6.2 Study Plan Template

Each study plan follows the template provided in PG&E's PAD (Table 6-1), which is replicated in **Table 3**.

6.2.1 Concepts that Apply to Each Relicensing Study Plan

Some general concepts that are included in each individual study plan are listed below.

- A "reasonableness" standard applies to each study and its implementation.
 - The schedule for each proposed study is reasonably flexible to accommodate unforeseen problems that may affect the schedule.
 - Field crews may make reasonable modifications to a study in the field to accommodate actual field conditions and unforeseen problems. When modifications are made, PG&E's field crew will follow industry accepted protocols to the extent possible. When substantial modifications are made, as time allows PG&E will advise resource agencies, tribes, and other interested parties of the change, and request comment, if possible.
 - When a number of alternative modifications are available to the field crew and all other things being equal, PG&E's field crew will choose the low-cost alternative.

² There were several studies requested by resource agencies, tribes, and other interested parties as part of comments on the PAD. PG&E addressed those requested studies in its April 30, 2018 filing. In working through the collaborative process with resource agencies, tribes, and other interested parties, some study elements requested by stakeholders were incorporated and others considered and not included. Consensus was obtained on all those plans for which additional elements were considered. Two new studies, bioaccumulation in Kerckhoff Reservoir and rare aquatic species, were added to the PSP from requests received from the State Water Board. An additional request from the State Water Board for a benthic macroinvertebrate study included in their PAD comments was incorporated in the RSP.



6.2.2 Access to Private Property and Areas with Unsafe Access

Implementation of the study plan may require access through private property. PG&E will make a good faith effort to obtain permission from landowners to: 1) obtain access through the landowner's property so that PG&E can reach study sites located on adjoining property; and/or 2) obtain access to the landowner's property so that PG&E can perform one or more relicensing studies on the landowner's property. Specifically excluded from the study area are areas where access is unsafe (very steep terrain or high water flows) or private property for which PG&E has not received specific approval from the landowner to enter the property to perform the study.

7 Study Plan Implementation and Reporting

A detailed study implementation schedule is provided at the end of each study plan in **Appendix B**. **Table 4** is a graphic depiction of the study plan implementation schedule. **Table 4** is intended to provide resource agencies, tribes, and other interested parties with a general understanding of time frames anticipated for completion of key study components. Many of the study plans include opportunities for resource agencies, tribes, and other stakeholder consultation on study site selection and some of the study plans have potential contingencies for consultation related to data collection and analyses. The schedule divides study implementation into two main categories: study development and reporting. Study development includes review of existing information, consultation, field surveys, data analysis, and model development/runs. Reporting includes preparation of draft and final study reports, participant review periods, and resolution of comments. The study plan schedules may change based on collaboration with resource agencies, tribes, and other interested parties and timing of FERC's approval of the final study plan³. The study schedule is focused on conducting studies in 2018 and 2019 with any follow-up work and reporting in 2020.

In accordance with 18 CFR § 5.15(b) and 18 CFR § 5.11(b)(3), PG&E will implement the following provisions for review/discussion of study implementation and findings. For each study implemented, Draft Technical Study Reports (summarizing methodologies and results) will be provided to resource agencies, tribes, and other interested parties for review and comment. Comments received on each report will be incorporated into the Final Technical Study Report, as appropriate. In addition to formal distribution of Draft and Final Technical Study Reports, PG&E will also present an overview of the content and key findings of each study report (if needed) to resource agencies, tribes, and other interested parties during a technical meeting.

³ PG&E's study plan schedules assume FERC approval of study plans on September 27, 2018, in accordance with SD2, Appendix B. As discussed in Section 1.4, four studies (AQ 1, GEO 1, GEO 2, and BOT 2) have potential early start dates prior to FERC's Study Plan Determination to facilitate collection of data that will be used to inform study site selection and approaches for data collection for other studies that will start in 2019.



Table 3 Study Plan Template

STUDY NUMBER
STUDY NAME
Date
<p>POTENTIAL RESOURCE ISSUE(S)</p> <p>This section provides a bulleted description of potential resource issues related to operation and maintenance of the Project.</p>
<p>PROJECT NEXUS</p> <p>This section identifies the nexus between Project operation and maintenance and the identified resource issue(s). For example, (1) does the issue(s) exist because of the Project or would the issue(s) exist without the Project; (2) are the Project effects direct, indirect, and/or cumulative; and (3) are there potential opportunities to address the issue(s) that can only be achieved by the Project?</p>
<p>RELEVANT INFORMATION</p> <p>This section briefly describes the existing information identified in the PAD, if any, and other relevant information related to the resource issue. If applicable, it also identifies the relevant management goals of the agency with jurisdiction over the resource issue being studied.</p>
<p>POTENTIAL INFORMATION GAPS</p> <p>This section describes potential gaps in information needed to evaluate Project impacts and develop appropriate protection, mitigation, and enhancement measures.</p>
<p>PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS</p> <p>This section describes the potential studies that may be used to address potential information gaps.</p>
<p>EXTENT OF STUDY AREA</p> <p>This section identifies the study area proposed to be investigated (e.g., Project road segment, specific stream reaches, specific reservoirs, or area of land to be evaluated).</p>
<p>STUDY METHODS AND ANALYSIS</p> <p>This section describes the standard methods, protocols, or other accepted technical methodology proposed for the study. If no "standard" method exists, it will describe the study steps or procedures to be followed. This section also includes a description of how the data will be analyzed and how the data/results will be presented. The study methods should include specific number of sites to be evaluated and specify the location or at least the distribution of sites (i.e., number) per reach. Locations should be shown on maps, where applicable.</p>
<p>CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE</p> <p>This section explains how the proposed study methods (including any proposed data collection and analysis techniques) are consistent with generally accepted practices. If more than one accepted study methodology exists, they should be identified, along with the rationale for selecting the proposed study methodology.</p>
<p>PRODUCTS</p> <p>This section describes the expected products for summarizing the information and findings.</p>
<p>RELATIONSHIP TO OTHER STUDIES (Optional)</p> <p>If two or more studies are interdependent, this section identifies the relationship between the two studies and how the combined information is used to inform the development of potential future license conditions.</p>
<p>SCHEDULE</p> <p>This section includes a general schedule identifying office tasks, fieldwork, data analysis, and presentation of results. Where applicable, the anticipated timing of surveys to be conducted during each field season should be identified.</p>

**LEVEL OF EFFORT AND COST**

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken by major tasks is as follows:

Project Management and Consultation	\$ _____
Field Work	\$ _____
Data Analysis	\$ _____
Products	\$ _____
Total	\$ _____

REFERENCES

This section identifies appropriate technical references.

8 FERC Annual Study Report and Meeting

In accordance with 18 CFR § 5.15(c) and 18 CFR § 5.15(f), PG&E will file an Initial Study Report within 1 year of FERC's approval of a study plan and an Updated Study Report within 2 years of FERC's approval. The reports will describe PG&E's overall progress in implementing the studies and an overview of data collected to date. The reports will also include a discussion of any variance from the approved study plan and schedule, and modifications to ongoing studies proposed by PG&E.

Within 15 days following filing of both the Initial Study Report and the Updated Study Report, PG&E will hold a meeting with resource agencies, tribes, interested parties, and FERC to discuss study results and PG&E'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 each meeting, PG&E will file a meeting summary, including any modification to ongoing studies or new studies proposed by PG&E.



Table 4 Preliminary Study Schedule

Title	Year	2018				2019				2020									
	Quarter	3		4		1		2		3		4							
	File FERC Study Progress Report	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
AQ 1. Aquatic Habitat Mapping																			
AQ 2. Fish Populations																			
AQ 3. Mussels and Aquatic Molluscs																			
AQ 4. Entrainment																			
AQ 5. Western Pond Turtles																			
AQ 6. Rare Aquatic Species																			
AQ 7. Benthic Macroinvertebrates																			
BOT 1. Plant Communities, Special-Status Plants, and Invasive Weeds																			
BOT 2. Riparian and Wetland Resources																			
CUL 1. Cultural Resources																			
CUL 2. Tribal Resources																			
GEO 1. Channel Form and Fluvial Processes																			
GEO 2. Project-Related Sediment Management Practices in Kerckhoff Reservoir																			
GEO 3. Project Road-Related Erosion																			
HYD 1. Operations Simulation Model																			
HYD 2. Hydrology With and Without the Project																			
LAND 1. Project Roads and Trails Assessment																			



Appendix A

Proposed Study Plan Comment/Response Matrix



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Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
BLM					
BLM	BLM-1	1-2	Paragraphs 1, 4, 5, 7, 8	<p>Conditions may exist at or near hydropower facilities that could be dangerous or conducive to accidents that could cause injury or loss of life. The potential for drownings, accidental deaths, and injuries near project facilities and on other project lands and waters has been of concern to the FERC and project owners for a considerable time.</p> <p>Public safety is a primary concern to BLM with regard to relicensing of Kerckhoff Project. BLM manages the San Joaquin River Gorge Special Recreation Management Area (SJRG) to provide for BLM’s multiple use mandate and specifically for recreation including river related recreation. These resources are directly impacted by Project operations. There is a clear Project nexus for BLM’s recreational resources being affected by Project operations requiring special safety considerations as a result of Project operations.</p> <p>Per Federal Regulations, 18 CFR Section 4.51(f)(6), on Report on Land Management and Aesthetics, this report must contain the management of lands within the Project boundary and the protection of the recreational and scenic values of the Project.</p> <ul style="list-style-type: none"> • Specifically, all existing project appurtenances such as fencing, gates, roads or trails, and safety or security features should be sufficiently described and mapped within and adjacent to the Project boundary. • Descriptions and maps should be detailed enough to understand the purpose of the feature and its actual operational effect. For example, the type of fence (chain-link, barbed 	<p>Clarification. Comments raised during relicensing related to public safety will be addressed by ongoing processes outside of relicensing as appropriate. This allows for quick responses to situations as they arise, and is a more appropriate venue to address issues that are immediate in nature. PG&E did not incorporate all of BLM’s proposed changes related to public safety in the recreation study plans, because there may be some issues that all parties would like to address more quickly and with more flexibility than the new FERC License, when issued, would allow.</p> <p>Note that the <i>LAND 1</i> Technical Study Report (TSR) will include detailed information about Project-related gates and roads, as well as safety, traffic control, and informational signs. Potential traffic safety concerns such as blind spots, poor sight distance, inadequate signage, and hazard trees will also be noted in the <i>LAND 1</i> TSR.</p>



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				<p>wire, wooden post), the type of gate (pedestrian, equestrian, vehicle, locked), the purpose of the feature (prevent unauthorized access by vehicles, pedestrians, livestock, or provide access to or through the Project), what safety features are installed and where (signs; their messages and targeted observer, gates, locks, sirens, lights, etc.). These features should be described in each sub-section of Existing Project Facilities.</p>	
BLM	BLM-2	2	10, 11	<ul style="list-style-type: none"> • BLM was provided the Kerckhoff Public Safety Plan as requested from PG&E on June 29th, 2018. It is recommended that this safety plan be included in the scoping document for analysis and referenced within the study plans identified below (Study Rec 3, Rec 4, and Lands 1). • BLM has determined that the descriptions of the Existing Project Facilities within the Proposed Action and Alternatives contained within SD2 (section 3.1.1) and relevant to STUDY REC 3, REC 4 and STUDY LAND 1, are inadequate. BLM requests that PG&E and/or FERC further develop this information in order to properly analyze the effects of Project operation and maintenance under all alternatives. 	<p>Clarification. The Public Safety Plan has been referenced in <i>Studies REC 3, REC 4, and LAND 1</i>, as requested by BLM. BLM Comment 2 also applies to FERC’s Scoping Document 2, which PG&E cannot revise.</p> <p>The requested information about safety is provided in the Public Safety Plan, and information in this plan needed for relicensing TSRs will be used as appropriate. The information does not need to be collected separately under the recreation or land use study plans.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				<ul style="list-style-type: none"> Additionally, in the sub-section on Developed Recreation Facilities, information should be provided to describe the existing situation that both the K1 and K2 Developments are within the BLM developed recreation site at the San Joaquin River Gorge and that administration and management activities, other authorized uses and multiple recreation activities occurring there pass in and out of the Project boundary. 	<p>Clarification. This comment applies to FERC’s Scoping Document 2. This information is documented in the introduction, recreation, and land use sections of the PAD as existing information and is not needed for the study plans.</p>
BLM	BLM-3	2	12	<p>Per the June 28, 2018 study plan discussions, PG&E agreed to rephrase the language of “agencies, tribes, and other stakeholders” to “federal or state agencies, tribal interests, and other interested parties.” BLM concurs with the revised language.</p>	<p>Clarification. This language has since been modified at the request of Honorable Ron Goode (North Fork Mono Tribe), and with the concurrence of other participants, at the July 17, 2018, study plan meeting to read “resource agencies, tribes, and other interested parties.”</p>
BLM	BLM-4	2–3	13–16	<p>STUDY REC 3 –Recreation Visitor Use, STUDY REC 4 – Recreation Visitor Use Surveys: April 2018/June 2018</p> <p>BLM acknowledges that PG&E has made modifications to their existing study plans issued in April 2018 to include additional lands surrounding Kerckhoff Powerhouse 1 and 2 in response to BLM comments. We also appreciate PG&E’s willingness to collaboratively work to improve public safety outside the license process to expedite implementation of public safety measures.</p> <p>The focus of BLM’s requested modifications to study plans documented below are to provide adequate information for analysis in regard to long-term Project related public safety.</p> <p>BLM was provided an updated version of <i>STUDY REC 3 Recreation Visitor Use - June 2018</i> and</p>	<p>Clarification. Issues related to <i>Study REC 3</i> and <i>Study REC 4</i> were resolved by consensus with BLM, other resource agencies, tribes, and interested parties during the August 13, 2018, study plan meeting.</p> <p>Please also see response to BLM Comment 1. PG&E did not include public safety as an independent resource issue in <i>Study REC 3</i> and <i>Study REC 4</i>.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				<p><i>STUDY REC 4 Recreation Visitor Use Surveys - June 2018</i> (via email on 6/29/18) which captures revisions discussed by stakeholders at the PG&E meeting held on 6/19/18</p> <p>COMMENTS APPLICABLE TO BOTH STUDY REC 3 – Recreation Visitor Use and REC 4 – Recreation Visitor Use Surveys</p> <p>POTENTIAL RESOURCE ISSUE(S)</p> <p>BLM requests identifying Public Safety as an independent resource issue for both studies.</p> <p>Insert bullet:</p> <ul style="list-style-type: none"> • Public Safety 	
BLM	BLM-5	2-3	17-19	<p>PROJECT NEXUS</p> <p>Modify existing language to include the bypass reach as indicated below for both studies. . .</p> <ul style="list-style-type: none"> • The Project reservoir and shoreline, bypass reach, and lands in the vicinity of Kerckhoff 1 and 2 powerhouses provide attractive settings for recreation use caused by Project operations. The Federal Energy Regulatory Commission (FERC) in its comprehensive planning process provides for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety and other beneficial uses including recreation resources. <p>This request is to acknowledge the role the bypass reach has in operations and maintenance of the Project for which public safety considerations need to be analyzed.</p>	<p>Accepted with Modification. The Project Nexus section in <i>Study REC 3</i> and <i>Study REC 4</i> has been revised per the bolded text below, per BLM’s request: “The Project reservoir and shoreline, Project Bypass Reach, and lands in the vicinity of the Kerckhoff 1 and 2 powerhouses provide attractive settings for recreation. The Federal Energy Regulatory Commission (FERC) through its comprehensive planning process requires its licenses provide for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety and other beneficial uses including recreation resources.”</p> <p>The “...use caused by Project operations” phrase was not added to the text because the Project Bypass Reach provides an attractive setting for recreation with or without the Project.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
BLM	BLM-6	3	20	<p>Insert bullet for both studies:</p> <p>The licensee is responsible for maintaining public safety associated with operations and maintenance of the Project.</p>	<p>Not Accepted. See response to BLM Comment 1. Although this bullet was not added to the recreation study plans, PG&E is committed to addressing public safety issues expeditiously as they arise, outside of the relicensing process.</p>
BLM	BLM-7	3	21-22	<p>RELEVANT INFORMATION</p> <p>Include the following for both studies:</p> <p>Kerckhoff Project, FERC No. 96 Public Safety Plan, 2016 (Pacific Gas and Electric Company [PG&E] 2016).</p> <p>POTENTIAL INFORMATION GAPS</p> <p>Insert bullets for both studies:</p> <ul style="list-style-type: none"> Existing/potential safety issues and existing features or measures that are implemented to protect the public. 	<p>Accepted. Reference to the Public Safety Plan has been added to the “Relevant Information” sections of both <i>Study REC 3</i> and <i>Study REC 4</i> for clarification.</p> <p>Not accepted. Public safety concerns will be addressed in an ongoing dialogue outside of relicensing that will be conducted prior to the completion of relicensing. Existing/potential safety issues and existing features or measures that are implemented to protect the public are not data gaps for recreation studies. Please also see response to BLM Comment 1.</p>
BLM	BLM-8	3	22	<ul style="list-style-type: none"> Existing and potentially conflicting public uses within the Project and in the vicinity of the Project including the bypass reach and the Project’s appurtenant facilities. 	<p>Accepted. “Existing and potentially conflicting public uses within the Project and in the vicinity of the Project including the Project Bypass Reach and the Project’s appurtenant facilities” are already identified in <i>Study REC 4</i>. This text was added to <i>Study REC 3</i>. <i>Study REC 3</i> results will report locations and amount of visitor use and can be referred to when addressing conflicting uses, but identifying and characterizing conflicts will be achieved by analyzing the visitor responses collected under <i>Study REC 4</i>.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
BLM	BLM-9	3-4	23-33	<p>EXTENT OF STUDY AREA in both STUDY REC 3 and REC 4</p> <p>BLM finds the extent of the study area and the proposed location from which observations will take place inadequate for both STUDY REC 3 and REC 4.</p> <p>This location provides limited scope of view of both the Project facility and the tailrace area.</p> <p>In the June 2018 version of STUDY REC 3 the following language was added and reflects discussion held on 6/19/18.</p> <p>“Visitor use observations will take place from within the polygons identified in Figure REC 3-1 and include the viewable area beyond the polygons.”</p> <p>BLM is in agreement on capturing the “viewable area” but not from the current location identified.</p> <p>The June 2018 version is unchanged from the April 2018 version of REC 4 which limits surveys to be administered to areas defined in Figure REC 4-1 polygons. BLM finds this inadequate.</p> <p>BLM acknowledges that steps towards consensus have been taken by PG&E. However, we request that the Visitor Use Observations in STUDY REC 3 and Visitor Surveys REC 4 be administered from areas that capture the most data to inform Project related recreation and Project related public safety.</p> <p>BLM requests that the observations for STUDY REC 3 be taken from the Madera side of the river, which provides the best view of the entire K1 study area identified by the Polygon in Figure</p>	<p>Accepted. The additional locations for the visitor use observations in <i>Study REC 3</i> and visitor surveys in <i>Study REC 4</i> have been added to the study plans.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				<p>REC 3-1, and includes the tailrace area and a greater extent of the Project’s bypass reach.</p> <p>BLM proposes locating the observer(s) at 37.09293 N, 119.55281 W. This location provides a view of the entire area identified at K1 within the polygon in Figure REC 3-1. Given the topography surrounding K1 and the powerhouse’s dimensions observing what is taking place within the polygon currently identified, while remaining inside that area, would be difficult. It should also be noted that there is no safe view of the tailrace area from within the polygon Figure Rec 3-1.</p> <p>BLM requests that Visitor Use Surveys for REC 4 be provided at locations to capture the most data possible with respect to Project facilities within the SJRG to inform long-term public safety measures:</p> <ul style="list-style-type: none"> • Primary: the San Joaquin River Bridge crossing with a view of Kerckhoff Powerhouse 1 and the River Access parking area with a view of Kerckhoff 2 Switchyard • Secondary: surveys should also be made available to individuals at the Trailhead, Group and Equestrian Campgrounds to inform limitations to access and latent demand. 	
BLM	BLM-10	4	34	<p>STUDY METHODS AND ANALYSIS</p> <p>Both versions of (April and June 2018) STUDY REC 3 states. . .</p> <p>“The observation surveys will be conducted by a roving surveyor in a vehicle and boat.”</p>	<p>Accepted. The study method was not intended to restrict field crew to their vehicles. They will exit their vehicles, as necessary, to perform the survey work. Clarification was provided by revising the study plan text to read: “The observation surveys will be conducted by a roving surveyor.”</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				BLM requests clarification to eliminate assumptions on how the surveys will be conducted. Will the surveyor(s) get out of their vehicle in the vicinity of K1 and K2?	
BLM	BLM-11	4-5	35-36	<p>As of the version provided to BLM on 6/29/18 via email the following language was modified and reflects discussion held on 6/19/18. BLM is in agreement on the changes that reflect an expanded number of spot-observation survey dates to accommodate the variation in recreation use in the vicinity of K1 and K2 Powerhouses, at BLM's request.</p> <p>“Recreation use will be observed and documented during the recreation season from March 1 through October 31. Observation surveys will occur on a sample of holiday weekends, non-holiday weekends, and weekdays during this period in accordance with Table REC 3-1.”</p>	Accepted. The language was the result of collaboration with BLM, other resource agencies, tribes, and other interested parties.
BLM	BLM-12	5	37-38	<p>Additional modifications regarding changes in survey dates in Table REC 3-1, Developed Recreation Facility Use Assessment, SCHEDULE are consistent with these changes. Changes in dates have also been made in REC 4, consistent with STUDY REC 3 changes. BLM is in agreement with PG&E on these date changes.</p> <p>“Spot-observation surveys will be conducted to record the number of visitors and types of activities occurring along the Kerckhoff Reservoir shoreline outside of developed facilities, on the reservoir surface, and in and within view1 from the Study Area near Kerckhoff 1 and 2 powerhouses (Figure REC- 3-1).”</p>	Accepted with Modification. The language was modified in collaboration with BLM, other resource agencies, tribes, and other interested parties.



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
BLM	BLM-13	5	39	In reference to the modification (June 29th version) BLM finds the extent of study area and the proposed location from which observations will take place inadequate for both STUDY REC 3 and REC 4. Inadequacy described above in <i>Extent of Study Area in both Study Rec 3 and 4</i>	Accepted. Please see also response to BLM Comments 9 and 10.
BLM	BLM-14	5	40–41	<p>BLM requests that a total of four trail counters (not cameras) be incorporated into STUDY REC 3. Trail counters should be placed at or in close proximity to PG&E’s installed hazard signs (see photos to the right and below). BLM recreation users access the Project’s Bypass Reach for recreation including gold panning, bouldering, fishing, swimming, river play, and to enjoy the views. Recreation users also cross through the Project boundary while accessing hiking trails. It is recommended that the trail counter closest to K1 powerhouse have the ability to differentiate between equestrian, bicyclist and pedestrian to inform what type of recreation user is accessing the Project’s Access Roads 3 and 4. The intent is to capture information on these access points to inform public safety needs. BLM recommends that the data is collected and analyzed as part of STUDY REC 3. Please see attached map: Kerckhoff Project-Areas of Concern for Recreation and Safety on BLM Public Lands. The TRAFx brand counting system or other similar is recommended.</p> <p>Estimated associated cost for equipment, data support and, labor to install and check counters at regular intervals throughout the study period: \$6,000.</p>	<p>Accepted with Modification. PG&E accepts the provisional use of trail counters to supplement the previously proposed observations in locations that provide information on visitors accessing the river.</p> <p>Trail counters may provide useful supplementary data about the relative amount of use, as well as time-of-day and seasonal distributions, but cannot provide specific data about the number of users by activity.</p> <p>Five trail counter locations are proposed by PG&E in <i>Study REC 3</i>.</p> <p>We also note that BLM underestimates the cost of this effort. The individual trail counters, without supporting hardware and software, are about \$500 each, and significant field effort is necessary to frequently visit the sites to ensure counter security and functionality.</p>



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BLM	BLM-15	6	42	<p>STUDY REC 4 STUDY METHODS AND ANALYSIS</p> <p>In regard to: “Visitor surveys will be administered throughout the sampled day (i.e., mornings from 8 a.m. to noon, afternoons from noon to 4 p.m., and evenings from 4 p.m. to 8 p.m.)” BLM requests that the sampled day be adjusted to start at 6:00 am and end at 6:00 p.m. for the portion of surveys administered at the San Joaquin River Gorge. This request is based on qualitative observations from BLM field personnel and partners. Language should also include the ability to modify time of day based on available data (weather, observations and trail counter data) if data collected indicates a more appropriate start and end time throughout the study period.</p>	<p>Accepted. The time frames for surveys have been adjusted in the study plan text.</p>
BLM	BLM-16	6–7	44–45	<p>POTENTIAL LICENSE CONDITION</p> <p>The Kerckhoff Public Safety Plan has valuable information. However, it is BLM’s position that the current study plans require modifications to inform Project analysis within the license renewal process including Project related public safety. Information such as level and timing of use at access points to the Project’s bypass reach and public access occurring in, and passing through the Project boundary.</p> <p>BLM requests the consideration of the following Potential License Condition:</p> <ul style="list-style-type: none"> • Develop an Enhanced Public Safety Plan that includes measures that are designed to: <ul style="list-style-type: none"> – Address Project-related needs in regard to recreation, as appropriate (within the 	<p>Clarification. Please see response to BLM Comment 1 and BLM Comment 14.</p>



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				<p>Project boundary, passing through, and on lands and waters within the vicinity); and</p> <ul style="list-style-type: none"> - Maintain Project-related public safety. 	
BLM	BLM-17	6	43	<p>PRODUCTS AND RELATIONSHIP TO OTHER STUDIES</p> <p>BLM requests that trail counters be used for STUDY REC 3. If accepted, incorporating the data from trail counters that captures public use into the Technical Study Report/Relationship to Other Studies is advised for REC 4.</p>	Accepted. Please see response to BLM Comment 14.
BLM	BLM-18	7	46-50	<p>An Enhanced Public Safety Plan should address:</p> <ul style="list-style-type: none"> • Existing recreation in, passing through, and around the Project Boundary within the SJRG in addition to Project related recreation at Smalley Cove; • Public safety considerations within the bypass reach due to operations and maintenance of the Project (dam spills, ramping rates, public notification), including level of use at access points to the bypass reach; • A detailed description (map/photos) of existing Project facilities and their safety and/or security features, including but not limited to fences, locked gates, and signage; • A description of K1 and K2 Developments as it relates to the BLM developed recreation sites at the SJRG, with BLM having a multiple use mandate both administratively and managerially. All other authorized uses and multiple recreational activities occurring on site, 	Clarification. Please see response to BLM Comment 1.



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				inclusive of pass through, adjacent, or in the vicinity of the Project boundary.	
BLM	BLM-19	7-8	53-56	<p>STUDY LAND 1</p> <p>EXTENT OF STUDY AREA</p> <p>BLM request modifications to the proposed study to include turnouts, turnarounds, or any area that is used for staging vehicles or equipment off of the road bed as these areas are subject to erosion, require maintenance, and are used by PG&E and/or its contractors frequently. These staging areas need to be clearly identified within the Project boundary and Project license. These staging areas are subject to BLM authorizations, if not included within the Project license. BLM will consider use of these staging areas not within the Project license or BLM authorization in trespass.</p> <p>STUDY METHODS AND ANALYSIS</p> <p>The Condition Assessment section of the study should be modified to conduct surveys to assess the current level of use of the “Project Roads” within the SJRG identified on Table LAND 1-1a. Identify the frequency and types of vehicles accessing the roads by PG&E and their affiliated companies (contractors and subcontractors). This information will provide data for maintenance requirements.</p> <ul style="list-style-type: none"> • Include approximate weight of the vehicle which can be determined by the model/type of vehicle and the load per axle for vehicles pulling trailers. • BLM requests monitoring of the average speeds of vehicles along project roads and 	<p>Clarification. Issues related to <i>Study LAND 1</i> were resolved by consensus with BLM, other resource agencies, tribes, and other interested parties during the July 17, 2018, study plan meeting.</p>



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				where identified within PG&E's right-of-way CACA 005086, access roads are subject to stipulations (4d): "The speed limit on this road shall be 25 M.P.H." and (4m): "The Grantee shall install traffic control and speed signs in accordance with AASHTO criteria and as designated from Authorized Officer" to ensure compliance.	
BLM	BLM-20	8	57	Condition Assessment: In regard to- Overall road condition, including identification of issues pertaining to conditions such as potholes, ruts, loose aggregate, missing aggregate, cracking debris, and excessive vegetation;" should include: loss of paving, erosion in turnouts.	Clarification. Road surface conditions are included in <i>Study LAND 1</i> . Turnouts are included in <i>Study GEO 3</i> . Please also see response to BLM Comment 21.
BLM	BLM-21	8	58	Resource Assessment: In regard to - "location of areas along the roads and trails identified" modify to include turnout areas and areas used for staging vehicles off road. Specifically noting the areas around K2 Switchyards within the Project boundary. BLM has observed PG&E utilizing this area as a staging area for Project equipment.	Clarification. Turnout, laydown, and staging areas are addressed in <i>Study GEO 3</i> . In that plan, the Extent of Study Area section states, "The Study Area includes the Project Roads and the one USFS Shared Access Road (i.e., roads shared with USFS) and associated turnouts and laydown areas..."
BLM	BLM-22	8	59	<p>PRODUCTS AND RELATIONSHIP TO OTHER STUDIES</p> <p>BLM has requested that trail counters be used for STUDY REC 3. If accepted, incorporating the data from trail counters that captures public use (on foot, equestrian and bicycle) of Project Roads into the Technical Study Report/Relationship to Other Studies is advised.</p>	Accepted with Modification. Please see response to BLM Comment 14.



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BLM	BLM-23	8-9	60-69	<p>STUDY CUL-1</p> <p>Past and historic use of the FERC boundary created cultural resources on the landscape beyond the initial expected boundary. This land pattern is likely to continue into the future license and use of the project area. Previous documentation of cultural resources related to the existing FERC license were not complete. The results of incomplete documentation were used to make decisions about eligibility on the whole hydro-system. Generally accepted cultural resource expectations include, when feasible, cultural resource boundaries would be documented fully and in relation to site formation processes and are not based solely upon project boundaries.</p> <ul style="list-style-type: none"> • In development of the Area of Potential Effects (APE), the BLM will need access to specific details, including record search results, shapefiles of the proposed APE(s), and maps of a scale that are reasonably large enough to view the data. • FERC needs to clarify which portions of the FERC license are above ground and which are subsurface preferably with shapefiles and relevant attribute data. • The timeline for development of the APE by February 2019 is supported by the BLM, provided that the BLM is afforded adequate time to provide input and review of the draft APE. • BOR lands are not adequately described and displayed on FERC project maps. BOR lands that are managed by the BLM are displayed as 	<p>Accepted. The text of <i>Study CUL 1</i> has been modified to address BLM comments. The schedule for the development of the APE has been adjusted to defer to the schedule requested by BLM. The study plan was discussed with resource agencies, tribes, and other interested parties on August 13, 2018. Plan <i>CUL 1 – Cultural Resources</i> was generally accepted by the resource agencies, tribes, and other interested parties, but several revisions were completed following the August 13, 2018 study plan meeting, and there was insufficient time to document consensus prior to the RSP filing deadline. Consensus for this study plans will be filed with FERC once documentation is completed.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				<p>being owned by the BLM. FERC seems to be confusing BLM recreation maps with official land status. This has the potential to create confusion, for example, identification of an appropriate agency to take the lead in the event of a NAGPRA discovery could be delayed if FERC does not recognize that BOR lands are within the license area. BLM has provide current shapefiles for the correct official land status. BLM will not take lead on NAGPRA and ARPA processes on BOR Lands.</p> <ul style="list-style-type: none">• Areas not surveyed as a result of steep slope, or other access areas, should still be addressed in field documentation even if excluded from survey.• CUL 1a TSR needs to include a clear definition of the APE used in the field studies as well as an appendix containing the CA OHP CHRIS IC records search.• CUL 1b / CUL 1c TSRs –Notification of the BLM needs to occur prior to notification of NRHP evaluation findings to SHPO for sites located on BLM parcels.• In order for the BLM to review the TSR’s, FERC will provide access to GIS data and record search information used in the development of the TSR’s. This information is also needed for BLM NEPA/NHPA review of the ROW process related to the K2 facilities.• The Organic Act applies to the USDA. For the BLM (in contrast the USFS), non-invasive studies (i.e. archaeological survey) and subsurface testing are subject to the	



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				Archaeological Resources Protection Act (ARPA)	
BLM	BLM-24	9	70–72	<p>STUDY CUL-2</p> <ul style="list-style-type: none"> • FERC proposed to interview tribal elders and other tribal representatives by contacting Native American Tribes. This process would not include non-federally recognized Native American leadership that has been identified to FERC from the BLM. FERC needs to incorporate measures to ensure all Native American voices are included in the ethnographic study. • For site visits between the ethnographer and Native American leadership, the BLM would need to be notified in advance regarding proposed locations on BLM lands to ensure compliance with any permit requirements. • All steps, including NRHP evaluations and TCP studies, identified by FERC within Study Plan CUL 2 should involve input from Federally and non-Federally recognized tribes and individuals, as well as tribal museums and tribal organizations, such as CIBA. This is stated at the beginning of the document, but is not consistent throughout the text, as a result, the intent is not clear. 	<p>Accepted. The text of <i>Study CUL 2</i> has been modified to address BLM comments. The study plan was discussed with resource agencies, tribes, and other interested parties. During the August 13, 2018, meeting, Plan <i>CUL 2 – Tribal Resources</i> was generally accepted by the resource agencies, tribes, and other interested parties, but several revisions were completed following the August 13, 2018 study plan meeting, and there was insufficient time to document consensus prior to the RSP filing deadline. Consensus for this study plans will be filed with FERC once documentation is completed.</p>
BLM	BLM-25	9–10	73–77	<p>STUDY GEO-1 POTENTIAL RESOURCE ISSUES</p> <ul style="list-style-type: none"> • This study does not evaluate the presence of hazardous substances in the water or sediments of the Kerckhoff Dam, bypass, and sections of the San Joaquin River between Kerckhoff 	<p>Clarification. Issues related to <i>Study GEO 1</i> were resolved and the plan accepted by consensus with BLM and other resource agencies, tribes, and other interested parties during the July 17, 2018, study plan meeting.</p> <p>Comments regarding reservoir sediments are appropriate to <i>Study GEO 2</i>, not <i>Study GEO 1</i>,</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				<p>Dam and Millerton Lake. This project is not subject to the provisions of the CERCLA Handbook (https://www.ntc.blm.gov/krc/uploads/219/CERCLAResponseHB1703-1.pdf)</p> <ul style="list-style-type: none"> This study does not address the gold content of sediments. It does not address historic and contemporary placer gold prospecting or development on the San Joaquin River in the project area. <p>RELEVANT INFORMATION</p> <ul style="list-style-type: none"> CERCLA Handbook https://www.ntc.blm.gov/krc/uploads/219/CERCLAResponseHB1703-1.pdf <p>INFORMATION GAPS</p> <ul style="list-style-type: none"> Characterization of dominant bed material size is not possible by visual inspection. Sediment characterization is typically made during normal and storm events for bed load, suspended load and dissolved load. This study will not close that information gap. <p>STUDY METHODS</p> <ul style="list-style-type: none"> This study will not evaluate the presence of hazardous materials in the water or sediments of the project, which would otherwise be evaluated per guidelines in the CERCLA Handbook (https://www.ntc.blm.gov/krc/uploads/219/CERCLAResponseHB1703-1.pdf). 	<p>which addresses channel form and fluvial processes. PG&E conducted testing of sediments for hazardous materials during the 2012 bathymetry study (PG&E 2013). The low concentration of detectable hazardous materials in these Kerckhoff sediments indicates that there are little to no sources from the upper San Joaquin River Watershed. Consequently, it was determined that an expanded laboratory testing program of Kerckhoff Reservoir sediments was unnecessary. In addition, a bioaccumulation study is proposed (<i>Study WQ 3</i>) to independently verify that hazardous materials are not entering the food chain.</p> <p>The proposed sampling plan in <i>Study GEO 2</i> essentially integrates the results of all types and magnitudes of flow and associated sediment input to Kerckhoff Reservoir over time because the sampling program will only collect sediments that are deposited in the reservoir.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
BLM	BLM-26	10	78	This study will not evaluate gold presence or prospecting in the project area per guidelines of the BLM Mineral Examiner’s Handbook.	Clarification. Comments regarding reservoir sediments are appropriate to <i>Study GEO 2</i> , not <i>Study GEO 1</i> . BLM is correct in stating that PG&E is not proposing to evaluate gold presence in the Project Area. This request was discussed at the July 17, 2018, meeting and consensus was reached by PG&E and the resource agencies, tribes, and other interested parties that it is not necessary to include a gold presence study in the revised study plan.
BLM	BLM-27	10	79, 84–86	<p>STUDY GEO 2 PROJECT RESOURCE ISSUE</p> <ul style="list-style-type: none"> • This study does not evaluate the quantity or quality of gold-bearing sediments in the project area or its impacts to recreational gold panning. <p>PROPOSED STUDIES</p> <ul style="list-style-type: none"> • Particle size analysis will not be performed using standard storm water sampling techniques • There is no discussion of gold panning recreational use and impacts thereto by the proposed action <p>STUDY METHODS AND ANALYSIS</p> <ul style="list-style-type: none"> • The surface and near-surface sampling is not representative of the sediment size distribution in the reservoir. If you want to characterize all the sediment trapped in the reservoir you will need to use a Vibroseise core drill, mounted on a barge. See attached photo. Explain that this is surface-only sampling and why sampling the entire depth of sediment is not needed. 	Clarification. Issues related to <i>Study GEO 2</i> were resolved and the study plan accepted by consensus with BLM and other resource agencies, tribes, and other interested parties during the July 17, 2018, study plan meeting. Please see response to BLM Comment 25.



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
NPS					
Barbara Rice, NPS		1-2	Paragraphs 2, 3, 4	<p>The NPS commends the applicant’s decision to modify the whitewater boating study presented in the Pre-Application Document (Study REC 1: Whitewater Boating Assessment) so that it is more consistent with the guidelines laid out in <i>Flows and Recreation: A Guide to Studies for River Professionals</i> (Whittaker, Shelby, and Gangemi 2005). However, the proposed study continues to deviate from the methods proposed in the <i>Guide</i> by neglecting to include the option of a Level 3 study.</p> <p>Phase 3 (<i>Potential Whitewater Boating Single-Flow Study</i>) presented in REC 1 is consistent with the second option (<i>On-water Boating Feasibility Assessment</i>) of Level 2 outlined in Whittaker et al. (2005). The applicant does not include the possibility of a Level 3 study (<i>Intensive Study Options</i>) as outlined in Whittaker et al., which include the options of 1) multiple flow reconnaissance assessments, 2) flow comparison surveys of experienced users, and 3) controlled flow studies for boating. While conducting such studies may not be necessary, this decision should only be made after careful scrutiny of the data gathered from the Level 2 study, which the applicant presents as Phases 2 and 3 in the proposed REC 1 Whitewater Boating Assessment. In addition, making these decisions would generally include the involvement of agencies and other stakeholders who have an interest in the outcome of the studies.</p> <p>The NPS thus request that the applicant revise REC 1 so it would be a more comprehensive whitewater boating study that includes the Level</p>	<p>Clarification. At the July 17, 2018, study plan meeting, <i>Study REC 1</i> was approved by consensus by the meeting participants, including representatives of American Whitewater, State Water Resources Control Board, U.S. Forest Service, U.S. Bureau of Land Management, and California Department of Fish and Wildlife, among others.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				III study options as outlined in Whittaker et. al. (2005).	
Barbara Rice, NPS		2	Paragraph 5	The NPS also requests that the three reaches identified in our whitewater boating study request (dated 03/16/18) be included in the proposed REC-1 Whitewater Boating Assessment. These three reaches include the Patterson Bend Run (Kerckhoff Dam to Powerhouse #1), Squaw Leap Run (Powerhouse #1 to Powerhouse #2), and Millerton Lake Bottom Run (Powerhouse #2 to Millerton Lake). The applicant only identifies the Patterson Bend and Squaw Leap Runs in the proposed REC-1 study and it gives no rationale for not including the Millerton Lake Bottom Run, which is directly affected by Powerhouse 2. Powerhouse 2 regularly diverts water for generation and then returns it, but not necessarily during ideal whitewater boating hours. Not knowing when these returns are happening makes it impossible to know what boating opportunities are being missed. The Millerton Lake Bottom Run is also the most accessible reach, thus making it a popular Class 3 whitewater boating run that be included in the study.	Accepted. The three reaches are included in <i>Study REC 1</i> . Provisions for studying flows in Reach 3, downstream of the Kerckhoff 2 Powerhouse, are specified in the plan. Please note, based on a request from the Honorable Ron Goode, North Fork Mono Tribe, the meeting participants renamed the reaches from top to bottom as Reach 1, Reach 2, and Reach 3 to remove objectionable language.
SWRCB					
Philip Choy, SWRCB		2	Paragraph 4	State Water Board staff has worked extensively with PG&E and relicensing participants to develop a study plan for the Project that will meet the information needs for issuance of water quality certification. Significant progress on the Proposed Study Plan has been made. Updates to the Proposed Study Plan (in track changes) are contained in Attachment A. Attachment A also contains studies: AQ-6 <i>Rare Aquatic Species</i> and	PG&E appreciates the work of State Water Board staff in collaborating on study plan development and providing valuable input.



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				WQ3- <i>Bioaccumulation</i> , which are studies requested by State Water Board staff (in response to PG&E's PAD filing) and subsequently included in the Proposed Study Plans.	
Philip Choy, SWRCB		2	Paragraphs 5–6	<p>Updates to the Proposed Study Plan (in clean version) are contained in Attachment B. Attachment B also contains study AQ7- <i>Benthic Macroinvertebrates</i>, which is a study requested by State Water Board staff (in response to PG&E's PAD filing), and subsequently developed by PG&E in consultation with relicensing participants.</p> <p>It is State Water Board staff's understanding that PG&E will include the updated Proposed Study Plans contained in Attachment B, as written, in PG&E's filing of its Revised Study Plan4. Minor grammatical or format changes to these updated Proposed Study Plans may occur, but material changes are not anticipated. At this time, State Water Board staff anticipates that the updated Proposed Study Plans (contained in Attachment B) will meet information needs (for the resource areas addressed in the study plans) for issuance of water quality certification.</p>	<p>Clarification. PG&E, resources agencies, tribes, and other interested parties reached consensus on the plans attached to the State Water Board's letter. After consensus was reached, slight modifications were made to correct non-substantive typographical or grammatical errors before they were filed with FERC.</p>
Philip Choy, SWRCB		2	Paragraph 7	<p>PG&E and relicensing participants have made notable progress on proposed studies REC 3 - <i>Recreation Visitor Use</i> and REC 4 - <i>Recreation Visitor Use Surveys</i>. However, there is disagreement whether to include the bypass reach (between Kerckhoff Dam and Kerckhoff Powerhouse 2) in the study area for proposed studies REC 3 and REC 4.</p>	<p>Clarification. PG&E worked with the resource agencies, tribes, and other interested parties to reach consensus on <i>Study REC 3</i> and <i>Study REC 4</i> at the August 13, 2018, study plan meeting.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
Philip Choy, SWRCB		2	Paragraph 8	<p>The beneficial uses for the Project area, as designated in the <i>Water Quality Control Plan for the Sacramento and San Joaquin River Basins</i> (Basin Plan), include contact recreation; canoeing and rafting; and other noncontact recreation. Limited information is available on the timing, quantity, and types of public use/recreation that occurs in the bypass reach. This information is important to identify public access points/trails and safety concerns. State Water Board staff encourages PG&E to include the bypass reach in the study areas for REC 3 and REC 4 to provide information regarding whether the designated recreation related beneficial uses in the bypass reach are adequately protected.</p>	<p>Accepted. Study REC 1 addresses whitewater recreation access and egress locations in the Project Bypass Reach in addition to information to be collected under Study REC 3 and Study REC 4.</p>
Philip Choy, SWRCB		3	Paragraphs 9–11	<p>Before the Commission can issue a new license, the Licensee must obtain water quality certification, or waiver thereof, 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 or waiver from the State Water Board that the discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of the CWA, and other appropriate requirements of state law.</p> <p>The State Water Board must evaluate the impacts of the Project on the associated water bodies to determine whether the Project complies with all applicable water quality objectives in the Basin Plan, and protects the designated beneficial uses. Water quality certification also may address a</p>	<p>Accepted. PG&E understands the role of the State Water Board in issuing the 401 Water Quality Certification and implementing CEQA. PG&E will apply for a water quality certification for the Project once FERC issues the Notice of Ready for Environmental Analysis.</p>



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
				<p>project's effects on public trust resources. In developing a water quality certification, the State Water Board looks not only at proposed modifications to project operations from the existing condition, but also on whether past, existing, or future operations may impair or degrade water quality.</p> <p>PG&E must file an application for water quality certification once the Commission issues the Notice of Ready for Environmental Analysis for the Project. In addition to the Commission's information gathering process, the State Water Board may request additional information to clarify, amplify, correct, or otherwise supplement the contents of the application (Cal. Code Regs. tit. 23, § 3836). During the licensing process, State Water Board staff will continue to act in an advisory role to inform PG&E of the information necessary for a complete application for water quality certification. Filing requirements for an application for water quality certification are specified in California Code of Regulations, title 23, section 3856. State Water Board staff cannot prejudge the outcome of any proceeding before the State Water Board on an application for water quality certification.</p>	



Commenter	Comment No.	Letter Page	Paragraph / Line	Comment	Response
USFS					
Dean Gould, Forest Supervisor		1	Paragraph 3	The Licensee and relicensing participants have come to consensus on most of the proposed study plans. The Licensee has provided relicensing participants edited versions of study plans agreed to by the Licensee and relicensing participants and has scheduled additional meetings to try to come to consensus on those plans where consensus has not yet been reached. The Forest Service appreciates this collaborative approach, and has no additional comments on the latest versions of the study plans. It is our understanding the Licensee will be using the most recently edited versions of agreed to study plans for their Revised Study Plan filing.	PG&E appreciates the work of USFS staff in collaborating on study plan development and providing valuable input.



Appendix B

Revised Study Plans



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STUDY WQ 1	Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach
STUDY WQ 2	Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir
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STUDY HYD 1 Operations Simulation Model

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Modification to the hydrology of the San Joaquin River (SJR) due to the presence and operation of the Project.

PROJECT NEXUS

- Project operations alter flows in the Project Bypass Reach.¹

RELEVANT INFORMATION

The following information was reviewed to determine the hydrology and Project operations modeling study needs (refer to Section 4, *Project Location, Facilities, and Operations*, of the Pre-Application Document [PG&E 2017c] for a summary of the existing Project and Project operations, and Section 5.1, *Water Use and Hydrology*, for a summary of water use and hydrology):

- Pacific Gas and Electric Company (PG&E) operations and facilities (PAD Section 4, *Project Location, Facilities, and Operations* and Section 5.1, *Water Use and Hydrology*);
- PG&E Kerckhoff Reservoir storage and elevation data (PG&E 2017a);
- PG&E SJR flow data below Kerckhoff Dam (PG&E 2017b);
- PG&E Kerckhoff 1 (K1) and Kerckhoff 2 (K2) Powerhouse flow and generation data (Section 5.1, *Water Use and Hydrology*; PG&E 2017b); and
- Flow data from upstream projects and tributaries (Southern California Edison [SCE] 2017; U.S. Geological Survey [USGS] 2017).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- There is insufficient information or tools available to evaluate Project impacts and develop appropriate protection, mitigation, and enhancement (PM&E) measures.

¹ The Project Bypass Reach includes the SJR from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from the K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

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PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

There is no available tool (model) to analyze the effect of Project structures, facilities, and operations on hydrology in the Project Bypass Reach and the effects of potential modifications to Project operations on Kerckhoff Reservoir and the flows in the Project Bypass Reach.

The following study is proposed to supplement existing information:

- Develop an operations simulation model. The operations simulation model will include: (1) flows through and storage in Kerckhoff Reservoir, (2) flows in the Project Bypass Reach, (3) flows through the K1 and K2 powerhouses, and (4) inflows from upstream sources and tributaries for the analysis period from 1984 to 2017.
- The operations simulation model is proposed to estimate flows through Kerckhoff Reservoir and the Project Bypass Reach with and without Project operations (*Study HYD 2, Hydrology with and without the Project*), and to evaluate any proposed modifications to Project operations or facilities. Average daily flows and storage are proposed to be used for the operations simulation model.

EXTENT OF STUDY AREA

The Study Area includes Kerckhoff Reservoir, the Project Bypass Reach, K1 and K2 powerhouses, and the SJR immediately downstream of the K2 Powerhouse.

STUDY METHODS AND ANALYSIS

A daily time step operations model will be constructed to provide a baseline simulation representing current operations. Once the baseline is established, it will be the basis from which changes in flows resulting from alternative operational scenarios will be measured. The software proposed for this application is the HEC-ResSim modeling program. HEC-ResSim is used to model reservoir operations at one or more reservoirs for a variety of operational goals and constraints. The software simulates reservoir operations for flood management, low-flow augmentation, water supply for planning studies, detailed reservoir regulation plan investigations, and real-time decision support. HEC-ResSim can represent both large and small-scale reservoirs and reservoir systems through a network of elements (junctions [nodes], routing reaches, diversions, and reservoirs) that the user builds. More detailed information regarding HEC-ResSim can be found at the following link: <http://www.hec.usace.army.mil/software/hec-ressim/>.

The baseline study assumptions include the current facilities, permits, licenses, agreements, and operating policies, including flows required as PM&E measures affecting Project operations and K2 Powerhouse operations since it came online (1984–2017). Existing inflow data from the Crane Valley Hydroelectric Project (A.G. Wishon Powerhouse and Willow Creek) and from SCE's Big Creek system (including Big Creek 4 Powerhouse outflows and flows passing Dam 7 below Redinger Lake) will be used to represent current operation and inflows from those projects.

The preliminary approach to develop upstream hydrology includes the use of historical flows for the 1984 to 2017 study period. These data may come from USGS, PG&E, or SCE flow and storage records.

Spills from Corinne Lake (forebay to A.G. Wishon Powerhouse, part of the Crane Valley Hydroelectric Project) and estimates of local inflow, if determined to be needed, could be calculated from PG&E operations reports for the selected period of record.

Millerton Lake Considerations

Current release requirements to support American shad spawning contained within a Federal Energy Regulatory Commission (FERC) order issued in April 1993 establish seasonal discharges from the K1 and K2 powerhouses, which are tied to Millerton Lake levels. Although operations have not materially changed Millerton Lake storage levels during the 1984 to 2017 period, increases in consumptive and riparian demands downstream of Friant Dam have changed over time. In addition, the court-ordered San Joaquin River Settlement Agreement that took effect in October 2006 requires state and federal agencies to cooperate in returning water and a self-sustaining salmon population to the SJR downstream of Friant Dam. As a result of the agreement, the San Joaquin River Restoration Program (SJRRP) was developed. Subsequent release requirements and testing below Friant Dam have been developed and executed since 2009. These elements are represented in the U.S. Bureau of Reclamation (BoR) Coordinated Long-Term Operation of the Central Valley Project and State Water Project CalSim II modeling. For Project simulation modeling, there are two sources for representing current Millerton Lake operations.

- CalSim II model output can be adapted. Monthly Millerton Lake operations are included in the model from 1922 to 2003. The monthly data can be interpolated to daily data.
- From 2003 to 2017, daily historical operations records can be used if the data adequately represent current operations.

Model inputs and representation of operations will be configured to evaluate differences in operational scenarios, diversions, and release flows to the Project Bypass Reach. Model outflows will include the K1 and K2 powerhouses and flows measured or estimated at Gage J-2. A schematic illustrating the system components will be a product of the model development. The schematic will inform the resource agencies, tribes, and other interested parties where operational scenarios can be evaluated.

Model Validation

Validation of the model and uncertainty will be documented. The validation process will include comparing model output to recent historical operational flow and storage data. The process begins by identifying operational differences and fine-tuning the model until those differences are minimized. Because the model assumes that the system is always in good working order, in most cases, the larger differences are a result of mechanical failures or unscheduled outages. Where larger differences persist, operations records and knowledgeable PG&E staff will be utilized to gain an explanation. Smaller differences are usually a product of errors in hydrology, evaporation, and penstock capacities. Differences will be documented to the extent possible. A meeting will

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be held with resource agencies, tribes, and other interested parties to present the model and the results of calibration and simulation to the resource agencies, tribes, and other interested parties, prior to using it for simulations of other conditions.

Model Calibration

Model calibration will occur after validation is complete. The calibration process will test and verify that the operational rules and constraints are performing effectively for the whole range of hydrologic variability experienced within the study period. This process will include adjustments to model parameters to within margins of uncertainties to obtain a model that is representative of current operations throughout the hydrologic study period.

With and Without Project

Once the hydrology dataset and baseline study is completed, the HEC-ResSim model will be capable of testing alternate operating scenarios. The first set of simulations will be to model flow conditions in Kerckhoff Reservoir and the Project Bypass Reach with and without the Project. These simulations will be used to support the analysis described in *Study HYD 2, Hydrology with and without the Project*.

Evaluating Alternative Operations and Flow-related PM&Es

The HEC-ResSim model was designed for use in a comparative manner. The model user will evaluate impacts by comparing baseline operations to an alternative operation. Alternate operating scenarios based on potential modifications can be evaluated by making a copy of the baseline study and changing the input tables. Once the changes are made and the alternate simulation is complete, the model will produce output reflecting changes to the system. The planned model will be capable of calculating changes in flow, storage, and generation. Data tables can be extracted from the model output database and evaluated with customized spreadsheets to illustrate changes in operation. This method can be used to identify whether an alternative meets the intended objectives or is even feasible.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- Operations simulation models are widely used hydrologic assessment tools and are consistent with use of flow data that have been checked and subject to USGS review. All analyses will be conducted using best available scientific practices.
- The HEC-ResSim operations simulation model has been used on several FERC relicensing applications, including in PG&E's Drum-Spaulding Project No. 2310 relicensing application and Bucks Creek FERC Project No. 619 relicensing (PG&E and City of Santa Clara 2014), and will be used for Potter Valley FERC Project No. 77 relicensing.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft HYD 1 Technical Study Report (TSR). The TSR will include a summary of the calibration and validation of the model including uncertainty.
 - The report also will include the predictive results of alternate operations including tabular results and figures.
- The Draft HYD 1 TSR will be distributed to resource agencies, tribes, and other interested parties for comment.
- Comments on the Draft HYD 1 TSR will be addressed, as appropriate, in a Final HYD 1 TSR. The Final HYD 1 TSR will be distributed in 2019.

RELATIONSHIP TO OTHER STUDIES

- The *Study HYD 1* model will be needed to conduct the work under *Study HYD 2, Hydrology with and without the Project*.
- The HYD 1 model will be available to evaluate PM&E measures involving flow, including potential whitewater flows under *Study REC 1, Whitewater Boating Assessment*.

SCHEDULE

Date	Activity
Winter–Spring 2019	Review data and prepare model
Spring–Summer 2019	Validate model and prepare Draft HYD 1 TSR
Fall 2019	Distribute Draft HYD 1 TSR to resource agencies, tribes, and other interested parties
July 2020	Distribute Final HYD 1 TSR in the Draft License Application

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LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	17,828
Fieldwork	\$	0
Data Analysis	\$	41,916
Products	\$	20,516
Total	\$	80,260

REFERENCES

PG&E (Pacific Gas and Electric Company). 2017a. PG&E Kerckhoff Reservoir storage and elevation data.

———. 2017b. PG&E K1 and K2 flow and generation data.

———. 2017c. Pacific Gas and Electric Company Kerckhoff Hydroelectric Project FERC Project No. 96 Pre-Application Document (PAD), November 2017. PG&E San Francisco, California.

PG&E and City of Santa Clara. 2014. Bucks Creek Project relicensing tech memo TM-34_WR-S4_Operations_Model_Assessment. Available at: http://www.bucksrelicensing.com/Public/Documents/WR-S4_Operations_Model.pdf.

SCE (Southern California Edison). 2017. Flow data from upstream projects and tributaries distributed to Big Creek 4 Technical Review Group.

USACE (U.S. Army Corps of Engineers). 2017. Hydrologic Engineering Center ResSim Software. Available at: <http://www.hec.usace.army.mil/software/hec-ressim/>.

USGS (U.S. Geological Survey). 2017. USGS surface-water daily data for nation for San Joaquin drainage. Available at: <https://waterdata.usgs.gov/nwis/dv>.

STUDY HYD 2 Hydrology With and Without the Project

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Modification to the hydrology of the San Joaquin River (SJR) due to the presence and operation of the Project.

PROJECT NEXUS

- Project operations alter flows in the SJR from Kerckhoff Dam to downstream of the Kerckhoff 2 (K2) Powerhouse (Project Bypass Reach¹).

RELEVANT INFORMATION

The following information was reviewed to determine the hydrology study needs:

- PG&E Kerckhoff Reservoir storage and elevation data (PG&E 2017a);
- Pacific Gas and Electric Company (PG&E) operations and facilities (see Section 4, *Project Location, Facilities, and Operations*, and Section 5.1, *Water Use and Hydrology*, of the Pre-Application Document [PG&E 2017b]);
- Indicators of Hydrologic Alteration (IHA) software version 7.1 with rPurview LLC - Ted Rybicki (The Nature Conservancy 2009);
- *A Method for Assessing Hydrologic Alteration within Ecosystems* (Richter et al. 1996);
- PG&E Kerckhoff 1 (K1) and K2 flow and generation data (PG&E 2017a); and
- Flow data from upstream projects and tributaries (Southern California Edison [SCE] 2017; U.S. Geological Survey [USGS] 2017).

POTENTIAL INFORMATION GAPS

The following has been identified as a potential information gap:

- Comparison of hydrology of the SJR in the Project Bypass Reach with and without Project operations for the analysis period 1984 to 2017.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Conduct IHA analysis for the Project Bypass Reach with and without Project operations for the analysis period from 1984 to 2017 (from the HEC-ResSim Model [*Study HYD 1, Operations Simulation Model*]).

¹ The Project Bypass Reach includes the SJR from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from K1 Powerhouse to the K2 Powerhouse.

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EXTENT OF STUDY AREA

The Study Area includes Kerckhoff Reservoir, the Project Bypass Reach, K1 and K2 powerhouses, and the SJR immediately downstream of the K2 Powerhouse (river mile [RM] 282.1) to Millerton Lake (0.62 mi. [<1 kilometer]).

STUDY METHODS AND ANALYSIS

- The daily flows for Kerckhoff Reservoir, flows in the SJR downstream of Kerckhoff Dam, K1 and K2 Powerhouse flows, and flows downstream of K2 Powerhouse with and without the Project are proposed to be calculated utilizing the *Study HYD 1, Operations Simulation Model* HEC-ResSim Model using a representation of current license conditions to characterize with Project flow conditions.
- Comparison of scenarios with and without Project flows is proposed using the IHA software program version 7.1. Hydrologic output parameters for comparison will include median monthly flow statistics (IHA Group 1), magnitude and duration of annual extreme flow conditions (IHA Group 2), timing of extreme water conditions (IHA Group 3), frequency and duration of high and low flow pulses (IHA Group 4), and rate and frequency of water condition changes (IHA Group 5).

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- IHA is a software program (The Nature Conservancy 2009) that provides information about hydrologic impacts of anthropogenic activities on surface flows. The IHA software compares hydrological datasets and calculates a variety of statistics to assess the degree of hydrological alteration between them. The IHA analytical approach has been well-documented (Richter et al. 1996) and is often used in studies to assess the degree of hydrologic alteration in regulated drainages.

PRODUCTS

- A Technical Study Report (TSR) will be prepared that describes study methodology, analysis, and results.
- IHA output parameters comparing scenarios with and without Project flow conditions will be summarized in tabular format.
- Flow duration curves for annual and monthly conditions will be provided.
- A hydrograph showing scenarios with and without Project flows will be provided.

RELATIONSHIP TO OTHER STUDIES

- Geomorphology (*Study GEO 1, Channel Form and Fluvial Processes*): flows with and without the Project will be used to assist with interpreting the effect of Project operations on geomorphology and sediment transport.
- Hydrology data and analyses will be coordinated with *Study BOT 2, Riparian and Wetland Resources*.
- Information from *Study HYD 2* and *HYD 1* will be used to support *Study REC 1, Whitewater Boating Assessment*.

SCHEDULE

This is an analytical study. Work is proposed to be conducted in 2019.

Date	Activity
March–May 2019	Obtain, conduct quality control, and analyze flow data for scenarios with and without Project operations
June–July 2019	Run IHA for comparison of scenarios with and without the Project
August–September 2019	Prepare Draft HYD 2 TSR
October 2019	Distribute Draft HYD 2 TSR to resource agencies, tribes, and other interested parties
July 2020	Distribute Final HYD 2 TSR in the Draft License Application

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	4,672
Fieldwork	\$	0
Data Analysis	\$	29,000
Products	\$	14,000
Total	\$	47,672

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STUDY GEO 1 Channel Form and Fluvial Processes

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Operations and maintenance (O&M) and modification of the sediment transport regime by the presence of Project structures can affect channel form and fluvial processes downstream of Kerckhoff Dam, which in turn can potentially affect aquatic habitat and riparian resources.

PROJECT NEXUS

- O&M and Project structures modify the hydrology and sediment transport regime in the San Joaquin River (SJR) downstream of Kerckhoff Dam, which in turn may affect aquatic and riparian habitat conditions.

RELEVANT INFORMATION

The following information is available and was reviewed to determine geomorphology study needs (Section 5.2, *Geology and Soils* of the Pre-Application Document [PAD] contains a summary of geology, soils, and geomorphology information):

- Project structures and facilities as described in Section 4, *Project Location, Facilities, and Operations*;
- Hydrology information as described in Section 5.1, *Water Use and Hydrology* and Section 6.2.1, *Water Use and Hydrology*;
- Publicly available aerial and satellite imagery (Google Earth);
- Topography, slope, and gradient information available from maps;
- Federal Energy Regulatory Commission's (FERC's) *Final Environmental Impact Statement, Kerckhoff Project No. 96* (FERC 1979);
- Pacific Gas and Electric Company's (PG&E's) 1977 amended application for new license (PG&E 1977);
- U.S. Geological Survey's (USGS's) *Geologic Map of the Millerton Lake Quadrangle* (Bateman and Busacca 1982);
- Southern California Edison's (SCE's) Initial Information Package for the Big Creek Hydroelectric System Alternative Licensing Process (SCE 2000);
- SCE's *Combined Aquatics Study Plan – CAWG 2 Geomorphology* (SCE 2003);
- U.S. Bureau of Reclamation (BoR's) *Draft Environmental Impact Statement, Upper San Joaquin Basin Storage Investigation* (BoR 2014);

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- *Biological Resource Technical Reports: Upper San Joaquin Basin Storage Investigation; Draft Riverine Fish Habitat Technical Report (BoR 2012); and*
- *Upper San Joaquin River Basin Storage Investigation (BoR 2008).*

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Fluvial geomorphology of the SJR between Kerckhoff Dam and Millerton Lake.
- Presence and characteristics of erosion and/or sedimentation downstream of Kerckhoff Dam including records of past sediment releases (sediment storage in Kerckhoff Reservoir is addressed in *Study GEO 2, Project-related Sediment Management Practices in Kerckhoff Reservoir*).
- Evaluation of geomorphic conditions in the channel in relation to changes in the flow regime.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following study is proposed to supplement existing information.

- Rosgen Level 1.5 (Rosgen 1996) geomorphic characterization in the river reaches potentially affected by the Project¹ during a helicopter low-altitude aerial survey.
- Characterization of dominant bed material size and relative presence of large wood and identification of any large-scale mass-wasting sediment inputs to the channel or any significant bank erosion failures based on visual inspection during helicopter survey.
- Characterization of channel according to Montgomery-Buffington² (1997).
- Analysis of channel conditions in relation to changes in flow regime.

EXTENT OF STUDY AREA

The Study Area for this study includes Kerckhoff Reservoir and the Project Bypass Reach (15.7 kilometers [km] [9.8 miles (mi.)]) and Millerton Lake immediately downstream of the Kerckhoff 2 (K2) Powerhouse (<1 km [0.62 mi.]) (Figure GEO 1-1).

¹ The river reaches potentially affected by the Project include the Project Bypass Reach (defined as the SJR from Kerckhoff Dam downstream to the Kerckhoff 1 [K1] Powerhouse and from the K1 Powerhouse to the Kerckhoff 2 [K2] Powerhouse) and the short reach immediately below the K2 Powerhouse in Millerton Lake, a BoR facility.

² Channel types according to Montgomery-Buffington are dune-ripple, pool-riffle, step-pool, cascade, bedrock, and colluvial.

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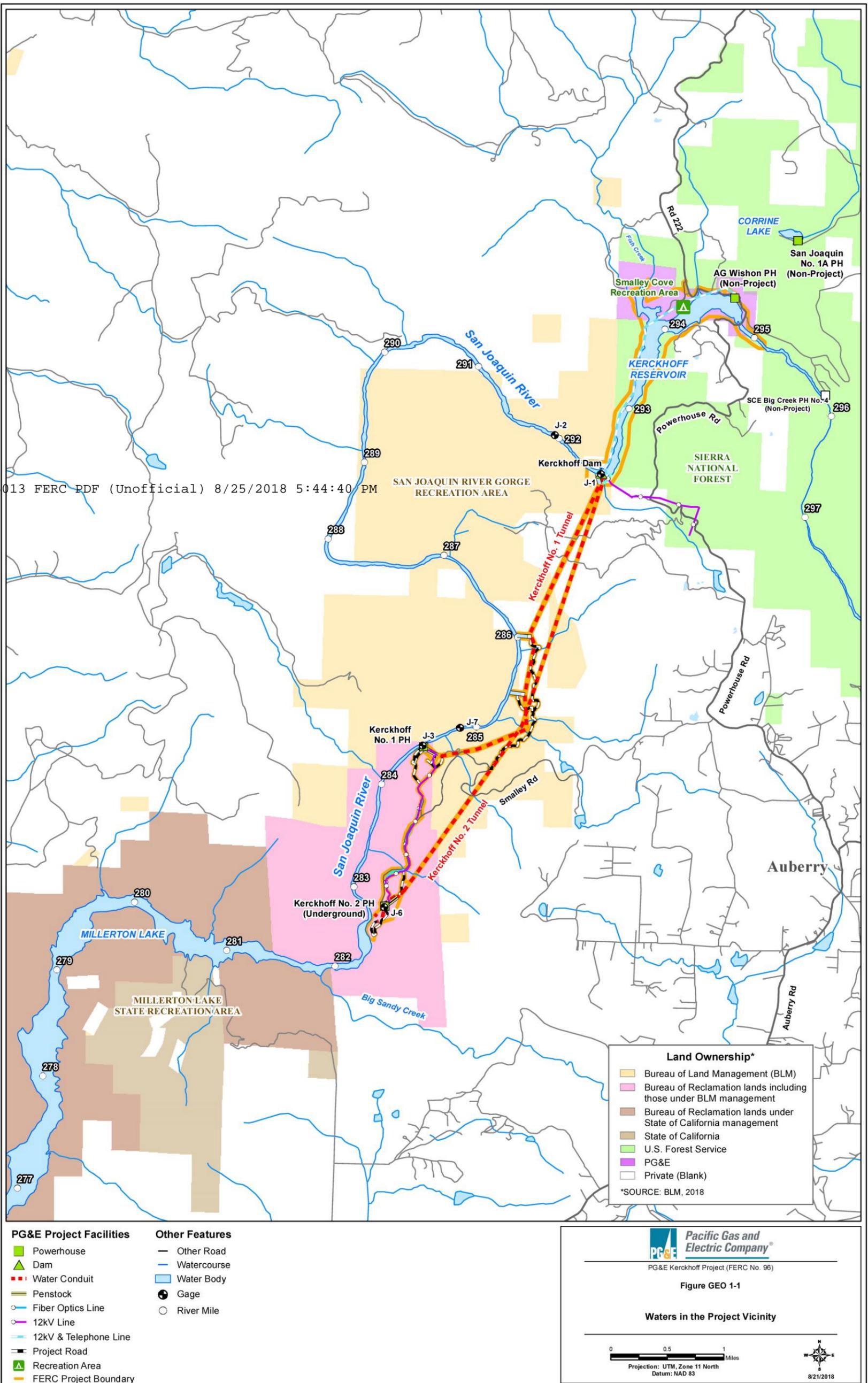


Figure GEO 1-1. Waters in the Project Vicinity.

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STUDY METHODS AND ANALYSIS

- Perform Rosgen Level 1.5 geomorphic classification along the SJR in the Study Area according to methodology established by Rosgen (1996) using topographic maps, aerial photography, and a low-altitude helicopter aerial survey (e.g., aerial reconnaissance survey flown in conjunction with *Study BOT 2, Riparian and Wetland Resources*):
 - Valley and channel gradient data (using topographic maps).
 - Sinuosity (using aerial photography and topographic maps).
 - Entrenchment (using aerial photography and a helicopter fly-over).
 - Characterize dominant channel material based on visual inspection during helicopter reconnaissance.
 - Prepare Geographic Information System (GIS) map of Rosgen Level 1.5 classifications along the Project Bypass Reach.
- Identify the locations and extents of large-scale mass-wasting features and any significant bank erosion failures based on visual inspection during the helicopter survey in the Study Area (including Kerckhoff Reservoir).
- Prepare a GIS map of Montgomery-Buffington (1997) bedform channel typing of the Project Bypass Reach. The Montgomery-Buffington (1997) protocol is a visually based characterization of bedform type, which will be determined during the aerial reconnaissance using data collected for the Rosgen Level 1.5 assessment.
- Use the comparison of scenarios with and without Project flow conditions developed in *Study HYD 1, Operations Simulation Model* and *Study HYD 2, Hydrology with and without the Project* to evaluate changes in geomorphically relevant flows.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- Rosgen (1996) stream typing and Montgomery-Buffington (1997) bedform channel typing are commonly used geomorphic analytical methods.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft GEO 1 Technical Study Report (TSR). The TSR will include summary tables and GIS maps, as appropriate. Maps (aerial photo or topographic base) will include the Rosgen Level 1.5 stream classifications and Montgomery-Buffington stream types, and dominant bed material size, delineated over the reach. GIS maps will also show locations of mass-wasting features and/or significant bank erosion. The TSR will include an evaluation of geomorphic flows with and without the Project (to be submitted as a Supplemental GEO 1 TSR).

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- The Draft GEO 1 TSR will be distributed to resource agencies, tribes, and other interested parties for review during the comment period.
- Comments on the Draft GEO 1 TSR will be addressed, as appropriate, in a Final GEO 1 TSR. The Final GEO 1 TSR will be distributed to resource agencies, tribes, and other interested parties.
- A Supplemental GEO 1 TSR will be distributed to resource agencies, tribes, and other interested parties upon completion of *Study HYD 2, Hydrology with and without the Project*.

RELATIONSHIP TO OTHER STUDIES

- The results of *Study HYD 1, Operations Simulation Model* and *Study HYD 2, Hydrology with and without the Project* will be relevant to *Study GEO 1*. Flows with and without the Project will be assessed in relation to the observed geomorphic conditions.
- Helicopter reconnaissance and flow analyses will be coordinated with *Study BOT 2, Riparian and Wetland Resources*.

POSSIBLE EARLY SCHEDULE

PG&E is evaluating the potential to implement this study in September 2018, which is earlier than Integrated Licensing Process (ILP) regulations require. PG&E is considering accelerating the schedule so it would have data available to facilitate other related studies. However, if the study cannot be implemented in 2018, it will be conducted in 2019 as indicated below.

Potential Early Start Date	Date	Activity
September 2018	Late Summer 2019	Conduct helicopter survey during low-flow period
September 2018–January 2019	Fall/Winter 2019	Complete Rosgen Level 1.5 and Montgomery-Buffington analyses and mapping
February 2019	Only one report will be distributed in December 2019	Distribute Draft GEO 1 TSR to resource agencies, tribes, and other interested parties
February–March 2019	-	Resource agencies, tribes, and other interested parties review and provide comments on draft report
April and May 2019	-	Resolve comments and prepare final report
May 2019	-	Distribute Final GEO 1 TSR
September 2019	Summer/Fall 2019	Evaluate geomorphic flows with and without Project flow conditions (results of <i>Study HYD 2, Hydrology with and without the Project</i>)
December 2019	December 2019	Distribute Draft Supplemental GEO 1 TSR
January–March 2020	January–March 2020	Resource agencies, tribes, and other interested parties review and provide comments on Draft Supplemental TSR
April and May 2020	April and May 2020	Resolve comments and prepare Final Supplemental TSR

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Management and Consultation	\$	6,000
Fieldwork	\$	24,500
Data Analysis	\$	30,000
Products	\$	20,000
Total	\$	80,500

REFERENCES

- Bateman, P.C., and A.J. Busacca. 1982. Geology of the Millerton Lake quadrangle, West-Central Sierra Nevada, California, U.S. Geological Survey, Geologic Quadrangle Map GQ-1548. Available at: <https://pubs.er.usgs.gov/publication/gq1548>. Accessed April 2018.
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- Montgomery, D.R., and J.M. Buffington. 1997. Channel-reach morphology in mountain drainage basins. Geological Society of America Bulletin 109(5):596–611.
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STUDY GEO 2

Project-related Sediment Management Practices in Kerckhoff Reservoir

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Sediment management practices in Kerckhoff Reservoir can potentially affect the reservoir capacity and the sediment regime in the San Joaquin River (SJR) between Kerckhoff Dam and Millerton Lake.
- The objective of *Study GEO 2* is to quantify whether there are ongoing changes in reservoir capacity that could affect infrastructure or Project operations due to potential ongoing net sediment deposition.
- Characterize surficial sediment grain sizes in this study and compare with surficial sediments sampled in 2012 to identify potential change.¹

PROJECT NEXUS

- Project structures trap sediment in Kerckhoff Reservoir. Sediment input has significantly reduced the original storage capacity of the reservoir.
- Project operations can affect the release of trapped sediments downstream, which can impact the conveyance capacity of the SJR between Kerckhoff Dam and Millerton Lake as well as the aquatic and riparian habitat in this reach.

RELEVANT INFORMATION

The following information is available and was reviewed to determine sediment management study needs (Section 5.2, *Geology and Soils* of the Pre-Application Document [PAD] contains a summary of geology, soils, and geomorphology information):

- Pacific Gas and Electric Company's (PG&E's) amended application for new license (PG&E 1977);
- Federal Energy Regulatory Commission's (FERC's) *Final Environmental Impact Statement, Kerckhoff Project No. 96* (FERC 1979);
- U.S. Geological Survey's (USGS's) *Geologic Map of the Millerton Lake Quadrangle* (Bateman and Busacca 1982);
- U.S. Bureau of Reclamation's (BoR's) *Upper San Joaquin River Basin Storage Investigation* (BoR 2008);
- *Kerckhoff Reservoir Bathymetric Survey and Sediment Sampling, Field Test Report* (PG&E 2013); and
- BoR's *Draft Environmental Impact Statement, Upper San Joaquin Basin Storage Investigation* (BoR 2014).

¹ Surficial sediment refers to the upper 6–9 inches of the bottom sediment.

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POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- The current volume and particle size characteristics of surficial sediment deposited in Kerckhoff Reservoir.
- Potential sources of sediment immediately adjacent to Kerckhoff Reservoir and their corresponding grain size characteristics.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following studies are proposed to supplement existing information:

- Summarize existing information related to sediment management practices at Kerckhoff Reservoir including methods, timing, and frequency, with a focus on the operation of the low-level outlets including hydrological conditions and reservoir elevations to the extent data are available.
- Review previously collected partial 2012 bathymetric survey and particle size distributions for comparison with data to be collected under this study. The 2012 survey was limited to the southern portion of the reservoir, approximately 4,000 feet (ft.) upstream from the dam (approximately 18 percent of the reservoir).
- Conduct a bathymetric survey of Kerckhoff Reservoir using a combination of multispectral water-penetrating light detection and ranging (LiDAR) and multibeam bathymetry. Collect representative surficial sediment samples for grain size analysis.
 - The bathymetric survey results will be compared to the partial 2012 bathymetric survey and the 1977 storage capacity of 4,252 acre-feet (af) to estimate the volume of sediment present in the reservoir. This comparison will determine if the reservoir is in “sediment equilibrium” (i.e., sediment into the reservoir is passed through with little or no net deposition) or if there is a trend toward aggradation that could adversely affect reservoir operations.
 - The current surficial sediment characterization data will be compared with the 2012 surficial sediment characteristics to assess the potential sources of sediment and support sediment management and resource planning, if needed. No particle size analysis will be performed on suspended sediment during individual stormwater events of varying magnitudes.² PG&E proposes no change in management of the sediments from current operations, so there is no need to characterize the variability in sediment particle sizes entering the reservoir during

² The proposed sampling plan essentially integrates the results of all types and magnitudes of flow and associated sediment input to Kerckhoff Reservoir over time because the sampling program will only collect sediments that are deposited in the reservoir. PG&E has no control over the sediment load or particle sizes entering or passing through the reservoir, nor does it propose to do so. It is anticipated that sediments flowing into and deposited in the reservoir will be predominantly sand-size particles based on sampling performed in 2012. Some larger particle sizes (e.g., gravels, cobbles) may deposit in the backwater of the upstream limits of the reservoir.

any individual storm/runoff event. Additionally, there is no plan to test reservoir sediments for hazardous materials. PG&E is unaware of any upper SJR watershed sources of hazardous waste material that would warrant a laboratory testing program of Kerckhoff Reservoir sediments.

- Identify immediate sources of sediment to Kerckhoff Reservoir and the characteristics of the sediment in the area surrounding Kerckhoff Reservoir, Fish Creek, and the SJR as it enters Kerckhoff Reservoir, based on reconnaissance observations. Information on these source areas contributing sediment to Kerckhoff Reservoir, as well as hydrology (*Study HYD 1, Operations Simulation Model* and *Study HYD 2, Hydrology with and without the Project*), will provide context for the development of sediment management planning, if needed. It will also help inform the potential efficacy of sediment management practices within Kerckhoff Reservoir and the potential implications for sediment deposition in the Project Bypass Reach.

EXTENT OF STUDY AREA

The Study Area for *Study GEO 2* includes Kerckhoff Reservoir and potential sources of sediment immediately upstream within the FERC Project Boundary (Figure GEO 2-1).

STUDY METHODS AND ANALYSIS

These methods have been successfully used for analysis of sediment associated with upstream reservoirs in the SJR and include commonly applied approaches and methods.

- The first step will be to review all previously collected bathymetric survey data and information on sediment size distributions in and around Kerckhoff Reservoir. Available information on sediment materials and volumes from upstream reaches will be evaluated to the extent available. This will include an examination of flow data for the SJR upstream and major tributaries such as Willow Creek. These data will be summarized to facilitate comparisons with data collected under this study.
- A bathymetric survey of Kerckhoff Reservoir will be conducted, using a combination of multispectral water-penetrating LiDAR and a boat-mounted Multibeam Echo Sounder (MBES) hydrographic survey, to create a seamless contour map of reservoir bottom topography (bathymetry). Multispectral LiDAR will be used for areas that are too shallow to reliably survey by boat (generally less than 2 meters [6.6 ft.]); these data will be collected in the summer/fall when the reservoir has a lower risk of adverse weather or runoff that could cause turbidity, thus reducing measurement accuracy. MBES hydrographic surveys will be used for the remainder of the reservoir that is sufficiently deep to allow for effective data collection. Bathymetric data will be collected in digital format along with high-resolution global positioning system (GPS) data.
- The bathymetric survey will be performed during the fall/winter period, when water surface elevations can be held stable. Hydrographic data and multispectral LiDAR data will be tied to a common set of benchmarks to allow for seamless integration of the datasets. Geographic information system (GIS) data will be used to facilitate

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preparation of reservoir contour maps, calculation of available storage, and comparison to previous bathymetric surveys. To estimate the volume of sediment present in the reservoir, a comparison of the results from this survey and the 2012 bathymetric survey will be conducted using the common areas included in both surveys. Information will also be used for comparison with the storage capacity of 4,252 af reported in 1977.

- Representative sediment samples will be collected in Kerckhoff Reservoir for grain size analysis. An Ekman or Ponar dredge will be used to collect surficial samples. A dredge will be used to make sure that the sampler can capture larger gravels, if present. Sediment samples will be supplemented by a sediment core taken at selected sites to characterize near-surface sediment to a depth of 1 ft. or more below the surface of the bottom (if needed to reach a sediment depth of more than 6 inches and if practicable). A total of 15 samples will be collected during the bathymetric survey. Seven of the reservoir sediment characterization samples will be collected as close as possible to the seven sites sampled in 2012, which are shown in Figure GEO 2-2 (sampling sites numbered 1 through 7). The 2012 sediment sampling sites were located near the dam (four samples) and approximately 4,000 ft. upstream from the dam (three samples) (covering approximately 18 percent of the reservoir surface area).
 - An additional eight sites located throughout the reservoir will be used to provide further information on sediment in areas not sampled in 2012, especially shallower areas and areas representing potential transport pathways for incoming sediment. The approximate locations for the additional sampling sites (numbered 8 through 15) are shown in Figure GEO 2-2.
- Immediate sources of sediment to the reservoir will be identified by a helicopter reconnaissance covering the valley walls around Kerckhoff Reservoir, Fish Creek drainage, and the SJR as it enters the reservoir. Erosional features identified will be marked on topographic maps/aerial photos, and the type of feature will be identified (landslide, gully, rilling, bank erosion, etc.). The helicopter reconnaissance will be coordinated with the aerial survey work to be performed under *Study GEO 1, Channel Form and Fluvial Processes* for stream typing. Following the aerial survey, a follow-up ground survey will be performed for *Study GEO 2* using the roads surrounding the reservoir, which will include accessible shoreline areas, the SJR where it enters Kerckhoff Reservoir and a short way upstream, A.G. Wishon Powerhouse, and Smalley Cove Recreation Area.

Consistency with Generally Accepted Scientific Practice

- The methodologies listed here are consistent with generally accepted scientific and engineering principles and practice. Combined hydrographic and multispectral LiDAR surveys are standard practice for assessing reservoir bathymetry and determining storage versus reservoir elevation. Similar methods have been used by other Licensees on numerous reservoirs in the Big Creek system, as well as applied by PG&E in other project areas. The bathymetric survey techniques to be used in 2018 or 2019 are effectively the same as those used for the 2012 survey.

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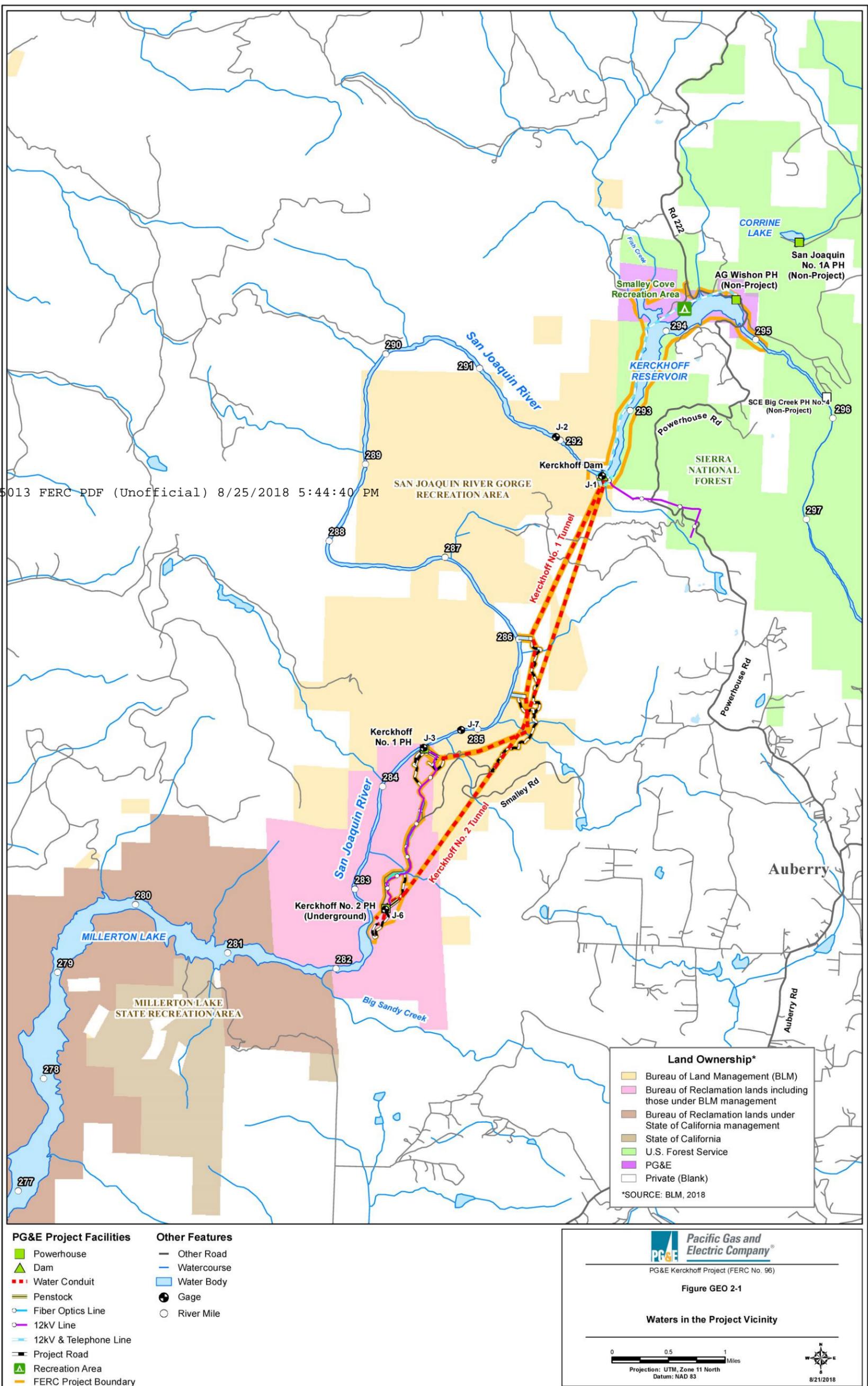


Figure GEO 2-1. Waters in the Project Vicinity.

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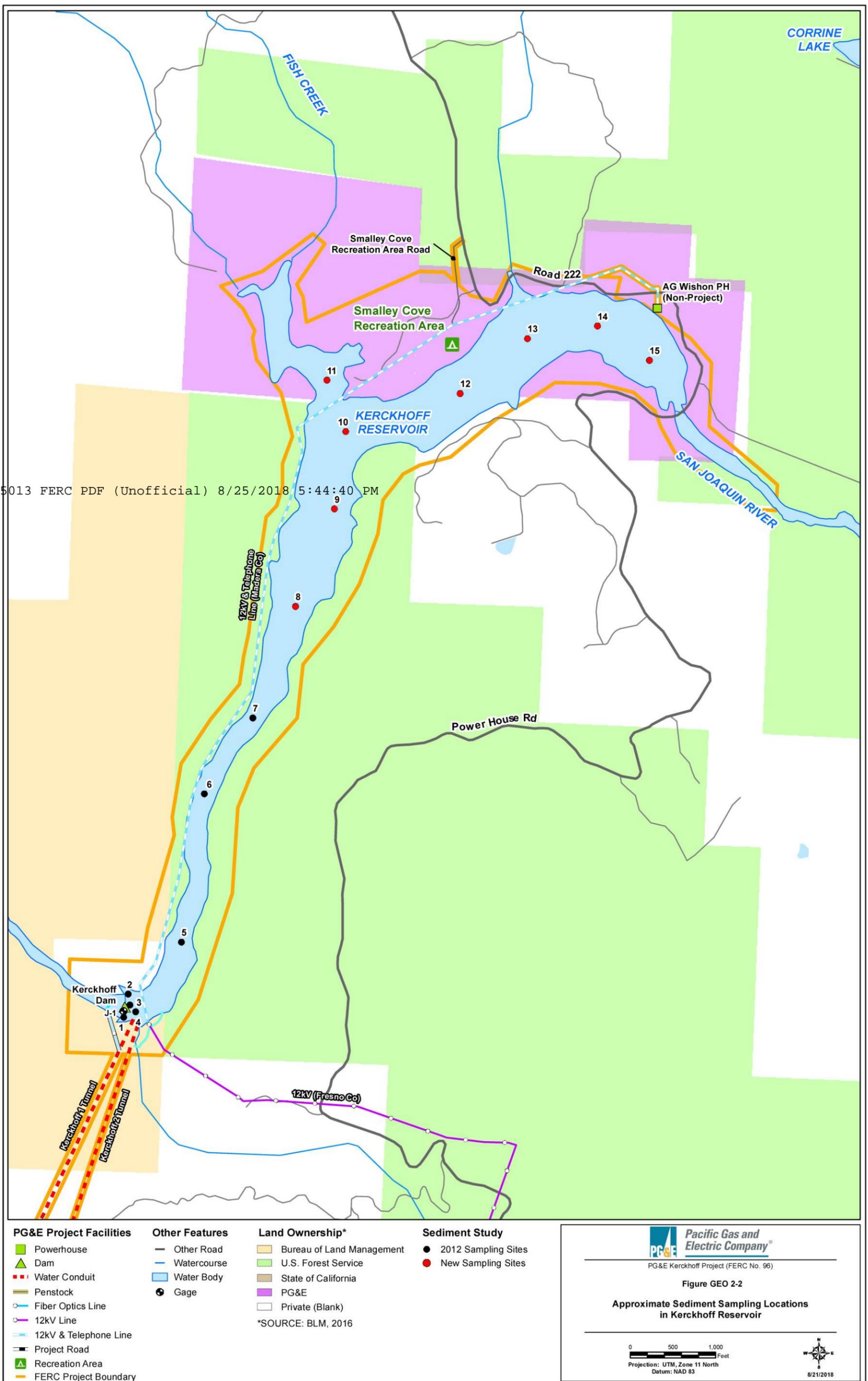


Figure GEO 2-2. Approximate Sediment Sampling Locations in Kerckhoff Reservoir.

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PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft GEO 2 Technical Study Report (TSR). The TSR will include data sheets, summary tables, GIS maps, and representative photographs, as appropriate. Sediment size distributions and comparisons will be provided in tabular format.
- The Draft GEO 2 TSR will be distributed to resource agencies, tribes, and other interested parties for comment.
- PG&E will review data collected as part of this study, data from *Study AQ 1, Aquatic Habitat Mapping* including LiDAR and high-resolution imagery, and data from *Study GEO 1, Channel Form and Fluvial Processes* including characterization of geomorphology and sediment sources in the Project Bypass Reach. After the data review, PG&E will consult with resource agencies, tribes, and other interested parties to determine potential additional steps to evaluate sediment supply in Kerckhoff Reservoir, depositional conditions in the Project Bypass Reach, or operation of the low-level outlets, if needed.
- If, after consultation by PG&E and resource agencies, tribes, and other interested parties, additional information on the effect of the low-level outlets is found to be needed, a focused bathymetric survey upstream of the low-level outlets would be conducted in 2019. This focused survey would occur before and after a low-level outlet “full travel” exercise to determine how much sediment was transported downstream. These low-level outlet tests usually occur after natural spill cessation (if spill occurs) as an annual component of dam safety evaluations. This focused survey and analysis would only take place if operationally feasible.³
- Comments on the Draft GEO 2 TSR will be addressed, as appropriate, in a Final GEO 2 TSR.

RELATIONSHIP TO OTHER STUDIES

- Areas experiencing excessive erosion that may be delivered to Kerckhoff Reservoir will be identified in coordination with *Study GEO 1, Channel Form and Fluvial Processes*; *Study GEO 3, Project Road-Related Erosion*; and *Study LAND 1, Project Roads and Trails Assessment*.
- LiDAR and high-resolution imagery collected in the Project Bypass Reach to support *Study AQ 1, Aquatic Habitat Mapping* and results from *Study AQ 1* will be used to characterize depositional conditions for sediment.

³ If a spill does not occur, PG&E in consultation with the resource agencies, tribes, and other interested parties would decide whether to conduct before/after bathymetric surveys in conjunction with Division of Safety of Dams exercise of the low-level outlets.

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- *Study WQ 1, Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach* will use the data collected to determine where to install water temperature monitoring equipment.
- *Study AQ 2, Fish Populations* will use the reservoir bathymetry results to determine where to set nets and other equipment for the fish population studies.

POSSIBLE EARLY SCHEDULE

PG&E is evaluating the potential to implement this study in September 2018, which is earlier than Integrated Licensing Process (ILP) regulations require. PG&E is considering accelerating the schedule so it would have data available to facilitate other related studies. However, if the study cannot be implemented in 2018, it will be conducted in 2019 as indicated below.

Potential Early Start Date	Date	Activity
Late Summer 2018	Summer 2019	Obtain topographic base maps, aerial photography, bathymetry, and other data; aerial reconnaissance and ground survey of sediment sources
Late Summer–Winter 2018	Summer–Fall 2019	Conduct multispectral LiDAR and hydrographic field surveys and sediment sampling (concurrent with bathymetric survey)
Winter 2018/2019	Fall 2019–Winter 2020	Analyze LiDAR and hydrographic data, sediment sampling data, and sediment sources to reservoir, and prepare Draft GEO 2 TSR
Late Winter–Early Spring 2019	Late Winter–Early Spring 2020	Distribute Draft GEO 2 TSR to resource agencies, tribes, and other interested parties, and consult them regarding results of studies and sediment-related potential next steps
Summer 2019	Spring 2020	Resource agencies, tribes, and other interested parties review and provide comments on draft report
Fall 2019	July 2020	Distribute Final GEO 2 TSR to the resource agencies, tribes, and other interested parties

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	5,000
Fieldwork and Research	\$	127,500
Data Analysis	\$	35,000
Products	\$	25,000
Total	\$	192,500

REFERENCES

- Bateman, P.C., and A.J. Busacca. 1982. Geology of the Millerton Lake Quadrangle, West-Central Sierra Nevada, California, U.S. Geological Survey, Geologic Quadrangle Map GQ-1548. Available at: <https://pubs.er.usgs.gov/publication/gq1548>. Accessed April 2018.
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- . 2014. Upper San Joaquin River basin storage investigation, draft environmental impact statement. August 2014. Available at: https://www.Reclamation.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=821. Accessed July 2017.
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GEO 2-12

STUDY GEO 3 Project Road-Related Erosion

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Erosion on or adjacent to Project Roads or roads shared with the U.S. Forest Service (USFS) (Shared Access Roads) could provide sediment to Project Area drainages and to Kerckhoff Reservoir.

PROJECT NEXUS

- Erosion of Project Roads and Shared Access Roads could deliver sediment to adjacent drainages and Kerckhoff Reservoir and impact aquatic and riparian habitat.

RELEVANT INFORMATION

The following information is available and was reviewed to determine study needs (Section 5.2, *Geology and Soils* of the Pre-Application Document [PAD] contains a summary of geology, soils, and geomorphology information):

- Project Roads (Table 4.5-4a) and gated roads shared with the USFS (Table 4.5-4b) that provide access to Kerckhoff Reservoir, powerhouses, and other Project facilities;
- Publicly available aerial photography and satellite imagery;
- Topography, slope, and gradient information available from published maps;
- Federal Energy Regulatory Commission's (FERC's) *Final Environmental Impact Statement, Kerckhoff Project No. 96* (FERC 1979);
- Pacific Gas and Electric Company's (PG&E's) 1977 amended application for new license for the Project (PG&E 1977);
- U.S. Geological Survey's (USGS's) *Geologic Map of the Millerton Lake Quadrangle* (Bateman and Busacca 1982);
- U.S. Bureau of Land Management's (BLM's) *National Inventory and Condition Assessment Guidance & Instructions Handbook* (BLM 2015);
- U.S. Bureau of Reclamation's (BoR's) *Upper San Joaquin River Basin Storage Investigation* (BoR 2008); and
- *Draft Environmental Impact Statement, Upper San Joaquin Basin Storage Investigation* (BoR 2014).

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POTENTIAL INFORMATION GAPS

The following has been identified as a potential information gap:

- There is a lack of information related to the erosional characteristics of Project Roads and Shared Access Roads, including the type of road and associated features (type of road surface, inboard ditch, outboard fill, culvert locations, sizes, maintenance records, etc.), and potential erosion and sediment transport pathways (topography, sediment erodibility, and proximity to receiving waters).

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The existing information is proposed to be supplemented by the following study:

- Survey approximately 5.8 kilometers (km) (3.6 miles [mi.]) of Project Roads and approximately 0.3 km (0.2 mi.) of Shared Access Roads to assess erosion and sediment production to Kerckhoff Reservoir and adjacent drainages. This assessment will consist of the following three components:
 - Conduct a desktop geographic information system (GIS) evaluation and microzonation to identify landslides and other potential sediment sources or erosion features related to roads using publicly available or privately acquired remote sensing imagery, including aerial photography, satellite imagery, and light detection and ranging (LiDAR) datasets. This desktop evaluation will use the existing methodology and workflow developed by PG&E’s Gas Transmission Integrity Management Program (TIMP) Geohazards Program (InfraTerra 2017).
 - Conduct a reconnaissance-level walkdown of all Project Roads and the one Shared Access Road. Photo-document existing road conditions and identify erosion features such as road surface rilling, gullies, fill-slope failures, cut-slope and inboard ditch erosion, and culvert/drainage failures with potential for significant sediment production. Data will be captured using the existing TIMP GIS field mapping platform (or its functional equivalent) and geodatabase schema.
 - Compile walkdown results, including erosion parameters and geotagged photos that document the presence or absence of erosion for each road feature, in tabular and common geospatial formats (e.g., ArcGIS shapefile and Google Earth KMZ) as part of the Technical Study Report (TSR) documentation. These data will also be shown on annotated “strip maps” centered on each road that show locations of erosion sites identified as part of the study, along with slope failures and incised erosional features adjacent to the roadway that may act as sediment sources or transport to receiving waters.

The purpose of this study is threefold: (1) to document the physical condition of existing Project and Shared Access Roads at a reconnaissance level; (2) to identify sites with significant active erosion or the potential for future erosion; and (3) to inform the need for protection, mitigation,

and enhancement (PM&E) measures to address these deficiencies, consistent with applicable road engineering and design standards. As such, no attempt will be made to quantify the rates of sediment production and transport potential from these roads or their appurtenance facilities, nor to conduct site-specific engineering evaluations for sites of concern.

EXTENT OF STUDY AREA

The Study Area includes the Project Roads and the one USFS Shared Access Road (i.e., roads shared with USFS) and associated turnouts and laydown areas listed in Tables GEO 3-1a and GEO 3-1b, and shown in Figures GEO 3-1a and GEO 3-1b. Note that the Study Area includes roads that are located both within and outside of the current FERC Project Boundary and are not shared roads subject to existing right-of-way or other road use agreements that determine proportional use by PG&E.

Table GEO 3-1a. Project Roads used by PG&E.

Road Name	Length (ft.)
Project Facility Access Roads	
Access Road 1 (from Access Road 2 to Adit 1)	4,482
Access Road 2 (Smalley Road to Adit 2)	5,572
Access Road 3 to Kerckhoff 1 Powerhouse (Upper)	1,927
Access Road 4 to Kerckhoff 1 Powerhouse (Lower)	1,007
Access Road 5 to Laydown Storage Area	532
Access Road 6 (portions)	3,365
Access Road 7 to Penstock Headworks	521
Access Road 8 (to Kerckhoff 2 Surge Tank)	1,304
Access Road 9 (to Kerckhoff 2 Penstock Construction Access Tunnel)	334
Recreation Facility Access Roads	
Smalley Cove Recreation Area Road	1,073

Table GEO 3-1b. Shared Access Roads.

Shared Road with Gated Access (Shared Entities)	Length (ft.)
Smalley Cove Recreation Area Road (USFS)	1,073

Note: The portions of Access Road 6 and Smalley Road shared with BLM are covered under a separate agreement between PG&E and BLM and will not be evaluated as part of this study.

Excluded from the Study Area are areas where access is unsafe (due to very steep terrain or high water flows) or private property for which the Licensee has not received specific approval from the landowner to enter the property to perform the study. For surveys that may require access through private property, PG&E will take the following steps to obtain approval:

- Notify the landowner of Project relicensing and request authorization to enter the property to conduct surveys.

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- If authorization is obtained, PG&E will complete surveys as described in this study plan.
- If authorization is not obtained, PG&E will not complete surveys at these locations.
- Areas where field surveys cannot be conducted will be classified and mapped based on aerial photographs and best professional judgment, and identified as such in the final study products.

STUDY METHODS AND ANALYSIS

- Desktop GIS Road Segmentation: As a precursor to field reconnaissance, existing Project Roads and Shared Access Road geospatial data will be evaluated for centerline accuracy and parsed via GIS to create discrete road segments with seamless, end-to-end linear referencing. Consistent with generally accepted practice, these discrete road segments will be as homogenous as practicable based upon land ownership, road surface type (e.g., asphalt, gravel, native), road width, and other factors (BLM 2015).
- Desktop GIS Erosion Evaluation: Project Roads and Shared Access Road erosion will be evaluated using publicly available maps and remote sensing imagery, including aerial photography, satellite imagery, and LiDAR datasets, to identify possible erosion sites (e.g., road surface rills and gullies, corrugated metal pipe [CMP] culverts) and sediment sources within and adjacent to the road corridor. This desktop microzonation of road-related erosion will utilize the existing methodology and workflow developed by the PG&E TIMP Geohazards Program and its corresponding geodatabase schema to the extent practicable.
- Field Reconnaissance: A visual reconnaissance and walkdown of all Project and Shared Access Roads will be made to verify road and erosion-related features delimited in the desktop evaluation and to locate (using global positioning system [GPS]-enabled tablets) and photo-document active erosion sites and sediment sources.
 - Consistent with contemporary practice for road inventories (BLM 2015), field reconnaissance will follow the Field Visual Assessment method to capture all relevant features and appurtenances (e.g., cross section/positive drainage, loose or missing aggregate, ditch condition, culverts) and to denote deficiencies having potential for significant sediment production and transport to the waters of interest for this study. Road mile markers will be captured via GPS for reference purposes.
 - Data will be captured using the existing TIMP GIS field mapping platform (or its functional equivalent) on GPS-enabled tablets using PG&E-established geodatabase schema parameters pertinent to erosion hazard and sediment production.

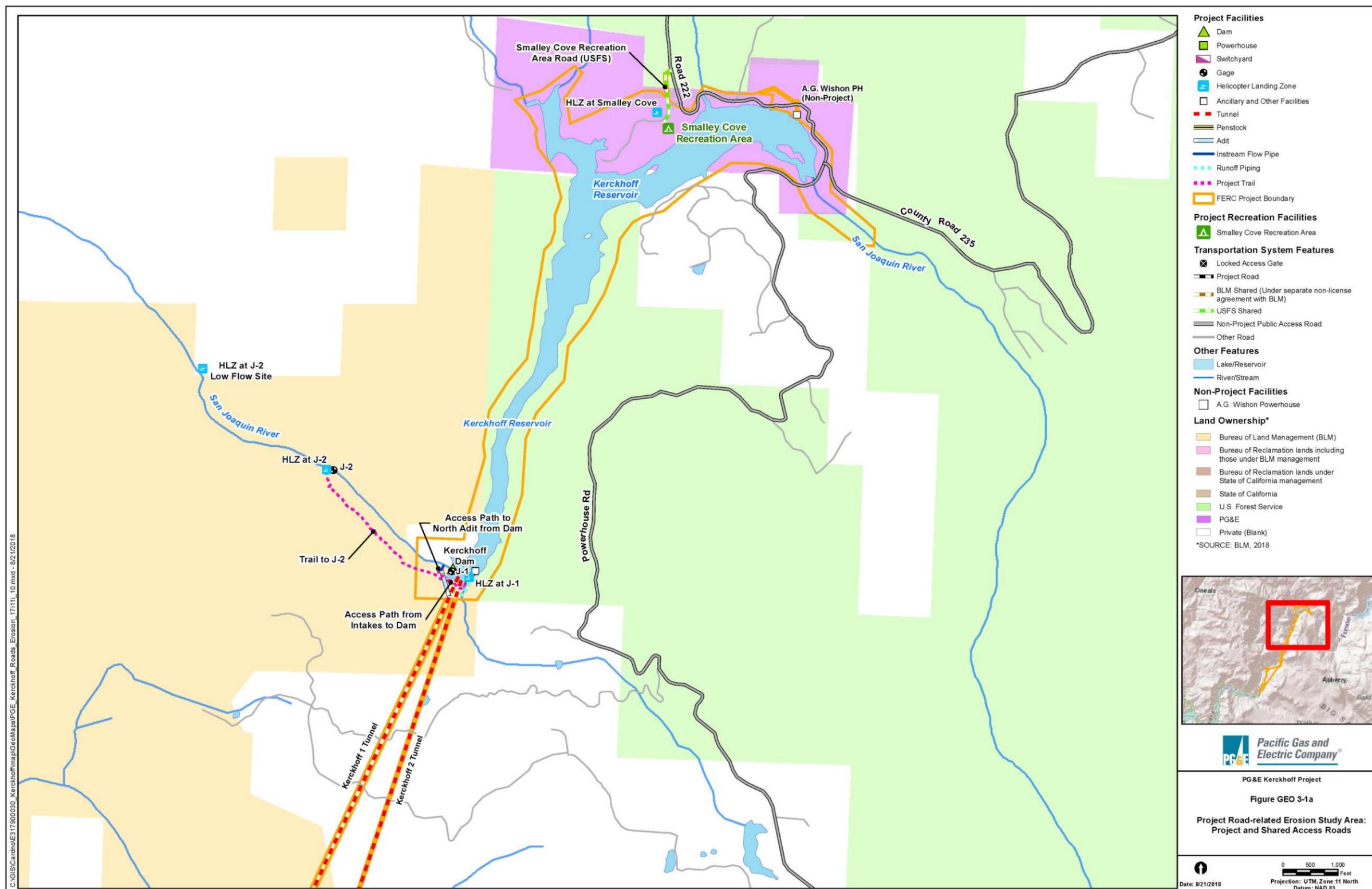


Figure GEO 3-1a. Project Road-related Erosion Study Area: Project and Shared Access Roads.

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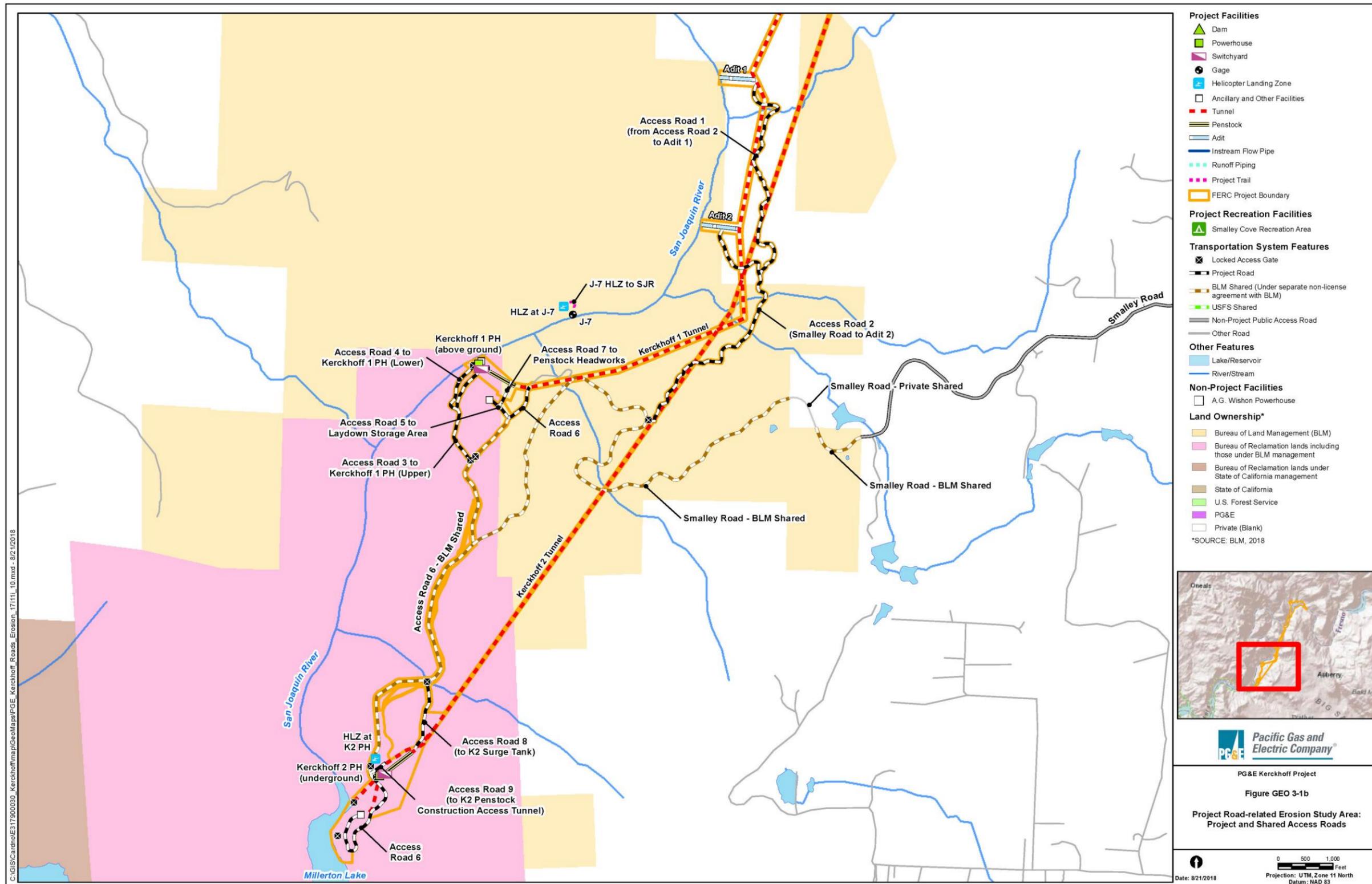


Figure GEO 3-1b. Project Road-related Erosion Study Area: Project and Shared Access Roads.

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- Additionally, each site will be subjectively rated for potential erosion and the propensity for sediment transport with delivery to receiving waters. The road erosion ratings will be based on the condition of the inventoried road and associated drainage features, as well as professional judgement. Sediment production rates will not be quantified.
- Data Analysis and Presentation: Study results, including erosion parameters and geotagged photos that document the presence or absence of landslide and erosion for each road feature, will be compiled in tabular and geospatial formats as part of the TSR. TSR documentation will also include annotated “strip maps” for each road showing the locations of landslide and erosion sites identified as part of the study, the condition of each road segment in terms of observed stored sediment and density of active erosion features per linear mile, and its relevant erosion/sediment production ranking (e.g., “good,” “fair,” or “poor”) based on potential for significant production and transport of sediment to receiving waters, as well as geotagged walkdown photos, road features, and other relevant information.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- This study plan is consistent with contemporary road inventory and condition assessment guidelines (BLM 2015), applies methodologies used for risk assessment of other PG&E infrastructure (InfraTerra 2017), and follows generally accepted practices for evaluating and documenting roads used for past hydroelectric relicensings such as the DeSabra-Centerville Project (FERC No. 803).

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft GEO 3 TSR. The TSR will include geospatial data, data sheets, summary tables, maps, and geotagged photographs of representative road conditions, as appropriate. The condition of each road segment will be described, and erosion/sediment production ranked (e.g., “good,” “fair,” or “poor”) in a tabular format.
- The Draft GEO 3 TSR will be distributed to resource agencies, tribes, and other interested parties for review during the comment period.
- Comments on the Draft GEO 3 TSR will be addressed, as appropriate, in a Final GEO 3 TSR. The Final GEO 3 TSR will be distributed with the Draft License Application (DLA) (July 2020).

RELATIONSHIP TO OTHER STUDIES

- Areas with excessive erosion will be identified in coordination with *Study LAND 1, Project Roads and Trails Assessment*. The list of roads to be analyzed under *Study GEO 3* (see Tables GEO 3-1a and 3-1b) will be updated to include any additional roads that may be later identified under *Study LAND 1* that are not currently listed in this study plan.

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- Information about locations with erosion may be used to identify potential issues related to aquatic biota.
- Information about road-related erosion may be used to inform PM&E measures related to road repairs or other improvements needed to reduce erosion. Road repairs and maintenance will consider BLM MS-9113 – Roads Design Handbook and other applicable road design engineering standards as may be appropriate.

SCHEDULE

Date	Activity
April–June 2019	Obtain road maps, topographic base maps, and aerial photography and complete GIS desktop evaluation
July–August 2019	Field reconnaissance
September–December 2019	Analyze data and prepare Draft GEO 3 TSR
December 2019	Distribute Draft GEO 3 TSR to resource agencies, tribes, and other interested parties
January–March 2020	Resource agencies, tribes, and other interested parties review and provide comments on draft report
April and May 2020	Address review comments and prepare final report
July 2020	Distribute Final GEO 3 TSR in the DLA

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	10,400
Fieldwork and Research	\$	33,000
Data Analysis	\$	17,000
Products	\$	20,000
Total	\$	<u>80,400</u>

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STUDY WQ 1 Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Summer water temperatures affect habitat usability for fish and other aquatic life and are potentially affected by Project structures and operations.

PROJECT NEXUS

- Water storage and Project operations may affect water temperatures in Kerckhoff Reservoir and the Project Bypass Reach.¹ Additional data are needed to characterize water temperature conditions.

RELEVANT INFORMATION

The following information is available and was reviewed in the Pre-Application Document (PAD) Section 5.3.3.1, *Water Temperature and Dissolved Oxygen* to determine water quality study needs:

- Fisheries studies at Millerton Lake (Ecological Analysts [EA] 1982; National Environmental Services, Inc. [NES] 1986, 1987);
- Daily discharge and water temperature records at Pacific Gas and Electric Company (PG&E) gages J-2, J-3, and J-7, from 1998 to 2016 (PG&E 1998–2016); and
- PG&E's amended application for new license for the Project (PG&E 1977).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Summer water temperature data in Kerckhoff Reservoir are limited to water temperature profiles measured in 1976.
- There are insufficient reservoir water temperature surveys to confirm there is no thermal stratification.
- Stream water temperature data are limited to upstream and downstream of the target stream segment.

¹ The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from the K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

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PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following studies are proposed to supplement existing information:

- Continuously monitor water temperatures in the Project Bypass Reach during May² through October. Water temperature loggers will be serviced monthly.
- Collect Kerckhoff Reservoir water temperature profiles measured from a boat and record water temperatures in Kerckhoff Reservoir at three profile stations: at the upstream end of the reservoir, mid-lake, and near Kerckhoff Dam. Water temperatures also will be recorded at two additional locations: in the A.G. Wishon Powerhouse tailrace, and in the San Joaquin River (SJR) immediately upstream of Kerckhoff Reservoir.
- Characterize concurrent meteorological conditions.

EXTENT OF STUDY AREA³

The Study Area for the water temperature study includes the Project Bypass Reach¹, SJR (Millerton Lake) immediately downstream of the K2 Powerhouse⁴ (<1 kilometer [km] [0.62 mile (mi.)]) (river mile [RM] 282.1) (Figure WQ 1-1), and Kerckhoff Reservoir (Figure WQ 1-2).

STUDY METHODS AND ANALYSIS

Kerckhoff Reservoir Water Temperatures

Continuous water temperature data recorders (e.g., VEMCOTM brand MiniLog II data recorders or Onset units) will be installed as arrays covering near surface to near bottom depths at the three profile stations in Kerckhoff Reservoir. One site will be located at the upstream end of Kerckhoff Reservoir in a well-mixed area (Station KRTMP-1), and two units will be installed at this location, one below the surface and one near the bottom. One site will be located near mid-reservoir in deeper water (Station KRTMP-2), and water temperatures will be recorded below the surface, at mid-depth, and near the bottom to represent water temperatures throughout the water column. These recorders will be installed on an anchored buoy with a float located beneath the water's surface. A third site (Station KRTMP-3) will be located near Kerckhoff Dam outside the boat exclusion in deep water. This location will have units installed below the surface, at mid-depth, and near the bottom to represent water temperatures throughout the water column. Two additional temperature recorder sites will be installed in Kerckhoff Reservoir: one site will be located in the A.G. Wishon Powerhouse tailrace (Station KRTR-1), where a pair of recorders will be installed; another site (Station SJRUK) will be located in the SJR upstream of Kerckhoff Reservoir.

² Installation of equipment will depend on safe access.

³ Only study sites that can be accessed safely with permission of the landowner or occupier will be sampled. Accessibility and selection of sample sites will be determined based on results of habitat mapping in *Study AQ 1, Aquatic Habitat Mapping*.

⁴ Millerton Lake is not considered part of the Project Bypass Reach as all flow has been returned to the SJR at the K2 Powerhouse. The water temperature dynamics within Millerton Lake are controlled by hydrodynamic, meteorology, and operational factors beyond the control of the Kerckhoff Project.

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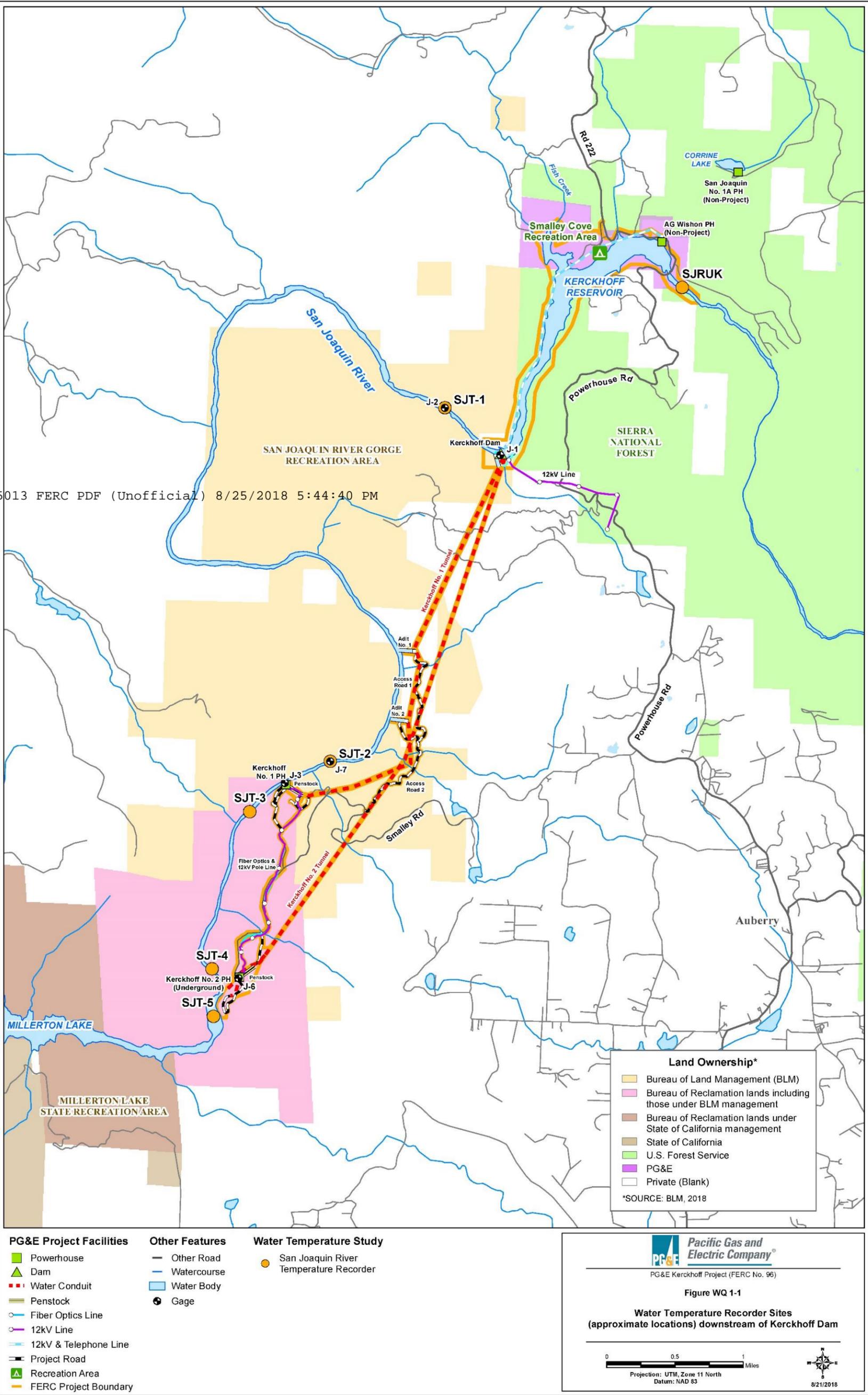


Figure WQ 1-1. Water Temperature Recorder Sites (approximate locations) downstream of Kerckhoff Dam.

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Figure WQ 1-2. Water Temperature Recording Sites (approximate locations) in Kerckhoff Reservoir.

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Recorders will be operated between May 1 and October 31. Four monthly water temperature profiles will be measured in the reservoir near each of the profile stations (June, July, August, and September). Reservoir water temperature profiles will be collected with a field meter such as a YSI™, Hydrolab™, or Hanna™ brand field instrument (or equivalent). In addition to water temperatures, dissolved oxygen and specific conductance will be measured.

Water temperature profiles will be recorded in degrees Celsius and at a depth interval of 1 meter (m) (3.2 feet [ft.]). Depth to bottom of reservoir will be recorded in the field logbook. Global positioning system (GPS) coordinates of each sampling location also will be recorded.

Water temperature data will be tabulated similar to those for stations monitored in the SJR (see below).

Water Temperature Monitoring in the SJR

Continuous water temperature will be collected in the SJR downstream of Kerckhoff Dam to characterize water temperatures and warming in the Project Bypass Reach. Water temperature data will be collected from Gage J-2 below Kerckhoff Dam, if operational. If the gage is not operational, a temperature recorder (Station SJT-1) will be installed near the site. A second site (Station SJT-2) will be located between J-2 and the K1 Powerhouse (equivalent to the location of Gage J-7). The site will be located as access and safety allow. A third site (Station SJT-3) will be located downstream of the K1 tailrace. A fourth site (Station SJT-4) will be located immediately upstream of the K2 tailrace, with the final site (Station SJT-5) located approximately 0.1 km (0.03 mi.) downstream of the K2 Powerhouse tailrace. At each site, two recorders will be installed to provide redundancy in case of data loss.

Initial installation will occur in April to begin collecting data from May 1 through October 31, unless river discharge makes access and installation unsafe, in which case installations may be delayed (final retrieval of recorders will be in early November). The GPS coordinates of each location will be recorded. Water temperatures will be recorded at 15-minute intervals and tabulated as daily mean, minimum, and maximum temperatures. Water temperature data loggers will be placed in the active flow channel that is representative of the river flow condition. Water temperature data will typically be downloaded and saved at regular intervals (i.e., monthly) to a computer. Water temperature will be collected with an independent device at the time of water temperature recorder servicing for quality assurance.

The data recorders are typically placed in metal housings with protective foam inserts and are placed in an appropriate section of stream using metal chain and locks. All water temperature recorders will be identified with an individual serial number so that accuracy of individual recorders can be tracked throughout the study. The digital recorders also should be marked with a contact name and phone number in the event that they are removed from the water.

Units will be serviced during fieldwork for various studies, or at a minimum monthly, as weather and access permit. Quality control calibrations will be performed on each recorder (water bath) in a laboratory setting prior to and after deployment as described in PG&E's quality control standard practices (PG&E's Quality Assurance Program Plan [QAPP]; PG&E 2011).

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Meteorological Data

Air temperature and relative humidity data will be collected near Kerckhoff Dam, near A.G. Wishon Powerhouse, and near the K1 Powerhouse to characterize warming conditions. Wind speed and solar radiation data also will be collected at Gage J-2. These data will be summarized similar to water temperature data and plotted with them.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

The study methodology proposed for this study plan is consistent with the generally accepted practice in the scientific community. Standard field sampling techniques and equipment will be utilized for all water temperature measurements.

In addition, the methods and quality assurance protocols for all water temperature and water quality data collection procedures will be consistent with PG&E's quality control standard practices outlined in PG&E's QAPP (PG&E 2011).

PRODUCTS

Water temperature results from monitoring will be compiled into minimum, mean, and maximum daily water temperatures and reported in graphical and tabular forms. Representative daily average flow, daily maximum, minimum, and average air temperature, as well as daily maximum, minimum, and average relative humidity data will be plotted with the water temperature data by month. Water temperatures below the K1 and K2 powerhouses will be plotted with flows through the powerhouses and instream flow releases (i.e., estimated total flow at the monitoring locations). Water temperature profiles from the reservoir will be plotted by depth for each profile taken. An assessment for the presence or absence of a thermocline will be included in the data analysis. Water temperatures recorded from the reservoir will be presented in a similar manner to water temperatures downstream of Kerckhoff Dam. Water temperatures in the reservoir will be plotted with inflows from upstream and from A.G. Wishon Powerhouse (i.e., total estimated inflow to Kerckhoff Reservoir).

A report will be prepared describing study methodology, field data collection techniques, and results of the data collected each monitoring year. The report will address the relationship of water temperature to air temperature and flow. Following distribution of the report, PG&E will meet with resource agencies, tribes, and other interested parties to evaluate the need for a water temperature model for the Project Bypass Reach.

RELATIONSHIP TO OTHER STUDIES

- Water quality measurements will be taken for water temperature, dissolved oxygen, and specific conductance at each sampling site and shared with *Study WQ 2, Water Quality Sampling* and *Study AQ1, Aquatic Habitat Mapping*.
- Water temperature data will be collected to provide information to support *Study AQ 2, Fish Populations* and *Study AQ 5, Western Pond Turtles*. Water temperatures are important to consider in evaluating Project effects on fish throughout their life history.

SCHEDULE

Date	Activity
May–September 2019	Collect data
November–December 2019	Analyze data and prepare Draft WQ 1 Technical Study Report (TSR)
January 2020	Distribute Draft WQ 1 TSR to participants
March 2020	Meet with resource agencies, tribes, and other interested parties to discuss the Draft WQ 1 TSR and need for water temperature modeling
April 2020	If consensus is reached for a water temperature model, work will begin
July 2020	The Final WQ 1 TSR will be distributed with the Draft License Application.

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. This does not include costs to develop a water temperature model, should it be determined that a model is necessary. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	9,300
Fieldwork	\$	85,200
Data Analysis	\$	24,097
Products	\$	20,500
Total	\$	<u>139,097</u>

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- EA (Ecological Analysts). 1982. Fisheries studies at Millerton Lake, 1979–1982. Prepared for Pacific Gas and Electric Company. Department of Engineering Research, San Ramon, California. 82 pp.
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PG&E (Pacific Gas and Electric Company). 1977. Before the Federal Power Commission, Kerckhoff Project-96 Amended Application for New License. Pacific Gas and Electric Company.

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STUDY WQ 2
Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir
August 2018

POTENTIAL RESOURCE ISSUE(S)

- Water quality is potentially affected by Project operations and maintenance, which may affect habitat conditions for fish, other aquatic life, water-based recreation, and other beneficial uses.
- Water quality compliance with Clean Water Act (CWA) standards as identified in the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan) objectives.¹

PROJECT NEXUS

- Project operations and maintenance may affect water quality in Kerckhoff Reservoir and the Project Bypass Reach.²

RELEVANT INFORMATION

The following information is available and was reviewed in the Pre-Application Document (PAD) Section 5.3.3.2, *Other Physical and Chemical Parameters* to determine water quality study needs:

- California Environmental Data Exchange Network (CEDEN) database queries of available water quality data, 2012 (CEDEN 2017);
- California Department of Water Resources (CDWR) Water Data Library (CDWR 2017);
- *Draft Environmental Impact Statement, Upper San Joaquin River Basin Storage Investigation* (U.S. Bureau of Reclamation [BoR] 2014); and
- Pacific Gas and Electric Company's (PG&E's) amended application for new license for the Project (PG&E 1977).

¹ This study is not intended to identify point source pollution discharges subject to National Pollutant Discharge Elimination System (NPDES) permits and regulations, nor hazardous waste disposal regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

² The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from the K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

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POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Chemical water quality in Kerckhoff Reservoir and the Project Bypass Reach.
- Water temperature, dissolved oxygen (DO), DO percent saturation, specific conductance, turbidity, and pH measurements reflective of conditions in spring and late summer.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following studies are proposed to supplement existing information:

- Characterize chemical water quality in Kerckhoff Reservoir (one location near dam) and Project Bypass Reach (up to three locations if needed).
- *In situ* measurements of water temperature, DO, DO percent saturation, specific conductance, turbidity, and pH measurements, along with samples for laboratory analysis, to reflect conditions in spring and late summer of 2019.

EXTENT OF STUDY AREA³

The Study Area for the water quality study includes the Project Bypass Reach in the San Joaquin River (SJR) between Kerckhoff Dam and immediately downstream of the Kerckhoff 2 (K2) Powerhouse (Figure WQ 2-1) and Kerckhoff Reservoir (Figure WQ 2-2).

STUDY METHODS AND ANALYSIS

The following study sites will be sampled for the list of parameters shown in Table WQ 2-1, except if otherwise noted (e.g., bacteriological sampling sites only) (see Figure WQ 2-2):

Kerckhoff Reservoir

- KR 1—Near dam; surface, mid, and deep water.
- KR 2—Shore sample near Smalley Cove Recreation Area (bacteriological sampling only)
- KR 3—Shore sample near dispersed recreation site above Smalley Cove Recreation Area (bacteriological sampling only)

³ Only study sites that can be accessed safely with permission of the landowner or occupier will be sampled.

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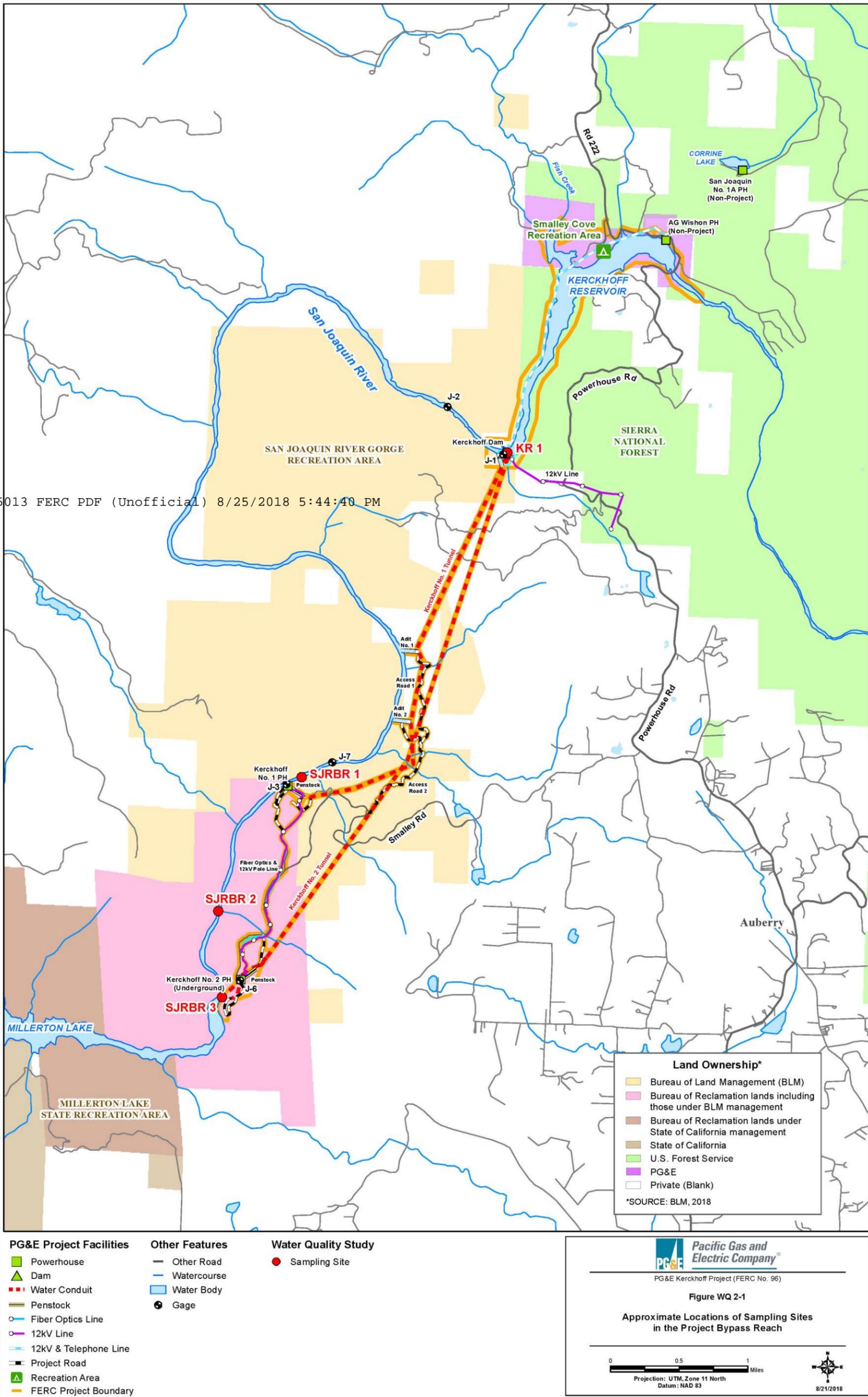
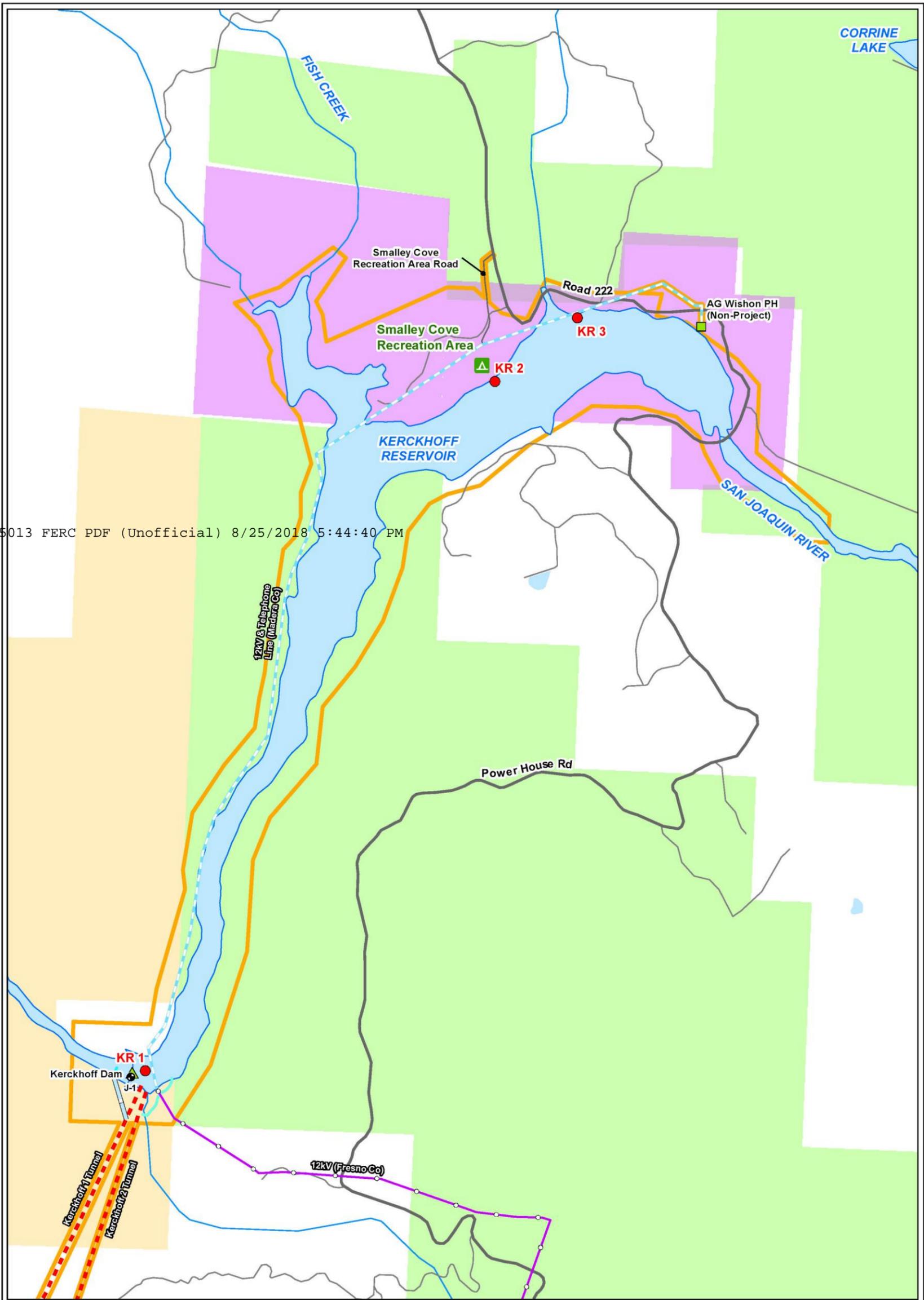


Figure WQ 2-1. Approximate Locations of Sampling Sites in the Project Bypass Reach.

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PG&E Project Facilities	Other Features	Land Ownership*	Water Quality Study
Powerhouse	Other Road	Bureau of Land Management	Sampling Site
Dam	Watercourse	U.S. Forest Service	
Water Conduit	Water Body	State of California	
Penstock	Gage	PG&E	
Fiber Optics Line		Private (Blank)	
12kV Line		<small>*SOURCE: BLM, 2016</small>	
12kV & Telephone Line			
Project Road			
Recreation Area			
FERC Project Boundary			

PG&E Kerckhoff Project (FERC No. 96)

Figure WQ 2-2

Approximate Locations of Sampling Sites in Kerckhoff Reservoir

Projection: UTM, Zone 11 North
Datum: NAD 83

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Figure WQ 2-2. Approximate Locations of Sampling Sites in Kerckhoff Reservoir

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Table WQ 2-1 Parameters for the Water Quality Assessment Program

Parameter/Constituent	Methods ^a	Seasonal Water Quality	Bacteria
<i>In Situ</i>			
Temperature	EPA 170.1	X	
Dissolved oxygen	SM 4500-O	X	
pH	SM 4500-H	X	
Specific conductance	SM 2510A	X	
Turbidity	SM 2130 B	X	
Secchi disk	USGS NFM	X	
General and Minerals			
Total alkalinity	EPA 310.1	X	
TOC and DOC	EPA 415.2	X	
Hardness	EPA 200.7	X	
Total dissolved solids	EPA 160.1	X	
Total suspended solids	EPA 160.2	X	
Nutrients			
Nitrate+Nitrite-N	EPA 300.0	X	
Total Ammonia-N	EPA 350.3	X	
Total Kjeldahl Nitrogen	EPA 351.3	X	
Orthophosphate	EPA 365.3	X	
Total Phosphorous	EPA 365.3	X	
Bacteriological			
Total coliform	SM 9223B		X ^d
Fecal coliform	SM 9222D		X ^d
<i>E. coli</i>	EPA 1603		X ^d
Hydrocarbons			
Hydrocarbon samples	EPA 418.1	X	
Oil and Grease	Visual Observations	X	
Metals (total except as noted)			
Iron	EPA 200.7	X	
Manganese	EPA 200.7	X	
Mercury	EPA 1631	X ^b	
Methylmercury	EPA 1630	X ^b	
CAM 17 Metals (Title 22 Metals)	EPA 200.8	X ^c	

Notes:

^a Method sources: American Public Health Association (2012); USEPA (2017); U.S. Geological Survey (USGS) *National Field Manual* (Wilde et al. 2014).

^b Mercury sampling is at lower detection limits with these methods than the CAM 17 metals below.

^c Includes total and dissolved metals: As, Hg, Sb, Ba, Be, Cd, Cr, Co, Cu, Pb, Mo, Ni, Se, Ag, Tl, V, Zn

^d Bacteriological sampling at SJRBR 3 (below K2 Powerhouse) only if the elevation of Millerton Lake is \geq 545 ft. Mean Sea Level [MSL]; i.e., is creating a backwater effect at K2 Powerhouse.

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Project Bypass Reach

- SJRBR 1—SJR just above the K1 Powerhouse.
- SJRBR 2—SJR between K1 and K2 powerhouses (only when K1 is operating).
- SJRBR 3—SJR approximately 100 meters (m) downstream of the K2 Powerhouse (includes bacteriological sampling only if the elevation of Millerton Lake is \geq 545 ft. Mean Sea Level [MSL]; i.e., is creating a backwater effect at the K2 Powerhouse).

Seasonal sampling schedule—samples will be collected at the sites listed above in early summer/late spring (May/June) to capture high flow, turbid conditions (safety permitting) and late summer (August/September) to evaluate low flow conditions. If the late spring/early summer sampling is delayed due to safety consideration, samples will be collected as soon as safe access permits.

Bacteriological sampling will be conducted at SJRBR 3 below the K2 Powerhouse around the Memorial Day and Labor Day weekends to capture high recreational use periods. Sampling in Kerckhoff Reservoir will occur for the same two holidays. Bacteriological sampling over the July 4th holiday was not included due to expected lower recreational use—high local air temperatures in July result in people avoiding this mid-summer holiday. Recreation-related bacteriological sampling will be used to determine if fecal coliform or *E. coli* concentrations meet Basin Plan objectives for the protection of water contact recreation (REC-1). The sampling and analysis protocol involves collecting multiple samples within a 30- to 48-day period. The fecal coliform standard requires determining a geometric mean of at least five (5) samples within a 30-day period. The *E. coli* standard requires the calculation of a geometric mean of at least six (6) weekly samples. Bacteriological sampling at SJRBR 3 will be conducted only if Millerton Lake is at or above 545 ft. MSL (i.e., backwater conditions near the K2 Powerhouse).

The *E. coli* objective is currently provisional, awaiting State Water Board approval before it officially becomes a Basin Plan objective. Consequently, both fecal coliform and *E. coli* are proposed for sampling to ensure that compliance with the Basin Plan can be determined. If the State Water Board approves a modified version of the standard prior to sampling, PG&E can modify the methodology to comply.

Methods

In situ water temperature, DO, DO percent saturation, specific conductance, turbidity, and pH water quality measurements will be collected using a YSI™, Hydrolab™, or Hanna™ brand field instrument (or equivalent). The field instrument will be calibrated for use in the field prior to each sampling event as described in PG&E's quality control standard practices (PG&E's Quality Assurance Program Plan [QAPP]; PG&E 2011). In cases where the portable instrument shows signs of malfunction or drift, a back-up sampling device or procedure will be used to validate the questionable measurement (back-up instruments or methods for monitoring all field parameters will always be available). Water samples for laboratory analysis will be collected using an appropriate and QAPP-approved method (PG&E 2011). Sample bottles provided by a state-certified water quality laboratory containing appropriate preservatives, if needed, will be used for samples of water to be analyzed. Appropriate equipment will be utilized during any sample

collection activities (e.g., vinyl gloves should be worn for collection of water samples). Sample bottles will be placed in iced freezer chests, and all method holding times will be complied with in delivering samples to the analytical laboratory.

- All *in situ* water quality monitoring data will be recorded in a field notebook or other suitable format and will include information pertaining to the following: date, time, weather conditions, name(s) of people collecting samples, methods of sample collection, units of measurements, depth (if sampling in a lake or reservoir), global positioning system (GPS) coordinates for sample site, and any problems or concerns associated with sampling including information regarding questionable samples and back-up measurements or water sample collection for analysis at an analytical laboratory. Special sampling conditions may also need digital photo documentation, if warranted. All field notes will be clearly written and in a format that can be reproduced, either scanned sheets (PDF) or entered into electronic format (Word or Excel). The field crew is responsible for maintaining back-up copies of all electronic files they generate to prevent data loss due to computer malfunction or other causes. Water samples will be collected in areas of smooth, non-turbulent flow, with at least 6 inches of depth. This is intended to provide an indication of differences in water quality characteristics over time as the ambient air temperature changes.
- Trace metal samples will be analyzed by California Department of Fish and Wildlife's (CDFW's) Marine Pollution Studies Laboratory (MPSL), or an equivalent lab, using "clean" lab techniques and U.S. Environmental Protection Agency's (USEPA's) Method 1638, Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry (USEPA 1996a). Total mercury will be measured using USEPA 1631e, modified (USEPA 2002). Trace metal samples will be collected in the field using USEPA Method 1669, Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (USEPA 1996b).
- Arsenic will be analyzed as total dissolved recoverable and compared with National Recommended Water Quality Criteria for Freshwater Aquatic Life Protection.
- A Chain of Custody (COC) will be filled out for each analytical water quality monitoring field visit. The COC is the official document listing all samples collected and analyses requested that will be used during transport and handling of the water quality samples from the field to the analytical laboratory.

Analytical water samples will be sent to a California State Certified Laboratory for analyses of the remaining constituents (i.e., non-trace metals) listed in Table WQ 2-1.

- Precision measurements will be determined on laboratory replicates. Individual laboratories must have quality assurance and quality control (QA/QC) protocols established for precision measurements. Recovery measurements will be determined by laboratory spiking of a replicate sample with a known concentration of the analyte. The target level of addition is at least twice the original sample concentration. Individual laboratories must have QA/QC protocols established for recovery measurements.

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- Field or equipment blanks will be collected (using trace clean de-ionized water) during each monitoring event for QA/QC for analytical samples. They will be analyzed for a select subset of analytes. The purpose of the field/equipment blanks is to ensure field sampling techniques and equipment did not introduce any contamination to the samples.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The study methodology proposed for this study plan is consistent with the generally accepted practice in the scientific community. Standard field sampling techniques and equipment will be utilized for all water temperature and *in situ* water quality measurements.
- In addition, the methods and QA/QC protocols for all water quality data collection procedures will be consistent with PG&E's quality control standard practices outlined in PG&E's QAPP (PG&E 2011).

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The WQ 2 Technical Summary Report (TSR) will summarize the water quality measurements in tabular form, comparing the results from the different sampling points. Laboratory analyses will be reported. Comparisons to Basin Plan water quality criteria and data collected in previous years will also be included.

RELATIONSHIP TO OTHER STUDIES

- Water quality measurements will be taken for water temperature, DO, and specific conductance at each sampling site used during *Study AQ 2, Fish Populations* and *Study AQ 5, Western Pond Turtle*; results from other studies will be shared with *Study WQ 2*.

SCHEDULE

Date	Activity
Spring–Fall 2019	Collect field samples and implement laboratory analyses
September–November 2019	Analyze data and prepare Draft WQ 2 TSR
December 2019	Distribute Draft WQ 2 TSR to resource agencies, tribes, and other interested parties
January–February 2020	Resource agencies, tribes, and other interested parties review and comment on the Draft WQ 2 TSR
July 2020	Distribute Final WQ 2 TSR with Draft License Application

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	9,000
Fieldwork	\$	60,000
Data Analysis	\$	53,603
Products	\$	12,000
Total	\$	134,603

REFERENCES

American Public Health Association. 2012. Standard methods for the examination of water and wastewater. American Public Health Association, American Water Works Association, and Water Environment Federation.

BoR (U.S. Bureau of Reclamation). 2014. Upper San Joaquin River Basin Storage Investigation draft environmental impact statement. Sacramento, CA.

CDWR (California Department of Water Resources). 2017. Water data library for water quality data in California. Available at: <http://www.water.ca.gov/waterdatalibrary/index.cfm>. Accessed on July 1, 2017.

CEDEN (California Environmental Data Exchange Network). 2017. Data system for surface water quality in California. Available at: <http://ceden.waterboards.ca.gov/AdvancedQueryTool>. Accessed on July 5, 2017.

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USEPA (U.S. Environmental Protection Agency). 1996a. Determination of trace elements in ambient waters by inductively coupled plasma-mass spectrometry, Method 1638, July 1996.

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- Wilde, F.D., M.W. Sandstrom, and S.C. Skrobialowski. 2014. Selection of equipment for water sampling, version 3.1. Chapter 2A in Techniques of Water-Resources Investigations. U.S. Geological Survey. Available at: <http://pubs.water.usgs.gov/twri9A2/>.

STUDY WQ 3
Bioaccumulation in Kerckhoff Reservoir
August 2018

POTENTIAL RESOURCE ISSUE(S)

- The bioavailability of contaminants is potentially affected by Kerckhoff Reservoir, which, through bioaccumulation, may affect fish tissue concentrations of commonly consumed fish and/or crayfish that may be obtained by fishing-based recreation.
- The bioaccumulation study will collect information to potentially develop fish consumption advisories for Kerckhoff Reservoir to promote public safety, if needed.

PROJECT NEXUS

- The impoundment of water in the Project reservoir and its operations and maintenance may affect the bioavailability of contaminants in legal-sized commonly consumed fish and crayfish.

RELEVANT INFORMATION

The following information is available and was reviewed in the Pre-Application Document (PAD) Section 5.3.3.2, *Other Physical and Chemical Parameters* or during study plan development to determine bioaccumulation study needs:

- California Environmental Data Exchange Network (CEDEN) database queries of available water quality data, 2012 (CEDEN 2017);
- California Department of Water Resources (CDWR) Water Data Library (CDWR 2017);
- *Draft Environmental Impact Statement, Upper San Joaquin River Basin Storage Investigation* (U.S. Bureau of Reclamation [BoR] 2014);
- Office of Environmental Health Hazard Assessment's (OEHHA's) *A Guide to Eating Fish Caught in the San Joaquin River from Friant Dam to the Port of Stockton* (OEHHA 2014) and *General Protocol for Sport Fish Sampling and Analysis* (OEHHA 2005);
- *Final California 2014 and 2016 Integrated Report (303(d) List/305(b) Report). Supporting Information: Regional Board 5—Central Valley Region; Millerton Lake Line of Evidence for Listing Decisions* (State Water Resources Control Board 2018); and
- Pacific Gas and Electric Company's (PG&E's) amended application for new license for the Project (PG&E 1977).

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POTENTIAL INFORMATION GAPS

The following has been identified as a potential information gap:

- Concentration of selected chemical contaminants in muscle tissue of legal-size commonly consumed fish caught within Kerckhoff Reservoir.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following study is proposed to supplement existing information:

- Characterize commonly consumed fish and/or crayfish muscle tissue concentrations of the following metals: mercury, arsenic, cadmium, copper, selenium, and silver.
- Evaluate a composite sample for the following organics: polychlorinated biphenyls (PCBs), organochlorine pesticides (chlordane, DDTs, dieldrin, toxaphene), and polybrominated diphenyl ethers (PBDEs; -28, -47, -99, -100, -153, -154, -183, -190, -209 congeners) from at least nine resident, legal-size bass, if available, or other fish or crayfish in Kerckhoff Reservoir.

EXTENT OF STUDY AREA

The Study Area for the bioaccumulation study is limited to Kerckhoff Reservoir.

STUDY METHODS AND ANALYSIS

The study approach for *Study WQ 3* is provided below.

Methods

- Fish and/or crayfish tissues for analysis will be collected during the fish population sampling study (*Study AQ 2, Fish Populations*) using OEHHA's collection and sample size protocols (OEHHA 2005). Reservoir sampling for fish will be conducted using a combination of boat electrofishing, minnow traps, seines, and gill nets. Sampling will occur during summer to early fall of 2019. Crayfish will be collected during *Study AQ 2* by using baited inclined plane crayfish traps.¹ Crayfish will be collected during *Study AQ 2* field sampling efforts for the sole purpose of tissue samples for bioaccumulation analysis (i.e., no sampling will be conducted to estimate crayfish population characteristics).
- Tissue samples will be collected from at least nine individual specimens from three commonly consumed species, which may include various species of bass, crayfish,

¹ Baited inclined plane crayfish traps will be deployed in Kerckhoff Reservoir in conjunction with the *Study AQ 2* field data collection efforts. Ten traps will be deployed for 24 hours to obtain sufficient tissue samples for bioaccumulation analysis. If it is necessary to obtain additional tissue samples, the traps will be relocated and fished for an additional 24 hours.

rainbow trout, sunfish,² and other fish species for a total of 27 samples (three species times nine samples). Each sample will be analyzed for mercury, arsenic, cadmium, copper, selenium, and silver. One composite sample, containing combined filets of at least nine bass will be analyzed for organics (i.e., PCBs, organochlorine pesticides, and PBDEs).

- Fish tissue samples will be analyzed by California Department of Fish and Wildlife's (CDFW's) Marine Pollution Studies Laboratory (MPSL), or an equivalent laboratory, using "clean" lab techniques and U.S. Environmental Protection Agency's (USEPA's) Method 1638, Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry (USEPA 1996). Total mercury will be measured using USEPA 1631e, modified (USEPA 2002). Whole fish and/or crayfish will be collected in the field (during *Study AQ 2*) and shipped, on ice, to MPSL who will extract muscle tissue using "clean" techniques. All holding requirements for these samples will be observed.
- A Chain of Custody (COC) will be filled out for each tissue sample collected during the field effort. The COC is the official document listing all samples collected and analyses requested that will be used during transport and handling of the water quality samples from the field to the analytical laboratory.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The study methodology proposed for this study plan is consistent with the generally accepted practice in the scientific community. Standard field sampling techniques and equipment will be utilized for all bioaccumulation study elements.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The WQ 3 Technical Study Report (TSR) will summarize the results of the fish tissue analysis in tabular form, comparing the results from the different species. Laboratory analyses will be reported. Data from the fish tissue analysis will be provided to OEHHA for determination of fish consumption advisories.

RELATIONSHIP TO OTHER STUDIES

- Water quality measurements will be taken for water temperature, dissolved oxygen, and specific conductance at each fish sampling site during *Study AQ 2, Fish Populations*. Fish collected from *Study AQ 2, Fish Populations* will be used for the fish tissue analysis.

² The preferential order for tissue samples will be bass, crayfish, rainbow trout, sunfish, suckers, and other fish commonly consumed. Hardhead will be excluded from tissue sampling.

Revised Study Plan**SCHEDULE**

Date	Activity
Summer–Fall 2019	Collect field samples and fish tissues, and implement laboratory analyses
September–November 2019	Analyze data and prepare Draft WQ 3 TSR
December 2019	Distribute Draft WQ 3 TSR to resource agencies, tribes, and other interested parties
February 2020	Resource agencies, tribes, and other interested parties review and provide comments on the Draft WQ 3 TSR
July 2020	The Final WQ 3 TSR will be distributed with the Draft License Application

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	2,391
Fieldwork	\$	12,500
Lab/Data Analysis	\$	25,741
Products	\$	9,620
Total	\$	50,252

REFERENCES

BoR (U.S. Bureau of Reclamation). 2014. Upper San Joaquin River basin storage investigation draft environmental impact statement. Sacramento, California.

CDWR (California Department of Water Resources). 2017. Water data library for water quality data in California. Available at: <http://www.water.ca.gov/waterdatalibrary/index.cfm>. Accessed on July 1, 2017.

CEDEN (California Environmental Data Exchange Network). 2017. Data system for surface water quality in California. Available at: <http://ceden.waterboards.ca.gov/AdvancedQueryTool>. Accessed on July 5, 2017.

OEHHA (Office of Environmental Health Hazard Assessment). 2005. General protocol for sport fish sampling and analysis. Pesticide and Environmental Toxicology Branch. 14 pp.

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PG&E (Pacific Gas and Electric Company). 1977. Before the Federal Power Commission, Kerckhoff Project-96 amended application for new license. Pacific Gas and Electric Company.

State Water Resources Control Board. 2018. Final 2014/2016 California integrated report (Clean Water Act Section 303(d) list/305(b) report): supporting information, Regional Board 5 – Central Valley Region. Available at: https://www.waterboards.ca.gov/water_issues/programs/tmdl/2014_16state_ir_reports/table_of_contents.shtml#r5. Accessed August 2018.

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WQ 3-6

STUDY AQ 1 Aquatic Habitat Mapping

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Aquatic habitat types and distribution are potentially affected by Project operations and flows. Habitat information developed as part of this study is proposed as a basis for stratifying technical studies involving aquatic resources.

PROJECT NEXUS

- In the Project Bypass Reach¹ and Kerckhoff Reservoir, Project operations have modified the flow regime and fish habitat.

RELEVANT INFORMATION

There is relatively little information available characterizing habitat conditions in the Project Bypass Reach. The following information is available and was reviewed to determine *Study AQ 1* needs (the following information was summarized in Section 5.4.2.1, *Physical Conditions*, of the Pre-Application Document):

- Federal Energy Regulatory Commission's (FERC's) *Final Environmental Impact Statement, Kerckhoff Project No. 96* (FERC 1979);
- *Draft Resource Management Plan/General Plan/Environmental Impact Statement/Environmental Impact Report for Millerton Lake* (URS 2008);
- U.S. Bureau of Reclamation's (BoR's) *Biological Resource Technical Reports: Upper San Joaquin Basin Storage Investigation; Draft Riverine Fish Habitat Technical Report* (BoR 2012); and
- *2016 Data Collection Report, Native Aquatic Species Management Plan (NASMP)* (Southern California Edison [SCE] 2017).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Existing habitat information for the Project Bypass Reach only has been characterized at a gross level, and the distribution of habitat types has not been characterized.
- Current habitat conditions in Kerckhoff Reservoir have not been characterized.

¹ The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Characterize mesohabitat² types between Kerckhoff Dam and the Kerckhoff 1 (K1) Powerhouse, between the K1 Powerhouse and the K2 tailrace spatially, and within Rosgen Level 1 channel types present.
 - Data will be collected based on a combination of ground-level mapping and aerial observations. Ground-level mapping will be conducted where there is access that may be utilized safely.
 - Mesohabitat types will be characterized according to Hawkins et al. (1993) and McCain et al. (1990). Dominant substrates, including the presence of fines and spawning substrate, pool depth, riparian vegetation, and woody debris will be characterized and recorded. Potential passage barriers based on rainbow trout barrier characteristics³ will be identified from aerial imagery, from helicopter, or on the ground. If pools are found to be isolated or discontinuous based on field observations, the location of those pools will be identified.
 - Water temperatures needed to characterize habitat conditions will be collected under *Study WQ 1, Water Temperature*.
- Characterize habitat in Kerckhoff Reservoir based on field measurements and the most recent available characterization of reservoir morphometry and stage-capacity relationship, along with reservoir water surface elevations.
 - Characterize reservoir substrate at low lake elevations by observation. If necessary, substrates in deeper areas will be characterized using an underwater camera or grab sampler. The percentages of nearshore substrate types will be recorded, along with the presence or absence of aquatic vegetation and the types of cover available for fish. Characterize limnological conditions of the reservoir that affect habitat including physical properties and water quality.
 - Water temperature profiles in the reservoir will be collected under *Study WQ 1, Water Temperature*.

EXTENT OF STUDY AREA⁴

The Study Area for the aquatic habitat study includes the Project Bypass Reach and Kerckhoff Reservoir.

² Mesohabitats are the stream channel structures that aquatic organisms might use for shelter, feeding, spawning, rearing, or other activities.

³ There are no criteria for barriers to native minnows, but any barriers identified for trout are likely to be barriers to other species present.

⁴ Only study sites that can be accessed safely with permission of landowner or occupier will be sampled.

STUDY METHODS AND ANALYSIS

Characterization of Existing Stream Habitat

Mesohabitat types will be characterized in 2018 in the Project Bypass Reach in two segments. The first segment is between Kerckhoff Dam and the K1 Powerhouse, and the second is between the K1 and K2 powerhouses. Mesohabitats will be characterized spatially and within Rosgen Level 1 channel types present (channel typing will be completed as part of *Study GEO 1, Channel Form and Fluvial Processes*). Data would be collected by experienced biologists using a combination of ground-level mapping and aerial observations. Ground-level mapping will be conducted to the extent that areas are accessible and may be utilized safely. Aerial imagery and/or overflights will be used to extend coverage of the Project Bypass Reach to 100%. Mesohabitat types will be characterized according to Hawkins et al. (1993) and McCain et al. (1990). Dominant substrates, including the presence of fines and spawning substrate, pool depth, riparian vegetation,⁵ and woody debris will be characterized and recorded. Potential passage barriers based on rainbow trout barrier characteristics⁶ (e.g., Thompson 1972, Bjornn and Reiser 1991, Flosi et al. 2009) will be identified from aerial imagery, from helicopter, or on the ground. Pools that are isolated or where flow is discontinuous will be identified and position located. The apparent reason for the discontinuity of flow will be documented. If any issues with fish passage are identified, then Pacific Gas and Electric Company (PG&E) will discuss these with resource agencies, tribes, and other interested parties including possible additional habitat studies to collect information on isolated pools and thermal suitability of summer habitat. Spatial referencing of data collections will be conducted using global positioning system (GPS) (where feasible) and hip chain distances between measured coordinates. The data from the stream habitat mapping will be recorded and analyzed.

Accessibility will be determined in advance of fieldwork by identification of potential helicopter landing zones and road access through maps and aerial photos. Helicopter reconnaissance will determine viability of potential access points and landing zones and locate additional access locations. Viable landing zones and other access locations will be used to enter the channel in the gorge, and habitat mapping will be conducted both upstream and downstream as far as possible.

Characterization of Existing Reservoir Habitat

Habitat in Kerckhoff Reservoir will be characterized based on field measurements and the most recent available characterization of reservoir morphometry (bathymetry) and stage-capacity relationship, along with reservoir water surface elevations. Reservoir substrate will be characterized at low lake elevations by observation and locations mapped to aerial imagery. If necessary, substrates in deeper areas will be characterized using an underwater camera or grab sampler. The percentages of nearshore substrate types will be recorded, along with the presence or absence of aquatic vegetation and the types of cover available for fish.

Limnologic conditions including physical properties and water temperature also will be used to characterize the habitat of Kerckhoff Reservoir. Physical properties will be characterized by profile measurements made for water temperature, dissolved oxygen, and specific conductance. Secchi disk transparency will be measured. Water temperature profiles in the reservoir also will

⁵ Characterization of riparian vegetation will be performed in coordination with *Study GEO 1* and *Study BOT 2*.

⁶ There are no criteria for barriers to native minnows, but any barriers identified for trout are likely to be barriers to other species present.

be collected under *Study WQ 1, Water Temperature* and water quality measurements under *Study WQ 2, Water Quality Sampling*.

Information developed under *Study GEO 2, Project-related Sediment Management Practices in Kerckhoff Reservoir* will be used to facilitate this work. Reservoir morphometry and shoreline development will be analyzed using PG&E plans and drawings. Available habitats in Kerckhoff Reservoir will be evaluated based on PG&E's latest stage-capacity tables (*Study GEO 2*), and reservoir water storage data obtained from U.S. Geological Survey (USGS) published records for the period from 1997 to 2017.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The methodologies listed here are consistent with generally accepted scientific and engineering principles and practice, including BoR 2012; FERC 1979; Hawkins et al. 1993; McCain et al. 1990; Rosgen 1996; SCE 2003, 2017; and URS 2008.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft AQ 1 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Draft AQ 1 TSR will be distributed to resource agencies, tribes, and other interested parties for comment.
- Comments on the Draft AQ 1 TSR will be addressed, as appropriate, in a Final AQ 1 TSR. The Final AQ 1 TSR will be distributed with the Draft License Application.

RELATIONSHIP TO OTHER STUDIES

- Geomorphology characterization developed under *Study GEO 1, Channel Form and Fluvial Processes* will be used to segment reaches.
- Riparian information will be shared with *Study BOT 2, Riparian and Wetland Resources*.
- Observations of encounters with western pond turtles and descriptions of habitat utilized will be shared with *Study AQ 5, Western Pond Turtles* to identify potential suitable trapping locations for western pond turtle population and demographics.
- Observations of mussels will be recorded and shared with mussel survey studies (*Study AQ 3, Mussels and Aquatic Molluscs*) to identify potential suitable survey locations for native mussels.
- Stream and reservoir habitat characterization data will be utilized and shared with the fish population study (*Study AQ 2, Fish Populations*) to identify potential suitable fish population sampling locations using a stratified random sampling design.
- Water temperature data collected under *Study WQ 1, Water Temperature* will be used to characterize water temperature as a habitat condition, especially in

Kerckhoff Reservoir, where stratification, if present, may affect usability of habitat. If isolated pools or flow discontinuities are identified, temperature characteristics of those pools will be addressed under *Study WQ 1*.

- Stream habitat characterization data will be shared with the rare aquatic species study (*Study AQ 6, Rare Aquatic Species*) to identify potential suitable eDNA sampling locations.

POSSIBLE EARLY SCHEDULE

PG&E is evaluating the potential to implement this study in September 2018, which is earlier than Integrated Licensing Process (ILP) regulations require. PG&E is considering accelerating the schedule so it would have data available to facilitate other related studies. However, if the study cannot be implemented in 2018, it will be conducted in 2019 as indicated below.

Potential Early Start Date	Date	Activity
Fall 2018	Summer 2019	Conduct stream habitat characterization (mapping) and analyze data
Fall 2018	Summer 2019	Collect Kerckhoff Reservoir habitat data and analyze data
December 2018	Fall/Winter 2019	Distribute Draft AQ 1 TSR to resource agencies, tribes, and other interested parties
June 2019	March 2020	Distribute Final AQ 1 TSR to resource agencies, tribes, and other interested parties

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	6,000
Fieldwork	\$	92,000
Data Analysis	\$	25,000
Products	\$	16,000
Total	\$	139,000

REFERENCES

- Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. American Fisheries Society Special Publication 19: 83–138.
- BoR (U.S. Bureau of Reclamation). 2012. Draft riverine fish habitat assessment. Upper San Joaquin River Basin Storage Investigation, California. March 2012.
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STUDY AQ 2 Fish Populations

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Fish species composition, distribution, and abundance in Kerckhoff Reservoir and the Project Bypass Reach¹ are potentially affected by Project operations and flows.

PROJECT NEXUS

- Project operation of Kerckhoff Reservoir may affect both native minnows and introduced game species.
- Project operations may modify the flow regime in the Project Bypass Reach potentially affecting fish habitat, populations, and community composition.

RELEVANT INFORMATION

The following information is available and was reviewed to determine *Study AQ 2* needs (the information is summarized in Sections 5.4.2, *Fish and Aquatic Communities* and 5.4.3, *Fish Populations* of the Pre-Application Document [PAD]):

- Federal Energy Regulatory Commission's (FERC's) *Final Environmental Impact Statement, Kerckhoff Project No. 96* (FERC 1979);
- *San Joaquin River Transport Time from Kerckhoff Powerhouse to the Proposed Kerckhoff 2 Powerhouse Site* (Landis and Lambert 1979);
- *Inland Fishes of California* (Moyle 2002);
- *Fisheries Studies at Millerton Lake, 1979–1982* (Ecological Analysts [EA] 1982);
- *Studies of American shad at Millerton Lake, 1987 to 1990* (National Environmental Services, Inc. [NES] 1988, 1989, 1990a, 1990b);
- *Revised Exhibit S, Fish and Wildlife, FERC Project No. 96. Kerckhoff Project.* (Pacific Gas and Electric Company [PG&E] 1984);
- *Biological Resource Technical Reports: Upper San Joaquin Basin Storage Investigation; Draft Aquatic Biological Resources Technical Report* (U.S. Bureau of Reclamation [BoR] 2008);
- *Technical and Scientific Support-Land and Environmental Management. Crane Valley Project Hardhead Pool Characterization* (PG&E 2011);
- *Big Creek No. 4 Water Power Project (FERC Project No. 2017), Application for New Licensee for Major Project – Existing Dam, Volume 2, Exhibit E* (Southern California Edison [SCE] 1997);

¹ The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from the K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

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- *2016 Data Collection Report, Native Aquatic Species Management Plan (NASMP)* (SCE 2017);
- *Biological Resource Technical Reports: Upper San Joaquin Basin Storage Investigation; Draft Riverine Fish Habitat Technical Report* (BoR 2012); and
- *Draft Resource Management Plan/General Plan/Environmental Impact Statement/Environmental Impact Report for Millerton Lake* (URS 2008).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Recent information on fish composition and distribution in Kerckhoff Reservoir.
- Recent information on fish composition and distribution in the Project Bypass Reach. Distribution and presence of native minnows has been identified by resource agencies, tribes, and other interested parties as a data need.
- Recent information on fish composition and distribution between the K1 and K2 powerhouses and in Millerton Lake immediately downstream (<1 kilometer [km] [0.62 mile (mi.)]) of the K2 Powerhouse.
- Recent information on the presence of American shad spawning adults in the San Joaquin River (SJR) reach below K1 and K2 powerhouses.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Characterize fish composition and relative abundance of fish in Kerckhoff Reservoir using snorkeling, gill nets, minnow traps, and electrofishing in appropriate habitats with safe access.
- Characterize fish composition, distribution, and abundance in the Project Bypass Reach using snorkeling and electrofishing in appropriate habitats with safe access.
- Characterize fish composition and abundance between the K1 and K2 powerhouses and in Millerton Lake immediately downstream of the K2 Powerhouse in appropriate habitats with safe access using snorkeling and electrofishing. Gill nets may be used, if water is too deep for snorkel or electrofishing sampling.
- Capture American shad spawning adults via hook and line in the SJR reaches below K1 and K2 powerhouses, as flows provide for safe passage, to verify presence and collect information on spawners.

EXTENT OF STUDY AREA²

The Study Area for the fish population study includes the Project Bypass Reach, Millerton Lake (<1 km [0.62 mi.]) downstream of the K2 Powerhouse, and Kerckhoff Reservoir (Figure AQ 2-1).

STUDY METHODS AND ANALYSIS

Stream Fish Species Composition and Relative Abundance

Fish species composition and relative abundance in the Project Bypass Reach will be sampled during 2019 using snorkeling and electrofishing. These methods have been successfully used for fish data collection in the SJR Horseshoe Bend reach in support of SCE's Big Creek 4 Project relicensing from 2010 to 2017 (SCE 2017; Figure AQ 2-1). Both sections of the river are physically similar. Sampling sites will be selected based on the results of the habitat inventory mapping (*Study AQ 1, Aquatic Habitat Mapping*) and accessibility. The SJR Gorge and SJR between the K1 and K2 powerhouses will be divided into different segments based on geomorphic channel-type. A fish population sampling location will be placed within one representative reach of each channel-type within the two Project Bypass Reach sections, to the extent that they are safely accessible. It is expected that four sampling sites will be needed. Sampling sites will be selected to include the major types of mesohabitats. Habitat composition and proximity, site-specific characteristics, and access will be considered in selecting appropriate sampling sites. Sampling locations will be selected based on review of aerial imagery and a field inspection prior to sampling to confirm access and safety. It is anticipated that each sampling site will consist of shallow habitats that can be safely electrofished and deeper habitats that will need to be snorkeled.

Electrofishing survey sites will be approximately 100 meters (m) (328 feet [ft.]) in length and include the entire wetted channel width, if it can be safely monitored. Multiple pass depletion sampling will be conducted using up to four backpack electrofishers.³ Prior to sampling, the sampling station will be isolated by ¼-inch (in.) mesh block nets placed across the upstream and downstream ends of the site. Start and end times and the sampling duration (shocking seconds) from each backpack electrofishing unit will be recorded. Battery-powered Smith-Root Model 12 LR-20 or LR-24 backpack electrofishers (or other similar type of electrofisher) will be used to qualitatively sample portions of the main channel that can be safely reached. Each electrofishing unit and biologist will be accompanied by a netter with additional available personnel assisting with netting or in transporting fish to live wells. All captured fish will be retained in live wells along the shoreline. Fish will be identified to species, measured to the nearest millimeter (mm) fork length (or total length, if appropriate), and weighed to the nearest gram (g) for up to 30 individuals per species per size group. Scale samples will be collected from selected native minnows and wild trout (five fish per size class per habitat). An additional qualitative pass will be conducted in wadeable⁴ depositional areas containing potential suitable lamprey habitat⁵ within

² Only study sites that can be accessed safely with permission of the landowner or occupier will be sampled. Accessibility and selection of sample sites will be determined based on results of aquatic habitat mapping in *Study AQ 1, Aquatic Habitat Mapping*.

³ Fish collections will be carried out by qualified biologists, as authorized under a California Department of Fish and Wildlife (CDFW) Scientific Collecting Permit.

⁴ Wadeable is defined as areas of the river that are less than 1 m in depth.

⁵ Potential suitable lamprey habitat is defined as low gradient, depositional areas that contain silt or sand substrate.

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the 100-m sites using lamprey electrofishing settings,⁶ after the quantitative passes are completed. Based on the results of the *Study AQ 1 Aquatic Habitat Mapping*, if wadeable and safely accessible depositional areas with potentially suitable lamprey habitat are identified outside of the 100-m quantitative electrofishing sites, up to three depositional sites with potential lamprey habitat will be sampled using qualitative lamprey electrofishing settings.⁶ These areas will be sampled for Kern brook lamprey in conjunction with the quantitative electrofishing sampling fieldwork. This will take place regardless of eDNA detection results from *Study AQ 6, Rare Aquatic Species*.

Snorkel surveys will be conducted in habitats that are too deep (pools and deep runs) for effective sampling by electrofishing. At each sampling site, a snorkel site of about 100 m in length will be surveyed in deep habitat. Both techniques provide information on fish abundance and length. The snorkeled habitat units will be divided into four or more⁷ swimming lanes parallel to the direction of streamflow, based on channel width and visibility. Methods will be similar to those presented in Griffith (1972), Platts et al. (1983), Hicks and Watson (1985), Hankin and Reeves (1988), and Hillman et al. (1992). Underwater visibility will be measured and used to determine lane width (Hillman et al. 1992). Surveys will be performed between 9 AM and 4 PM (Hankin and Reeves 1988) to maximize the likelihood that light intensities are suitable for observing fish. Direct observation surveys will not be conducted on overcast days (Platts et al. 1983).

Direct observation (snorkeling) provides lower resolution length information, since lengths are visually estimated in comparison to a target. Length classifications for fish species observed during snorkeling will be as follows: 0 to 3 in. (0–76 mm), 3 to 6 in. (76–152 mm), 6 to 9 in. (152–228 mm), and fish greater than 9 in. (228 mm) in length (SCE 2017).

Small cyprinids in large schools that cannot be adequately identified during snorkel surveys as either hardhead or Sacramento pikeminnow will be classified as “unidentified cyprinids.” Captures made using electrofishing or cast nets will be used to sample the relative composition of portions of these “unidentified cyprinids,” to identify them, and to obtain information on age (SCE 2017). Non-native species encountered during sampling will be recorded.

General habitat parameters will be recorded at each location and will include habitat type classification, surficial substrate, available cover, mean wetted channel width, and water depth. Habitat classification, substrates, and cover quantification will be performed by visual observation. Water temperature, dissolved oxygen, and specific conductance will be measured with an appropriate instrument, which will be calibrated daily at each site. Channel width and depth will be measured to the nearest 0.1 ft. (3 centimeters [cm]) using a tape and stadia rod, respectively. Width measurements will be recorded every 30 ft. (9.14 m), and depths will be recorded at a quarter, half, and three-fourths the distance across the channel, and also at the thalweg.

⁶ As recommended by Smith-Root and U.S. Fish and Wildlife Service (<https://www.smith-root.com/support/kb/setting-up-a-backpack-electrofisher-to-capture-larval-lamprey/>).

⁷ If the wetted channel is sufficiently wide to accommodate four lanes.

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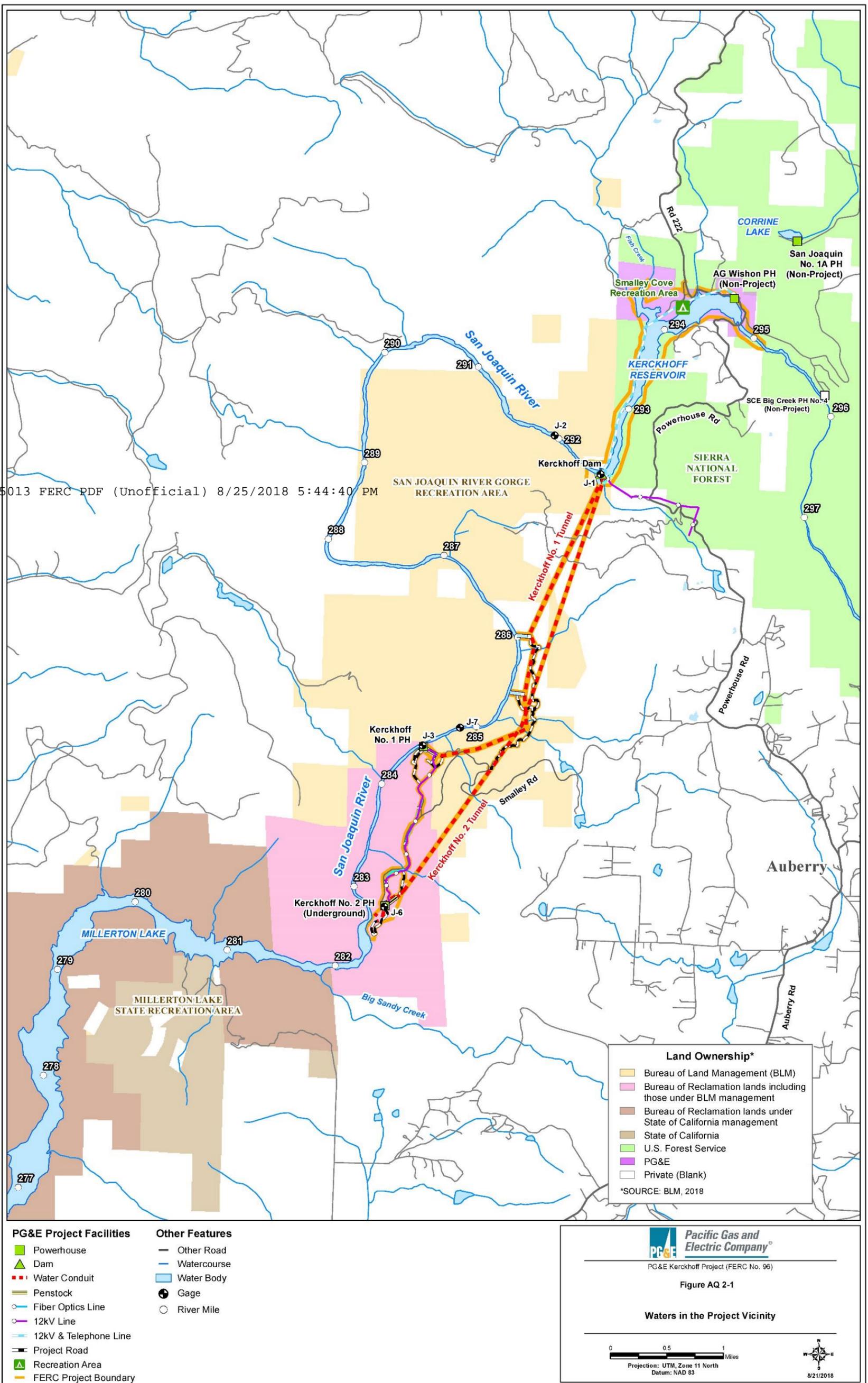


Figure AQ 2-1. Waters in the Project Vicinity.

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Project Bypass Reach Reporting and Analyses

Fish population estimates based on electrofishing multi-pass depletion will be performed using MicroFish 3.0 (Van Deventer and Platts 1989). Data will be analyzed by fish species and age group (e.g., Age 0 and Age 1 and older fishes). Where sufficient numbers of native fish and gamefish species are captured, age group breaks will be determined based on an evaluation of the length frequency distributions. Scales will be used to verify age at length for native minnows and wild trout. Fish standing crop estimates for each species at each study site in terms of density (fish/km) and biomass (kilograms per hectare [kg/Ha]) will be summarized. Fish condition factors using measured weight and length data for native minnows and game species will be calculated. A longitudinal distribution figure for fish species in the Project Bypass Reach using the quantitative abundance estimates and qualitative sampling data will be developed. Results for the fish community and native minnows will be analyzed using the approach of Moyle et al. (1998) to determine if the fish community and populations are in “good condition.”

American Shad Study

The SJR in the reach receiving American shad spawning flows from downstream of the K1 and K2 powerhouses will be investigated to document use by spawning American shad to the extent that it can be safely accessed via boat.⁸ Flows to support American shad spawning are released by PG&E for a 47-day period (May 15 to June 30). During this period, American shad will be sampled by hook and line, though the sampling period may need to be adjusted to accommodate potential yearly variability in the timing of American shad spawning. The sampling team will make use of a knowledgeable local fishing guide to assist the sampling team and to help locate American shad for hook and line capture downstream of the K1 or K2 powerhouses, depending on the powerhouse from which the shad spawning flows are being provided and the safety of passage conditions for the sampling boat. Sampling will be performed from a boat four times during the period of flow releases for shad. Sampling will take place at the conclusion of the first week of releases and every other week through the release period. Based on American shad captures, the last sampling will take place at the end of the last week (during the week of June 30) of shad flows, or after the shad flow releases to increase the opportunity to capture spawned out fish that will provide an indication of completed spawning. Equal fishing effort will take place during each sampling trip to provide catch per unit effort (CPUE) estimates.

Adult American shad captured by hook and line will be identified; a target of 20 fish will be measured for fork length, weighed, scales collected, and evaluated for gonadal development each sampling trip. The field team will attempt to collect fish of different lengths that may represent different cohorts of spawners, as well as collect data from both male and female adults. Any striped bass that are incidentally captured will be identified, measured, weighed, and scales will be collected.

⁸ If flows and lake levels are low, the area may not be accessible by boat. In that case fishing from shore or from a kayak or raft launched from shore will be attempted.

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American Shad Reporting and Analyses

Catch of American shad will be standardized to CPUE as American shad caught per hour for each trip. CPUE will be compared between sampling trips. Scales will be used to verify age at length for American shad. American shad condition factors will be calculated using measured weight and length data. Sex and gonadal development will be summarized with age, length, and condition factor by sampling date. Characteristics of the sampled spawning population of American shad will be documented over the sampling period. If available, information from fishing guide reports to California Department of Fish and Wildlife⁹ (CDFW) will be reviewed for additional information on American shad spawning and fishing downstream of Kerckhoff 1 and 2 powerhouses. Those data will be incorporated in the report.

Kerckhoff Reservoir Fish Species Composition and Relative Abundance

Reservoir sampling will be conducted using a combination of boat electrofishing, minnow traps, and gill nets; sampling will occur during summer to early fall of 2019. Nine individual fish from each of three commonly consumed fish species (or crayfish) will be provided to *Study WQ 3, Bioaccumulation in Kerckhoff Reservoir* for analysis (a total of 27 fish will be collected). Non-native species encountered during sampling will be recorded.

Boat Electrofishing

Boat electrofishing will be conducted in coordination with netting and minnow trapping, using standard methods (Reynolds 1996) to sample reservoir nearshore habitat of sufficient depth. Kerckhoff Reservoir will be sampled with an 18-ft. Smith-Root GPP (Generator-Powered Pulsator) electrofisher boat with Kohler powered generator (or similar electrofishing boat and generator). Voltage settings will be generally between 350 and 450 volts depending on conductivity. Sampling will be conducted during daytime hours, and seven sites will be sampled around the margin of Kerckhoff Reservoir (see Figure AQ 2-1). The locations of specific sampling sites will be based on the results of *Study AQ 1, Aquatic Habitat Mapping* and bathymetry information from *Study GEO 2, Project-related Sediment Management Practices in Kerckhoff Reservoir*, if implemented in 2018. Two additional sites will be sampled upstream of Kerckhoff Dam along the left and right banks of the reservoir, respectively. The left bank site will be located near the Project intakes, if it can be safely accessed. Each reservoir station will be approximately 164 ft. (50 m) in length. Sampling will begin at one end of a station with the boat perpendicular to shore about 32.8 ft. (10 m) out from the shoreline or zone too shallow to operate the boat. This area will be electrofished toward shore until the electrodes touch the shoreline, or in stations with shallow depths, before the propeller would be damaged. In stations with downed trees, sampling will proceed until the electrodes touch the woody vegetation. The boat will be backed away from shore and maneuvered parallel to the shoreline approximately 9.8 to 16.4 ft. (3 to 5 m) from the previous area, and electrofishing will proceed in this manner until the entire station is sampled.

⁹ To be provided by CDFW, if available.

Due to the shallow nature of much of the reservoir, some nearshore areas may not be available to sampling using the boat electrofisher. The field team will have beach seines, hand seines, and cast nets with them to use as an alternative. Nearshore sampling will depend on substrate composition, accessibility, and safety.

Minnow Traps

To supplement data collection to characterize juvenile fish composition and distribution in shallow nearshore areas, baited minnow traps will be deployed at six locations in areas too shallow to effectively sample by boat electroshocking. These sites will be determined based on the results of *Study AQ 1, Aquatic Habitat Mapping*. These traps will be set for 48 hours and checked at approximately 24-hour intervals. More frequent checks have been found to be unnecessary due to the low mortality level observed in minnow traps (SCE 2003). Each sample location will consist of a cluster of three minnow traps. Minnow traps are composed of two wire baskets (0.25-in. mesh) held together with a clip attached to a line with a float. The traps are 16 in. long, with a diameter of 9 in. at the middle, and 7.5 in. at the end. The opening to the trap is 2 in.

Adult and Juvenile Gill Nets

To address fish species composition and distribution in deeper water, one variable-mesh “adult” gill net (1- to 4-in. mesh) and one variable-mesh “juvenile” gill net (<1-in. mesh) will be deployed during fall at four locations along the length of Kerckhoff Reservoir, and two nets will be deployed in the area near the dam and the Project intakes.¹⁰ Variable-mesh gill nets will be 100 to 125 ft. long and 6 to 8 ft. deep and consist of four to five 25-ft. panels of variable mesh sizes; each panel consists of a different mesh size (e.g., 1 in., 1.5 in., 2 in., 3 in., and 4 in.) so that a gradient of sizes is represented across the net. Juvenile mesh gill nets are 30 ft. long, 6 ft. deep, and consist of three 10-ft. panels of variable mesh sizes; each panel consists of a different mesh size (e.g., 0.5 in., 0.83 in., and 0.75 in.). For the “adult” gill net sites, one net will be set just below the surface and one net will be set at about 30 to 40 ft. deep (if water of that depth is available near the site). “Juvenile” gill nets will only be set near the surface. To reduce the potential for mortality, the gill nets will be set for two 4-hour (hr.) net-set periods during the day and one 8- to 10-hr. set overnight, over an approximate 24-hr. period to facilitate good coverage, and to separate diel periods. The time of deployment and locations of each gill-net set will be recorded. The goals are to minimize mortality, while providing information on fish composition.

Kerckhoff Reservoir Fish Processing and Analysis

All sample locations for each method will be recorded using global positioning system (GPS) coordinates. Set and retrieval times for each method also will be recorded to provide CPUE estimates for nets. After capture, fish will be identified to species, measured to fork length or total length (+ 1 mm), as appropriate for the species, and weighed to the nearest gram. Scale samples will be collected from any native minnows and wild trout captured and will be used to verify length-frequency results. All fish will be released after processing.

¹⁰ If clearance to safely operate gill nets in the intake vicinity cannot be obtained, trawls will be used to sample in the vicinity of the intakes, where safe and permissible.

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Kerckhoff Reservoir Reporting and Analyses

Analyses will include quantifying and describing fish composition and distribution by life stage and by collection gear. Length-frequency histograms will be developed for all fish species observed. Fish capture results will be reported both as total catch and in terms of CPUE. CPUE for fishes captured via boat electrofishing will be calculated by dividing the number of fish of each species captured by the total area of water sampled. CPUE for fishes captured by gill net will be calculated by dividing the number of fish captured by the dimensions of the gill net; an additional calculation will incorporate the length of time fished. CPUE will be summarized by location and species. Where sufficient numbers of native fish and gamefish species are captured, age group breaks will be determined based on an evaluation of length-frequency distributions. Scales collected will be analyzed to verify the age-class structure inferred by length frequency for native minnows and trout. Fish condition factors will be calculated using measured weight and length data for native minnows and game species. Information analyzed will be related to reservoir location and habitat to the extent supported by the data. Results for the fish community and native minnows will be analyzed using the approach of Moyle et al. (1998) to determine if the fish community and populations are in “good condition.”

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The methodologies listed here are consistent with generally accepted scientific and engineering principles and practice, including Reynolds (1996) and SCE (2003, 2017).

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft AQ 2 Technical Study Report (TSR). The TSR will include summary tables, charts, and maps, as appropriate.
- The Draft AQ 2 TSR will be distributed to resource agencies, tribes, and other interested parties for comment.
- Comments on the Draft AQ 2 TSR will be addressed, as appropriate, in a Final AQ 2 TSR. The Final AQ 2 TSR will be distributed with the Draft License Application.

RELATIONSHIP TO OTHER STUDIES

- Water quality measurements will be taken for water temperature, dissolved oxygen, and specific conductance at each sampling site and shared with *Study WQ 1, Water Temperature*.
- Concentrations of mussels located during fish sampling will be documented and sampled during surveys for *Study AQ 3, Mussels and Aquatic Molluscs*.

- Sampling results in the vicinity of the downstream end of Kerckhoff Reservoir will be used to inform Phase 2¹¹ of *Study AQ 4, Entrainment*, if needed, in terms of vulnerable fish species and age life stages.
- Nine individual fish from each of three commonly consumed fish species will be provided to *Study WQ 3, Bioaccumulation in Kerckhoff Reservoir* for analysis. Non-native species encountered during sampling will be recorded.
- Western pond turtle observations will be recorded and shared with *Study AQ 5, Western Pond Turtles*.
- Results of *Study AQ 1, Aquatic Habitat Mapping* will assist in determining sampling locations in the Project Bypass Reach for *Study AQ 2*. These sites will be selected in consultation with resource agencies, tribes, and other interested parties.
- Bathymetry information from *Study GEO 2, Project-related Sediment Management Practices in Kerckhoff Reservoir*, if implemented in 2018, will provide information that will assist in selecting sampling locations.
- Results from *Study AQ 6, Rare Aquatic Species* will be shared with *Study AQ 2* to inform whether Kern brook lamprey is detected via eDNA in the Project Bypass Reach.

SCHEDULE

Date	Activity
Summer–Fall 2019	Conduct fish sampling fieldwork
September–November 2019	Analyze data and prepare Draft AQ 2 TSR
December 2019	Distribute Draft AQ 2 TSR to resource agencies, tribes, and other interested parties
July 2020	The Final AQ 2 TSR will be distributed with the Draft License Application.

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	6,500
Fieldwork	\$	224,000
Data Analysis	\$	36,000
Products	\$	27,512
Total	\$	294,012

¹¹ If a clearance can be obtained to safely sample in the vicinity of the K1 and K2 intakes.

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STUDY AQ 3 Mussels and Aquatic Molluscs

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Project operations may affect the distribution, species composition, and relative abundance of native freshwater mussels and other native aquatic molluscs.

PROJECT NEXUS

- Project operations have modified the flow regime and water surface elevations in the Project Bypass Reach¹ and Kerckhoff Reservoir, potentially affecting native freshwater mussels and other native aquatic molluscs.

RELEVANT INFORMATION

There is relatively little information available on native mussels and native aquatic molluscs in Kerckhoff Reservoir and the Project Bypass Reach, although they are known to occur. The following information was reviewed to determine AQ 3 study needs (the following information was summarized in Section 5.4.4, *Potential Entrainment* of the Pre-Application Document [PAD]):

- Pacific Gas and Electric Company's (PG&E's) amended application for new license for the Project (PG&E 1977);
- *Guide to Sensitive Aquatic Mollusks of the U.S. Forest Service (USFS) Pacific Southwest Region* (Furnish 2007); and
- *2016 Data Collection Report, Native Aquatic Species Management Plan (NASMP)* (Southern California Edison [SCE] 2017).

POTENTIAL INFORMATION GAPS

The following has been identified as a potential information gap:

- Distribution, species composition, and relative abundance of native freshwater mussels and other native aquatic molluscs, especially aquatic molluscs classified as sensitive species or species of special concern in Kerckhoff Reservoir and the Project Bypass Reach (identified by California Department of Fish and Wildlife [CDFW] as a resource concern).

¹ The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from the K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

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PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following study is proposed to supplement existing information:

- Characterize native freshwater mussels and other native aquatic molluscs' distribution, composition, and relative abundance in Kerckhoff Reservoir.
- Characterize native freshwater mussels and other native aquatic molluscs' distribution, composition, and relative abundance in the Project Bypass Reach.
- Record the presence of invasive aquatic molluscs and other invasive aquatic species, if encountered.
- Freshwater mussel and aquatic mollusc sampling sites in Kerckhoff Reservoir and the Project Bypass Reach will be co-located with *Study AQ 2, Fish Population* study sites.
- The survey will use a modification of the two-phase approach of Villella and Smith (2005). The two-phase approach is used to locate concentrations of mussels using timed-effort. This is followed by sampling high- and low-density areas to derive a quantitative density estimate. Monitoring sites will be approximately 100 meters (m) (328 feet [ft.]) in length, in appropriate habitats with safe access.

EXTENT OF STUDY AREA²

The Study Area for the aquatic molluscs study includes Kerckhoff Reservoir, the Project Bypass Reach, and Millerton Lake immediately downstream of the K2 Powerhouse (<1 kilometer [km] [0.62 mile]) (river mile [RM] 282.1) (Figure AQ 3-1).

STUDY METHODS AND ANALYSIS

- Mollusc sampling sites will be co-located with *Study AQ 2, Fish Population* sites, sites identified from information collected during *Study AQ 1, Aquatic Habitat Mapping*, previously located mussel beds, and consultation with California Native American Tribes regarding known locations and harvesting sites. It is estimated that up to six sites will be sampled in the Project Bypass Reach and up to four in Kerckhoff Reservoir, if suitable habitat conditions can be found.

² Only study sites that can be accessed safely with permission of the landowner or occupier will be sampled. Accessibility and selection of sample sites will be determined based on the results of *Study AQ 1, Aquatic Habitat Mapping*.

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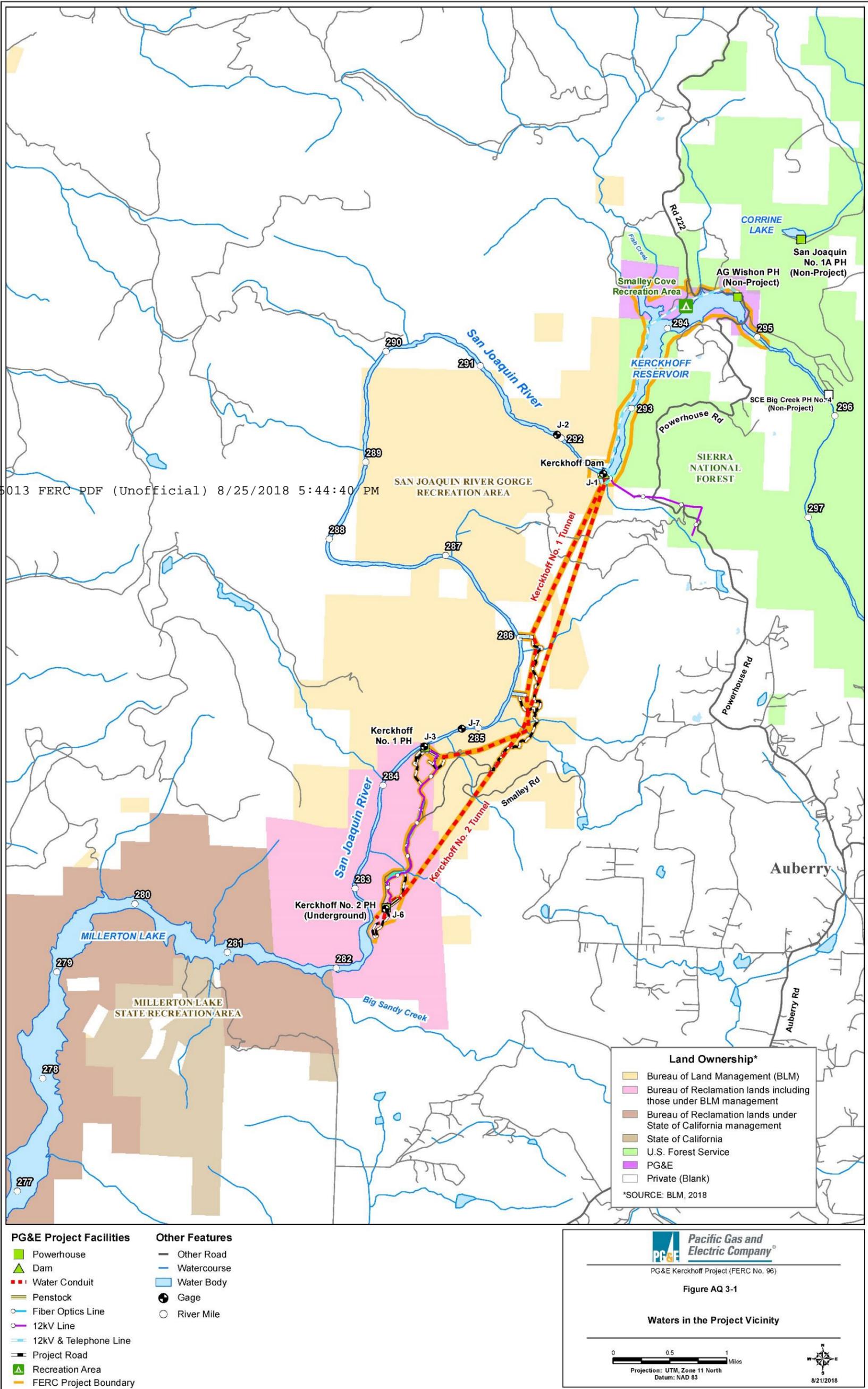


Figure AQ 3-1. Waters in the Project Vicinity.

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- Sites will be surveyed for aquatic mollusc species, including all USFS sensitive mollusc and California mollusc species of special concern, using methods adapted from Strayer and Smith (2003). Surveys will take place in the late summer/early fall in an upstream direction by two-person teams, with one surveyor on either side of the stream. Surveyors will search the edges of the streams and all water to approximately 2 ft. of depth. All substrate will be searched, including gravel, cobble, boulders, woody debris, and aquatic and emergent vegetation. A glass-bottom (i.e., unbreakable acrylic) observation tube will be used to increase the amount of underwater substrate searched and to look for molluscs in deeper areas. If deeper habitat is found within the site, a mask and snorkel may be used. Where appropriate substrate exists, sieving of mud/silt may be employed following the methods of Furnish et al. (1997) to search for sphaeriid and corbiculid clams and special-status species that may occur in these areas.
- Monitoring sites will be approximately 100 m (328 ft.) in length. Where mussels are present, a modification of the two-phase approach of Villella and Smith (2005) will be applied. The two-phase approach is used to locate concentrations of mussels using timed-effort. This is followed by sampling high- and low-density areas to derive a quantitative density estimate. A total of 10 transects will be sampled using 0.25-square-meter (m²) quadrats used to characterize sites where mussels are present. Mussels will be measured at each site in both high- and low-density groupings.
- Mussels will be characterized as <50 millimeters (mm) or >50 mm.
- Other native aquatic molluscs encountered will be identified and counted. Surveyors will take care to identify and record any USFS sensitive mollusc species or California mollusc species of special concern encountered. The presence of invasive molluscs will be documented, if encountered.
- Physical habitat characteristics will be recorded at each site including water temperature, substrate composition, mean column water velocity, discharge as measured at Gage J-2, channel gradient, width, and mean depth. Global positioning system (GPS) coordinates will be recorded and photographs taken of representative habitats.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The study methods are consistent with published and unpublished scientific methods and practices currently in use in California. The two-phase approach of Villella and Smith (2005) is in use for surveys of densities of mussels for SCE's Big Creek 4 Project. Techniques of Strayer and Smith (2003) and Furnish et al. (1997) are commonly used in studying mussels and other aquatic molluscs.

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PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft AQ 3 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Draft AQ 3 TSR will be distributed to resource agencies, tribes, and other interested parties for comment.
- Comments on the Draft AQ 3 TSR will be addressed, as appropriate, in a Final AQ 3 TSR. The Final AQ 3 TSR will be distributed with the Draft License Application.

RELATIONSHIP TO OTHER STUDIES

- Sampling locations will be in part based on results of *Study AQ 1, Aquatic Habitat Mapping*.
- Consultation will take place with knowledgeable California Native American Tribes regarding mussel locations and harvest sites in conjunction with *Study CUL 2, Tribal Resources*.
- Work will be coordinated with fish sampling under *Study AQ 2, Fish Populations*.

SCHEDULE

Date	Activity
Summer–Fall 2019	Conduct aquatic mollusc sampling fieldwork
September–November 2019	Analyze data and prepare Draft AQ 3 TSR
December 2019	Distribute Draft AQ 3 TSR to resource agencies, tribes, and other interested parties
July 2020	The Final AQ 3 TSR will be distributed with the Draft License Application

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	5,300
Fieldwork	\$	49,500
Data Analysis	\$	13,600
Products	\$	13,700
Total	\$	82,100

REFERENCES

- Furnish, J. 2007. Guide to sensitive aquatic mollusks of the U.S. Forest Service (USFS) Pacific Southwest Region. USDA Forest Service Pacific Southwest Region.
- Furnish, J.L., R. Monthey, and J. Applegarth. 1997. Survey protocols for survey and manage program: aquatic mollusk species from the Northwest Forest Plan. Version 2.0. 61 pp.
- PG&E (Pacific Gas and Electric Company). 1977. Before the Federal Power Commission, Kerckhoff Project-96 amended application for new license.
- SCE (Southern California Edison). 2017. 2016 data collection report. Native Aquatic Species Management Plan (NASMP). Big Creek, California.
- Strayer, D.L., and D.R. Smith. 2003. A guide to sampling freshwater mussel populations. American Fisheries Society Monograph 8. American Fisheries Society, Bethesda, Maryland. 103 pp.
- Villella, R.F., and D.R. Smith. 2005. Two-phase sampling to estimate river-wide populations of freshwater mussels. *Journal of North American Benthological Society* 24(2):357–368.

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AQ 3-8

STUDY AQ 4
Entrainment
August 2018

POTENTIAL RESOURCE ISSUE(S)

- Loss of fish entrained from Kerckhoff Reservoir through Project intakes and potential mortality of fish entrained through Project turbines.

PROJECT NEXUS

- Entrainment of fish at Project intakes can remove fish from Kerckhoff Reservoir and result in mortality. The risk of entrainment is influenced by the depth of the intake, intake design, flow approach velocities, operations, and other factors.

RELEVANT INFORMATION

The following information is available and was reviewed to determine *Study AQ 4* needs (the information is summarized in Sections 5.4.2, *Fish and Aquatic Communities* and 5.4.3, *Fish Populations* of the Pre-Application Document [PAD]):

- Existing documents and drawings describing the physical conditions (Section 4, *Project Location, Facilities, and Operations*);
- Operations of the Kerckhoff 1 (K1) and Kerckhoff 2 (K2) intakes and Kerckhoff Reservoir water surface elevations (Section 4.5, *Existing Project Facilities* and supporting data);
- Information on fish species present in Kerckhoff Reservoir in the vicinity of the Project intakes (Section 5.4, *Fish and Aquatic Resources*);
- Information on swimming capabilities of fish species present (various scientific literature);
- *CAWG (Combined Aquatic Working Group) – 9 Entrainment* (Southern California Edison [SCE] 2005); and
- *Evaluation of Fish Injury and Mortality Associated with Hydrokinetic Turbines* (Electric Power Research Institute 2011).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Potential entrainment and mortality risk for fish species in the vicinity of the Project intakes.
- Potential mortality risk for fish passing over Kerckhoff Dam during spill.

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PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following study is proposed to supplement existing information:

- Conduct a Phase 1 desktop assessment of both Project intake structures to evaluate potential for fish entrainment into these Project facilities.
- Assess risk of fish mortality at similar turbine types and head based on available literature.
- Review available literature on fish loss over similar dams for relevant information to assess potential losses at Kerckhoff Dam.
- Evaluate the need for Phase 2 field studies based on the entrainment assessment. The criteria for Phase 2 field studies will be based on whether there is a high risk of fish entrainment and a high risk of turbine mortality with a focus on Age 1 and older fish.
- If Phase 2 field studies are needed, the following data gathering will take place:
 - Identify fish species, life stages, and relative distribution near intakes; and
 - Conduct monitoring of entrainment at the intakes using hydroacoustic sampling.

EXTENT OF STUDY AREA

The Study Area for the fish entrainment study includes the Kerckhoff Reservoir area in the vicinity of Kerckhoff Dam at the intakes for the K1 and K2 powerhouses.

STUDY METHODS AND ANALYSIS

The approach and methods for this study have been successfully used for assessing the potential for fish entrainment at diversions and water intakes. The approach has been used in assessing the potential for entrainment in support of SCE's Big Creek Six Alternative Licensing Process (ALP) project relicensings from 2001 to 2005 (SCE 2005).

Phase 1

The first step will take place in 2019 and consists of a review of information on the potential for entrainment at the Project intakes and scientific literature addressing potential turbine mortality associated with turbine types used at the K1 and K2 powerhouses. This review will include (1) likely fish vulnerability to entrainment at the intakes by species and life history stage, and (2) literature review of turbine mortality for turbine types similar to those at the K1 and K2 powerhouses. The second step in the study approach will be to conduct an initial evaluation of the potential for entrainment and mortality at each intake.

The following information will be used to assess potential entrainment and turbine passage mortality.

- Provide a description of physical characteristics of reservoir, intake locations, intake dimensions, bar rack spacing, capacity, operations, and approach velocities, at representative generation flows;
- Identify current routes of likely fish movement/presence near the K1 and K2 intakes and identify likely presence near intakes;
- Analyze target species for factors that may influence vulnerability to entrainment and mortality; and
- Estimate turbine passage survival rates from scientific literature.

These objectives will be accomplished through desktop analysis relying on data developed for other projects including those in the drainage (SCE 2005) and other projects outside the drainage including Placer County Water Agency (2011); Nevada Irrigation District and Pacific Gas and Electric Company (PG&E) (2011); and PG&E (2017).

Available literature on fish loss over similar dams or dams with similar spillways will be reviewed for relevant information to assess potential losses at Kerckhoff Dam. Analysis may need to be based on available literature on salmonids.

A Phase 1 Preliminary Draft Technical Study Report (TSR) will be prepared summarizing the results of the desktop analysis. The TSR will address the likelihood of fish entrainment from low to high potential. The likely life stages vulnerable to entrainment will be addressed, as well as the likelihood of turbine mortality based on literature and recent studies. The criteria for conducting Phase 2 field studies will be based on three factors having a class of high likelihood. The first is the likelihood of entrainment. The second is the likelihood of entrainment of older life stages that have greater value to the maintenance of the population, and the third is the likelihood of turbine mortality. If there is a high likelihood of entrainment and turbine mortality, especially of older life stages, a recommendation will be made to conduct a Phase 2 field study in consultation with resource agencies, tribes, and other interested parties. The recommendation will be discussed with resource agencies, tribes, and other interested parties prior to making a decision on Phase 2.

Phase 2

If Phase 2 is to be implemented, it would include two principal components to be implemented in 2019 and 2020:

- Identify fish species, life stages, and relative distribution near intakes (conducted in coordination with *Study AQ 2, Fish Populations*); and
- Conduct monitoring of entrainment at the intakes using hydroacoustic sampling on a seasonal basis (fall 2019 and summer 2020).

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To identify fish species and life stages present near the K1 and K2 intakes, sampling to be conducted under *Study AQ 2, Fish Populations*¹ would be augmented to provide seasonal information on fish in the vicinity of the K1 and K2 intakes. Sampling would occur during the late summer to fall of 2019 in conjunction with *Study AQ 2*. Seasonal sampling also will take place during summer 2020 (depending on flow conditions and safety considerations).

Methods described in *Study AQ 2, Fish Populations* would be used to identify fish species and life stages present in the vicinity of the intakes. Adult and juvenile gill nets would be sampled near the intake locations, but sufficiently off the centerlines of the intakes and with sufficient distance to reduce the potential for net impingement on the intakes.² Deep, mid-depth, and shallow net deployments will be used where depths are 40 feet (ft.) or greater. Nets would be deployed to characterize fish near the intakes over 24 hours (hrs.), with two 4-hr. sets during the day and one 8- to 10-hr. set overnight and checked after each set. Boat electrofishing would be used along the local shoreline, where safe and accessible due to depth of reservoir near the shoreline. Fish processing and analyses will be in accordance with *Study AQ 2, Fish Populations*.

A split beam scientific echo sounder will be used to assess fish distributions in the vicinity of the intakes in coordination with fish sampling.³ Fish vertical and horizontal distributions in the vicinity of the intakes will be analyzed. Data will be evaluated to characterize sizes of fish located near the intakes. The hydroacoustic surveys will be conducted in conjunction with both fish sampling events. Surveys will be conducted during day and at night.³ The data collected will be analyzed to assess the relative abundance of vulnerable fish life stages near the intakes. Hydroacoustic monitoring of the intakes by use of fixed transducers will be used to assess entrainment, if vulnerability of fish is confirmed following sampling in the vicinity of the intakes. Each intake will be sampled during operation. A horizontally oriented hydroacoustic transducer will be used to sample entrainment by tracking fish into each intake. The transducers will be oriented to provide substantial coverage of the intake face, and each intake will be sampled for 4 days. Sampling will take place in early summer (2020) and fall (2019). Each sampling will take place for a minimum of 4 hrs. for each day and night per sampling day.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

The analysis of entrainment is consistent with the approach used in other Federal Energy Regulatory Commission (FERC) relicensing projects in California. Similar approaches have been used upstream in the Big Creek system (SCE 1998, 2005), Bucks Creek (PG&E 2017), Sacramento Municipal Utility District's Upper American River Project (Devine Tarbell & Associates, Inc. 2004), and PG&E's Spring-Gap Stanislaus Project (PG&E 2002).

¹ Fish collections will be carried out by qualified biologists, as authorized under a California Department of Fish and Wildlife Scientific Collecting Permit.

² If clearance to safely operate gill nets in the intake vicinity cannot be obtained, trawls will be used to sample in the vicinity of the intakes, where safe and permissible.

³ Commensurate with safety requirements.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The Phase 1 study methods and results will be documented in a Draft AQ 4 TSR. The TSR will include summary tables and figures, as appropriate.
- The Draft Phase 1 AQ 4 TSR will be distributed to resource agencies, tribes, and interested parties for comment.
- Comments on the Draft Phase 1 AQ 4 TSR including any recommendation for Phase 2, will be addressed, as appropriate, in a Final Phase 1 AQ 4 TSR.
- If the decision is made to proceed with Phase 2, discussions with resource agencies, tribes, and interested parties will take place during early summer of 2019.
- If Phase 2 is implemented, the Phase 2 study methods and results will be documented in a Draft Phase 2 AQ 4 TSR. The TSR will include summary tables and maps, as appropriate.
- The Draft Phase 2 AQ 4 TSR will be distributed to resource agencies, tribes, and interested parties for comment.
- Comments on the Draft Phase 2 AQ 4 TSR will be addressed, as appropriate, in a Final Phase 2 AQ 4 TSR.

RELATIONSHIP TO OTHER STUDIES

- Fish sampling will be conducted using similar methods and in conjunction with *Study AQ 2, Fish Populations*.

SCHEDULE

Date	Activity
Winter 2019–early Spring 2019	Phase 1 analysis and prepare Draft Phase 1 AQ 4 TSR
Spring 2019	Distribute Draft Phase 1 AQ 4 TSR to resource agencies, tribes, and other interested parties
Early Summer 2019	Meet with resource agencies, tribes, and other interested parties to discuss Phase 2, if needed
Late Summer–Fall 2019	Address comments for Phase 1. If Phase 2 is conducted, mobilize, install hydroacoustic array, and test prior to sampling
Winter 2019	If Phase 2 is not conducted, prepare Final Phase 1 AQ 4 TSR
Fall 2019–Summer 2020	If Phase 2 is conducted, Phase 2 fieldwork will occur
Fall 2020	Analyze data and prepare Draft Phase 2 AQ 4 TSR, if Phase 2 is conducted
Late Fall–Winter 2020	Distribute Draft Phase 2 AQ 4 TSR to participants, if Phase 2 is conducted
Late Winter 2020	Address comments and prepare Final Phase 2 AQ 4 TSR, and distribute to resource agencies, tribes, and other interested parties, if Phase 2 is conducted.

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LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. This cost estimate includes effort for Phase 1 only. For example, the preliminary estimated cost (2018 dollars) for the Phase 1 study broken down by major tasks is as follows:

Project Management and Consultation	\$	4,500
Fieldwork	\$	0
Data Analysis	\$	19,686
Products	\$	10,000
Total	\$	34,186

REFERENCES

- Devine Tarbell & Associates, Inc. 2004. Deepwater intake entrainment technical report. Sacramento Municipal Utility District. Sacramento, California.
- Electric Power Research Institute. 2011. Evaluation of fish injury and mortality associated with hydrokinetic turbines. 1024569 Final report, November 2011. Palo Alto, California.
- Nevada Irrigation District and Pacific Gas and Electric Company. 2011. Technical memorandum 3-5, fish entrainment. Yuba-Bear Hydroelectric Project, FERC Project No. 2266-096, Drum-Spaulding Project, FERC Project No. 2310-173. October 2011.
- PG&E (Pacific Gas and Electric Company). 2002. Study 4.3.3 fish entrainment and passage. Spring Gap-Stanislaus Project, FERC Project No. 2130. San Francisco, California.
- . 2017. Bucks Creek Project, FERC Project No. 619, technical memorandum (TM-39) fish entrainment risk assessment (FA-S2). San Francisco, California.
- Placer County Water Agency. 2011. Placer County Water Agency Middle Fork American River Project (FERC No. 2079). Final AQ 7 – entrainment technical study report – 2011. Placer County Water Agency, Auburn, California.
- Southern California Edison (SCE). 1998. Balsam Meadow pumpback monitoring report. Big Creek, California.
- . 2005. CAWG-9 Entrainment. Big Creek, California.

STUDY AQ 5
Western Pond Turtles
August 2018

POTENTIAL RESOURCE ISSUE(S)

- Effects of Project operation on western pond turtle (WPT), a special-status aquatic reptile species in Kerckhoff Reservoir and the Project Bypass Reach.¹

PROJECT NEXUS

- Project operations may affect special-status WPT and their habitats in the Project Aquatic Study Area² due to (1) alteration of the amount and timing (e.g., seasonal or daily patterns) of flows in the Project Bypass Reach; (2) changes in physical habitat conditions (e.g., streambed characteristics) due to altered flow regimes; (3) fluctuation of reservoir surface elevations due to Project operations; (4) alteration of water temperature and quality in affected stream reaches and waterbodies; and (5) direct human disturbance related to Project operations and maintenance.

RELEVANT INFORMATION

As summarized in Section 5.4.6.2, *Western Pond Turtle* of the Pre-Application Document (PAD), WPT are known to occur in Kerckhoff Reservoir (Pacific Gas and Electric Company [PG&E] 2017a), upstream of the Project Area in the San Joaquin River (SJR) Horseshoe Bend reach (Southern California Edison [SCE] 2017), in Big Sandy Creek near the downstream boundary of the Project Area (U.S. Bureau of Reclamation [BoR] 2008), and in the Project Bypass Reach (California Department of Fish and Wildlife [CDFW] 2017a) (Figure AQ 5-1). There is suitable WPT habitat throughout the Project Aquatic Study Area, including the Project Bypass Reach between Kerckhoff Reservoir and the Kerckhoff 2 (K2) Powerhouse, but population status in the reach is unknown.

The following information is available and was reviewed in PAD Section 5.4.6.2, *Western Pond Turtle* to determine WPT study needs:

- CDFW's California Natural Diversity Database (CNDDDB) (CDFW 2017a);
- California Wildlife Habitat Relationship (CWHR) System database, version 9.0 (CDFW 2017b);
- Museum records for areas within 1 mile (mi.) of the Project from the University of California at Berkeley, Museum of Vertebrate Zoology (MVZ) and the California Academy of Sciences (CAS) (CAS 2017; MVZ 2017);

¹ The Project Bypass Reach includes the SJR from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

² The Aquatic Study Area includes areas within the Federal Energy Regulatory Commission (FERC) Project Boundary, Project Bypass Reach, along with the SJR immediately below the K2 Powerhouse (<1 kilometer [km; 0.62 mi.]) potentially affected by the Project.

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- *2016 Annual Noxious Weed Control Monitoring Report, Final, Addressing Article 409, 4(e) Conditions 18 and 48. Crane Valley Hydroelectric Project FERC No. 1354 (PG&E 2017b);*
- *Biological Resources Technical Reports: Upper San Joaquin River Basin Storage Investigation, California; Draft Aquatic Biological Resources Technical Report (BoR 2008); and*
- *2016 Data Collection Report, Native Aquatic Species Management Plan (NASMP) (SCE 2017).*

POTENTIAL INFORMATION GAPS

The following has been identified as a potential information gap:

- Current status and distribution of WPTs in Kerckhoff Reservoir and the Project Bypass Reach.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following studies are proposed to augment existing information:

- Document the presence and distribution of WPT during habitat, fish, water quality, and mollusc surveys, and document incidental sightings of WPT during all Project-associated studies.
- Conduct trapping of WPTs at identified occurrence sites to characterize population characteristics (e.g., abundance/population age/size structure).

EXTENT OF STUDY AREA³

The Study Area for WPT includes the following:

- Project Bypass Reach and tributary confluences from Kerckhoff Dam to the K2 Powerhouse; and
- Kerckhoff Reservoir.

³ Only study sites that can be accessed safely with permission of the landowner or occupier will be sampled.

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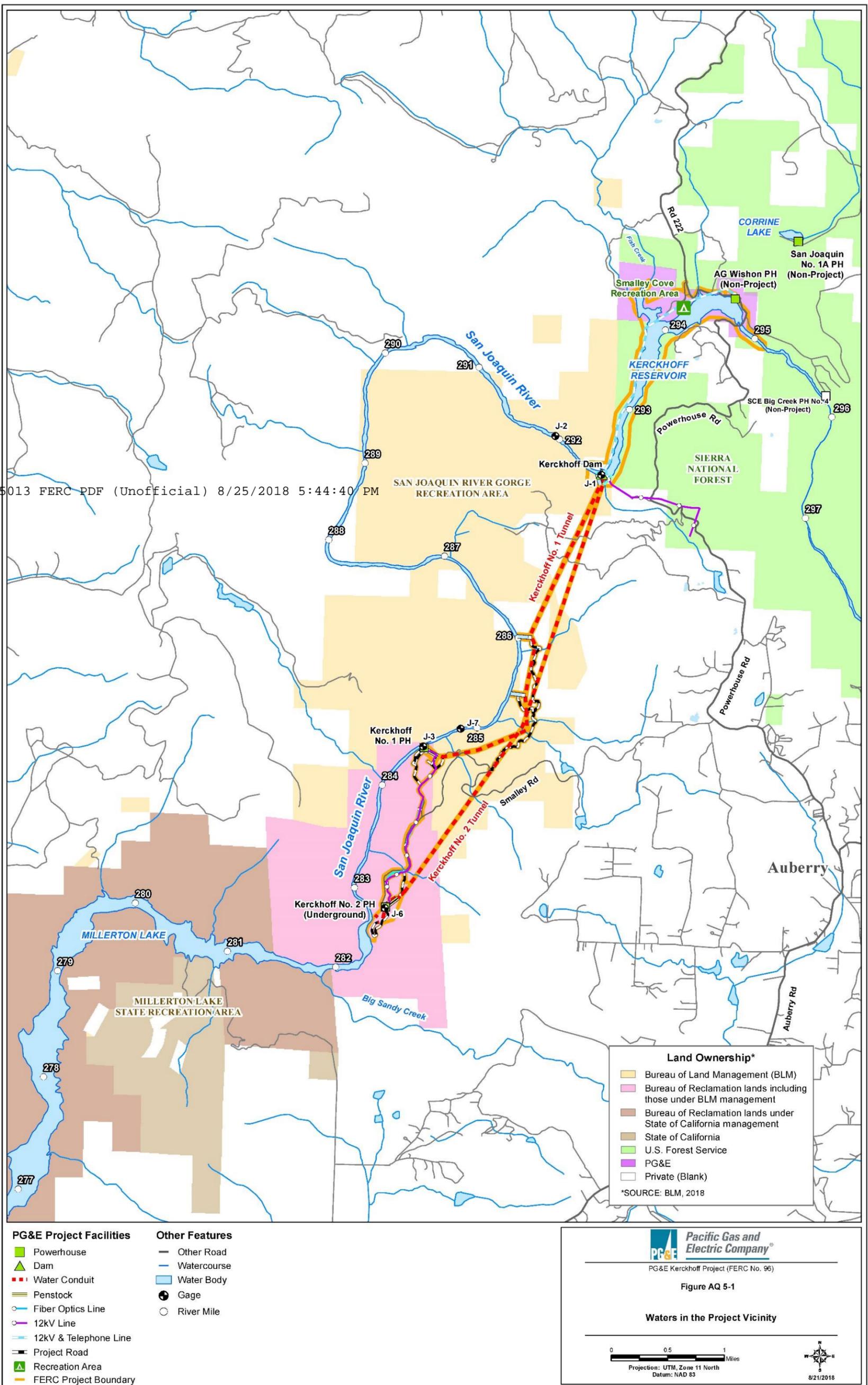


Figure AQ 5-1. Waters in the Project vicinity.

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STUDY METHODS AND ANALYSIS

The study approach for WPT is provided below.

Approach

- Biologists will record sightings of WPTs during implementation of aquatic technical studies (*Study AQ 1, Aquatic Habitat Mapping* and *Study AQ 2, Fish Populations*). In particular, surveyors will be visually inspecting pools and backwaters for WPTs at each study site during *Study AQ 1, Aquatic Habitat Mapping* data collection (mapping) and during other field studies (e.g., *Study AQ 2, Fish Populations*).
- Three trapping sites will be selected in the Project Bypass Reach and three in Kerckhoff Reservoir based on the results of habitat assessment and visual encounter observations recorded during *Study AQ 1, Aquatic Habitat Mapping* in the field as well as a visual encounter survey of Kerckhoff Reservoir by kayak.
- Additionally, as a contingency, a fourth site could be sampled to increase the extent of geographic coverage in the Project Bypass Reach, should an appropriately located fourth site be identified containing appropriate habitat (a combination of cover, escape, and basking habitat) along with consideration of the number of turtles observed during *Study AQ 1*.
- PG&E will review maps and photos with resource agencies, tribes, and other interested parties and consult on selection of proposed trapping sites after analysis of data from *Study AQ 1* and prior to the start of trapping.
- Methods of surveying for this species in lentic and lotic habitats will generally follow standard visual survey protocols outlined by the U.S. Geological Survey (USGS) (2006).
- Data on surveyed habitat will be collected including water temperature, Secchi disk transparency, and dissolved oxygen. All other native and non-native aquatic species will be documented (e.g., beavers, snakes, crayfish, and otters).

Western Pond Turtle Trapping⁴

WPT population abundance and population structure will be assessed based on trapping and marking turtles. Data for the studies will be obtained during two trapping events. These will be scheduled at least 2 weeks apart to allow sufficient time for the population to recover from investigator-caused disturbances. Trapping will occur in summer to early fall. WPT capture methodology will be the same as that used in the Horseshoe Bend reach of the SJR (SCE 2017).

Detailed Methods

Four to six traps will be installed at each of the three study sites located on the Project Bypass Reach and three sites on Kerckhoff Reservoir. Two days of trapping will be conducted for each trapping event. Collapsible nylon net traps will be staked or tied in water of sufficient depth to submerge the entries. The turtle traps will be baited with sardines and set in the morning and

⁴ WPT trapping will be carried out by qualified biologists, as authorized under a CDFW Scientific Collecting Permit.

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checked at least once every 2 hours during the day (i.e., trapping day). Floating traps will be operated and baited during the day, and in addition, operated at night. These traps will be checked during the day on the same schedule as the nylon net traps, but will be left in place to trap at night and checked the following morning. Two of the traps set at each site will be juvenile WPT traps; these will be floating traps with smaller openings to better retain juveniles. These have proven to be effective in sampling upstream in the SJR (SCE 2017).

Data Analysis and Reporting

Trapping data to be collected will include date, time, crew, location, general water and weather conditions, sex, determination of whether females are gravid, weight, age, maximum carapace length, height, width, external signs of disease and lesions, and photographs of each individual turtle captured or recaptured. Age will be estimated by counting annuli on one or more scutes of the plastron and/or carapace (Bury and Germano 1998). Biologists will submit a California Native Species Field Survey Form for all WPT recorded to the CNDDDB, provided that the observation is on public land or PG&E-owned land.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

The study methods are consistent with published and unpublished scientific methods and practices currently in use in California. They use modern methods of area and time-constrained surveys to generate acceptable descriptive statistics of relative species abundance (Heyer et al. 1994).

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft AQ 5 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Draft AQ 5 TSR will be distributed to resource agencies, tribes, and other interested parties for review and comment.
- Comments on the Draft AQ 5 TSR will be addressed, as appropriate, in a Final AQ 5 TSR. The Final AQ 5 TSR will be distributed with the Draft License Application.

RELATIONSHIP TO OTHER STUDIES

- This study is dependent on recorded visual observations of WPT during *Study AQ 1, Aquatic Habitat Mapping* and *Study AQ 2, Fish Populations* field data collection, as well as any other observations made during *Study WQ 1, Water Temperature* or *Study WQ 2, Water Quality Sampling* or other fieldwork. Other studies are not dependent on the results from this study.

PROPOSED SCHEDULE

Date	Activity
September 2018* (summer 2019)	Collect WPT observations in coordination with <i>Study AQ 1, Aquatic Habitat Mapping</i> and possible kayak reconnaissance survey of Kerckhoff Reservoir. Consult with resource agencies, tribes, and other interested parties about selection of trapping sites during spring 2019.
Summer–Fall 2019	Conduct observations of WPT in conjunction with <i>Study AQ 2, Fish Populations</i> and other field studies. Conduct trapping of WPT for collection of population and demography data.
Fall–Winter 2019	Prepare Draft AQ 5 TSR and provide it to resource agencies, tribes, and other interested parties.
February 2020	Resource agencies, tribes, and other interested parties comment on TSR.
July 2020	The Final AQ 5 TSR will be distributed with the Draft License Application.

* PG&E is evaluating the potential to implement *Study AQ 1* in September 2018, which is earlier than Integrated Licensing Process (ILP) regulations require. PG&E is considering accelerating the schedule so it would have data available to facilitate *Study AQ 5* and other related studies. However, if the study cannot be implemented in 2018, it will be conducted in 2019 as indicated in the table.

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	6,800
Fieldwork	\$	78417
Data Analysis	\$	22,000
Products	\$	15,000
Total	\$	122,217

REFERENCES

BoR (U.S. Bureau of Reclamation). 2008. Biological resources technical reports: Upper San Joaquin River Basin Storage Investigation, California. Draft aquatic biological resources technical report. February.

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STUDY AQ 6 Rare Aquatic Species

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Potential effects of Project operations on foothill yellow-legged frog (*Rana boylei*, FYLF) (if present), a candidate amphibian species for threatened status under the California Endangered Species Act (CESA) in Kerckhoff Reservoir and the Project Bypass Reach¹ and Kern brook lamprey (*Lampetra hubbsi*) in the Project Bypass Reach (if present).

PROJECT NEXUS

- Project operations may affect FYLF and Kern brook lamprey (if present) and their habitats in the Project Aquatic Study Area² due to (1) alteration of the amount and timing (e.g., seasonal or daily patterns) of flows in the Project Bypass Reach³; (2) changes in physical habitat conditions (e.g., streambed characteristics) due to altered flow regimes; (3) fluctuation of reservoir surface elevations due to Project operations; (4) alteration of water temperature and quality in affected stream reaches and waterbodies; and (5) direct human disturbance related to Project operations and maintenance.

RELEVANT INFORMATION

As summarized in Section 5.4.6.3, *Foothill Yellow-Legged Frog* of the Pre-Application Document (PAD), FYLF are not known to occur in Kerckhoff Reservoir, the Project Bypass Reach, Millerton Lake, or any of their tributaries (Pacific Gas and Electric Company [PG&E] 2017). FYLF have not been observed in the Aquatic Study Area in recent decades. Focused surveys for FYLF were conducted in the Project Bypass Reach within the Aquatic Study Area in spring and summer 2007 for baseline studies for the proposed Temperance Flat Reservoir and none was found. Habitat was deemed suitable, but current hydroelectric operations have altered the natural hydrograph that is essential for successful breeding (U.S. Bureau of Reclamation [BoR] 2008). Additionally, American bullfrogs were observed at every site during both 2007 focused surveys, which are a known non-native predator, and non-native predacious centrarchids are also present.

Surveys for FYLF were conducted upstream of the Project Aquatic Study Area on the Horseshoe Bend (HSB) reach of the San Joaquin River (SJR) in 2008 and again at the protocol level in 2012 (Southern California Edison [SCE] 2013). No FYLF were encountered during these surveys. The same limiting factors for FYLF presence in the Project Bypass Reach also exist in the HSB reach (SCE 2013). An unconfirmed California Natural Diversity Database (CNDDDB) record from the

¹ The Project Bypass Reach includes the SJR from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

² The Aquatic Study Area includes areas within the Federal Energy Regulatory Commission (FERC) Project Boundary, along with the Project Bypass Reach and SJR immediately below the K2 Powerhouse (<1 kilometer [km]) (0.62 mile [mi.]) potentially affected by the Project.

³ Alterations in timing may be due to upstream hydroelectric projects, not part of the Kerckhoff Hydroelectric Project (FERC No. 96).

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1960s exists for North Fork Willow Creek, but recent surveys did not confirm that record (SCE 2008). The nearest known population resides upstream of SCE's Big Creek No. 3 Powerhouse in Jose Creek, but it is over 24 kilometers (km) (15 miles [mi.]) away and upstream of two dams (SCE 2008). No other populations are known in the SJR Watershed.

As summarized in Section 5.4.3.3, *San Joaquin River Gorge* in Section 5.4.3, *Fish Population* of the PAD, Kern brook lamprey are known to occur in Millerton Lake and may potentially reside in the Project Bypass Reach (PG&E 2017). Kern brook lamprey are potentially present in the reach. BoR studies (2008) and Moyle (2002) indicated that ammocoetes (larvae), possibly Kern brook lamprey, were collected in the upper SJR between Millerton Lake and Kerckhoff Dam from 1979 through 1982 (Wang 1986). The species is not expected to occur anywhere else in the Aquatic Study Area, but its current status is unknown.

The following information is available and was reviewed in PAD Section 5.4.6.3, *Foothill Yellow-legged Frog* to determine FYLF study needs:

- *Biological Resource Technical Reports: Upper San Joaquin Basin Storage Investigation; Draft Aquatic Biological Resources Technical Report* (BoR 2008);
- California Department of Fish and Wildlife's (CDFW's) CNDDDB (CDFW 2017a);
- California Wildlife Habitat Relationship (CWHR) System database, version 9.0 (CDFW 2017b);
- Museum records of areas within 1 mi. of the Project from the University of California at Berkeley, Museum of Vertebrate Zoology (MVZ) and the California Academy of Sciences (CAS) (CAS 2017; MVZ 2017); and
- *2012 Data Collection Report, Native Aquatic Species Management Plan (NASMP)* (SCE 2013).

The following information is available and was reviewed in PAD Section 5.4.3.3, *San Joaquin River Gorge* to determine Kern brook lamprey study needs:

- *Biological Resource Technical Reports: Upper San Joaquin Basin Storage Investigation; Draft Aquatic Biological Resources Technical Report* (BoR 2008); and
- *Fishes of the Sacramento-San Joaquin Estuary and Adjacent Waters, California: A Guide to the Early Life Histories* (Wang 1986).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Current status and distribution of FYLFs in Kerckhoff Reservoir and tributaries and the Project Bypass Reach.
- Current status and distribution of Kern brook lamprey in the Project Bypass Reach.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following study is proposed to augment existing information:

- Conduct environmental DNA (eDNA) sampling during spring when DNA is most likely detectable for both FYLF and Kern brook lamprey.

EXTENT OF STUDY AREA⁴

The Study Areas for FYLF and Kern brook lamprey are defined as follows:

- **FYLF:** Project Bypass Reach and near larger tributary confluences from Kerckhoff Dam to the Kerckhoff 2 (K2) Powerhouse and Kerckhoff Reservoir and Fish Creek (tributary to Kerckhoff Reservoir).
- **Kern brook lamprey:** Project Bypass Reach.

STUDY METHODS AND ANALYSIS

The study approach for eDNA sampling is provided below.

Approach

- Biologists will record sightings of FYLF or Kern brook lamprey during implementation of aquatic technical studies, including *Study AQ 1, Aquatic Habitat Mapping* data collection (mapping) and during other field studies (e.g., *Study AQ 2, Fish Populations*).
- Five eDNA sampling sites will be selected in the Project Bypass Reach and three in Kerckhoff Reservoir (one of which will be in Fish Creek, a tributary to Kerckhoff Reservoir).
- Methods of collecting eDNA samples for both FYLF and Kern brook lamprey will generally follow the most current peer-reviewed study protocols such as those outlined by the U.S. Geological Survey (USGS) (Laramie 2015).
- Data on sampled habitat will be collected including global positioning system (GPS) locations and physical habitat parameters. Observations of native and non-native aquatic species will be documented (e.g., bullfrogs, beavers, snakes, crayfish, and otters).
- Samples will be sent to a qualified lab that tests eDNA such as the U.S. Department of Agriculture (USDA) Forest Service, Rocky Mountain Research Station National Genomics Center (NGC) for Wildlife and Fish Conservation.

FYLF and Kern Brook Lamprey eDNA Data Collection and Analysis

Presence of FYLF and Kern brook lamprey will be determined by collecting eDNA samples from filtered water samples during one sampling event at five sites in the Project Bypass Reach for both

⁴ Only study sites that can be accessed safely with permission of the landowner or occupier will be sampled.

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species, two locations in Kerckhoff Reservoir, and one location in Fish Creek. Sampling will occur in spring/early summer as soon as flows allow for safe access, when eDNA may be most likely detected during breeding/spawning for both species.

Detailed Methods

Site locations in the Project Bypass Reach include: below Kerckhoff Dam, in the Patterson Bend, upstream of the Kerckhoff 1 (K1) Powerhouse, near (downstream) the tributary downstream of K1, and near (downstream) the tributary upstream of K2 (Figure AQ 6-1). Site locations in and near Kerckhoff Reservoir include: at the inlet of the SJR, Smalley Cove, and Fish Creek (Figure AQ 6-1). These site locations are approximate and will be finalized pending habitat mapping information collected during *Study AQ 1, Aquatic Habitat Mapping*. Samples will be collected at locations that are most likely to have eDNA for FYLF and Kern brook lamprey. Bedwell and Goldberg (2017) collected eDNA for FYLF at breeding/tadpole rearing locations because these locations are most likely to contain eDNA for the species. Likewise, Grote and Carim (2017) collected eDNA samples for Pacific lamprey in slow velocity waters over finer substrates.

Sampling will be conducted during spring, when breeding/spawning occurs for both species and eDNA is most likely detectable or as soon as flow conditions (i.e., < 100 cubic feet per second [cfs]) allow for safe access. Field sample collection will generally follow current peer-reviewed studies (e.g., USGS protocol [Laramie et al. 2015]). One to 2 liter samples will be filtered, collected, and preserved using the most appropriate field protocols for remote locations. Replicate samples will be considered when reviewing the most recent accepted methodology prior to sampling. The amount of water that will be filtered will depend upon the turbidity and suspended solids in the water. Sample collection vials will be properly labeled with site location, project, names of crew members, time, and date immediately after the filter is secure inside the sample vial. Samples will be sent to and tested by a lab that tests for eDNA such as the USDA Forest Service, Rocky Mountain Research Station NGC for Wildlife and Fish Conservation. Field crews will wear sterilized disposable gloves and sterilize all equipment used including: hand driven vacuum or peristaltic pump, sample bottles, plastic filter funnel, tubing, vials, and forceps at each sampling location and sampling event. Most materials used will be pre-packed in sterile containers prior to sampling. Equipment will be sterilized after sampling using a sterilant currently being used in similar studies such as Virkon Aquatic or DNA AWAY™.

Data Analysis and Reporting

Samples collected for eDNA will be tested for presence of FYLF using a marker developed specifically for the species (Bedwell and Goldberg 2017), and presence of Kern brook lamprey will be analyzed using a marker from the same genus. A specific marker for Kern brook lamprey is not yet available, but will be utilized if available by spring 2019. Results of sampling based on the laboratory analyses will be included in a technical report. A map will be prepared showing the results by site.

If FYLF is positively detected, Licensee will consult with resource agencies, tribes, and other interested parties to determine next steps, which may include: (1) determining if the detection is a false positive; (2) conducting additional eDNA testing; and/or (3) designing and implementing a visual encounter survey (VES) in the appropriate study area.

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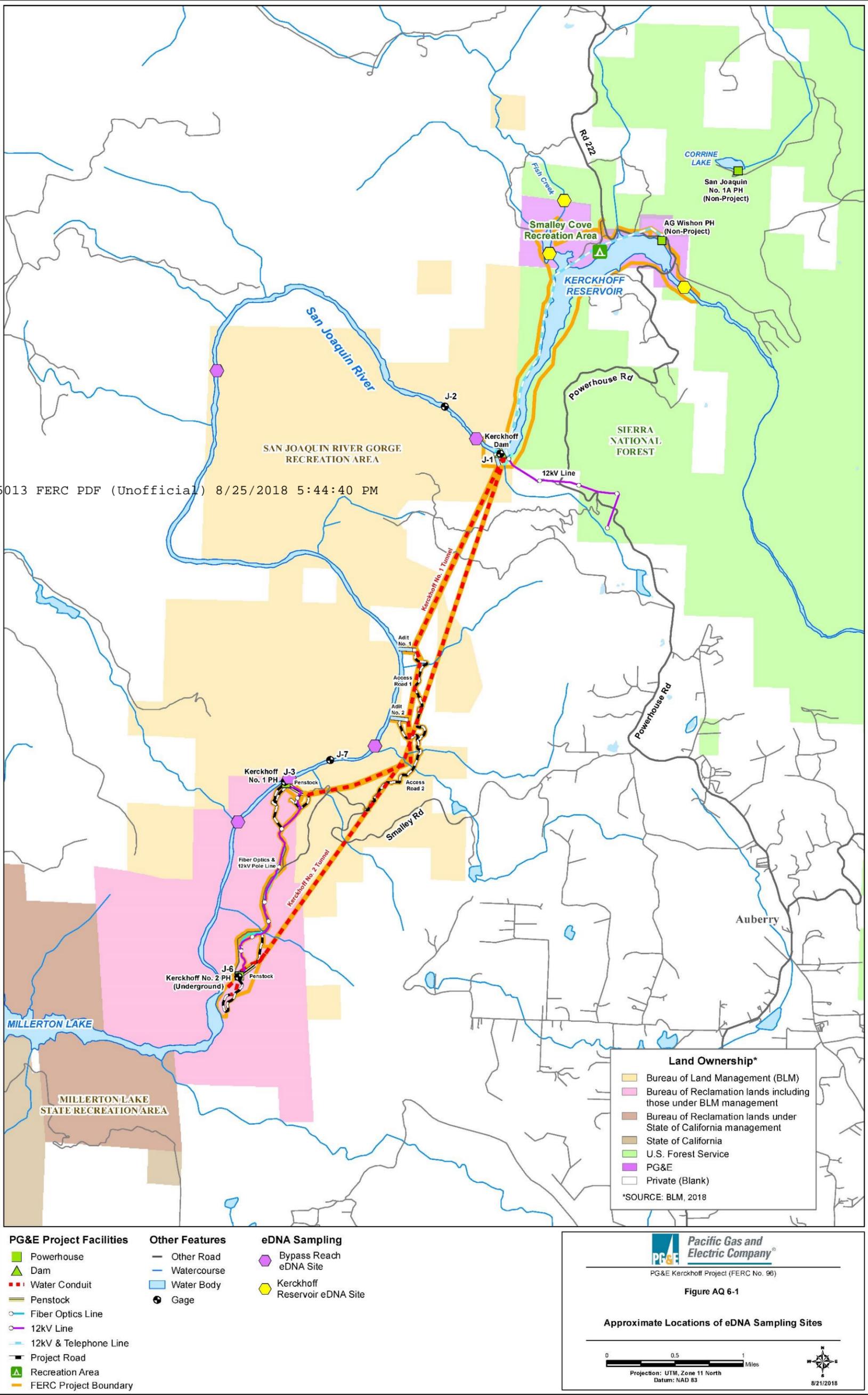


Figure AQ 6-1. Approximate locations of eDNA sampling sites.

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CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

The study methods are consistent with published and unpublished scientific methods and practices currently in use for eDNA sample collection and data analysis. Field crews will employ the most current methods collecting eDNA samples for FYLF (Bedwell and Goldberg 2017), and for Kern brook lamprey (Gingera et al. 2016; Grote and Carim 2017; Gustavson et al. 2015; and Ostberg et al. 2018).

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft AQ 6 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Draft AQ 6 TSR will be distributed to resource agencies, tribes, and other interested parties for review and comment. If positive results are obtained for FYLF, PG&E will consult with the resource agencies, tribes, and other interested parties on next steps.
- Comments on the Draft AQ 6 TSR will be addressed, as appropriate, in a Final AQ 6 TSR. The Final AQ 6 TSR will be distributed with the Draft License Application.

RELATIONSHIP TO OTHER STUDIES

- This study is not dependent on other studies, but positive results for presence of Kern brook lamprey will be shared with *Study AQ 2, Fish Populations*. Kern brook lamprey will be targeted in appropriate habitat during backpack electrofishing as part of *Study AQ 2*. Sampling access will be determined from information collected during *Study AQ 1, Aquatic Habitat Mapping*. Other studies are not dependent on the results from this study.

SCHEDULE

Date	Activity
May–June 2019	Collect water samples to test for eDNA in the Project Bypass Reach and Kerckhoff Reservoir and Fish Creek (tributary)
July 2019–September 2019	Laboratory analysis
September–October 2019	Analyze data and prepare Draft AQ 6 TSR
December 2019	Distribute Draft AQ 6 TSR to participants. If positive detections are obtained for FYLF, consult with resource agencies, tribes, and other interested parties on next steps.
July 2020	The Final AQ 6 TSR will be distributed with the Draft License Application

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LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	6,431
Fieldwork	\$	22,000
Data Analysis	\$	5,649
Products	\$	8,006
Total	\$	42,086⁵

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⁵ Does not include cost of replicates.

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AQ 6-10

STUDY AQ 7 Benthic Macroinvertebrates

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Benthic macroinvertebrates (BMI) community composition, distribution, and abundance in Project Bypass Reach¹ are potentially affected by Project operations and flows.

PROJECT NEXUS

- Project operations and facilities, through habitat modification and altered flow regimes, have the potential to affect the composition, abundance, and distribution of BMI in Project-affected reaches.

RELEVANT INFORMATION

Volume 1, Section 5.4.5.2, *Benthic Macroinvertebrates* of the Pre-Application Document (PAD) provides minimal BMI data from the Project Area. The PAD references one sample that was collected in 2012 in Kerckhoff Reservoir as part of the Environmental Protection Agency's National Lakes Assessment Program. Information was not readily available for the Project Bypass Reach. Data are available from Southern California Edison (SCE), who conducted extensive BMI studies as part of its Big Creek Alternative Licensing Process (SCE 2004). SCE's data were collected from the San Joaquin River mainstem and tributaries upstream of Redinger Lake using the California Stream Bioassessment Procedure (CSBP).

POTENTIAL INFORMATION GAPS

- The lack of recent information on BMI composition and distribution in the Project Bypass Reach has been identified as a potential information gap.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The goal and objective of the BMI study is to characterize the BMI community and associated physical conditions within Project Bypass Reach using the Surface Water Ambient Monitoring Program (SWAMP) protocol (Ode et al. 2016, 2007) or a similar protocol deemed appropriate (in consultation with resource agencies, tribal interests, and other stakeholders).

¹ The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from the K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse.

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EXTENT OF STUDY AREA²

The Study Area for the BMI study includes the Project Bypass Reach downstream to the K1 Powerhouse (Figure AQ 7-1). The substrate below the K1 Powerhouse is generally very large and the habitats appear to be deep pools and runs, which are not suitable for studies employing a wadeable sampling protocol (e.g., Ode et al. 2016) for BMI collection. In general, a reach is considered wadeable if it is less than 1 meter deep for at least half the length of the reach (Ode et al. 2016).

STUDY METHODS AND ANALYSIS

Project Bypass Reach Stream BMI Targeted Riffle Composite Procedure

BMI sampling will occur in the Project Bypass Reach in summer to fall 2019, primarily using the SWAMP Targeted Riffle Composite (TRC) Procedure outlined in the 2016 SWAMP standard operating procedures (Ode et al. 2016). The TRC Procedure will likely be necessary because much of the Project Bypass Reach is not wadeable and stream access is limited. Biological indicators derived from the TRC Procedure are generally interchangeable with other ambient biomonitoring programs and approaches (Rehn et al. 2007). The Reach-Wide Benthos Procedure (RWB), also outlined in the 2016 SWAMP standard operating procedures, will be used at a site within the first kilometer (km) below Kerckhoff Dam, if the results from *Study AQ 1, Aquatic Habitat Mapping* show that 250 meters of contiguous wadeable stream is present. If 250 meters of contiguous wadeable stream is not present, Pacific Gas and Electric Company (PG&E) will consult with resource agencies, tribal interests, and other stakeholders and the TRC Procedure will likely be used.

Sampling will occur at three locations along the Project Bypass Reach. Three candidate locations are:

- A riffle approximately 200 meters downstream from Kerckhoff Dam (if RWB is used for this location, the riffle will be included)³
- A riffle near river mile (RM) 287
- A riffle approximately 1 km upstream from the K1 Powerhouse

Additionally, as a contingency, a fourth site on the Patterson Bend area (RM 288–291) could be sampled should suitable habitat (e.g., riffle/wadeable) and safe access be located in conjunction with *Study AQ 1*. See Figure AQ 7-1 for the three candidate sampling locations.⁴

² Only study sites that can be accessed safely with permission of the landowner or occupier will be sampled. Accessibility and final selection of sample sites will be determined based on results of aquatic habitat mapping in *Study AQ 1, Aquatic Habitat Mapping*.

³ A potential site is located near Gage J-2, downstream of RM 292.

⁴ Site locations are approximate and may be adjusted based on site conditions, access, and safety considerations in consultation with resource agencies, tribal interests, and other stakeholders.

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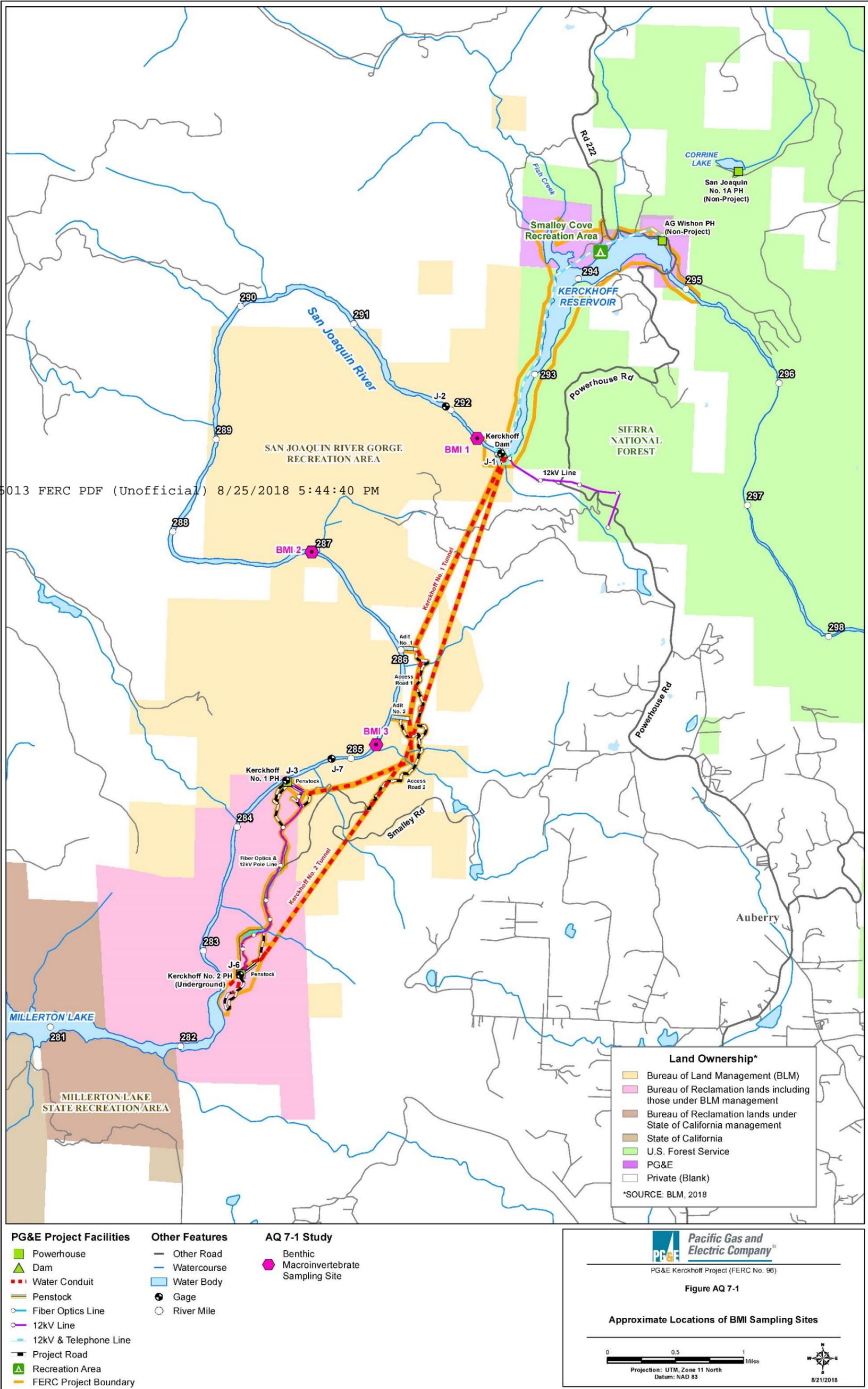


Figure AQ 7-1. Approximate locations of BMI sampling sites.

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All study sites will be approximately 250 meters in length, but may be reduced to approximately 100 meters in length if sufficient wadeable stream length is not present. At each TRC site, a composite of eight randomly selected samples of 1 ft² (0.09 m²) will be collected using a 500- μ m mesh D-net and put into 1,000-mL wide-mouth plastic sample jars. The samples will be preserved using 95% ethanol and labeled. Information on reach location and condition along with water chemistry parameters will be documented and recorded on SWAMP field forms. Should RWB sampling be implemented at the site below Kerckhoff Dam, the site length will be approximately 250 meters and one 1 ft² (0.09 m²) sample will be collected every 25 meters using a 500- μ m mesh D-net and put into 1,000-mL wide-mouth plastic sample jars; samples will be composited by site according to the SWAMP protocol (Ode et al. 2016) and preserved with 95% ethanol. Additionally, a full suite of habitat and algal measurements will be collected at the site below the Kerckhoff Dam using the 2016 SWAMP procedure regardless of which approach is used (Ode et al. 2016). An alternative collection method may be substituted for the D-net, if necessary, in consultation with resource agencies, tribal interests, and other stakeholders.

All habitat measurements will be made according to procedures outlined in SWAMP protocol (Ode et al. 2016). These measurements will include wetted width, bankfull, embeddedness, substrate particle size, canopy cover, slope, visual estimates of human influence, riparian vegetation, percent algal cover, and instream habitat complexity. Photographs and global positioning system (GPS) coordinates of the sampling sites will be taken.

Project Bypass Reach Reporting and Analyses

Samples will be processed by a qualified lab using protocols outlined in *Standard Operating Procedures for Laboratory Processing and Identification of Benthic Macroinvertebrates in California* (Woodward et al. 2012) and SWAMP protocol (Ode et al. 2016). The specimens will be sorted by taxa and counted. The results from each site will be used to calculate metrics outlined in Rehn et al. (2007). Results also will be scored utilizing the Index of Biotic Integrity (IBI) and California Stream Condition Index (CSCI) to translate BMI metrics into a measure of overall stream health (Environmental Protection Agency 2002; Rehn et al. 2015).

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The methodologies listed here are consistent with generally accepted scientific and engineering principles.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft AQ 7 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Draft AQ 7 TSR will be distributed to resource agencies, tribal interests, and other stakeholders for comment.
- Comments on the Draft AQ 7 TSR will be addressed, as appropriate, in a Final AQ 7 TSR. The Final AQ 7 TSR will be distributed with the Draft License Application.

Revised Study Plan**RELATIONSHIP TO OTHER STUDIES**

- Water quality measurements will be taken for water temperature, dissolved oxygen, and specific conductance at each sampling site and shared with *Study WQ 1, Water Temperature*.
- Concentrations of native mussels or invasive molluscs located during BMI sampling will be documented and shared with *Study AQ 3, Mussels and Aquatic Molluscs*, if the AQ 3 survey is scheduled after BMI sampling is completed.
- Turtle observations will be recorded and shared with *Study AQ 5, Western Pond Turtles*.
- Results of *Study AQ 1, Aquatic Habitat Mapping* will assist in selecting sampling locations in the Project Bypass Reach for this study. Results also will be used to determine the feasibility of using the RWB approach in the site below Kerckhoff Dam.

SCHEDULE

Date	Activity
Summer–Fall 2019	Conduct BMI sampling fieldwork
September–November 2019	Analyze data and prepare Draft AQ 7 TSR
December 2019	Distribute Draft AQ 7 TSR to resource agencies, tribal interests, and other stakeholders
July 2020	The Final AQ 7 TSR will be distributed with the Draft License Application.

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	10,000
Fieldwork	\$	41,000
Laboratory/Data Analysis	\$	27,000
Products	\$	15,000
Total	\$	93,000

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AQ 7-8

STUDY BOT 1
Plant Communities, Special-Status Plants, and Invasive Weeds
August 2018

This plan includes all the botanical study elements identified in Section 6.2.5, *Botanical and Wildlife Resources* of the Pre-Application Document (PAD).

POTENTIAL RESOURCE ISSUES

- Vegetation communities and associated special-status wildlife habitats, and rare plant communities could be affected by Project operation and maintenance.
- Special-status plant, bryophyte, and lichen populations could be affected by Project operation and maintenance.
- Introduction and/or spread of invasive weed populations due to Project operation and maintenance in the Federal Energy Regulatory Commission (FERC) Project Boundary, along Project Roads and Trails, and along gated roads shared with the U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS) have the potential to impact native species' habitats, including habitats of special-status species.

PROJECT NEXUS

- Project operation and maintenance activities within the FERC Project Boundary and Project Roads and Trails as identified in Table BOT 1-1a and along gated roads shared with the BLM and USFS (Table BOT 1-1b) could result in alteration or direct loss of vegetation communities and wildlife habitats, including communities with special recognition by state and federal agencies.
- Project operation and maintenance activities could result in indirect effects on wildlife species by affecting vegetation communities and wildlife habitats.
- Project operation and maintenance activities within the FERC Project Boundary, along Project Roads and Trails (Table BOT 1-1a), and along gated roads shared with the BLM and USFS (Table BOT 1-1b) could result in inadvertent removal or disturbance of special-status plant, bryophyte, and lichen populations.
- Project maintenance activities in the FERC Project Boundary, at Project facilities, at Project recreation facilities, along Project Roads and Trails (Table BOT 1-1a), and along gated roads shared with the BLM and USFS (Table BOT 1-1b) could result in the spread or introduction of invasive weeds.

Revised Study Plan**Table BOT 1-1a. Project Roads and Trails.**

Project Road Name	Length (feet)
Access Road 1 (from Access Road 2 to Adit 1)	4,482
Access Road 2 (Smalley Road to Adit 2)	5,572
Access Road 3 to Kerckhoff 1 Powerhouse (PH) (Upper)	1,927
Access Road 4 to Kerckhoff 1 PH (Lower)	1,007
Access Road 5 to Laydown Storage Area	532
Access Road 6 (portions)	3,365
Access Road 7 to Penstock Headworks	521
Access Road 8 (to Kerckhoff 2 [K2] Surge Tank)	1,304
Access Road 9 (to K2 Penstock Construction Access Tunnel)	334
Project Trail Name	Length (feet)
Trail to J-2	2,940
Access path from intakes to dam	978
J-7 Helicopter Landing Zone to San Joaquin River	<300
Access path to North Adit from dam	<300

Table BOT 1-1b. Gated Roads Shared with the BLM and USFS (PG&E/BLM/USFS).

Shared Road with Gated Access (shared entities)	Length (feet)
Smalley Cove Recreation Area Road (PG&E/USFS)	1,073
Access Road 6 (PG&E/BLM)	8,018

RELEVANT INFORMATION

The following information was reviewed to determine the need for vegetation community and wildlife habitat studies (the following information was summarized in Section 5.5.1, *Botanical Resources* of the PAD).

Vegetation Communities and Wildlife Habitat Mapping

Vegetation communities and wildlife habitat mapping data are based on:

- Mapped vegetation communities and associated wildlife habitats based on the USFS Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) (USFS 2014) and Rare Natural Communities based on USFS CALVEG (USFS 2014) and California Department of Fish and Wildlife's (CDFW's) California Natural Diversity Database (CNDDDB) (CDFW 2017a) within 1 mile (mi.) of the Project facilities and river reaches potentially affected by the

Project.¹ The CALVEG data are designed for high-level planning efforts and require refinement for Project-related analyses.

Special-Status Plants

Special-status plants data are based on:

- BLM special-status plants under the jurisdiction of the Bakersfield Field Office (BLM 2015);
- Sierra National Forest Sensitive Plant List (USFS 2013);
- U.S. Fish and Wildlife Service (USFWS) list of federally listed and proposed endangered, threatened, and candidate species (USFWS 2017);
- California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2017);
- CDFW's CNDDDB (CDFW 2017a);
- Data from the Consortium of California Herbaria (CCH; 2017); and
- Previous special-status plant surveys of portions of the FERC Project Boundary (Stebbins 2013a, 2015; U.S. Bureau of Reclamation [BoR] 2007).

Invasive Weeds

Invasive weed information is based on:

- Data from the CCH for California Invasive Plant Council (Cal-IPC) (Cal-IPC 2017) and/or California Department of Food and Agriculture (CDFA)-listed invasive weeds (CCH 2017; CDFA 2017);
- Calflora observation data of Cal-IPC and CDFA-listed invasive weeds (Calflora 2017);
- *Invasive and Noxious Weeds of Highest Concern for Sierra National Forest* (USFS 2015); and
- Previous botanical surveys of portions of the FERC Project Boundary (BoR 2007; Pacific Gas and Electric Company [PG&E] 2016; Stebbins 2013a, 2013b, 2015).

¹ The river reaches potentially affected by the Project include the Project Bypass Reach (defined as the San Joaquin River [SJR] from Kerckhoff Dam downstream to the Kerckhoff 1 [K1] Powerhouse [8 mi.] and from the K1 Powerhouse to the Kerckhoff 2 [K2] Powerhouse [1.8 mi.]), and the short reach immediately below the K2 Powerhouse to Millerton Lake (0.62 mi.), a BoR facility.

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POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Field-verification of mapped vegetation communities and associated wildlife habitats within the FERC Project Boundary.
- Information regarding the locations and attributes of small-scale habitat features (e.g., springs/seeps, small streams, other unique plant communities) and Rare Natural Communities.
- Current information on the location of special-status plant, bryophyte, and lichen populations within the FERC Project Boundary, along Project Roads and Trails (Table BOT 1-1a), and gated roads shared with the BLM and USFS (Table BOT 1-1b) is needed to avoid disturbance and removal.
- Current information on the location of invasive weed populations within the FERC Project Boundary, along Project Roads and Trails (Table BOT 1-1a), and along gated roads shared with the BLM and USFS (Table BOT 1-1b) used for Project operation and maintenance activities is needed to identify existing populations to help avoid spread of invasive weed populations.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following studies are proposed to supplement existing information and assess potential Project effects on botanical resources:

- Conduct ground-based verification and refinement using currently accepted classification systems of existing vegetation and associated special-status wildlife habitat mapping to avoid disturbance and/or removal.
- During vegetation mapping, identify locations of small-scale habitat features (e.g., springs/seeps, small streams, other unique plant communities) that are not currently captured by existing data.
- During vegetation surveys, map culturally significant plant species at locations identified by the California Native American Tribes to be incorporated in the cultural resources report.
- Conduct appropriately timed floristic surveys to identify any special-status plant, bryophyte, lichen, and invasive weed populations to avoid disturbance and/or removal of special-status species and help limit spread of invasive weed populations.

EXTENT OF STUDY AREA

The Study Area for all botanical resource studies includes the following:

- A 50-foot (ft.) buffer of all areas within the FERC Project Boundary and adjacent to Project facilities.
- A 50-ft. buffer (i.e., 25 ft. on either side from the road edge) on Project Roads and gated roads shared with the BLM and USFS.
- A 10-ft. buffer (i.e., 5 ft. on either side from the trail edge) on Project Trails.

Excluded from the Study Area are areas where access is unsafe (very steep terrain or high water flows) or private property for which the Licensee has not received specific approval from the landowner to enter the property to perform the study. For surveys that may require access through private property, PG&E will take the following steps to obtain approval:

- Notify the landowner of Project relicensing and request authorization to enter the property to conduct surveys.
- If authorization is obtained, PG&E will complete surveys as described in this study plan.
- If authorization is not obtained, PG&E will not complete surveys at these locations.

Areas where field surveys cannot be conducted will be classified and mapped based on aerial photographs and best professional judgment, and identified as such in the final study products.

STUDY METHODS AND ANALYSIS

The botanical studies will consist of the following three tasks: desktop review, field surveys, and analysis.

Desktop Review

- Update lists of Rare Natural Communities, special-status plants, bryophytes, lichens, and invasive weeds known to occur or that potentially occur in the FERC Project Boundary included in Section 5.5.1, *Botanical Resources* of the PAD.
 - For the purposes of this study, Rare Natural Communities are defined as vegetation types with a ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) by CDFW.
 - Special-status plant species are defined as: (1) those species listed, proposed, or under review as rare, threatened, or endangered by the federal or state government; (2) those species designated by the BLM and USFS as sensitive; or (3) those species on the CDFW *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2017b) (as updated) with a California Rare Plant Rank

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(CRPR) of 1, 2, 3, or 4.² Surveys will focus on those species with a CRPR rank of 1 and 2.

- Invasive weeds are defined as plant species that: (1) have a pest rating of A or B by the CDFA; or (2) are included in the Cal-IPC Invasive Plant Inventory (Cal-IPC 2017) (as updated). Surveys will focus on species with high and moderate rankings in the Cal-IPC inventory.³
- The most recent species lists, including those published by USFWS, CNDDDB, CNPS, BLM, and USFS, will be reviewed to identify target vegetation communities and plant species for the Study Area.

Field Surveys

- Conduct a field survey to verify the existing vegetation community and habitat maps of the Study Area to the extent necessary to identify accurately the location and extent of all vegetation communities present within the Study Area, as defined above. Field surveys will be conducted by individuals with: (1) experience conducting floristic field surveys; (2) knowledge of plant taxonomy and plant community ecology and classification; (3) familiarity with the plant, bryophyte, and lichen species of the area; (4) familiarity with appropriate state and federal statutes related to plant, bryophyte, and lichen collecting; and (5) experience with analyzing impacts of a project on native plant, bryophyte, and lichen species and communities. Individuals who may collect specimens will have the appropriate permits.
 - Verification will include identification of general vegetation communities based on the *Manual of California Vegetation, Second Edition* (Sawyer et al. 2009), and map updates with a minimum mapping unit of 1.0 acre. Verification will focus on areas that are suitable for special-status species and areas where there is potential for operation and maintenance activities or construction over the term of the License.
 - Map locations and attributes of small-scale habitat features (e.g., springs/seeps, small streams, other unique plant communities). These features will be mapped regardless of size (i.e., locations less than the 1.0-acre minimum mapping unit).
 - Vegetation community and habitat mapping will occur concurrently with the first botanical field survey for special-status plants and invasive weeds.
 - Map the locations of culturally significant plant species at locations identified by the California Native American Tribes to be incorporated in the cultural resources report.

² California Rare Plant Rank: 1B: Plants rare, threatened, or endangered in California and elsewhere; 2B: Plants rare, threatened, or endangered in California, but more common elsewhere; 3: More information needed about this plant, a review list; and 4: Plants of limited distribution, a watch list.

³ Cal-IPC: High = Severe ecological impacts, moderate to high rates of dispersal and establishment, widely distributed; Moderate = Substantial and apparent ecological impacts, moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance; Limited = Invasive, but with minor ecological impacts, moderate rates of invasion, distribution generally limited.

- The vegetation community mapping results will be used with wildlife habitat data to determine the location of potential suitable habitat for special-status wildlife species (*Study WILD 1, Special-status Wildlife*).
- Map locations of all special-status plant, bryophyte, and lichen species and invasive weeds observed within the Study Area with a global positioning system (GPS) receiver with a minimum accuracy of 1 meter. Field surveys will be floristic, and the entire Study Area will be surveyed during the appropriate blooming periods to cover the potentially occurring special-status and invasive weed taxa.
 - Two surveys (e.g., spring and summer) will be conducted to locate potential special-status plant, bryophyte, and lichen species. The survey protocol will follow the *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 1996) and *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (California Department of Fish and Game [CDFG] 2009). Specifically, surveys will be comprehensive for vascular and nonvascular plant and lichen species such that “every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status” (CDFG 2009).
 - Unique habitats of limited distribution capable of supporting special-status plant, bryophyte, and lichen species (e.g., granitic rock outcrops, lava caps, wetlands) will be more comprehensively surveyed than habitat with a broader distribution (e.g., foothill woodlands).
 - Site coordinates and attribute data (e.g., numbers of plant, bryophyte, and lichen species observed, relative condition of the population, recognizable risk factors) will be captured in the Project geographic information system (GIS) platform.
 - Photographs showing diagnostic floral characteristics, growth forms, and habitat characteristics will be taken of all special-status plant, bryophyte, and lichen species observed.
 - California native species field survey forms will be filled out and filed with the CNDDDB for all special-status plant occurrences on PG&E and public lands.
 - Prepare a comprehensive plant species list for the Study Area by survey area to provide information on the distribution of plant species in the Study Area.

Analysis

- Determine total area (acres) for each vegetation community within the Study Area; all mapped communities will be checked against the most recent CDFW *Natural Communities List* (CDFG 2010) (as updated) to determine if any special-status natural communities are present.
- Map all special-status natural communities in GIS in relation to Project facilities and features and Project operation and maintenance activities that have the potential to affect these communities.

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- Map all special-status plant, bryophyte, and lichen species, and invasive weed populations in GIS in relation to Project facilities, features, and Project operations and maintenance activities that have the potential to affect these resources.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

The methods described above are consistent with generally accepted methods for conducting vegetation community and habitat mapping and floristic surveys in California (CDFG 2009; Sawyer et al. 2009; USFWS 1996) and follow the generally accepted special-status plant, bryophyte, and lichen and invasive weed survey techniques used by federal agencies that manage public lands within the vicinity of the Project.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft BOT 1 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- Electronic copies of the data will be provided to resource agencies, tribes, and other interested parties upon request. GIS maps and locations of special-status species will be kept confidential from the public.
- The draft TSR will be distributed to the resource agencies, tribes, and other interested parties for review and comment.
- Comments on the draft TSR will be addressed, as appropriate, in a Final BOT 1 TSR. The Final BOT 1 TSR will be distributed in the Draft License Application.

RELATIONSHIP TO OTHER STUDIES

- Vegetation community and habitat mapping is key to planning and information gathering for other studies including mapping and locating riparian habitat (*Study BOT 2, Riparian and Wetland Resources*) and mapping and locating potential habitat for special-status wildlife (*Study WILD 1, Special-status Wildlife*). Additionally, information collected as part of this study will be used to help document the location of sensitive plant resources located along Project Roads, Project Trails, and Shared Access Roads in *Study LAND 1, Project Roads and Trails Assessment*.
- The mapped culturally significant plant species will be included in the TSR for *Study CUL 2, Tribal Resources*.

SCHEDULE

Date	Activity
March–September 2019	Perform desktop analysis and related preparation and conduct field surveys
September–October 2019	Analyze data and prepare Draft BOT 1 TSR
December 2019	Distribute Draft BOT 1 TSR to the resource agencies, tribes, and other interested parties
January–March 2020	Resource agencies, tribes, and other interested parties review and provide comments on draft report
April and May 2020	Resolve comments and prepare final report
July 2020	Distribute Final BOT 1 TSR in the Draft License Application

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	7,400
Fieldwork and Research	\$	100,500
Data Analysis	\$	25,000
Products	\$	25,500
Total	\$	<u>158,400</u>

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STUDY BOT 2 Riparian and Wetland Resources

August 2018

POTENTIAL RESOURCE ISSUES

- Project operation and maintenance could affect riparian and wetland resources along the perimeter of Kerckhoff Reservoir within the Federal Energy Regulatory Commission (FERC) Project Boundary and river reaches potentially affected by the Project.¹

PROJECT NEXUS

- Project operations modify the flow regime in the Project Bypass Reach, potentially affecting riparian resources.
- Project operations of Kerckhoff Reservoir could potentially affect existing wetland and riparian resources along the reservoir shoreline.
- Project maintenance within the FERC Project Boundary could result in removal or disturbance of riparian and wetland resources.

RELEVANT INFORMATION

The following information was reviewed to determine riparian and wetland study needs (summarized in Section 5.5.1, *Botanical Resources* of the Pre-Application Document [PAD]):

- Recent Google Earth aerial imagery (March 31, 2017; March 18, 2015; and August 27, 2012) and other recent documents that include information on riparian resources (e.g., U.S. Bureau of Reclamation [BoR] 2007, 2008a) within the FERC Project Boundary, along river reaches potentially affected by the Project, and around Kerckhoff Reservoir;
- *Preliminary Delineation of Waters of the United States, Including Wetlands, for the Temperance Flat Reservoir Alternatives* (BoR 2008a) and other biological reports prepared for the Temperance Flat project (BoR 2008b, 2012); and
- FERC's *Final Environmental Impact Statement, Kerckhoff Project No. 96* (FERC 1979).

¹ The river reaches potentially affected by the Project include the Project Bypass Reach (defined as the San Joaquin River [SJR] from Kerckhoff Dam downstream to the Kerckhoff 1 [K1] Powerhouse [12.8 km [8 mi.]] and from the K1 Powerhouse to the Kerckhoff 2 [K2] Powerhouse [2.8 km [1.8 mi.]]) and the short reach immediately below the K2 Powerhouse to Millerton Lake (≤ 1 km [0.62 mi.]), a U.S. Bureau of Reclamation (BoR) facility.

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POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Detailed distribution, composition, and age structure of riparian resources in the Study Area.
- Minimal riparian or wetland vegetation was mapped in the Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) dataset (U.S. Forest Service [USFS] 2014) in the vicinity of the Project.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following study is proposed to supplement existing information:

- Map riparian and wetland vegetation along the Project reaches potentially affected by the Project and Kerckhoff Reservoir using publicly available aerial and satellite imagery and a low-altitude helicopter aerial survey.
- Map the distribution of dominant woody riparian species and wetlands along the river corridor and reservoir perimeter (coordinated with *Study GEO 1, Channel Form and Fluvial Processes*).
- Map general age classes of the woody riparian species.
- Conduct a desktop evaluation of flows for riparian resources (“re-setting” events, recruitment flows²) along the river reaches potentially affected by Project operations and water levels for riparian and wetland resources along the Kerckhoff Reservoir shoreline.

EXTENT OF STUDY AREA

The Study Area for the riparian and wetland resources study includes:

- The Project Bypass Reach;
- The short reach immediately below the Kerckhoff 2 (K2) Powerhouse in Millerton Lake, a BoR facility; and
- The shoreline around Kerckhoff Reservoir within the FERC Project Boundary (10.3 kilometers [km] [6.4 miles [mi.]]).

² “Re-setting” events are high-magnitude events that scour the majority of the existing vegetation within the channel and along the channel margins. These events can occur in winter or be associated with snowmelt. “Recruitment flows” are high flows (generally, 1.5- to 5-year recurrence interval) that are timed to coincide with spring seed release and seed setting by riparian species. This typically coincides with the spring high flow recession.

STUDY METHODS AND ANALYSIS

- Map riparian and wetland vegetation within the Study Area using publicly available aerial and satellite imagery and a low-altitude helicopter aerial survey.
 - Map the distribution of vegetation along the river corridor and reservoir perimeter based on the extent of coverage of the vegetation, and as defined below: polygons, continuous or discontinuous lines, or points, depending on the extent of vegetation.
 - Polygons (Wide Riparian Corridor): An area of woody riparian vegetation that is greater than three mature trees/shrubs long and two trees/shrubs wide. Meadows and wetlands will also be mapped as polygon features.
 - Continuous lines (Narrow Riparian Corridor): Woody riparian vegetation is less than two mature trees/shrubs wide, without breaks in the canopy greater than the width of the line of trees/shrubs.
 - Discontinuous lines (Discontinuous Riparian Corridor): Woody riparian vegetation is less than two mature trees/shrubs wide with breaks in the canopy cover that are greater than the width of the line of trees/shrubs, but are no more than six times the width of the line of trees/shrubs.
 - Points (Sparse Cover): Woody riparian vegetation is present in smaller quantities than discontinuous lines. This distribution class generally describes longer reaches of stream channel when vegetation is present where no line is distinguishable. Individual trees/shrubs are included in this category.
 - Identify dominant woody riparian species in each polygon, line, and point feature, as feasible. The riparian vegetation will be classified according to the *Manual of California Vegetation, Second Edition* (Sawyer et al. 2009). Dominant woody riparian species, but not herbaceous species, will be mapped within meadows and wetlands. The extent of meadows and wetlands will be delineated as polygon features.
 - Identify any areas with riparian vegetation that may be encroaching into the channel.
 - Identify general age classes of woody riparian vegetation. Age classes will be generally classified as old and mature trees and shrubs, medium-age trees and shrubs, and younger individuals (including seedlings, if visible).
 - Photograph vegetation and channel conditions during the helicopter survey.
- Summarize life history strategies of woody riparian species present in the Study Area, including root growth rates.
- Review time series of publicly available historical aerial imagery and identify changes in riparian distribution from recent high flows or drought, if any.

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- Evaluate existing flows in the San Joaquin River (SJR) downstream of Kerckhoff Dam (1984–2017) in relation to riparian and wetland resources:
 - Annual hydrology and attenuation patterns (annual hydrographs of the monthly average daily flows by water year type).
 - Recurrence intervals of flow magnitudes important for riparian processes (recruitment flows and “re-setting” events)—Q1.5, Q2, Q5, Q10, and Q25.
 - Timing of high flows.
 - Recession rates of spring/early summer flows during the time of spring seed release.
 - Use the comparison of flow conditions with and without the Project developed in *Study HYD 1, Operations Simulation Model* and *Study HYD 2, Hydrology with and without the Project* to evaluate changes in flows important for riparian resources.
- Evaluate Kerckhoff Reservoir water surface elevations (Gage J-1) (1984–2017) in relation to riparian and wetland resources:
 - Annual hydrology and attenuation patterns (annual hydrographs of the monthly average water surface elevation by water year type).
- Summarize the results in a Technical Study Report (TSR), which will include:
 - Maps with digitized riparian and wetland distribution in geographic information system (GIS).
 - Riparian and wetland vegetation data mapped during the helicopter survey by community, age class, and distribution class in tabular format.
 - Project hydrology in tabular and graphic format.
 - Evaluation of riparian and wetland vegetation in relation to geomorphology of the river reaches (in coordination with *Study GEO 1, Channel Form and Fluvial Processes*) and Project hydrology (in coordination with *Study HYD 1, Operations Simulation Model* and *Study HYD 2, Hydrology with and without the Project*).

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

The riparian and wetland mapping and hydrologic data evaluation approach are similar to methods used on other recent hydroelectric relicensing and compliance projects (e.g., Placer County Water Agency’s [PCWA’s] Middle Fork American River project [FERC Project No. 2079] [PCWA 2011]; Southern California Edison’s [SCE’s] Big Creek Alternative Licensing Process [ALP] projects [FERC Project Nos. 2085, 2175, 67, and 120] [SCE 2007]; and Pacific Gas and Electric Company’s [PG&E’s] Mokelumne Hydroelectric project [FERC Project No. 137] [PG&E 2011a] and Pit 3, 4, 5 project [FERC Project No. 233] [PG&E 2011b]).

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft BOT 2 TSR. The report will document the findings of the vegetation mapping, and historical aerial imagery assessment and will include summary tables, figures, and maps, as appropriate. The draft report will also include the evaluation of riparian and wetland vegetation in relation to geomorphology of the river reaches and hydrology with and without the Project (using *HYD 2, Hydrology with and without the Project*).
- The Draft BOT 2 TSR will be distributed to resource agencies, tribes, and other interested parties for review and comment.
- Comments on the Draft BOT 2 TSR will be addressed, as appropriate, in a Final BOT 2 TSR, which will be distributed to resource agencies, tribes, and other interested parties.

RELATIONSHIP TO OTHER STUDIES

- Seeps and riparian vegetation also will be mapped as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds*.
- Riparian vegetation mapped as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds* will supplement the mapping from the low-altitude helicopter survey.
- Helicopter survey will be coordinated with *Study GEO 1, Channel Form and Fluvial Processes*.
- Hydrology data and analyses will be coordinated with *Study HYD 1, Operations Simulation Model* and *HYD 2, Hydrology with and without the Project*.
- Photographs and vegetation information collected as part of *Study AQ 1, Aquatic Habitat Mapping* will supplement the mapping from the low-altitude helicopter survey.

POSSIBLE EARLY SCHEDULE

PG&E is evaluating the potential to implement this study in September 2018, which is earlier than Integrated Licensing Process (ILP) regulations require. PG&E is considering accelerating the schedule so it would have data available to facilitate other related studies. However, if the study cannot be implemented in 2018, it will be conducted in 2019 as indicated below.

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Potential Early Start Date	Date	Activity
September 2018	Late Summer 2019	Conduct helicopter survey during low-flow period
January–August 2019	Fall/Winter 2019	Prepare vegetation maps and summarize data. Conduct hydrologic analyses and aerial imagery time series review. Evaluate flows with and without the Project (results of <i>Study HYD 2, Hydrology with and without the Project</i>)
September 2019	December 2019	Distribute Draft BOT 2 TSR
October–December 2019	January–March 2020	Resource agencies, tribes, and other interested parties review and provide comments on Draft BOT 2 TSR
January and February 2020	April–May 2020	Resolve comments and distribute Final BOT 2 TSR

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	5,900
Fieldwork and Research	\$	16,000
Data Analysis	\$	11,000
Products	\$	9,000
Total	\$	<u>41,900</u>

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BOT 2-8

STUDY WILD 1 Special-Status Wildlife Species

August 2018

This study plan includes all the wildlife study elements identified in Section 6.2.5, *Botanical and Wildlife Resources* of the Pre-Application Document (PAD).

POTENTIAL RESOURCE ISSUES

- Project operation and maintenance could affect:
 - Special-status wildlife and their habitats;
 - Bald eagle nesting, roosting, and foraging habitat; and
 - Special-status bat reproductive roosting and foraging habitat.

PROJECT NEXUS

- Project operation and maintenance activities, including helicopter use, could directly disturb special-status wildlife and/or result in loss of their habitat.
- Project operation and maintenance activities, including helicopter use, could directly disturb nesting and foraging bald eagles and/or result in loss of their habitat.
- Project operation and maintenance activities could directly disturb special-status bats if they are found to be roosting in Project facilities.

RELEVANT INFORMATION

The following information is available and was reviewed to determine special-status wildlife species study needs (the following information was summarized in Section 5.5.2, *Wildlife Resources* of the PAD). Available information identified below was assessed within a 1-mile (mi.) buffer around the Federal Energy Regulatory Commission (FERC) Project Boundary and river reaches potentially affected by Project operation.¹ The Assessment Area is shown in Figure 5.5-1 of the PAD.

Special-Status Wildlife and Their Habitats

- Special-status wildlife and common wildlife species potentially present based on a crosswalk from the U.S. Forest Service's (USFS's) Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) alliances to California Department of Fish and Wildlife's (CDFW's) California Wildlife Habitat Relationship (CWHR) wildlife habitats (CDFW 2017a; USFS 2017);

¹ The river reaches potentially affected by the Project include the Project Bypass Reach (defined as the San Joaquin River [SJR] from Kerckhoff Dam downstream to the Kerckhoff 1 [K1] Powerhouse [8 mi.] and from the K1 Powerhouse to the Kerckhoff 2 [K2] Powerhouse [1.8 mi.]), and the short reach immediately below the K2 Powerhouse to Millerton Lake (0.62 mi.), a Bureau of Reclamation (BoR) facility.

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- Known occurrences of special-status wildlife based on the CDFW's California Natural Diversity Database (CNDDDB), USFS's *Pacific Southwest Region 5 Regional Forester's 2013 Sensitive Animal Species List*, and the U.S. Fish and Wildlife Service's (USFWS's) Information for Planning and Consultation (IPaC) report (CDFW 2017b; USFS 2013; USFWS 2017);
- Memoranda and reports summarizing recent Pacific Gas and Electric Company (PG&E) surveys in support of construction projects at Project facilities (Garcia and Associates [GANDA] 2015a, 2015b, 2016a, 2016b; PG&E 2016);
- Known occurrences of special-status wildlife species based on the *Draft Environmental Impact Statement, Upper San Joaquin Basin Storage Investigation* (U.S. Bureau of Reclamation [BoR] 2014); and
- Museum records from the University of California at Berkeley, Museum of Vertebrate Zoology (MVZ) and the California Academy of Sciences (CAS) (CAS 2017; MVZ 2017).

Bald Eagle

- Bald eagle habitat use, including documentation of foraging, breeding, and wintering locations (BoR 2014; Southern California Edison [SCE] 2011);
- Bald eagle monthly observations memorandum from the Upper San Joaquin Basin Storage Investigation (AECOM 2011); and
- Known occurrences of bald eagle in the vicinity of the Project based on the CDFW CNDDDB (CDFW 2017a).

Special-Status Bats

- Known occurrences of special-status wildlife, including bats, within the Assessment Area (BoR 2014; CDFW 2017a; GANDA 2015a, 2016b);
- Museum records for areas within the Assessment Area from the University of California at Berkeley MVZ and the CAS (CAS 2017; MVZ 2017); and
- Special-status bat habitat use, including documentation of roosting and foraging habitat (BoR 2014).

POTENTIAL INFORMATION GAPS

Potential data gaps for special-status wildlife associated with the Project were based on an assessment of the existing information and include:

- Updated information on wildlife habitats.
- Detailed habitat data necessary to complete a habitat-based analysis of the potential effects of operation and maintenance of the Project on special-status wildlife species.

- Bald eagle data (i.e., nesting, roosting, and foraging data) necessary to complete analysis of the potential effects of operations and maintenance of the Project on bald eagles.
- Information on the location of special-status bat roosts in Project facilities to evaluate potential effects of operations and maintenance of the Project on special-status bat reproductive roosts.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following proposed studies would be used to supplement existing information. The Study Area for these proposed studies will be focused on areas within the FERC Project Boundary and adjacent to Project facilities, as well as river reaches potentially affected by the Project, as defined in the Study Area section below.

- Determine special-status wildlife species potentially occurring in the Study Area as identified from habitat relationships from CWHR habitats documented as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds*.
- Conduct a special-status wildlife reconnaissance survey to collect relevant habitat information necessary to complete a habitat-based analysis and document incidental observations of special-status wildlife.
- Conduct bald eagle wintering and nesting surveys following the methods in *Protocol for Evaluating Bald Eagle Habitat and Populations in California* (Jackman and Jenkins 2004).
- Conduct an evaluation of Project facilities to identify facilities potentially supporting special-status bat reproductive roosts (i.e., areas for focused surveys). In areas identified as potentially supporting special-status bats, implement surveys to determine presence/absence and document the general assemblage of bats present. Surveys would include primarily visual inspection and acoustic surveys.

EXTENT OF STUDY AREA

Study Areas for special-status wildlife, bald eagle, and special-status bats are defined below.

Excluded from the Study Area are areas where access is unsafe (e.g., where there is very steep terrain or high water flows) or private property for which the Licensee has not received specific approval from the landowner to enter the property to perform the study. For surveys that may require access through private property, PG&E will take the following steps to obtain approval:

- Notify the landowner of Project relicensing and request authorization to enter the property to conduct surveys.
- If authorization is obtained, PG&E will complete surveys as described in this study plan.
- If authorization is not obtained, PG&E will not complete surveys at these locations.

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Areas where field surveys cannot be conducted will be classified and mapped based on aerial photographs, available information, and best professional judgment, and identified as such in the final study products.

Special-Status Wildlife and Their Habitats

- The Study Area for CWHR habitats includes the area within the FERC Project Boundary (including a 0.5-mi. buffer) and areas within 0.5 mi. of Project facilities currently outside of the FERC Project Boundary.
- For wildlife reconnaissance surveys, the Study Area includes the area within the FERC Project Boundary (including a 0.5-mi. buffer), focused on areas where maintenance occurs around Project facilities.

Bald Eagle

- The Study Area for bald eagle includes Kerckhoff Reservoir and the Project Bypass Reach (9.8 mi.) and the short reach immediately below the Kerckhoff (K2) Powerhouse to Millerton Lake, a BoR facility (0.62 mi.), including a 0.25-mi. buffer on either side of these reaches.

Special-Status Bats

- The Study Area for special-status bats includes Project facilities.

STUDY METHODS AND ANALYSIS

For the purposes of this document, special-status wildlife species are defined as any animal species that are granted status by a federal or state agency. Federally listed species granted status by USFWS under the Endangered Species Act (ESA) include those Federally listed as Endangered (FE), Federally listed as Threatened (FT), Federally Proposed Endangered (FPE), Federally Proposed Threatened (FPT), Federal Candidate (FC), or Federally Delisted (FD). California-listed wildlife species that are granted status by the California Fish and Game Commission under the California Endangered Species Act (CESA) include species that are State-listed as Endangered (SE) and State-listed as Threatened (ST); California Fully Protected (CFP) and California Species of Special Concern (CSC) that are protected under the Fish and Game Code are also included. Species considered sensitive by the USFS (FSS) and special-status species granted protection under the U.S. Bureau of Land Management (BLM; BLM-S) are also considered special-status species.

The study approach for special-status wildlife, bald eagle, and special-status bat surveys is provided below.

Special-Status Wildlife and Their Habitats

- Determine special-status wildlife species potentially occurring in the Study Area as identified from habitat relationships from CWHR habitats and vegetation communities documented in the Study Area as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds*. Review the most recent species lists published by USFWS, CNDDDB, BLM, and USFS. The special-status wildlife list included in Section 5.5.2, *Wildlife Resources* in the PAD will be updated using this information and the habitats documented as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds*.
- Conduct a special-status wildlife reconnaissance survey within the Study Area to evaluate the potential habitat suitability of habitats documented as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds* and document observations of special-status wildlife species.
 - Survey methods will include both zigzag and linear transects depending on the area surveyed 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).
 - Species will be recorded as present if species-specific vocalizations are heard or if diagnostic field signs are found (e.g., scat, tracks, pellets). Some species that are known to occur, or for which appropriate habitat is present, will be recorded as “expected, but not observed.”
 - Wildlife taxonomy will be based on *California’s Wildlife, Volumes I, II, and III* (Zeiner et al. 1988–1990).
- For each special-status species observed on PG&E and public land, a CNDDDB field survey form will be completed and submitted to CDFW.
- Incidental observations of any special-status species during all field surveys completed in support of the relicensing will be recorded.

Bald Eagle

Conduct bald eagle wintering and nesting surveys following the methods in *Protocol for Evaluating Bald Eagle Habitat and Populations in California* (Jackman and Jenkins 2004) within the Study Area. A summary of the proposed survey requirements is provided below.

Bald Eagle Wintering Surveys

- Wintering Bird Surveys
 - Single-day surveys conducted monthly from December through February (three surveys, at least 2 weeks apart).

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Bald Eagle Nesting Surveys

Surveys will be conducted to locate any new nests.

- Early Season Survey (February through March)
 - Survey will be completed to determine whether suitable breeding habitat is occupied by nesting bald eagles and, if so, determining their breeding status.
- Mid-nesting Season Survey (late April through May)
 - Survey will be completed to determine the presence of eggs/nestlings in known nests. All nests identified in the early season survey will be evaluated.
- Late-nesting Season Survey (early June through early July)
 - Survey will be completed to determine nest success.

Bald eagle data will be incorporated into a Geographic Information System (GIS) data layer. This information will be presented on maps with the Project facilities.

Special-Status Bats

- Conduct an evaluation of Project facilities to identify locations potentially supporting special-status bat maternity roosts (i.e., areas for focused surveys) through agency consultation and qualified bat expert opinion.
- Use multiple survey techniques to determine the presence/absence of special-status bat species at Project facilities. Sampling methods will include primarily visual assessment and acoustic sampling. Any location where bat species cannot be determined from the visual assessment will be monitored using acoustic equipment. If visual and acoustic surveys are inconclusive (i.e., species or species groups cannot be determined), then mist netting may be used at specific locations. Each of these is described below.
 - Reproductive roost surveys will be conducted at Project facilities potentially supporting special-status bats during the summer reproductive season (April through September) when maternal colonies may be present. Survey locations will be selected at potential roost sites and/or within flight corridors between roost sites and potential foraging habitat (e.g., within stream channels or adjacent to reservoirs).

Visual Assessment

- Each selected location will be searched for bats or bat sign (i.e., guano, characteristic staining, and culled insect parts).

Acoustic Sampling

- If sign of bats is detected during the visual assessment, but no bats are observed, acoustic sampling will be conducted to attempt to determine species.
- Acoustic sampling will be conducted using a Wildlife Acoustic bat detector system or similar to identify bat species or bat species groups if species cannot be determined. The Wildlife Acoustic system detects bat ultrasonic echolocation calls (sonograms) in the field. Acoustic units will be placed in appropriate settings to collect bat calls.
- Up to two acoustic units will be placed at each site. The number of survey nights will depend on the number of survey locations that are identified during the visual assessment.
- Acoustic sonograms will be downloaded from the bat detection system and analyzed to determine species or species group present. The sonograms will be compared with a sonogram library with confirmed species determinations. Sonograms will also be manually vetted to provide additional clarity on species determinations, as possible.
- A map of special-status bat occurrences and reproductive roosts overlaid with information on Project facilities will be developed.

Mist Net Sampling

- If the first survey acoustic results are inconclusive (e.g., species or species group cannot be determined), mist nets may be used at that specific location in an attempt to identify the species or species group if a special-status species is suspected to occur.
- Due to the potential injury to bats, mist nets would be used sparingly.
- Nighttime mist net sampling would be conducted if bat species cannot be determined from the visual assessment or the acoustic surveys, as follows:
 - Mist nets would be set up for one night, from sunset to 1 a.m., in locations where active roosts are identified.
 - Captured bats would be identified to species. Other information collected will include sex, age (juvenile or adult), reproductive status, and forearm measurements.
 - Captured bats would be released on-site and echolocation calls recorded at the time of release.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

The methods described above are consistent with the generally accepted scientific techniques used to conduct wildlife reconnaissance surveys, determine the presence of bald eagle activity, and identify special-status bats and bat use.

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PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below:

- The study methods and results will be documented in a Draft WILD 1 Technical Study Report (TSR). The TSR will include summary tables and habitat maps, as appropriate. GIS maps and locations of special-status species will be kept confidential from the public.
- The draft TSR will be distributed to the resources agencies, tribes, and other interested parties for a review and comment period.
- Comments on the draft TSR will be addressed, as appropriate, in a Final WILD 1 TSR. The Final WILD 1 TSR will be distributed with the Draft License Application (July 2020).

RELATIONSHIP TO OTHER STUDIES

The wildlife studies will rely on vegetation maps generated from *Study BOT 1*, *Plant Communities*, *Special-Status Plants*, and *Invasive Weeds*, as well as other available information, to determine the location of potentially suitable habitat for each species.

SCHEDULE

Date	Activity
December 2018–September 2019	Conduct bald eagle, reconnaissance field surveys and special-status bat surveys
October–December 2019	Analyze data and prepare Draft WILD 1 TSR
December 2019	Distribute Draft WILD 1 TSR to the resource agencies, tribes, and other interested parties
January–March 2020	Resource agencies, tribes, and other interested parties review and provide comments on draft report
April and May 2020	Resolve comments and prepare final report
July 2020	Distribute Final WILD 1 TSR in the Draft License Application

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	8,400
Fieldwork and Research	\$	227,000
Data Analysis	\$	40,000
Products	\$	55,000
Total	\$	330,400

REFERENCES

- AECOM. 2011. Upper San Joaquin River basin storage investigation technical memorandum: bald eagle nesting and use area documentation at San Joaquin River RM 274. September 8.
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- _____. 2015b. Kerckhoff Dam LLO Replacement Project sensitive species pre-activity survey and nesting bird survey. Memorandum from Heather L. Johnson (GANDA) to Gina Morimoto (PG&E). 9 pp.

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- _____. 2016a. Kerckhoff Dam Handrail Replacement Project April 26, 2016, nesting bird survey. Memorandum from Heather L. Johnson (GANDA) to Tyson Read (PG&E). 4 pp.
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- USFWS (U.S. Fish and Wildlife Service). 2017. Information, planning, and consultation system (IPaC) website. Available at: <https://ecos.fws.gov/ipac/>. Accessed July 2017.
- Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White. 1988–1990. California's wildlife volumes I, II, and III.

STUDY LAND 1 Project Roads and Trails Assessment

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Project Road and Trail maintenance.
- Protect environmental and cultural resources during road and trail maintenance.

PROJECT NEXUS

- Pacific Gas and Electric Company (PG&E) is responsible for maintaining Project Roads and Trails with primary use for operation and maintenance of the Project.

RELEVANT INFORMATION

The following information is available and was reviewed to determine *Study LAND 1* needs:

- The Project facility access roads and trails identified in Table 4.5-1 of the Pre-Application Document (PAD);
- The description of Project Roads and Trail maintenance activities summarized in Sections 4.7.7, *Road Maintenance* and 4.7.8, *Trail Maintenance* of the PAD;
- Federal Energy Regulatory Commission (FERC) Project Boundary information shown in Figure 4.5-1;
- Rights-of-way and lease agreements (if any) between: PG&E and private parties; PG&E and the U.S. Bureau of Land Management (BLM); and PG&E and the U.S. Forest Service (USFS) – Sierra National Forest (SNF);
- Road standards information for the BLM (BLM 2006, 2015); USFS (USFS 2005, 2014); Fresno County (Fresno County 2016); and Madera County (Madera County 2017);
- SNF's *Forest Land and Resource Management Plan* (LRMP) (1991);
- Pacific Forest and Watershed Lands Stewardship Council's (Stewardship Council's) *Land Conservation Plan* (2007); and
- Stewardship Council's *Land Conservation and Conveyance Plan – PG&E Retained Lands at Kerckhoff Lake Planning Unit* (Stewardship Council 2017).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Information regarding the condition of Project Roads and Trails in relation to applicable standards, including potential sediment sources.
- Information regarding environmental and cultural resources that could be affected by road and trail maintenance activities, if present.

LAND 1-1

Revised Study Plan**PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS**

The following study is proposed to supplement existing information:

- Conduct focused surveys to assess the current condition of:
 - Project Roads and Project Trails relative to applicable standards (Table LAND 1-1a).
 - The one Shared Access Road that crosses National Forest System Lands (NFSL) relative to applicable USFS standards (Table LAND 1-1b).
- Identify areas that may be subject to excessive erosion due to inadequate maintenance or poor drainage, in coordination with geology studies (*Study GEO 3, Project Road-related Erosion*).
- Identify environmental or cultural resources located along Project Roads and Trails (Table LAND 1-1a) and gated roads shared with the USFS (Table LAND 1-1b) that could be affected by maintenance activities, in coordination with plant and cultural resource studies (*Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds; Study CUL 1, Cultural Resources; and Study CUL 2, Tribal Resources*).

Table LAND 1-1a Project Roads and Trails.

Project Road Name	Length (feet)
Access Road 1 (from Access Road 2 to Adit 1)	4,482
Access Road 2 (Smalley Road to Adit 2)	5,572
Access Road 3 to Kerckhoff 1 Powerhouse (Upper)	1,927
Access Road 4 to Kerckhoff 1 Powerhouse (Lower)	1,007
Access Road 5 to Laydown Storage Area	532
Access Road 6 (from its intersection with Access Road 5 to Kerckhoff 1 tunnel, and also from the locked gate near Access Road 9 to Kerckhoff 2 [K2] Powerhouse)	3,365
Access Road 7 to Penstock Headworks	521
Access Road 8 (to K2 Surge Tank)	1,304
Access Road 9 (to K2 Penstock Construction Access Tunnel)	334
Project Trail Name	Length (feet)
Trail to J-2	2,940
Access path from intakes to dam	978
J-7 Helicopter Landing Zone to San Joaquin River	<300
Access path to North Adit from dam	<300

LAND 1-2

Table LAND 1-1b Gated shared roads with USFS.

Shared Access Road Name ^a	Length (feet)
Smalley Cove Recreation Area Road (USFS)	1,073

^a The portions of Access Road 6 and Smalley Road shared with BLM are covered under a separate agreement between PG&E and BLM and will not be evaluated as part of this study.

EXTENT OF STUDY AREA

The Study Area includes the Project Roads and Project Trails identified in Table LAND 1-1a and the one Shared Access Road identified in Table LAND 1-1b. The Study Area also includes the area along these roads and trails that is subject to maintenance activities, specifically a 10-foot (ft.)-wide buffer on either side of the Project Roads and the Shared Access Road, and a 5-ft.-wide buffer on either side of the Project Trails.

Note that the Study Area includes roads and trails that are located both within and outside of the current FERC Project Boundary and not shared roads subject to existing right-of-way or other road use agreements that determine proportional use by PG&E. For surveys along Project Roads or Trails that are located outside of the current FERC Project Boundary and on private land, PG&E 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, PG&E will complete surveys as described in this study plan.
- If authorization is not obtained, PG&E will not complete surveys at these locations.

STUDY METHODS AND ANALYSIS

Condition Assessment

- Identify current maintenance levels and associated maintenance standards for each of the Project Roads and Project Trails identified on Table LAND 1-1a and the one Shared Access Road identified on Table LAND 1-1b.
- Conduct surveys to assess the current condition of the Project Roads identified on Table LAND 1-1a and the Shared Access Road identified on Table LAND 1-1b relative to prescribed maintenance levels and associated standards. The following information will be collected as part of the road condition assessment:
 - Asset type (improved road, primitive road);
 - Landownership/jurisdiction;
 - Route, road, or spur number (and common name, if applicable);
 - Beginning and end points, and overall length;
 - Average width;

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- Segments, if applicable;
 - Surface type (e.g., paved, gravel, dirt);
 - Overall road condition, including identification of issues pertaining to conditions 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 or fords;
 - Location and condition of safety, traffic control, and informational signs and access control features such as gates and other closure methods; and
 - Potential traffic safety concerns such as blind spots, poor sight distance, inadequate signage, and hazard trees.
- Assess the current condition of the Project Trails identified on Table LAND 1-1a relative to trail management objectives and standards. The following information will be collected as part of the trail condition assessment:
 - Landownership/jurisdiction;
 - Trail number (if applicable);
 - Beginning and end points, and overall length;
 - Average width;
 - Average slope;
 - Presence/absence of safety features such as hand rails;
 - Overall condition, including identification of issues pertaining to condition such as rutting, loose aggregate, obstacles, and excessive vegetation;
 - Location, size, and condition of culverts and other drainage features, if applicable; and
 - Location of bridge crossings or fords, if applicable.
 - All road and trail features described above will be photographed and located using a sub-meter global positioning system (GPS) unit, and the roads data will be incorporated into the Project Geographic Information System (GIS) database for tabulation, analysis, and mapping.

Maintenance Characterization

- Identify and characterize how the Project Roads and Trails and the one Shared Access Road are used by PG&E, resource agencies, and the public, and associated maintenance responsibilities.
- Identify and characterize PG&E's maintenance practices and activities, including, for example, culvert clearing and vegetation management.

- Characterize PG&E's use of Project Roads and Trails, including season of use and level of use.
- Identify current agreements between PG&E and BLM, USFS, Fresno County, Madera County, and private property owners, as applicable, including associated termination dates. These agreements may include, but are not limited to, maintenance agreements, easements, rights-of-way (including with BLM [BLM 1980]), and special use permits. The shared access roads under these agreements are subject to the identification of PG&E proportional use by methods as agreed upon and required by those jurisdictions.
- Estimate the frequency and types of vehicles accessing the Project roads by PG&E and their affiliated companies (contractors and subcontractors). This information will provide data for maintenance requirements.

Resource Assessment

- Identify and map the location of areas along the roads and trails identified on Tables LAND 1-1a and LAND 1-1b that may be experiencing excessive erosion due to inadequate maintenance or poor drainage in coordination with *Study GEO 3, Project Road-related Erosion*.
- Identify and map the location of environmental and/or cultural resources that may occur along the roads and trails identified on Tables LAND 1-1a and LAND 1-1b, in coordination with the *BOT 1, Vegetation Communities, Special-Status Plants, and Invasive Weeds; CUL 1, Cultural Resources; and CUL 2, Tribal Resources* studies.
 - Note that the location of protected biological resources or cultural resources is considered confidential information. As such, this information will not be shown on maps or otherwise included in reports that are distributed to the general public.

Consistency with Generally Accepted Scientific Practice

- The roads and trails data will be collected using standardized forms that are designed to document road conditions and features with respect to BLM, USFS, and state and county standards, as applicable.
 - Roads and trails that cross NFSL will be surveyed with respect to USFS criteria for the assigned maintenance level (USFS 2005, 2014).
 - Roads and trails that cross land managed by the BLM will be surveyed with respect to BLM criteria.
 - Roads and trails that cross private land will be surveyed with respect to State of California road maintenance standards and/or applicable Madera and/or Fresno County standards.

Revised Study Plan

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft LAND 1 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Draft LAND 1 TSR will be distributed to resource agencies, tribes, and other interested parties for a review and comment period.
- Comments on the Draft LAND 1 TSR will be addressed, as appropriate, in a Final LAND 1 TSR. The Final LAND 1 TSR will be distributed with the Draft License Application (July 2020).

RELATIONSHIP TO OTHER STUDIES

- Information collected as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds*; *Study CUL 1, Cultural Resources*; and *Study CUL 2, Tribal Resources* will be used to help document the locations of sensitive plant and cultural resources located along the Project Roads, Project Trails, and Shared Access Roads.
- Areas experiencing excessive erosion will be identified in coordination with *Study GEO 3, Project Road-related Erosion*.
- Information about culvert size and condition may be used to identify potential issues related to fish and amphibian passage, if applicable.
- Information on pedestrian traffic will be collected under *Study REC 4, Recreation Visitor Use Surveys*.

SCHEDULE

Date	Activity
April–June 2019	Consult with USFS, BLM, Fresno County, and Madera County regarding road maintenance levels and standards
July–August 2019	Conduct road and trail condition assessment
September–December 2019	Analyze data and prepare Draft LAND 1 TSR
December 2019	Distribute Draft LAND 1 TSR to resource agencies, tribes, and other interested parties
January–March 2020	Resource agencies, tribes, and other interested parties review and provide comments on draft report
April and May 2020	Resolve comments and prepare final report
July 2020	Distribute Final LAND 1 TSR in the Draft License Application

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken by major tasks is as follows:

Project Management and Consultation	\$	10,000
Fieldwork and Research	\$	42,000
Data Analysis	\$	12,400
Products	\$	16,000
Total	\$	80,400

REFERENCES

- BLM (Bureau of Land Management). 1980. Right-of-way grant agreement between BLM, Sacramento, and Pacific Gas and Electric Company, San Francisco, for the Kerckhoff Project. April 25.
- . 2006. Roads and trails terminology. Technical note 422. November 2006. Available at: <https://www.blm.gov/nstc/library/pdf/TN422.pdf>.
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- Stewardship Council (Pacific Forest and Watershed Lands Stewardship Council). 2007. Kerckhoff Reservoir Planning Unit, Willow Creek Watershed - land conservation plan (LCP). Final – November 2007. Available at: <http://www.stewardshipcouncil.org/lcp>. Accessed July 2017.

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———. 2017. Proposed land conservation and conveyance plan (LCCP) – PG&E retained lands at Kerckhoff Reservoir Planning Unit. January 25.

USFS (U.S. Forest Service). 2005. Guidelines for road maintenance levels. 7700-Transportation Management 0577 1205-SCTDC. December.

———. 2014. Forest Service Manual (FSM) 7700. Travel management, Chapter 7730 – transportation system operation and maintenance. Amendment no. 7700-2014-1. Effective November 20, 2014.

STUDY REC 1 Whitewater Boating Assessment

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Whitewater boating opportunities in the San Joaquin River (SJR) between Kerckhoff Reservoir and Millerton Lake.
- Public access to the SJR channel for whitewater boating activities.
- Public safety related to whitewater boating associated with Project facilities and operations.
- Project facility security issues associated with whitewater boater access.
- Availability of publicly available streamflow information to facilitate use of existing whitewater boating opportunities.

PROJECT NEXUS

- Project operations and facilities may affect whitewater boating opportunities and access to the river. The Federal Energy Regulatory Commission (FERC) in its comprehensive planning process provides for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety and other beneficial uses including recreation resources.¹

RELEVANT INFORMATION

The following available information was reviewed to determine whitewater boating flow study needs (refer to Section 5.7, *Recreation Resources* of the Pre-Application Document [PAD; PG&E 2017] for a summary of recreation resource information and to PAD Section 4.5.4, *Gages* for gage information):

- Interviews with whitewater boating nongovernmental organization (NGO) representatives;
- Review of published literature on whitewater boating runs (Holbeck and Stanley 1998);
- Review of American Whitewater (AW) website and whitewater boating run descriptions on the SJR between Kerckhoff Reservoir and Millerton Lake (AW 2017); and
- Flow data for the SJR from various gages maintained by Pacific Gas and Electric Company (PG&E) and/or the U.S. Geological Survey (USGS).

¹ Section 10(a)(1) of the Federal Power Act.

Revised Study Plan

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Comprehensive resource descriptions for whitewater boating runs on the SJR between Kerckhoff Reservoir and Millerton Lake from whitewater boating NGO representatives.
- Boatable streamflow ranges for target whitewater boating runs.
- The number of existing whitewater boating-day opportunities for each whitewater run by water year type.
- The seasonal distribution of existing whitewater boating-day opportunities for whitewater runs.
- Assessment of safety and Project security related to whitewater boating access to Project facilities and the river channel.
- Characterization of other issues potentially affecting whitewater boating, including public safety related to flows, or potential for sudden high flow spills, including those related to potential operational events and/or related to grid conditions.

PROPOSED STUDIES/ANALYSES TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

A phased approach will be used to develop information needed to address the identified information gaps. The phases are sequenced to provide foundational information to the subsequent study phases. Subsequent study phases will be initiated if there is an outstanding information gap(s) remaining upon completion of the initial, or prior, phase.

- **Phase 1 – Initial Information Gathering and Hydrology Assessment:** PG&E will develop additional information on whitewater resources and opportunities utilizing existing information, supplemented with information collected through interviews with knowledgeable boaters; evaluate public safety and Project security related to whitewater boating; and summarize hydrology in the SJR between Kerckhoff Reservoir and Millerton Lake.
- **Phase 2 – Focus Group Session and Site Visit:** PG&E will conduct a focus group discussion with stakeholders to refine and/or develop additional details about the boating runs and discuss PG&E's safety and security concerns and objectives. The site visit will be contingent upon the need to develop additional information on access and/or PG&E's safety and security concerns that could not be addressed in the focus group session. One of the outcomes of the focus group will be a determination of the need for a whitewater flow study to refine the estimated boatable flow range. This determination may be deferred until the site visit is completed.

- **Phase 3 – Potential Whitewater Boating Flow Study (contingent):** If an outcome of Phase 2 is that a whitewater boating flow study is needed and can be implemented meeting PG&E's safety and liability concerns, PG&E will collaborate with the stakeholders to conduct a whitewater boating flow study. Prior to conducting any on-water study activities, all safety and liability concerns will need to be identified and addressed.

EXTENT OF STUDY AREA

The Study Area includes access and egress and the following three whitewater boating runs located on the SJR between Kerckhoff Dam and Millerton Lake² (Figure REC 1-1):

- Run 1³: SJR from below Kerckhoff Reservoir to Kerckhoff 1 (K1) Powerhouse (8 mi.)
- Run 2: SJR from the K1 Powerhouse to Kerckhoff 2 (K2) Powerhouse (1.8 mi.)
- Run 3: SJR from the K2 Powerhouse to Millerton Lake (run length varies depending on Millerton Lake water surface elevation)

STUDY METHODS AND ANALYSIS

The whitewater boating assessment will be conducted following the general approach contained in *Flows and Recreation: A Guide to Studies for River Professionals* (Whittaker et al. 2005). It is anticipated that work will primarily occur during 2019.

Phase 1 – Initial Information Gathering and Hydrology Assessment

- Develop information about whitewater boating resources in the Study Area using existing information contained in published whitewater guide books and available on the internet (e.g., at www.cacreeks.com, www.awa.org, and www.awetstate.com).
- Conduct phone interviews with target whitewater boaters with experience on the whitewater runs in the Study Area to refine, and/or develop, information about boating opportunities. This information will include estimates of boatable flow ranges, availability of flow information, river channel access, and safety concerns.
- Identify and assess existing routes and access/egress points used for whitewater boating activities.
- Identify Project facility safety concerns associated with access routes and/or access/egress points used for whitewater boating activities.
- Evaluate public safety and Project security information to assess potential safety and security related to current and potential whitewater boating practices and consider consistency with Project safety and security objectives.

² Whitewater run names have been omitted based on stakeholder Draft Study Plan comments. Whitewater runs described correspond to published whitewater run nomenclature.

³ Distances were calculated from Geographic Information System (GIS) data.

Revised Study Plan

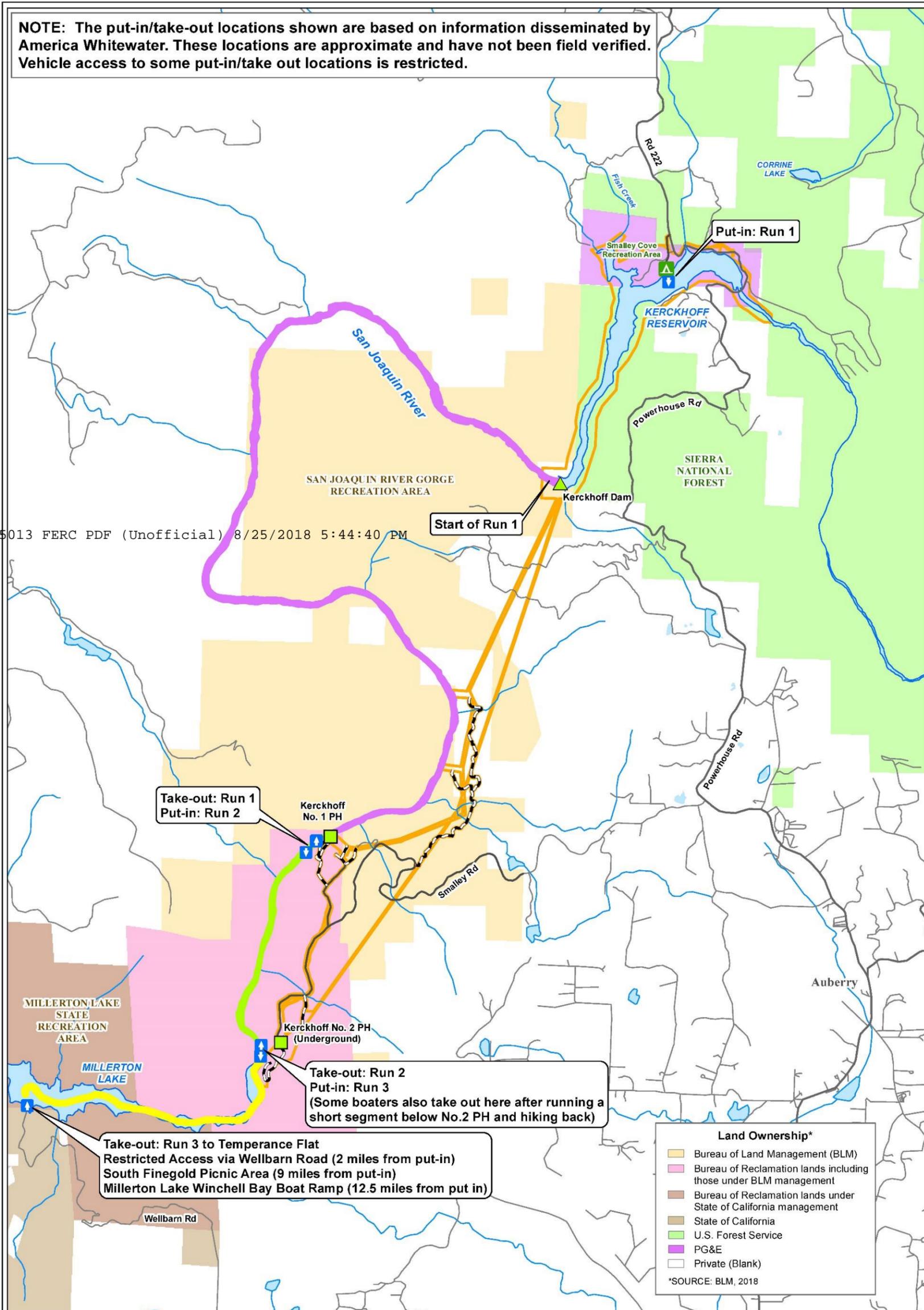
- Identify, map, and characterize existing stream gaging stations in the SJR, including location, equipment, and data collection capabilities.
- Summarize the hydrology of the SJR using data available from existing gages; where feasible 15-minute (or 1-hour) time step hydrology data will be used.
- Characterize historical spill and spill recession rates.
- Describe how Project operations modify flows on the SJR, including hourly, daily, and monthly flows utilizing existing data.
- Characterize the potential for flow fluctuations including those related to potential operational events and/or related to changing grid conditions.
- Assess boatable opportunity days based on the boatable flow ranges identified in published information and from interviews with boaters, by run. This will be done using the flow record (1984–2017) for “with and without” the Project flow conditions. Results will be presented by California Department of Water Resources (CDWR) SJR water year type (CDWR 2018).

Phase 2 – Focus Group Sessions and Site Visit

- Conduct a focus group discussion with stakeholders to refine and/or develop additional details about the whitewater boating runs. Information to be collected through the focus group process includes:
 - Existing and potential whitewater use
 - Access and egress conditions or constraints
 - Types of watercraft used, and timing (i.e., boating season)
 - Refinement of acceptable boatable flow ranges
 - Whitewater boating safety considerations
- The focus group meeting will also include a presentation of PG&E concerns and issues including:
 - Project operations
 - Project safety concerns
 - Project security issues
 - Project safety and security objectives
- Based on the focus group discussion, determine if a site visit is necessary to develop additional information to assess whitewater boating access, egress, and/or PG&E safety and security concerns.
 - If needed, a site visit would be conducted the day following the focus group discussion with experienced whitewater boaters and PG&E Operations staff.

NOTE: The put-in/take-out locations shown are based on information disseminated by America Whitewater. These locations are approximate and have not been field verified. Vehicle access to some put-in/take out locations is restricted.

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- | | |
|------------------------------------|----------------------------------|
| PG&E Project Facilities | Whitewater Runs |
| Powerhouse | Run 1 (Kerckhoff Dam to K1 PH) |
| Dam | Run 2 (K1 PH to K2 PH) |
| Project Road | Run 3 (K2 PH to Temperance Flat) |
| Recreation Area | Put-In |
| FERC Project Boundary | Take Out |
| Other Features | |
| Other Road | |
| Watercourse | |
| Water Body | |

- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - Bureau of Reclamation lands under State of California management
 - State of California
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM, 2018

Pacific Gas and Electric Company
 PG&E Kerckhoff Project (FERC No. 96)

Figure REC 1-1
Identification of Whitewater Runs and Access/Egress Locations

0 0.5 1 Miles

Projection: UTM, Zone 11 North
 Datum: NAD 83

8/21/2018

Figure REC 1-1 Identification of whitewater runs and access/egress locations.

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- Based on the focus group discussion, determine if a whitewater flow study is necessary to develop additional information needed to refine the acceptable boatable flow range.
 - A flow study will be conducted only if there is a need to substantially refine the acceptable boatable flow range or identify specific flow-related points of concern within the target reaches that cannot be assessed in another manner.
 - The determination of the need for a whitewater flow study may be deferred until a site visit is conducted.

Phase 3 – Whitewater Boating Flow Study (contingent)

- Study up to three flow levels from Kerckhoff Dam to K2 Powerhouse (Reaches 1 and 2) by making use of natural flows (spill from Kerckhoff Reservoir), if available, and depending on the target flow range, runoff conditions, identified safety considerations, and PG&E's operational constraints. If Kerckhoff Reservoir spill does not occur, controlled flow spills from Kerckhoff Reservoir will be initiated to conduct the flow study.
 - For Reach 3 below K2 Powerhouse, up to three flow levels also would be studied. The length of the study reach would depend upon the Millerton Lake level on the day of the study, which is outside the control of the Licensee.
- The final flow study target flow(s) will be identified through consultation with whitewater boating stakeholders.
- Flow studies will be scheduled with as much advance notice to the boating study team as feasible.
 - The scheduling of flow studies using natural flow will be influenced by the timing of runoff and the ability of PG&E to stabilize runoff flow within target flow ranges.
 - Safety, operational, and other considerations will be considered in making use of natural flows.
 - The scheduling of flow studies using flow from controlled spills from Kerckhoff Reservoir will be dependent upon PG&E operational and other considerations.

Flow Study Preparation

- Analyze historical hydrological data to identify potential timeframes when target flow(s) will occur from Kerckhoff Dam spill events, or, when PG&E operational considerations are suitable for controlled flow spills from Kerckhoff Reservoir.
- Identify target study flow(s) in consultation with stakeholders.

Revised Study Plan

- Identify and address PG&E safety and liability concerns prior to conducting on-water study activities.
 - Develop a REC-1 Whitewater Flow Study Safety Plan for conducting flow studies. The REC-1 Flow Study Safety Plan will address PG&E safety and security issues as well as on-water boating study team safety and coordination.
- 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.
- Develop a REC-1 Whitewater Flow Study Implementation Plan that identifies the schedule and process for conducting the flow studies.

Flow Study Implantation

- Identify and assemble the on-water boating study team through consultation with stakeholders.
 - The boating study team will be comprised of whitewater boaters with the experience and skill level required to safely boat the target runs.
 - The boating study team members should have experience with participation in flow studies and be qualified to assess changes in boating conditions for flows lower or higher than the study target flow.
 - All boating team members will complete a “boater-profile form” documenting their boating skill level and experience, as well as their experience with participation in whitewater flow studies.
 - All boating team members will complete and sign a release of liability waiver.
- Conduct a flow study pre-meeting (conference call) with on-water boating study team members to present the study schedule and logistics, and review the survey instrument to be used for data collection.
- Conduct the whitewater boating flow study to refine the acceptable boatable flow range for whitewater boater skill levels as identified in Phases 1 and 2.
 - Scheduling of the flow study will be dependent on availability of natural spill from Kerckhoff Reservoir and/or PG&E operational and other considerations.
 - All three runs will be boated.
- Conduct a post-flow study meeting after each flow with the boating study team members to complete the boating surveys and collect addition information that may have resulted from the flow study.
- Utilize the information developed during the flow study to refine the acceptable whitewater boating flow range and determine Minimum Acceptable Boating Flow.
 - The “Minimum Acceptable Boating Flow” is lowest flow that supports flow dependent characteristics that contribute to a viable whitewater recreation experience that the majority of the target boater-group(s) (e.g., kayakers, rafters)

would return to boat. Flow dependent characteristics include “whitewater challenge,” opportunities for “whitewater play,” safety, and transit time.

- Utilize the refined acceptable whitewater boating flow range and hydrologic information to estimate the number of boatable days under existing Project operations.
- Address other whitewater boating considerations (including safety) in the Study Area.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The whitewater boating study methods, to the extent applicable, generally follow the methods outlined in the following document: *Flows and Recreation: A Guide to Studies for River Professionals* (Whittaker et al. 2005).

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results from Phase 1 and/or 2 will be documented in a Preliminary Draft REC 1 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Preliminary Draft REC 1 TSR will be distributed to the resources agencies, tribes, and other interested parties for a review and comment period.
- The study methods and results from Phase 3, if conducted, will be documented in a Revised Draft REC 1 TSR.
- Comments on the draft TSR will be addressed, as appropriate, in a Final REC 1 TSR. The Final REC 1 TSR will be distributed with the Draft License Application (July 2020).

RELATIONSHIP TO OTHER STUDIES

- Information developed as part of *Study HYD 1, Operations Simulation Model* will be used to conduct the hydrology assessment, including the spill cessation analysis.

Revised Study Plan**SCHEDULE**

Date	Activity
January–February 2019	Phase 1 - Conduct initial information gathering and evaluation
January–March 2019	Phase 1 - Hydrology assessment
February–April 2019	Phase 2 - Conduct interviews and focus group session
April–July 2019	Phase 3 - If needed and agreed to, conduct a flow study ¹
July–October 2019	Analyze data and prepare Draft REC 1 TSR
December 2019	Distribute Draft REC 1 TSR for review and comment
January–March 2020	Resource agencies, tribes, and other interested parties review and provide comments on draft report
April and May 2020	Resolve comments and prepare final report
July 2020	Distribute Final REC 1 TSR in the Draft License Application

¹ Flows will be provided preferentially by making use of natural flows (spill flows from Kerckhoff Reservoir), or a “managed spill event.” Timing will be dependent on the target flow range, runoff conditions, and PG&E’s operational and other considerations.

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	4,000
Fieldwork and Research	\$	129,569
Data Analysis	\$	10,086
Products	\$	22,896
Total	\$	166,551

REFERENCES

- AW (American Whitewater). 2017. American whitewater. Available at: www.americanwhitewater.org.
- California Department of Water Resources (CDWR). 2018. Chronological Reconstructed Sacramento and San Joaquin Valley Water Year Hydrologic Classification Indices. Available at: http://cdec.water.ca.gov/cgi-progs/iodir_ss/wsi.
- Holbeck, L., and C. Stanley. 1998. The best whitewater in California. Third Edition. Watershed Books.
- PG&E (Pacific Gas and Electric Company). 2017. Pacific Gas and Electric Company Kerckhoff Hydroelectric Project FERC Project No. 96 Pre-Application Document (PAD), November 2017. PG&E San Francisco, California.
- Whittaker, D., B. Shelby, and J. Gangemi. 2005. Flows and recreation: a guide to studies for river professionals. October 2005. Available at: <http://www.hydroreform.org/sites/default/files/flowrec.pdf>.

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REC 1-12

STUDY REC 2 Recreation Facility Assessment

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Provide safe and suitable facilities with sufficient capacity for public recreation use of Project lands and waters.

PROJECT NEXUS

- The Project reservoir and shoreline provide attractive settings for recreation use. The Federal Energy Regulatory Commission (FERC) in its comprehensive planning process provides for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety and other beneficial uses including recreation resources.

RELEVANT INFORMATION

The following information is available and was reviewed to determine the need for a study related to recreation facilities (the following information is summarized in Section 5.7, *Recreation Resources* of the Pre-Application Document [PAD]):

- Exhibit R of Pacific Gas and Electric Company's (PG&E's) amended application for new license for the Project (PG&E 1977);
- Form 80 recreation use reports for 2002, 2008, and 2014 (PG&E 2003, 2009, 2015); and
- U.S. Bureau of Land Management's (BLM's) *Bakersfield Proposed Resource Management Plan and Final Environmental Impact Statement* (BLM 2012) and *Bakersfield Field Office Record of Decision and Approved Resource Management Plan* (BLM 2014).

POTENTIAL INFORMATION GAPS

The following has been identified as a potential information gap:

- Existing Project recreation facility condition, including accessibility to persons with disabilities.

PROPOSED STUDIES/ANALYSES TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The existing information is proposed to be supplemented by the following study:

- Recreation Facility Assessment—Project recreation facilities will be assessed to report capacity, condition, and consistency with applicable accessibility requirements.

Revised Study Plan

EXTENT OF STUDY AREA

- The Study Area includes Smalley Cove Recreation Area (consisting of Smalley Cove Campground and Smalley Cove Day Use Area).

STUDY METHODS AND ANALYSIS

Facility Inventory and Condition Assessment

This study element will inventory the number and type of components (e.g., campsites, tables, restrooms) that are provided at Smalley Cove Recreation Area and compare this information to what is required by the Project's FERC-approved recreation plan. Information will be collected using data sheets designed to provide an inventory of campsites, picnic sites, restrooms, boat launches, internal circulation roads, campsite spurs, parking areas, and other facility amenities at Smalley Cove Recreation Area. All entrance and internal signs will be inventoried and checked for clarity, consistency, and appropriate and understandable wording. Photographs will be taken, cataloged, and cross-referenced to maps to provide representative views and document the condition of the facilities or items of specific interest.

A qualitative condition assessment of Smalley Cove Recreation Area will be conducted. Information will be collected on data sheets organized using the below four assessment categories to rate the condition of individual facility components (e.g., restrooms, sign boards) as well as the overall condition of the facility.

- Needs replacement (N)—Non-functional or has broken or missing components.
- Needs repair (R)—Has structural damage or is in an obvious state of disrepair.
- Needs maintenance (M)—Needs maintenance, such as cleaning or painting.
- Good condition (G)—Functional and well maintained.

These four categories are intended to cover the spectrum of possible conditions encountered on the date of assessment. Repairs (R) and maintenance (M) needs identified during the assessment are temporary because in the course of its day-to-day facility operation, PG&E will identify these types of needs and either perform or schedule repairs or maintenance actions to continue operating safe public recreation facilities.

Developed Facility Accessibility Assessment

Smalley Cove Recreation Area, including restrooms, day-use sites, campsites, signs, internal circulation roads, and parking areas, will be assessed for compliance with applicable accessibility requirements. Project recreation facility access roads will be assessed only with regard to providing accessibility within the developed facility. Data sheets will include the 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design (U.S. Access Board 2010) and the California Title 24 accessibility requirements (California Department of General Services 2011). In addition, recreation facilities will be assessed for their ability to provide opportunities for persons with disabilities to participate in recreation opportunities provided by the Project, including boating, fishing, and accessing the reservoir shoreline.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- This study plan proposes study assessments and methodologies using generally accepted practices for evaluating recreation facilities associated with the relicensing of hydroelectric projects.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft REC 2 Technical Study Report (TSR) and will include summary tables, drawings, and maps, as appropriate.
- The Draft REC 2 TSR will be distributed to resource agencies, tribal interests, and other stakeholders for a review and comment period.
- Comments on the Draft REC 2 TSR will be addressed, as appropriate, in a Final REC 2 TSR. The Final REC 2 TSR will be distributed with the Draft License Application (DLA) (July 2020).

RELATIONSHIP TO OTHER STUDIES

- None.

SCHEDULE

Date	Activity
April 2019	Conduct facility inventory, condition, and accessibility assessments
June 2019	Analyze data and prepare Draft REC 2 TSR
December 2019	Distribute Draft REC 2 TSR to participants
January–March 2020	Resource agencies, tribal interests, and other stakeholders review and provide comments on draft report
April and May 2020	Resolve comments and prepare final report
July 2020	Distribute Final REC 2 TSR in the DLA

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LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	17,600
Fieldwork and Research	\$	17,800
Data Analysis	\$	12,600
Products	\$	12,600
Total	\$	60,600

REFERENCES

- BLM (Bureau of Land Management). 2012. Proposed resource management plan and final environmental impact statement, volume one. U.S. Department of the Interior, Bureau of Land Management, Bakersfield Field Office. Bakersfield, California. August 2012.
- . 2014. Record of decision and approved resource management plan for the Bakersfield Field Office. U.S. Department of the Interior, Bureau of Land Management, Bakersfield Field Office. Bakersfield, California. December 2014.
- California Department of General Services. 2011. California access compliance reference manual, 2010 California building standards code with California errata and amendments, effective: January 1, 2011. Division of the State Architect, California Department of General Services. Sacramento, CA.
- PG&E (Pacific Gas and Electric Company). 1977. Kerckhoff 1 & 2 Project, Exhibit R. Pacific Gas and Electric Company, San Francisco, CA. Filed with FERC June 20, 1977.
- . 2003. Licensed hydropower development recreation report, FERC Form 80 for reporting year 2014. Pacific Gas and Electric Company, San Francisco, California. Filed with FERC May 20, 2003.
- . 2009. Licensed hydropower development recreation report, FERC Form 80 for reporting year 2008. Pacific Gas and Electric Company, San Francisco, California. Filed with FERC April 29, 2009.
- . 2015. Licensed hydropower development recreation report, FERC Form 80 for reporting year 2014. Pacific Gas and Electric Company, San Francisco, California. Filed with FERC May 8, 2015.
- U.S. Access Board. 2010. Americans with Disabilities Act and Architectural Barriers Act accessibility guidelines. U.S. Access Board, Washington, DC.

STUDY REC 3 Recreation Visitor Use

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Accommodating existing and future Project visitor needs consistent with applicable land management plan guidance.
- Locations of Project recreation-related effects to environmental resources.

PROJECT NEXUS

- The Project reservoir and shoreline, Project Bypass Reach,¹ and lands in the vicinity of Kerckhoff 1 and 2 powerhouses provide attractive settings for recreation. The Federal Energy Regulatory Commission (FERC) through its comprehensive planning process requires its licenses provide for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety and other beneficial uses including recreation resources.

RELEVANT INFORMATION

The following information is available and was reviewed to determine the need for a study related to current and future levels of visitor use and visitor needs (the following information is summarized in Section 5.7, *Recreation Resources* of the Pre-Application Document [PAD]):

- Form 80 recreation use reports for 2002, 2008, and 2014 (Pacific Gas and Electric Company [PG&E] 2003, 2009, 2015);
- *Survey on Public Opinions and Attitudes on Outdoor Recreation in California 2012, Complete Findings* (California Department of Parks and Recreation [CDPR] 2014);
- U.S. Bureau of Land Management's (BLM's) *Bakersfield Proposed Resource Management Plan and Final Environmental Impact Statement* (BLM 2012) and *Bakersfield Field Office Record of Decision and Approved Resource Management Plan* (BLM 2014).
- *Public Safety Plan for Kerckhoff Hydroelectric Project, FERC No. 96* (PG&E 2016).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Level, timing, and type of boating use on Kerckhoff Reservoir.
- Level and timing of Project recreation use at developed Project recreation facilities.

¹ The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse

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- Types, capacities, and locations of developed recreation facilities necessary to accommodate existing and future recreation use.
- Characterization of dispersed Project recreation use in terms of the level and timing, type, and locations of use for Kerckhoff Reservoir shoreline and along the San Joaquin River in the vicinity of the Kerckhoff 1 and 2 powerhouses.
- Recreation-related effects on environmental resources.

PROPOSED STUDIES/ANALYSES TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Shoreline, land, and water surface areas in the vicinity of Kerckhoff 1 and 2 powerhouses and at Kerckhoff Reservoir will be assessed to identify the level, timing, location, and type of recreation use occurring in these areas, including boating use. This information will be obtained using observation surveys, which identify at-one-time use. In addition, at the Kerckhoff 1 and 2 powerhouse areas additional information on the timing and relative amounts of recreation use near Kerckhoff 1 and 2 powerhouses also will be collected using trail counters that provide an indication of visits on an hourly, daily, and seasonal basis.
- Developed recreation facility use assessment—The number of visitors to the Project will be compiled and sorted to report the level of visitor use and facility occupancy on holiday weekends, weekends, and weekdays for peak and non-peak seasons.
- Recreation use impact assessment—Project lands, and land immediately adjacent to Project lands within the Study Area, will be inventoried to report locations of recurrent dispersed recreation and identify any visually evident effects on environmental resources at these locations.
- Existing and potentially conflicting public uses.

EXTENT OF STUDY AREA

The Study Area includes:

Study Element	Study Area
Shoreline, land, and water surface use assessment	<p>Observation Surveys: Water surface and shoreline of PG&E-owned and National Forest System Lands (NFSL) of Kerckhoff Reservoir.</p> <p>Area extending up to 100 ft. from the FERC Project Boundary in the vicinity of Kerckhoff 1 and 2 powerhouses and the shoreline downslope from the westernmost section of Access Road 6 between the last switchback and tailrace (Figure REC 3-1). Visitor use observations will take place from within the polygons identified in Figure REC 3-1 and include the viewable area beyond the polygons.</p> <p>Trail Counters: Locations used for river access in the vicinity of Kerckhoff 1 and 2 powerhouses (Figures REC 3-2 and 3-3). Note that the figure depicts the approximate locations, and exact locations will be selected to maximize data integrity and minimize vandalism potential.</p>
Developed recreation facility use assessment	Smalley Cove Recreation Area
Recreation use impact assessment	<p>Area within the FERC Project Boundary extending 100 ft. from the: (1) boundary of Smalley Cove Recreation Area; (2) maximum water surface elevation of Kerckhoff Reservoir; (3) Area extending up to 100 ft. from the FERC Project Boundary in the vicinity of Kerckhoff 1 and 2 powerhouses; (4) the shoreline downslope from the westernmost section of Access Road 6 between the last switchback and tailrace; and (5) two additional locations along Access Road 6 (Figure REC 3-1).</p> <p>Exception: Study Area within this 100-ft. zone only includes land owned by PG&E or public land managed by the Sierra National Forest or BLM.</p>



Figure REC 3-1. Study Area (depicted by red lines) in the vicinity of Kerckhoff 1 (left photo) and 2 (right photo) powerhouses and along the shoreline and Access Road 6 near the Kerckhoff 2 tailrace (right photo).

Revised Study Plan**STUDY METHODS AND ANALYSIS*****Shoreline, Land, and Water Surface Use Assessment***

To estimate recreation visitor use of the Project reservoir shoreline and water surface area as well as in the vicinity of Kerckhoff 1 and 2 powerhouses, PG&E will use observation surveys and trail counters (Kerckhoff 1 and 2 powerhouse areas only). The observation surveys will be conducted by a roving surveyor. Recreation use will be observed and documented during the recreation season from March 1 through October 31. Observation surveys will occur on a sample of holiday weekends, non-holiday weekends, and weekdays during this period in accordance with Table REC 3-1.

Spot-observation surveys will be conducted to record the number of visitors and types of activities occurring along the Kerckhoff Reservoir shoreline outside of developed facilities, on the reservoir surface, and in and within view² from the Study Area near Kerckhoff 1 and 2 powerhouses (Figure REC-3-1). Shore-based water surface spot-observation surveys of the reservoir will record the number, type, and activity of watercraft observed on the Project reservoir. Because the entire reservoir water surface and shoreline are not visible from access roads, shore-based spot-observations will be supplemented with spot-observations of the water surface and shoreline taken from a boat on one Saturday per month from April 1 to September 30. The boat-based spot-observations on the reservoir will be conducted during the day between 11 a.m. and 4 p.m. Boat-based observations will only be made when conditions for boat operations on the reservoir are safe.

Table REC 3-1. Number of sampling days for shore-based spot-observations.

Month	No. of observation days			
	Weekday	Weekend	Holiday	Total
March	1	2	0	3
April	1	2	0	3
May	1	2	1	4
June	1	2	0	3
July	1	2	0	3
August	1	2	0	3
September	1	2	1	4
October	1	2	0	3
Total	8	16	2	26

² Observers will use binoculars from safe vantage points within the polygons to view as much area as possible.

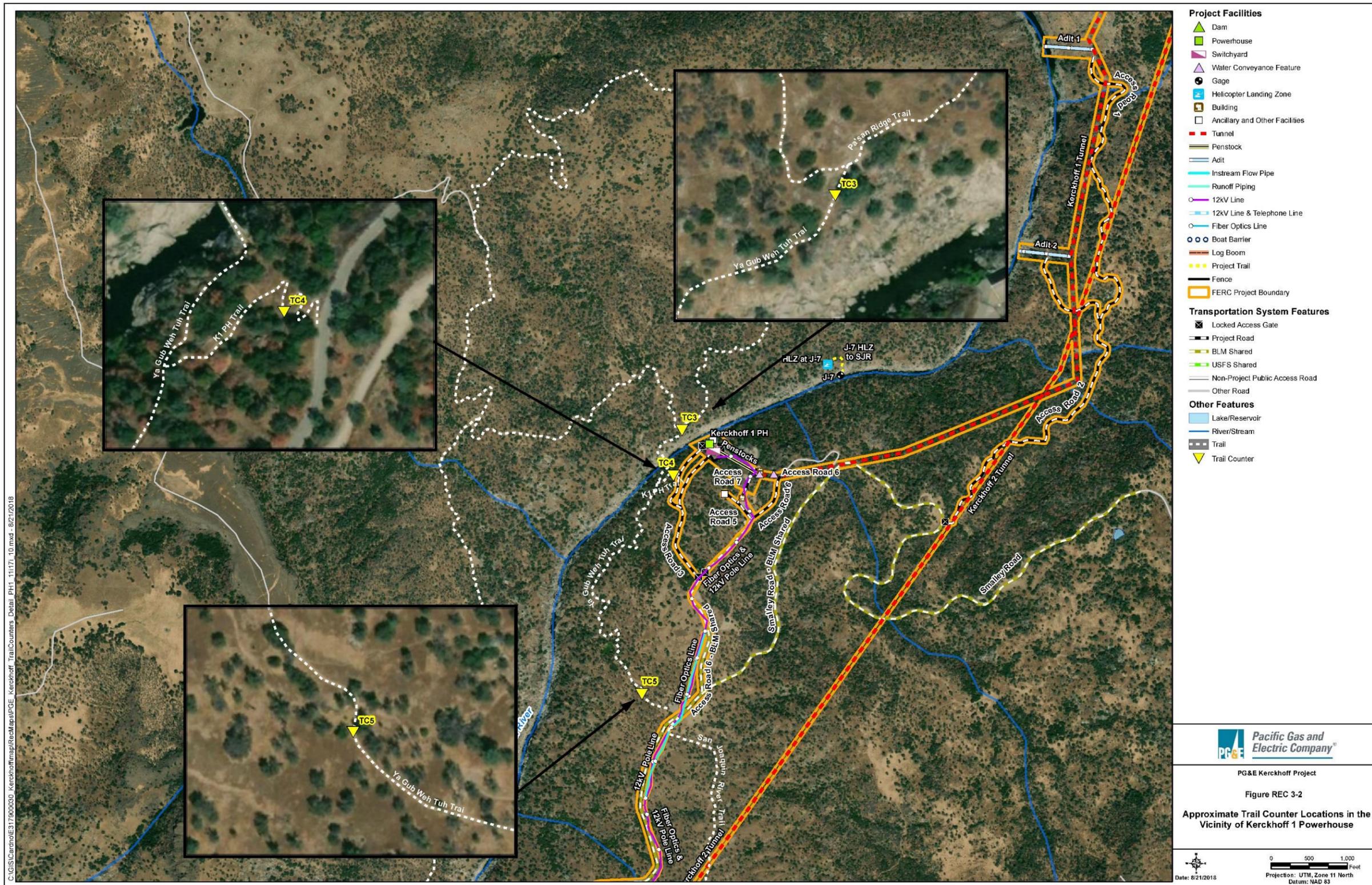


Figure REC 3-2. Approximate trail counter locations in the vicinity of Kerckhoff 1 Powerhouse.

Revised Study Plan

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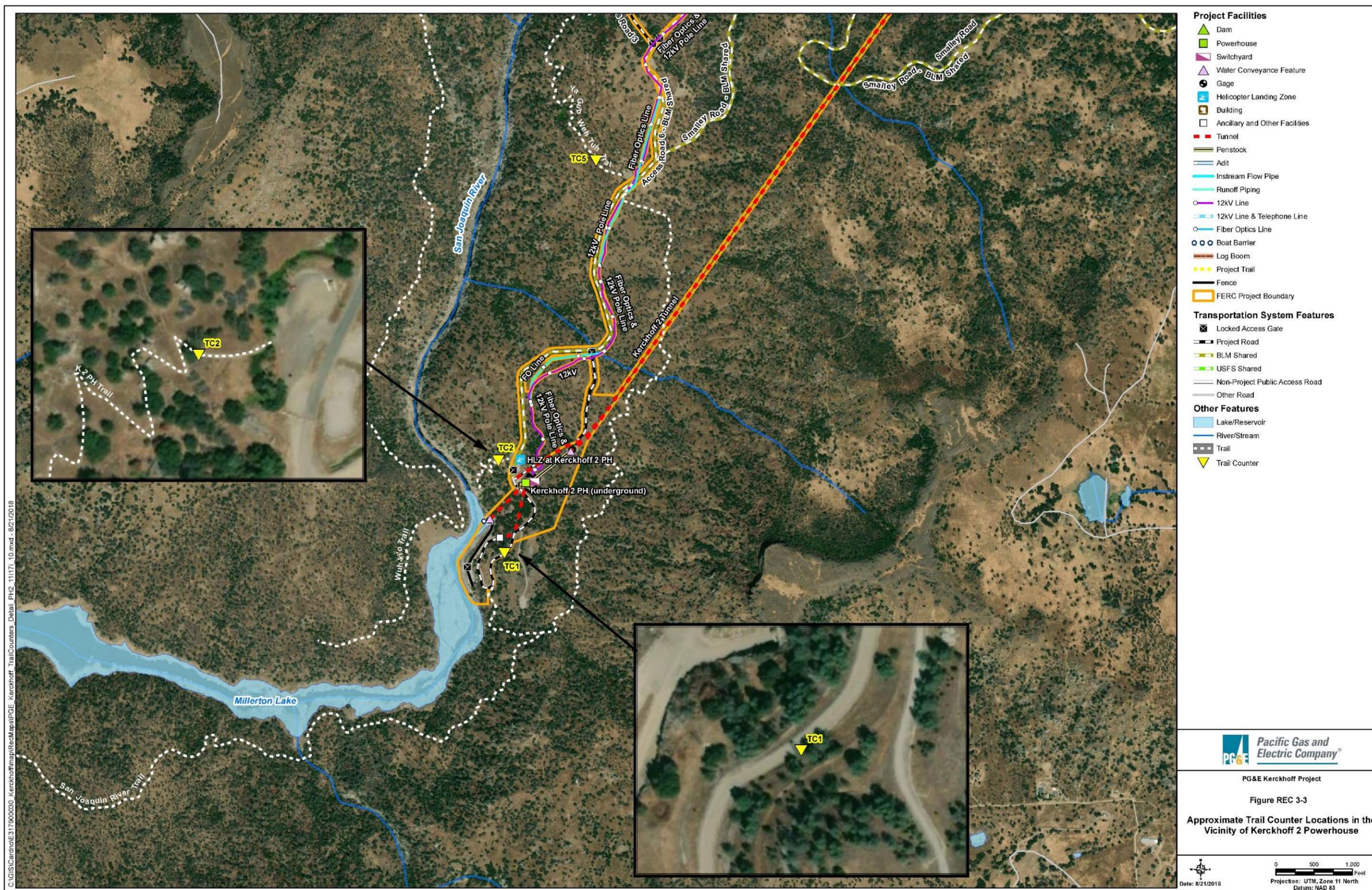


Figure REC 3-3. Approximate trail counter locations in the vicinity of Kerckhoff 2 Powerhouse.

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To characterize river recreation visitor use patterns in the vicinity of Kerckhoff 1 and 2 powerhouses, PG&E will install and collect data at five locations that are the primary routes that could be used for river access. Trail counters (TRAFx or other appropriate trail counters) will be installed at or near the locations indicated in Figure REC 3-2 and data will be collected from March 1 through October 31. The trail counters record the number of visitors passing the sensor to provide 24-hour data collection of the hourly number of visitors throughout the study period of March 1 to October 31. PG&E will check trail counter function and download data at least monthly during the study period.

Recreation use in this vicinity includes both Project and non-Project related use. Consequently, the data collected cannot be used by itself to estimate the number of Project visitors. Information from the observation and visitor surveys will be needed to help make this assessment. However, the data will provide refined information about visitor use patterns because data will be collected at several locations and over the length of each day during the study period. Data will be summarized in a series of graphs and tables.

Implementing this study methodology may be challenging due to environmental conditions at the trail counter locations, the limitations of the technology, and potential for vandalism. PG&E will install the trail counters to collect the data and minimize potential vandalism. However, if proper function of the trail counters at any of the identified locations cannot be attained or if trail counters are vandalized or stolen, PG&E will discontinue this methodology at that site and rely on the observation data to characterize river recreation visitor use patterns in the vicinity of Kerckhoff 1 and 2 powerhouses.

Developed Recreation Facility Use Assessment

Smalley Cove Recreation Area campground occupancy data recorded by the facility operator will be compiled for the 2019 operating season. Visitor use at developed day-use areas will be estimated based on spot-observations of these locations at Smalley Cove Recreation Area. Spot-observations will be conducted from March 1 through October 31 using the same sampling scheme presented in Table REC 3-1. The observations will document the number of visitors observed, visitors' activities, party size, the number and types of vehicles, and watercraft observed at each location.

Recreation Use Impact Assessment

This study element will assess effects caused by recreational use adjacent to developed recreation facilities and at areas receiving dispersed public recreational use along the shoreline of Kerckhoff Reservoir and within the polygons shown in Figure REC 3-1 in the vicinity of Kerckhoff 1 and 2 powerhouses. The assessment will be primarily qualitative, focusing on observable impacts, such as relative amounts of litter, damaged vegetation, bare soil, erosion, and displacement of vehicle access barriers; user-created roads, trails, and campsites; and proximity of the impact to reservoir, wetlands, creeks, or other sensitive areas. Representative photographs will be taken of each dispersed, user-created site, trail, road, and any areas with notable impacts (e.g., erosion, cut or damaged vegetation). Dispersed recreation use sites will be located using global positioning system (GPS) technology, and maps will be developed showing the location and type of dispersed recreational activity or impact (e.g., user-created trails, fire rings). Photographs will be cataloged and cross-referenced to maps.

Revised Study Plan

Four types of information will be collected:

- Spatial information on the location of user-created sites, roads, and trails. This information includes quantitative information, such as the number of user-created sites and fire rings, the lengths of roads and trails, and mapped locations.
- Observational or qualitative assessments (characteristics) of individual sites using categorical criteria. These assessments describe each site's characteristics and allow summaries of the number of sites with certain features (or problems), such as the number of dispersed site fire rings without sufficient vegetation clearing for fire prevention.
- Professional assessment of the number of vehicles or groups that can be accommodated at dispersed sites.
- Professional assessment of the type of recreational uses that are occurring at the site (e.g., camping, swimming, fishing, boating access, hunting).

Impact and resource inventory forms will be completed based on reviews of existing information and field reconnaissance.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- This study plan proposes study assessments and methodologies using generally accepted practices for evaluating recreation resources and use associated with the relicensing of hydroelectric projects.

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft REC 3 Technical Study Report (TSR) and will include summary tables, drawings, and maps, as appropriate.
- The Draft REC 3 TSR will be distributed to agencies, tribes, and other interested parties for a review and comment period.
- Comments on the Draft REC 3 TSR will be addressed, as appropriate, in a Final REC 3 TSR. The Final REC 3 TSR will be distributed in the Draft License Application (DLA) (July 2020).

RELATIONSHIP TO OTHER STUDIES

- *Study REC 1, Whitewater Boating Assessment* will report information about river access.

SCHEDULE

Date	Activity
March–October 2019	Conduct fieldwork for assessments
November 2019	Analyze data and prepare Draft REC 3 TSR
December 2019	Distribute Draft REC 3 TSR to participants
January–March 2020	Stakeholders review and provide comments on draft report
April and May 2020	Resolve comments and prepare final report
July 2020	Distribute Final REC 3 TSR in the DLA

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	11,000
Fieldwork and Research	\$	106,000
Data Analysis	\$	40,000
Products	\$	32,000
Total	\$	<u>189,000</u>

REFERENCES

- BLM (Bureau of Land Management). 2012. Proposed resource management plan and final environmental impact statement, volume one. U.S. Department of the Interior, Bureau of Land Management, Bakersfield Field Office. Bakersfield, California. August 2012.
- . 2014. Bakersfield Field Office record of decision and approved resource management plan. U.S. Department of the Interior, Bureau of Land Management, Bakersfield Field Office. Bakersfield, California. December 2014.
- CDPR (California Department of Parks and Recreation). 2014. Survey on public opinions and attitudes on outdoor recreation in California 2012, complete findings. California State Parks, Natural Resources Agency, State of California. Sacramento, California. January 2014.

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PG&E (Pacific Gas and Electric Company). 2003. Licensed hydropower development recreation report, FERC Form 80 for reporting year 2014. Pacific Gas and Electric Company, San Francisco, California. Filed with FERC May 20, 2003.

———. 2009. Licensed hydropower development recreation report, FERC Form 80 for reporting year 2008. Pacific Gas and Electric Company, San Francisco, California. Filed with FERC April 29, 2009.

———. 2015. Licensed hydropower development recreation report, FERC Form 80 for reporting year 2014. Pacific Gas and Electric Company, San Francisco, California. Filed with FERC May 8, 2015.

———. 2016. Public safety plan for Kerckhoff Hydroelectric Project (FERC No. 96). Pacific Gas and Electric Company, San Francisco, California. Filed with FERC January 6, 2017.

STUDY REC 4
Recreation Visitor Use Surveys
August 2018

POTENTIAL RESOURCE ISSUE(S)

- Unmet existing and future demand for recreation opportunities and facilities at the Project.
- Conflicts between recreation user groups.

PROJECT NEXUS

- The Project reservoir and shoreline, Project Bypass Reach,¹ and lands in the vicinity of Kerckhoff 1 and 2 powerhouses, provide attractive settings for recreation. The Federal Energy Regulatory Commission (FERC) through its comprehensive planning process requires its licenses provide for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety and other beneficial uses including recreation resources.

RELEVANT INFORMATION

The following information is available and was reviewed to determine the need for a study about visitor preferences, satisfaction, and user conflicts (the following information was summarized in Section 5.7, *Recreation Resources* of the Pre-Application Document [PAD]):

- *2015 Statewide Comprehensive Outdoor Recreation Plan (SCORP)* (California Department of Parks and Recreation [CDPR] 2015);
- U.S. Forest Service (USFS) – *Sierra National Forest’s Draft Revised Land Management Plan for the Sierra National Forest* (USFS 2016);
- CDPR’s *Outdoor Recreation in California’s Regions 2013* (CDPR 2013);
- Exhibit R of Pacific Gas and Electric Company’s (PG&E’s) amended application for new license for the Project (PG&E 1977);
- *Survey on Public Opinions and Attitudes on Outdoor Recreation in California 2012, Complete Findings* (CDPR 2014);
- Bureau of Land Management (BLM), *Bakersfield Proposed Resource Management Plan and Final Environmental Impact Statement* (BLM 2012);
- *Bakersfield Field Office Record of Decision and Approved Resource Management Plan* (BLM 2014); and
- *Public Safety Plan for Kerckhoff Hydroelectric Project, FERC No. 96* (PG&E 2016).

¹ The Project Bypass Reach includes the San Joaquin River (SJR) from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse and from K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse

Revised Study Plan

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Recreation-related effects on environmental resources.
- Characterization of visitors, their preferences, and satisfaction with recreation facilities and opportunities at the Project.
- Visitor use conflicts at the Project.
- Latent demand for recreation opportunities in the context of the Project.
- Projection of future Project-related recreation use.

PROPOSED STUDIES/ANALYSES TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Visitor survey—Visitors will be surveyed to (1) report visitor satisfaction with available recreation opportunities and facilities at Kerckhoff Reservoir, (2) identify visitor use conflicts, (3) identify desired recreation facilities or management actions at Kerckhoff Reservoir, (4) characterize Project visitors (e.g., places of residence, gender, age, frequency of visits) to project future recreation visitation to the Project, and (5) identify barriers to recreation opportunity participation.
- Key contact interviews—Latent demand assessment will be completed to report information about unmet demand because opportunities are either not available or opportunities have a barrier to participation.

EXTENT OF STUDY AREA

The Study Area includes:

- Smalley Cove Recreation Area and areas with recurrent dispersed use within the FERC Project Boundary around the Kerckhoff Reservoir shoreline;
- Area extending up to 100 ft. from the FERC Project Boundary in the vicinity of Kerckhoff 1 and 2 powerhouses (Figure REC 4-1, left and right photographs, respectively);
- The shoreline downslope from the westernmost section of Access Road 6 between the last switchback and Kerckhoff 2 Powerhouse tailrace (Figure REC 4-1, right photograph); and
- Two additional locations along Access Road 6 (Figure REC 4-1, right photograph).

REC 4-2



Figure REC 4-1. Study area (depicted by red lines) in the vicinity of Kerckhoff 1 (left photo) and 2 (right photo) powerhouses and along the shoreline and Access Road 6 near the Kerckhoff 2 tailrace (right photo).

STUDY METHODS AND ANALYSIS

Visitor Survey

Surveys will be administered to collect information about recreation activity participation and preferences, accessibility needs, zip code, group size, user conflicts, perceived crowding, length of stay, and satisfaction with or desire for recreational opportunities and facilities. The surveys will also provide an opportunity for visitors to identify barriers or circumstances that prevent participation in desired recreational activities. Specific questions for the surveys will be developed in consultation with BLM, USFS, and other interested stakeholders. The surveys will be administered at Smalley Cove Recreation Area and areas with recurrent dispersed use (e.g., reservoir shoreline, near powerhouses). Surveys will also be administered to visitors at the San Joaquin Bridge, parking area near Kerckhoff 2 switchyard, trailhead, and group and equestrian campgrounds (Figure REC 4-2). Visitor surveys will be conducted from March 1 through October 31 using the sampling scheme presented in Table REC 4-1.

Table REC 4-1. Number of sampling days for shore-based spot-observations.

Month	No. of survey days			
	Weekday	Weekend	Holiday	Total
March	1	2	0	3
April	1	2	0	3
May	1	2	1	4
June	1	2	0	3
July	1	2	0	3
August	1	2	0	3
September	1	2	1	4
October	1	2	0	3
Total	8	16	2	26

REC 4-3

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Except for locations near Kerckhoff 1 and 2 powerhouses located in the San Joaquin River Gorge, visitor surveys will be administered throughout the sampled day (i.e., mornings from 8 a.m. to noon, afternoons from noon to 4 p.m., and evenings from 4 p.m. to 8 p.m.). Visitor surveys at locations near Kerckhoff 1 and 2 powerhouses will be conducted from 6 a.m. to noon and from noon to 6 p.m. These times may be adjusted during the study period to address influences of climate or changing use patterns. Sampling frequencies will be based on estimated use levels and consultation with interested stakeholders, and the questionnaire will be administered in a face-to-face manner. The number of completed surveys and refusals (including reasons provided by visitors for their refusals) at each site will be reported in the study results.

Key Contact Interviews

Latent demand will be assessed by compiling information about organized uses and accessible opportunities on land in the vicinity of and within the context of the Project (i.e., Project lands, water, and operation). Licensee will:

- Request information from BLM about uses of lands it authorizes in the vicinity of the Project for special events (e.g., bicycle or foot races) and obtain contact information for existing event organizers and other interest group representatives;
- Identify key contacts associated with local organizations involved with providing opportunities for persons with disabilities; and
- In the context of the Project, make reasonable attempts² to interview the key contacts about (1) existing activities and future planned use in terms of the number of events and participants, types, locations, and time(s) of year; (2) barriers that prevent participation in desired recreation activities; and (3) suggestions for removing barriers to participation. Specific questions used for the interviews will be developed in consultation with BLM, USFS, and other interested stakeholders.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- This study plan proposes study assessments and methodologies using generally accepted practices for evaluating recreation resources and use associated with the relicensing of hydroelectric projects.

² No more than three attempts to reach key contacts by phone, including leaving voice mail requesting a response.

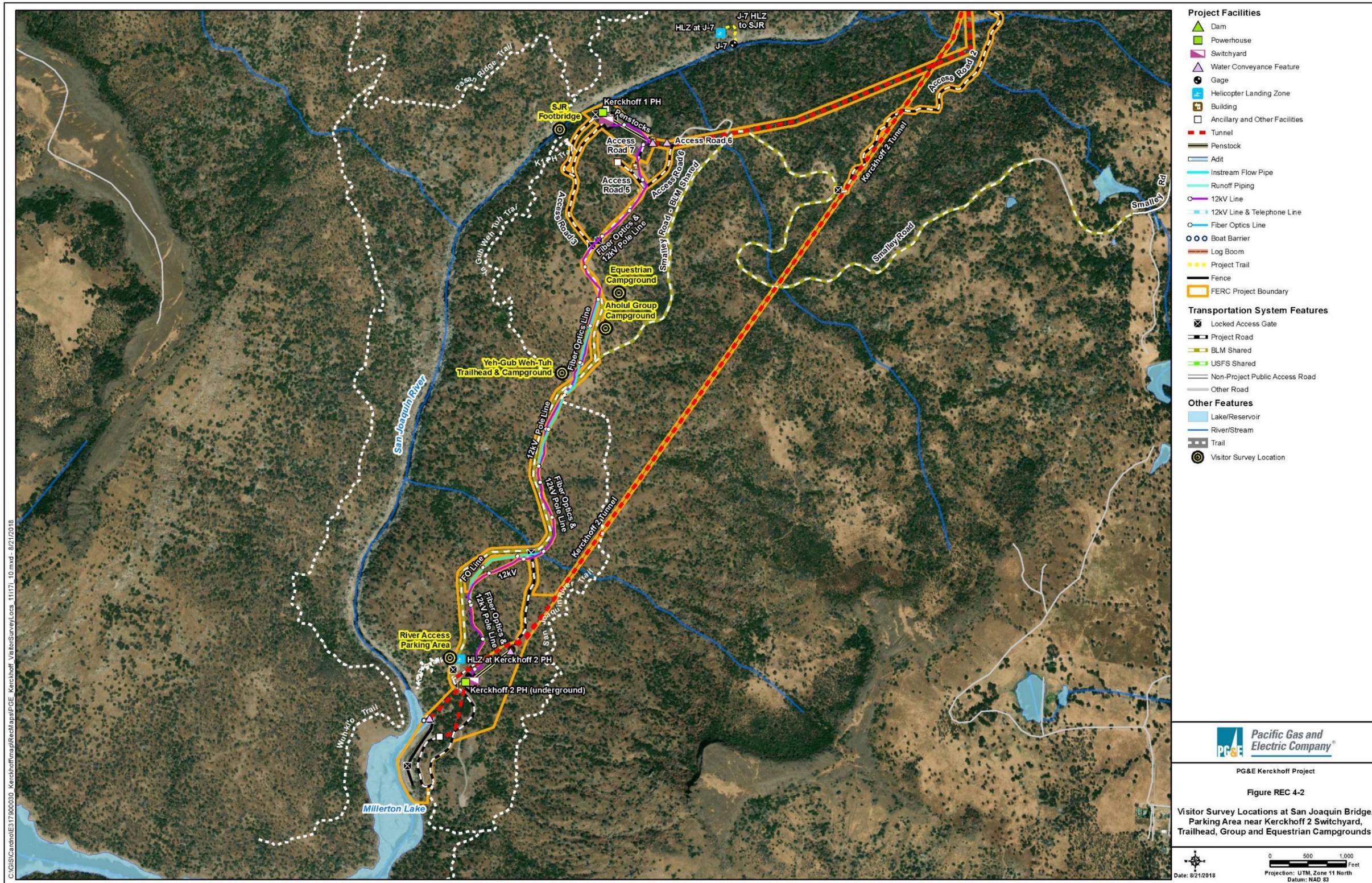


Figure REC 4-2. Visitor survey locations at San Joaquin Bridge, parking area near Kerckhoff 2 switchyard, Trailhead, Group and Equestrian campgrounds.

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REC 4-6

PRODUCTS

The following products will be developed and distributed in accordance with the schedule shown below.

- The study methods and results will be documented in a Draft REC 4 Technical Study Report (TSR) and will include summary tables, drawings, and maps, as appropriate.
- The Draft REC 4 TSR will be distributed to agencies, tribes, and other interested parties for a review and comment period.
- Comments on the Draft REC 4 TSR will be addressed, as appropriate, in a Final REC 4 TSR. The Final REC 4 TSR will be distributed in the Draft License Application (DLA) (July 2020).

RELATIONSHIP TO OTHER STUDIES

- *Study REC 1, Whitewater Boating Assessment* will report information about river access.

SCHEDULE

Date	Activity
March–October 2019	Conduct visitor surveys
November 2019	Analyze data and prepare Draft REC 4 TSR
December 2019	Distribute Draft REC 4 TSR to resource agencies, tribes, and other interested parties
January–March 2020	Stakeholders review and provide comments on draft report
April and May 2020	Address comments and prepare final report
July 2020	Distribute Final REC 4 TSR in the DLA

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	11,000
Fieldwork and Research	\$	115,000
Data Analysis	\$	35,000
Products	\$	32,000
Total	\$	193,000

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REFERENCES

- BLM (Bureau of Land Management). 2012. Proposed resource management plan and final environmental impact statement, volume one. U.S. Department of the Interior, Bureau of Land Management, Bakersfield Field Office. Bakersfield, California. August.
- . 2014. Bakersfield Field Office record of decision and approved resource management plan. U.S. Department of the Interior, Bureau of Land Management, Bakersfield Field Office. Bakersfield, California. December.
- CDPR (California Department of Parks and Recreation). 2013. Outdoor recreation in California's regions 2013. Planning Division, California State Parks, Natural Resources Agency, State of California. Sacramento, California.
- . 2014. Survey on public opinions and attitudes on outdoor recreation in California 2012, Complete Findings. California State Parks, Natural Resources Agency, State of California. Sacramento, California. January.
- . 2015. 2015 Statewide comprehensive outdoor recreation plan. California State Parks, Natural Resources Agency, State of California. Sacramento, California.
- PG&E (Pacific Gas and Electric Company). 1977. Kerckhoff 1 & 2 Project, Exhibit R. Pacific Gas and Electric Company, San Francisco, CA. Filed with FERC June 20.
- . 2016. Public safety plan for Kerckhoff Hydroelectric Project (FERC No. 96). Pacific Gas and Electric Company, San Francisco, California. Filed with FERC January 6, 2017.
- USFS (U.S. Forest Service). 2016. Draft revised land management plan for the Sierra National Forest. U.S. Forest Service, Sierra National Forest, Clovis, California. May.

STUDY CUL 1 Cultural Resources

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Effects of the Project on recorded, known but unrecorded, and previously unknown/unrecorded prehistoric and historic-era cultural resources documented in the Project Area.

PROJECT NEXUS

- Project operations and maintenance (O&M) activities may affect objects, sites, buildings, structures, or districts comprising archaeological and historical resources and Traditional Cultural Properties/places that may qualify for listing in the National Register of Historic Places (NRHP).
- The Federal Energy Regulatory Commission's (FERC's) decision to issue a new license is considered an "undertaking" pursuant to 36 Code of Federal Regulations (CFR) 800.16(y). The National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of undertakings on historic properties.

RELEVANT INFORMATION

The following information is available and was reviewed to determine cultural resource study needs:

- Numerous cultural resources inventory, overview, and evaluation reports that document prehistoric and historic-era sites, features, and artifacts within the FERC Project Boundary and in the vicinity of the Project are available from Pacific Gas and Electric Company (PG&E) and the Southern San Joaquin Valley Information Center (SSJVIC) of the California Historical Resources Information System, as documented in Section 5.9, *Cultural Resources* and Section 5.10, *Tribal Resources* of the Pre-Application Document (PAD).
- Records for known prehistoric and historic-era resources located within or adjacent to the FERC Project Boundary are available from the SSJVIC, the Office of Historic Preservation (OHP), and PG&E.
- Historical mapping of the vicinity of the Project is available through the U.S. Geological Survey (USGS) Historical Topographic Map Collection, the U.S. Bureau of Land Management's (BLM's) General Land Office (GLO); the Map Room at the Henry Madden Library at California State University, Fresno; and the Fresno County Public Library Heritage Center.
- Records of early purchases and grants of public lands in the vicinity of the Project are available through the GLO.

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- Information about the history of the Project and select Project facilities is available from a number of primary sources including the following:
 - *Archaeological Testing, Resource Evaluation, and Management Planning for the Crane Valley Hydroelectric Project Area* (Goldberg et al. 1986) (includes resources within the Kerckhoff Reservoir area);
 - *Ethnographic, Ethnohistoric, and Traditional Cultural Property Study for the Crane Valley Hydroelectric Project* (McCarthy et al. 2011) (covers portions of the Kerckhoff Reservoir area);
 - *National Register of Historic Places Evaluation of the Kerckhoff Hydroelectric Project* (Nettles and Cimino 2013); and
 - *Archaeological Investigations for the Kerckhoff Hydroelectric Project* (Varner and McCormick 1977).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- FERC and State Historic Preservation Officer (SHPO) concurrence on the Area of Potential Effects (APE) (i.e., final definition of APE).
- Information regarding locations of unidentified resources, areas of high sensitivity, and historical context.
- NRHP evaluations of all historic-era and prehistoric cultural resources within the APE that may be affected by Project O&M activities.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Establish an APE for the Project through implementation of this study plan in consultation with the SHPO, the U.S. Forest Service, BLM, the Bureau of Reclamation (BoR), and California Native American Tribes with interest in the Project, and other appropriate interested parties. For the purpose of this study plan, California Native American Tribes include federally recognized Native American tribes; tribes and individuals listed by the California Native American Heritage Commission as having an interest in the Project Area; tribes and individuals holding land, an allotment, or an allotment in trust, within or adjacent to the Project Area; and tribes, organizations, and individuals identified by other tribes and Native American individuals, agencies (federal, state, or local), and ethnographers. For the purpose of this study plan, interested parties include consulting parties as defined in 36 CFR 800.2.
- Complete archival research to define possible locations of unidentified resources, determine areas of high sensitivity, and establish the historical context. Additional archives may include the BLM's cultural resources files, files of the Sierra National Forest, files of the BoR (if available), the Map Room at the Henry Madden Library, California State University – Fresno, and the records of local historical societies.

CUL 1-2

- Visit known cultural resources (including unevaluated archaeological resources, built environment resources, and historic properties) located within the APE to verify their location, condition, and boundaries, and update the existing site records, as necessary.
- Conduct intensive pedestrian archaeological/built environment inventories of areas within the APE that have not been the subject of previous surveys, where previous surveys are outdated, or where previous surveys do not meet current standards or sufficient methods to identify, map, and record presently unknown cultural resources.
- Complete NRHP evaluations of historic-era and prehistoric archaeological resources within the APE that are subject to effects from Project O&M activities. As archaeological testing is inherently destructive, archaeological testing will be limited to the extent required to characterize and evaluate resources. NRHP evaluations will consider all four eligibility criteria (A, B, C, and D). NRHP evaluations will be conducted in accordance with an NRHP Work Plan that is developed in consultation with resource agencies, tribes, and other interested parties.

EXTENT OF STUDY AREA

- The Study Area includes the area within 1.6 kilometers (km) (1 mile [mi.]) of the FERC Project Boundary and any Project facility that currently lies outside of the FERC Project Boundary. This Study Area will be used for archival research that will be used to develop contextual and background information.
- Field surveys will be limited to the APE, which for the purposes of this study is proposed as the area within the FERC Project Boundary plus the area within 200 feet (ft.) of any Project facility that is not located within the current FERC Project Boundary. The proposed APE is shown in Figures CUL 1-1 and CUL 1-2. For subsurface facilities (i.e., tunnels and buried penstocks) that are in the FERC Project Boundary, but will not or cannot be accessed from outside of specific access areas, the field survey will include survey of all O&M access areas, portals, adits, and other above-ground Project features with a buffer of 200 ft. to account for O&M and Project access. As these facilities were constructed by tunneling and can only be reached from access points, there was no past disturbance and no potential for future disturbance outside of those access points.
- As the cultural resources studies proceed, it may become necessary, depending on the nature of the resources identified, to further define the indirect APE (IAPE). The IAPE, if needed, will indicate those areas where direct impacts will not occur (and which are, therefore, not subject to archaeological survey or testing) but in which resources may experience indirect impacts as a result of Project activities (e.g., damage to an archaeological site that is part of an archaeological district may result in the requirement that the entire district be considered as being within the IAPE). If an IAPE is developed, no archaeological study will be performed within it, but further archival and ethnographic study may be necessary to assess impacts and develop avoidance or mitigation measures.

CUL 1-3

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STUDY METHODS AND ANALYSIS

Information available from the SSJVIC and PG&E's confidential cultural resource database was compiled and reviewed in support of the PAD. However, information that may be available from the following sources will be acquired and reviewed to supplement the information that was compiled for the PAD:

- The SSJVIC of the California Historical Resources Information System;
- USGS historical topographic map collection;
- BLM GLO plat maps and survey notes;
- BLM GLO land patent and grant records;
- BLM Bakersfield Field Office cultural resource files;
- Sierra National Forest High Sierra Ranger District cultural resources files and, if appropriate, the Bass Lake Ranger District cultural resources files;
- Cultural resources documents on file with the BoR, if any are available;
- Madera County Museum;
- Eastern Fresno County Historical Society;
- PG&E's company archives;
- Map Room at the Henry Madden Library, California State University, Fresno; and
- Fresno County Public Library Heritage Center.

Study development will include complete mapping of the locations of all known prehistoric and historic-era cultural resources and historic properties in the APE, including current NRHP listing eligibility status.

All fieldwork will be conducted under permits issued by the land management agency responsible for the area to be studied. The specific authorities under which the permits are issued (i.e., the Archaeological Resources Protection Act, the Organic Act, Federal Land Policy Management Act) and the necessary applications and approvals for permits vary among agencies and type of work performed. All work performed for this relicensing Project will be performed under the appropriate permits issued by each agency.

Executive Order 13007 directs federal agencies to allow Native Americans access to, and avoid degradation of, sacred sites (potentially including archaeological sites) located on federal land, and would be applicable during the life of the proposed License.

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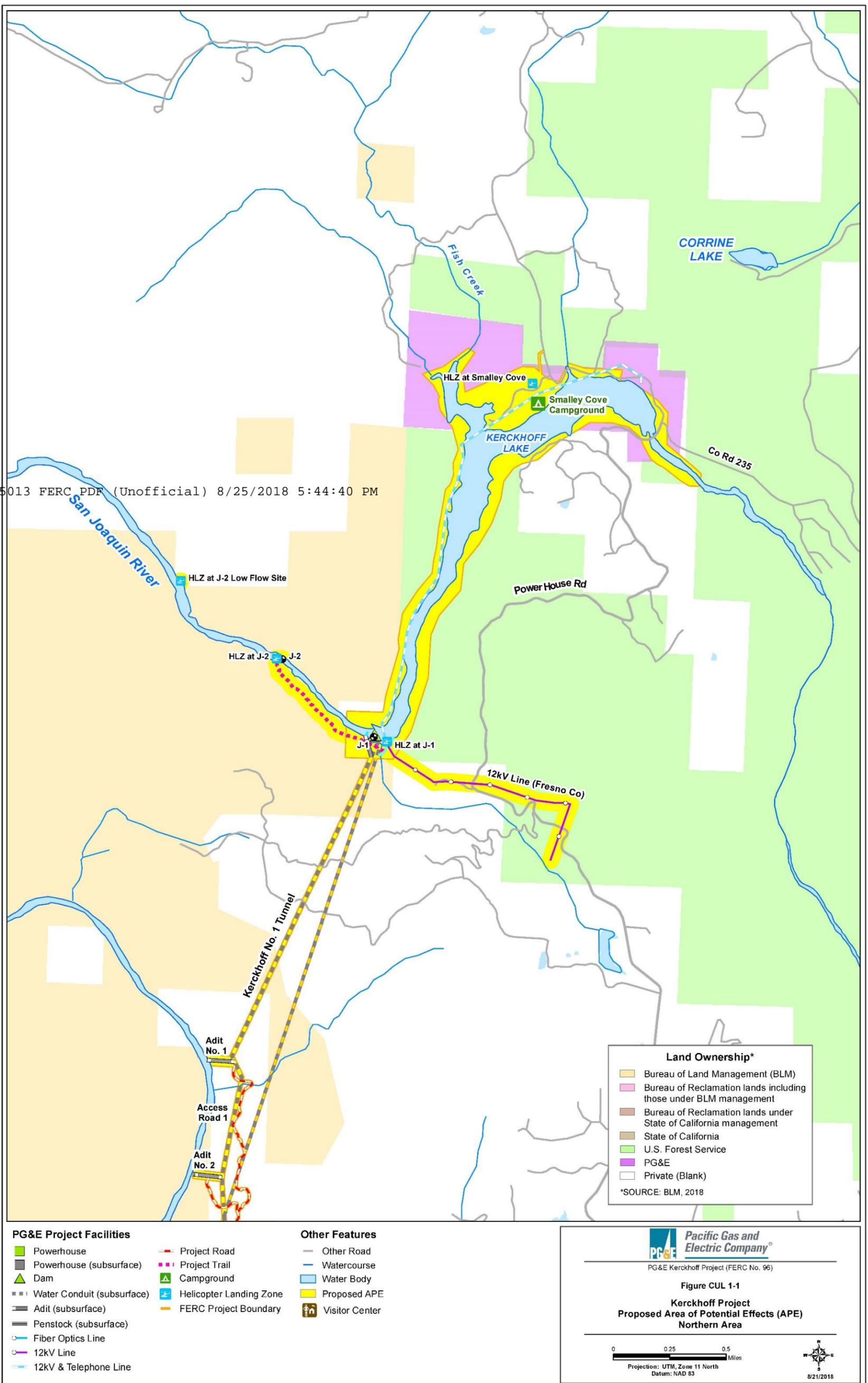


Figure CUL 1-1. Kerckhoff Project Proposed Area of Potential Effects (APE), Northern Area.

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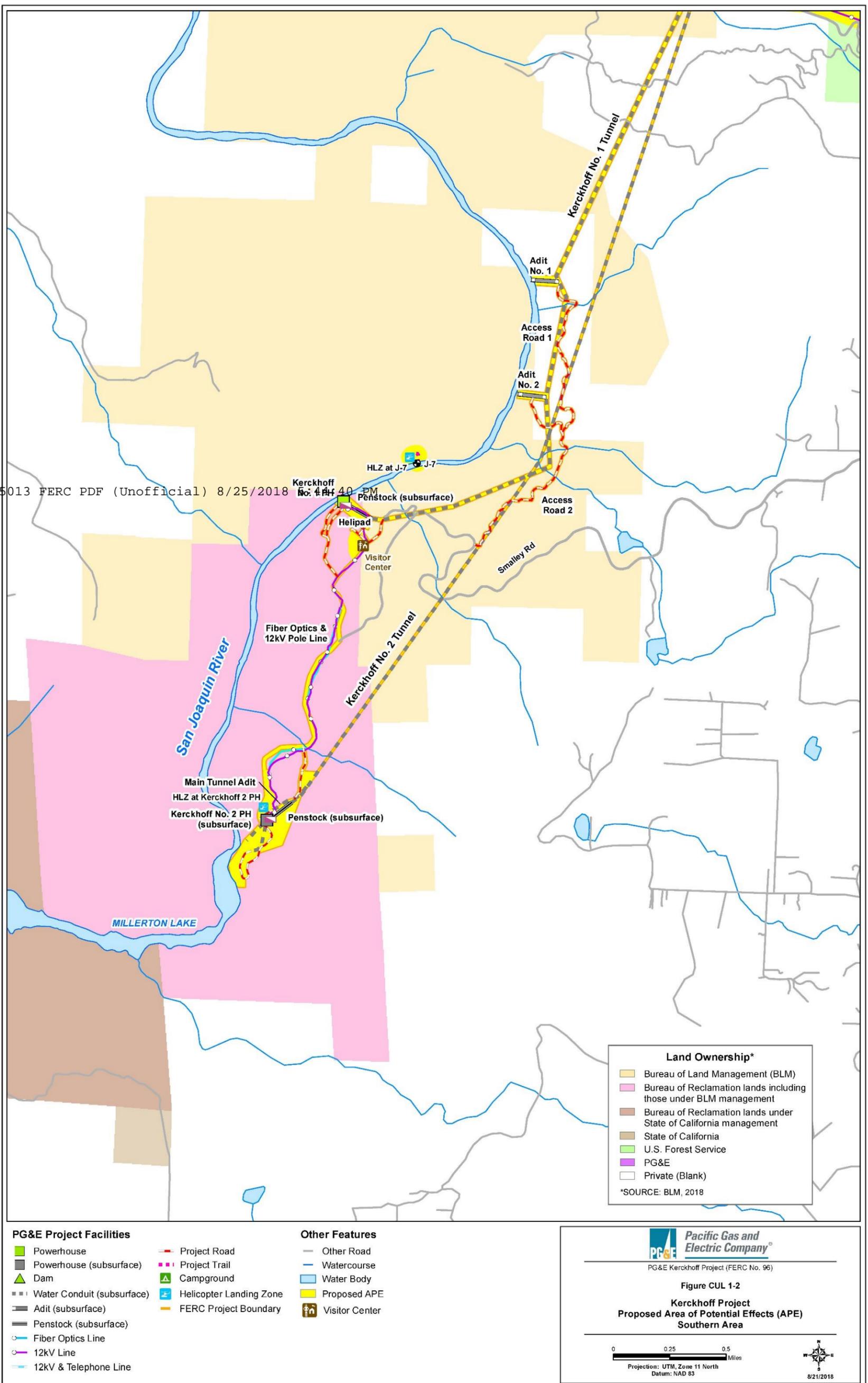


Figure CUL 1-2. Kerckhoff Project Proposed Area of Potential Effects (APE), Southern Area.

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Any human remains identified and/or disturbed by PG&E personnel or contractors acting on behalf of PG&E on federal lands during the relicensing process will be treated in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA). The field personnel will notify the appropriate contact at the land management agency (defined in the fieldwork permits), and further steps will be determined in consultation with the agency, California Native American Tribes as required and/or allowed by the policies of the land management agency, and the county coroner.

Human remains identified on private lands during the course of the relicensing will be reported to the county coroner, as required by California state law, and the coroner will consult with the Native American Heritage Commission to determine the most likely descendant (MLD). PG&E will work with the MLD to address proper repatriation of the remains, as required by state law.

Field Surveys¹

- Revisit previously recorded cultural resources and update existing site records as necessary.
- Conduct intensive pedestrian surveys in those portions of the APE that may not have been adequately surveyed for archaeological resources during previous investigations, or for which previous surveys are now outdated.
 - Surveys will be conducted using transects spaced no greater than 30 meters (98 ft.) apart, depending upon variations in the terrain, archaeological sensitivity of the area, and the requirements of the land management agency. Areas of steep slope (e.g., slopes >35 percent) or that are otherwise unsafe to access will be marked on Project maps, but not surveyed.
 - Areas that cannot be safely accessed will be reviewed by binoculars, and any potential resources identified will be plotted by the archaeologist.
 - All diagnostic artifacts, features, artifact concentrations, and modern physical disturbances that are identified in the field will be inspected, recorded, and described in field notes, photographed, and plotted (with global positioning system [GPS] or tape and compass methods).
 - Site boundaries, features, artifact scatters and deposits, and landscape elements will be mapped using a GPS unit with sub-meter accuracy.
 - Surface features and artifacts, building or structure remains, and the surrounding environment and setting will be photo-documented using a digital camera.
- All newly identified resources and resources warranting updated documentation will be recorded on the appropriate California Department of Parks and Recreation (CDPR) Series 523 forms.
- Newly recorded resources that intersect the survey area will be recorded in full when feasible (e.g., the historic residential and industrial buildings and remains surrounding Kerckhoff Powerhouse 1). Recording in full may not be feasible in

¹ Licensee will obtain required permits from land management agencies prior to conducting field studies.

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situations where doing so would pose a risk to the safety of the field crew (e.g., resources located on extremely steep slopes), situations where the resource is so large as to make recording the entire resource impractical (i.e., a large historic district or landscape that extends well beyond the APE), or for linear features that stretch well beyond the APE (e.g., historic roads, canals). In cases where the entire resource is not recorded in full, the site record will note that only a segment has been recorded, and indicate the reasons for not documenting the entire resource. In the case of linear resources, if documentary and/or ethnographic materials are readily available illustrating the full length, such information will be incorporated into the documentation.

- The cultural resources team will examine the Kerckhoff hydroelectric system as a historic landscape.
- All surveys and evaluations will be overseen by professionals who meet the Secretary of Interior's Standards and Guidelines for Professional Qualifications for prehistoric archaeology, historic archaeology, and architectural history, as appropriate.
- If Kerckhoff Reservoir levels are low enough to allow survey of portions of the lakebed and examination of previously reported sites that are typically submerged, such surveys will be performed, and resources documented. If lake levels do not allow for such a survey to be performed, then site records for currently known resources will be updated with information that is available.

National Register of Historic Places Evaluations

Cultural resources that may be affected by O&M of the Project, and that have not been previously evaluated, will be evaluated for eligibility for listing on the NRHP as required by Section 106 of the NHPA. Evaluation of cultural resources will be conducted using the following general procedures:

- Identify cultural resources located within the APE that may be affected by O&M of the Project, including historic-era and prehistoric archaeological resources. Submerged sites or those that are otherwise inaccessible will be assumed eligible for the NRHP until such time that conditions allow for their evaluation.
- Coordinate and consult with FERC, land management agencies, SHPO (if necessary), California Native American Tribes, and appropriate interested parties regarding the resources that may be affected by Project O&M.
- Develop an NRHP Work Plan that includes a research design/historic context statement that clearly identifies research topics and themes that will guide the assessment of resource significance and integrity of each resource.
 - The Work Plan will be developed in consultation with resource agencies, tribes, and other interested parties, as appropriate.
 - The Work Plan will incorporate a NAGPRA Plan of Action.
 - The Work Plan will consider all NRHP criteria and not be limited to those criteria under which certain resource types are normally evaluated.

- A NAGPRA Plan of Action detailing appropriate treatment of remains discovered on federal lands will be created prior to any excavation at locations that may contain human remains or burial items. Human remains identified on private lands will be treated in the manner required by California state law.
- Conduct NRHP eligibility studies as follows:
 - NRHP eligibility studies will be conducted in adherence to *National Register Bulletin Number 15 – How to Apply the National Register Criteria for Evaluation* (National Park Service [NPS] 1995).
 - Contextual information and research themes will be developed using the historical background information developed through archival research and will consider the ethnographic information and archaeological data collected as part of *Study CUL 2, Tribal Resources*.
 - The evaluations may require subsurface excavations to determine a site’s spatial extent, character, and potential for retaining important scientific information.
 - All fieldwork in support of studies will be conducted under permits issued by the appropriate land management agency.
- Consult with the Sierra National Forest, BLM, BoR, appropriate California Native American Tribes, appropriate interested parties, and the SHPO regarding NRHP eligibility recommendations.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- All phases of the cultural resources investigation will be conducted in accordance with the Secretary of the Interior’s Standards and Guidelines for Identification of Cultural Resources (48 CFR 44720-23).
- Resource evaluations will be conducted in adherence with *National Register Bulletin Number 15 – How to Apply the National Register Criteria for Evaluation* (NPS 1995).
- The NRHP Work Plan will adhere to the California OHP’s *Guidelines for Archaeological Research Designs* (1991).
- The cultural resources inventory report will adhere to the California OHP’s *Archaeological Resource Management Reports: Recommended Contents and Format* guidelines (1990).
- Both cultural resources inventory and evaluations will be consistent with standard requirements for Section 106 as laid out at 36 CFR 800. As necessary and appropriate, these studies will also be consistent with the requirements of the *State Protocol Agreement Among the California State Director of the Bureau of Land Management and the California State Historic Preservation Officer Regarding the Manner in Which the Bureau of Land Management 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* (BLM Agreement)

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(2014) and the *Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region* (Forest Service PA) (2012). Use of these agreements may require consultation with SHPO before the studies are initiated.

PRODUCTS

The cultural resources study methods and results will be documented in three cultural resources inventory and evaluation reports (referred to as the CUL 1a, CUL 1b, and CUL 1c Technical Study Reports [TSRs]), which will be considered confidential and will not be distributed to the general public. The CUL 1 TSRs will be formatted in accordance with the Secretary of the Interior's (48 CFR 44720-23), California OHP's, FERC's, and PG&E's standards and guidance.

- The CUL 1a TSR will document the archaeological resource identification efforts, including methods and results. The TSR will include, but is not limited to:
 - Project location and description;
 - A description of the Project APE and map depicting the APE;
 - Regulatory setting;
 - Prehistoric context for the Study Area;
 - Study methods;
 - Study results;
 - If appropriate, discussion of historic-era archaeological sites as elements of a historic landscape based around the hydroelectric system;
 - Maps showing the location of cultural resources, past resource studies, and relicensing survey area with respect to the APE;
 - An appendix containing updated and/or new CDPR Series 523 forms for each cultural resource;
 - An appendix containing additional information from the record search (in digital format if large); and
 - As appropriate, the NRHP Work Plan may be appended to this document to support the development of the CUL 1b TSR.
- The CUL 1b TSR will document the NRHP and California Register of Historical Resources (CRHR) evaluation efforts for archaeological resources, including methods and eligibility findings. The TSR will include, but is not limited to:
 - Project location and description;
 - Regulatory setting;

- NRHP evaluation findings;²
 - Maps showing the location of cultural resources, past resource studies, and relicensing survey area with respect to the APE; and
 - An appendix containing updated and/or new CDPR Series 523 forms for each evaluated cultural resource.
- The CUL 1c TSR will document the historic-era built environment study efforts, including methods and NRHP and CRHR eligibility findings. The TSR will include, but is not limited to:
 - Project location and description;
 - Regulatory setting;
 - Historic-era context for the Study Area;
 - Study methods;
 - Study results;
 - Discussion of the hydroelectric system's built environment as a potential element of a historic district;
 - NRHP evaluation findings;
 - Maps showing the location of cultural resources, past resource studies, and relicensing survey area with respect to the APE; and
 - An appendix containing updated and/or new CDPR Series 523 forms for each built environment cultural resource.
 - The Draft CUL 1 TSRs will be submitted to appropriate resource agencies, tribes, and interested parties for a 45-day review and comment period.
 - If submerged sites in Kerckhoff Reservoir cannot be surveyed under this study plan, the Historic Properties Management Plan (HPMP) will include a recommendation for a future potential survey when reservoir levels are low.
 - As needed, and allowed by FERC's process and federal regulations, cultural resources geographic information system (GIS) data and record search information will be shared with land management agencies
 - Comments on the Draft CUL 1 TSRs will be addressed, as appropriate, in Final CUL 1 TSRs. The Final CUL 1 TSRs will be distributed with the Draft License Application (DLA) in July 2020.
 - Provisions for the treatment of any human remains identified and/or disturbed by PG&E personnel or as a result of PG&E activities on federal lands during the life of this License will be developed during the creation of the HPMP. These provisions will be developed in accordance with NAGPRA and in consultation with

² Licensee will consult with the land management agency on NRHP findings before consulting with SHPO.

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California Native American Tribes under the policies of the land management agency and in accordance with proper laws and regulations.

- Provisions for appropriately treating and repatriating remains found on private lands during the life of the License will be determined during the development of the HPMP. These provisions will be determined based on existing law and must be compatible with legal practices required within California and Fresno County.

RELATIONSHIP TO OTHER STUDIES

- Information developed as part of *Study CUL 2, Tribal Resources* will be used in *Study CUL 1*, as appropriate.
- Contextual and ethnographic information developed as part of *Study CUL 2, Tribal Resources* will be used to support *Study CUL 1* NRHP evaluations (if deemed necessary).

SCHEDULE

Date	Activity
January–February 2019	Establish APE in consultation with land management agencies, California Native American Tribes, appropriate interested parties, FERC, and SHPO
March 2019	Conduct detailed review of previous survey reports and records
April 2019–June 2019	Conduct field surveys
July–November 2019	Develop NRHP Work Plan in consultation with California Native American Tribes, interested parties, and resource agencies (as appropriate)
December 2019–February 2020	Conduct NRHP eligibility studies
March–April 2020	Prepare Draft CUL 1 TSRs and distribute for review and comment by authorized participants (45-day review)
July 2020	Comments will be addressed and the Final CUL 1 TSRs will be distributed with DLA to authorized participants

LEVEL OF EFFORT AND COST

The estimated cost (2018 dollars) for the study by major tasks is as follows:

Project Management and Consultation	\$	47,498
Fieldwork	\$	131,418
Data Analysis	\$	122,188
Products	\$	95,996
Total	\$	397,100

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- Nettles, W.M., and S.L. Cimino. 2013. National Register of Historic Places evaluation of the Kerckhoff Hydroelectric Project (FERC 96). Report prepared by Pacific Gas and Electric Company, Fresno, California.
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Wilson, K.L. 1976. Archaeological Reconnaissance of the Kerckhoff Hydroelectric Project. Report to PG&E.

STUDY CUL 2 Tribal Resources

August 2018

POTENTIAL RESOURCE ISSUE(S)

- Indian Trust Assets (ITAs), Traditional Cultural Properties (TCPs), and other resources of traditional, cultural, or religious importance to the Native American community. An ITA is defined as a legal interest in property held in trust by the U.S. government for Indian tribes and individuals, or property protected under U.S. law for Indian tribes and individuals, including Indian allotments. A TCP is defined as a property that is eligible for inclusion in the National Register of Historic Places (NRHP) based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community.

PROJECT NEXUS

- Operation and maintenance (O&M) of the Project could potentially affect tribal resources, including ITAs, TCPs, and other resources of traditional, cultural, or religious importance to the Native American community.
- The Federal Energy Regulatory Commission's (FERC's) decision to issue a new license is considered an "undertaking" pursuant to 36 Code of Federal Regulations (CFR) 800.16(y). The National Historic Preservation Act (NHPA) requires federal agencies to take into account the effect of undertakings on historic properties.

RELEVANT INFORMATION

The following databases and information are available or were reviewed to determine tribal resources study needs (refer to Section 5.10, *Tribal Resources* of the Pre-Application Document [PAD] for a summary of available information):

- Databases maintained by the Native American Heritage Commission (NAHC), which include some known TCPs, tribal cultural resources, other culturally sensitive properties and sites, and contact information for tribal representatives, governments, and other Native American organizations;
- Records on ITAs held in trust for tribes and individual Native Americans maintained by the Bureau of Indian Affairs;
- Records of potentially culturally sensitive archaeological and ethnographic-period sites and properties maintained by the Southern San Joaquin Valley Information Center (SSJVIC) of the California Historical Resources Information System;
- Stakeholder questionnaire responses (provided in Appendix A of the PAD); and

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- Numerous site records and cultural resource survey, inventory, and evaluation reports available from Pacific Gas and Electric Company (PG&E), as documented in Section 5.10, *Tribal Resources* of the PAD.

In addition, those resources listed below under “Archival Research” will provide valuable information.

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Location and nature of tribal resources that could be affected by Project O&M.
- Inadequate identification of Native American community respondents.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following information gathering and studies are proposed to supplement existing information:

- Consult with California Native American Tribes and agency personnel (U.S. Bureau of Land Management [BLM], U.S. Bureau of Reclamation [BoR], U.S. Forest Service) to identify Native American groups and individuals to be consulted that are not already listed among the resource agencies, tribes, and other appropriate interested parties. For the purpose of this study plan, California Native American Tribes include federally recognized Native American tribes; tribes and individuals listed by the California NAHC as having an interest in the Project Area; tribes and individuals holding land, an allotment, or an allotment in trust, within or adjacent to the Project Area; and tribes, organizations, and individuals identified by other tribes and Native American individuals, agencies (federal, state, or local), and ethnographers. For the purpose of this study plan, interested parties include consulting parties as defined in 36 CFR 800.2.
- Consult with California Native American Tribes and other appropriate interested parties to identify and map tribal resources, including ITAs, TCPs, and other resources of traditional, cultural, or religious importance to Native Americans that could be affected by Project O&M.
- Conduct an inventory and tribal/ethnographic study to determine the presence of tribal resources within the Area of Potential Effects (APE), and evaluate those resources to determine if they are eligible for listing in the NRHP.

EXTENT OF STUDY AREA

For tribal resources studies, the proposed Study Area (also referred to as the APE) includes the area within the existing FERC Project Boundary and the area within 200 feet (ft.) of any Project facility that is not located within the current FERC Project Boundary. The final definition of the APE will be developed during APE consultation under implementation of *Study CUL 1, Cultural Resources*. As described in the plan for *Study CUL 1*, a records and literature search will be conducted for a 1-mile (1.6-kilometer) area around the APE. This will provide background

information that may inform *Study CUL 2* as well as *Study CUL 1*. The proposed APE is included in this study plan as Figures CUL 2-1 and CUL 2-2.

As the cultural resources studies proceed, it may become necessary, depending on the nature of the resources that are identified, to further define the indirect APE (IAPE). The IAPE, if needed, will indicate those areas where direct impacts will not occur but in which resources may experience indirect impacts as a result of Project activities (e.g., damage to an archaeological site that is part of an archaeological district may result in the requirement that the entire district be considered as being within the IAPE).

STUDY METHODS AND ANALYSIS

The tribal resources study will involve a three-step process that includes completion of archival research, identification of resources, and NRHP evaluations of resources that may be directly or indirectly affected by Project activities. These steps will be conducted in consultation with the State Historic Preservation Officer (SHPO), the NAHC, California Native American Tribes, and federal land management agencies, as appropriate.

Executive Order 13007 directs federal agencies to allow Native Americans access to, and avoid degradation of, sacred sites (potentially including, but not limited to, archaeological sites, important geologic formations, gathering areas, and historic locations) located on federal land, and would be applicable under the study and during the life of the proposed License.

Archival Research

Complete archival research to identify previous studies and ethnographic information can be used to establish the context in which potential TCPs may be identified and evaluated. Potential information sources include the following:

- California NAHC;
- California State University, Chico, Merriam Library Special Collections;
- California State Library, California History Room;
- California State Library, Government Publications;
- Published and unpublished ethnographic references;
- University of California, Berkeley, Bancroft Library;
- University of California, Davis, Merriam Collection;
- National Archive and Records Administration, San Bruno;
- Sierra Mono Museum, North Fork;
- Fresno County Public Library Heritage Center;
- Madera County Library Native American Collection;
- The cultural resources files and in-house personnel of the BLM, Bakersfield Field Office;

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- The cultural resources files and in-house personnel of the Sierra National Forest; and
- Cultural resources documents on file with the BoR, if any are available.

Tribal Consultation and Resource Identification

- Continue identification of California Native American Tribes and individuals who may have affiliation with and knowledge of the vicinity of the Project.
- Consult with California Native American Tribes to identify ITAs, TCPs, and other Native American resources of traditional, cultural, or religious importance located within the APE. In order to facilitate consultation and collection of pertinent information, PG&E may retain a qualified ethnographer, with the professional qualifications for ethnography as defined in Appendix II of National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Identification of Traditional Cultural Properties* (Parker and King 1998).
- Consult with the Sierra Mono Museum and the California Indian Basketweavers' Association about the places of importance to their traditional practices.
- Interview local elders and other representatives from both federally recognized tribes and non-recognized local stakeholder tribes to help define potentially important cultural resources located within the APE and to establish the significance of those resources. PG&E's Cultural Resources Specialist (CRS) and/or the ethnographer (if delegated the task by the CRS) will contact the appropriate California Native American Tribe(s) to arrange one-on-one interviews with tribal elders or other representatives who may have knowledge of special interest areas within the Project APE. Interviews will be respectfully conducted and documented by a qualified ethnographer.
- In some cases, a site visit may be appropriate or necessary to define potential TCPs accurately. If necessary, the PG&E CRS or the ethnographer (if delegated the task by the CRS) will arrange site visits between the appropriate tribal representatives and the ethnographer. Site location information that is developed as part of this process will be kept confidential and respectfully documented by the ethnographer. All site visits will be coordinated with the appropriate land management agency and under permits, as necessary, issued by that agency.
- If participating California Native American Tribes do not wish to disclose the locations of potential resources due to religious or confidentiality reasons, the PG&E CRS will work with the tribes to identify the general issues and concerns that the tribe(s) may have regarding potential Project effects and will work to develop agreeable measures to alleviate these concerns.

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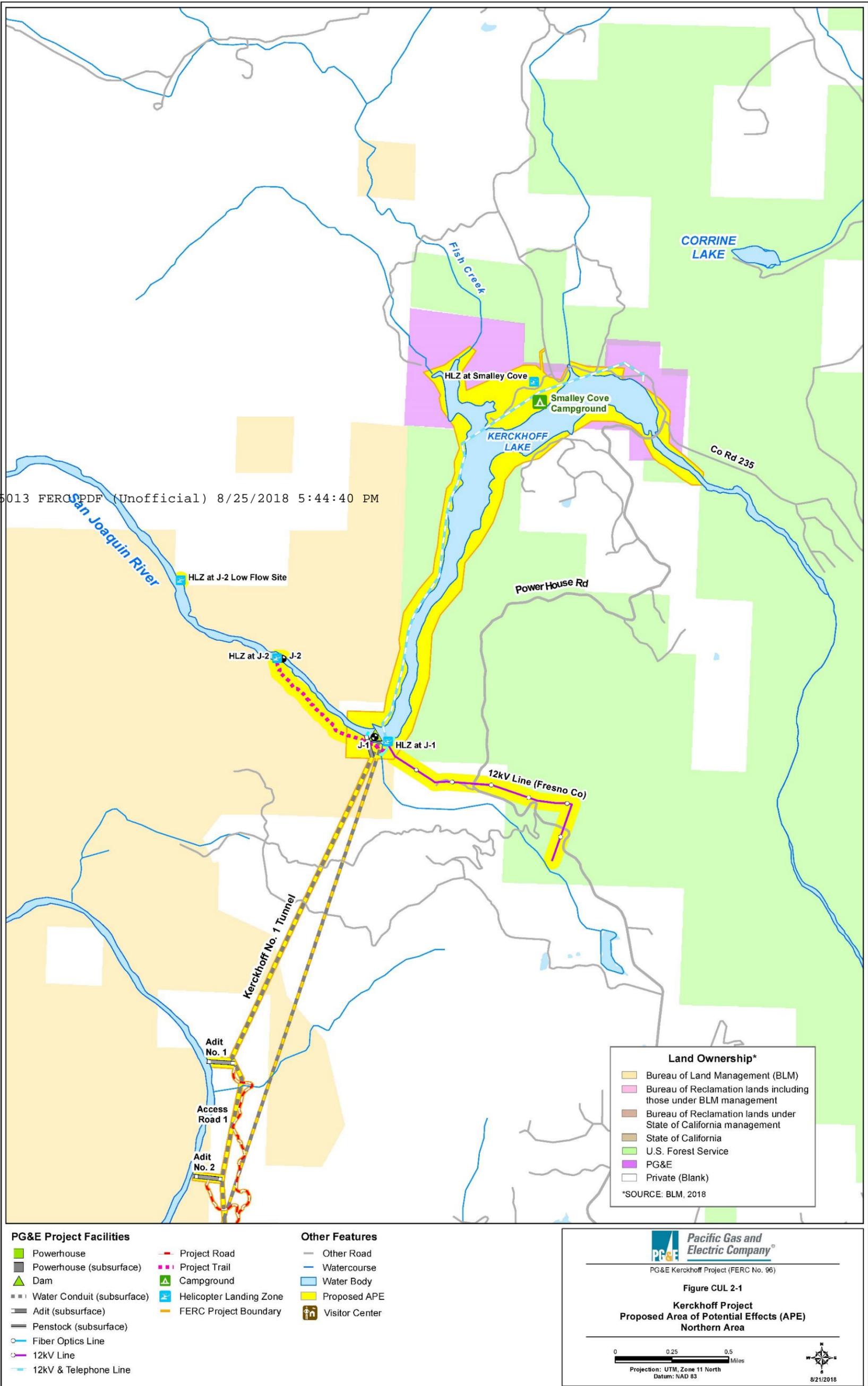


Figure CUL 2-1. Kerckhoff Project Proposed Area of Potential Effects (APE), Northern Area.

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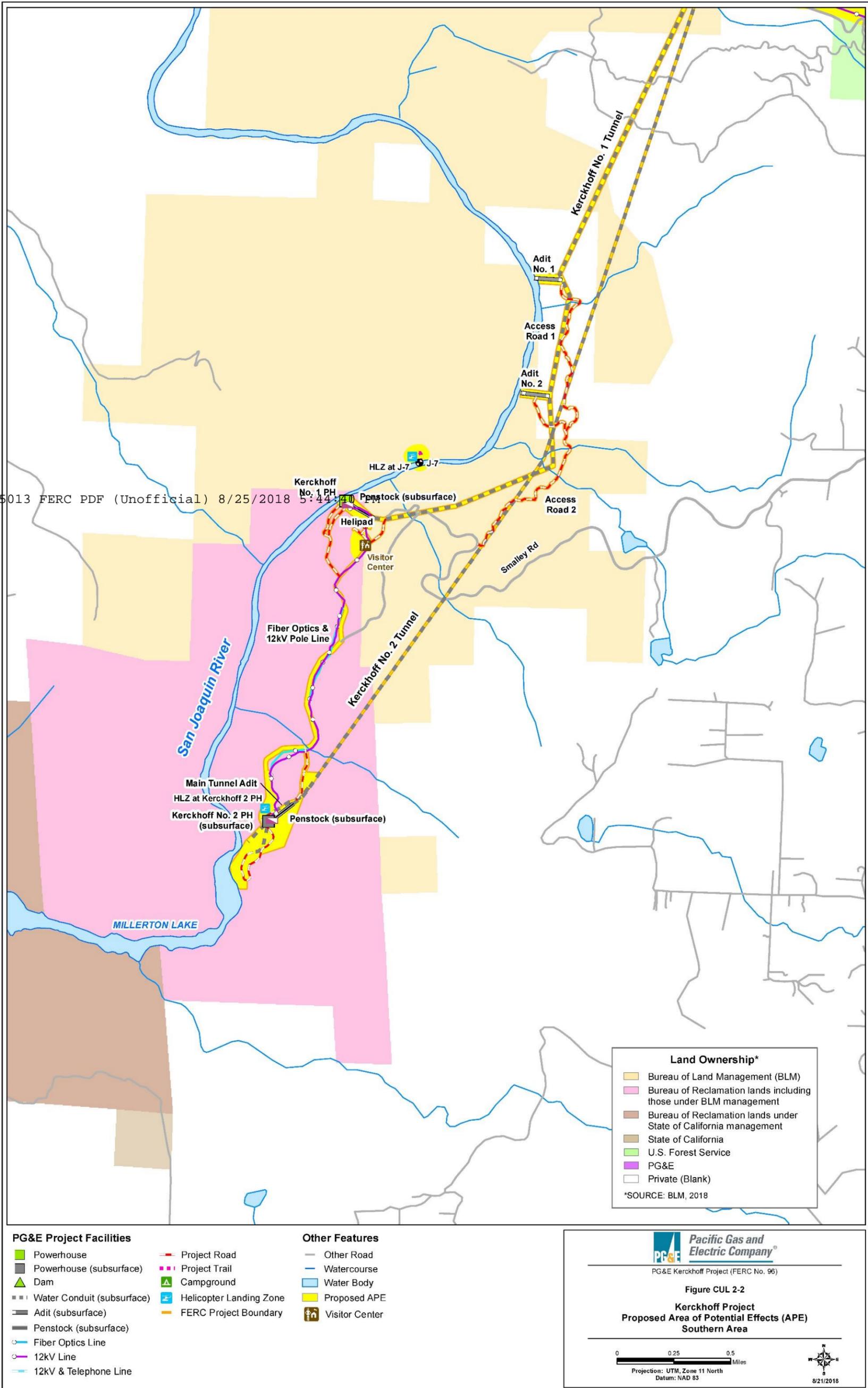


Figure CUL 2-2. Kerckhoff Project Proposed Area of Potential Effects (APE), Southern Area.

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National Register of Historic Places Evaluation

The NRHP evaluation of tribal resources follows the same procedures and criteria used for determining the significance of other potential historic properties. Although tribal resources have the same classification structure as other NRHP properties, their description, boundaries, integrity, and evaluation structure is usually substantially different from those of archaeological or architectural resource evaluations, and thus they would not be evaluated under the CUL 1 Technical Study Report (TSR). Although there can be considerable overlap between tribal resources and areas categorized as archaeological sites, in general the physical and cultural distinctions are significant enough to provide for a clear differentiation between the two and separate evaluation assessments. Addressing the NRHP eligibility of tribal resources would include the following tasks:

- Determine whether any of the culturally important resources located within the APE could potentially be affected by O&M of the Project.
- If deemed necessary, develop a Tribal Resources NRHP Eligibility Evaluation Work Plan in consultation with the California Native American Tribes and resource agencies, as appropriate, and conduct studies.
- Conduct tribal resources NRHP eligibility studies.
 - The tribal resources NRHP eligibility studies will be conducted in adherence with National Register Bulletin No. 15, *How to Apply the National Register Criteria for Evaluation* (National Park Service [NPS] 1995).
 - NRHP evaluations will be conducted in consultation with appropriate California Native American Tribes, appropriate federal land management agencies, FERC, and the SHPO.
 - The evaluations will consider the ethnographic data, tribal member interviews, and cultural data collected as part of the tribal interview and resources documentation process described above.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- All phases of the tribal resources investigation will be conducted in accordance with the Native American community consultation standards outlined in Section 106 of the NHPA and discussed in the 2012 Advisory Council on Historic Preservation publication *Consultation with Indian Tribes in the Section 106 Review Process: A Handbook*.
- Consultation, any necessary fieldwork, and potential TCP documentation will be implemented in accordance with Section 106 of the NHPA, as amended, and shall take into consideration National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Identification of Traditional Cultural Properties* (Parker and King 1998).

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- Tribal resources documentation will be implemented in accordance with Section 106 of the NHPA, as amended, and shall take into consideration National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Identification of Traditional Cultural Properties* (Parker and King 1998).
- Evaluations will be conducted in adherence with National Register Bulletin No. 15, *How to Apply the National Register Criteria for Evaluation* (NPS 1995).

PRODUCTS

All tribal resources will be documented in a tribal resources inventory and evaluation report (referred to as the CUL 2 TSR), which will be considered confidential and will not be distributed to the general public or the SSJVIC without tribal approval. The CUL 2 TSR will be formatted in accordance with the Secretary of the Interior (48 CFR 44720-23), California Office of Historic Preservation, FERC, PG&E, and land managing agency standards and guidance. This report will include, but not necessarily be restricted to, the following information:

- Project location and description;
- Regulatory setting;
- Ethnographic context of the FERC Project Boundary and adjacent areas;
- Review of newly documented tribal and ethnographic resources;
- Study methodology;
- Study findings, resource evaluations, and management recommendations; and
- Relevant Project and tribal resource mapping as appropriate.

The inventory and evaluation report will be submitted to appropriate resource agencies, California Native American Tribes, and other interested parties for a 45-day review and comment period. Comments on the draft inventory and evaluation report will be addressed in the final report as appropriate and distributed in July 2020.

Although NRHP evaluations for some prehistoric/ethnographic tribal resources have been conducted, evaluations for tribal resources subject to potential Project effects may require further research and consultation with tribal governments and representatives. NRHP evaluations requiring data collected outside the identification process will be documented in a separate report also conforming to the criteria outlined above.

RELATIONSHIP TO OTHER STUDIES

- The location of culturally important plant species that are identified by California Native American Tribes or mapped by botanists will be identified as part of *Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds*, limited to the APE as defined above. These maps will be incorporated into the CUL 2 TSR, as appropriate.

- Information about culturally important aquatic species that is developed as part of the aquatic studies will be incorporated into the CUL 2 TSR, as appropriate.
- The locations of culturally important plant species will be considered in *Study LAND 1, Project Roads and Trails Assessment*, to the extent possible without divulging confidential information.
- Information on sites associated with prehistoric and ethnographic-period Native American occupation and use of the landscape will be identified in the *Study CUL 1, Cultural Resources*.

SCHEDULE

Date	Activity
January–February 2019	Conduct archival research
March–August 2019	California Native American Tribal consultation and site visits
September–October 2019	Identify potential Project effects and determine need for NRHP eligibility studies in consultation with tribes
November–December 2019	Develop NRHP Eligibility Evaluation Work Plan in consultation with tribes and resource agencies
January–February 2020	Conduct NRHP eligibility studies
March–April 2020	Resource agencies, tribes, and other interested parties review and provide comments on Draft CUL 2 TSR (45 days)
May–July 2020	Resolve comments and prepare Final CUL 2 TSR

LEVEL OF EFFORT AND COST

This section includes a cost estimate (2018 dollars), broken down to the major component level, to provide an understanding of the level of effort anticipated in the study. For example, the preliminary estimated cost (2018 dollars) for the study broken down by major tasks is as follows:

Project Management and Consultation	\$	16,670
Fieldwork and Research	\$	60,012
Data Analysis	\$	34,050
Products	\$	46,343
Total	\$	157,075

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Advisory Council on Historic Preservation. 2012. Consultation with Indian tribes in the Section 106 review process: a handbook. December 2012. Available at: <https://www.energy.gov/sites/prod/files/2016/02/f30/consultation-indian-tribe-handbook.pdf>.

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Appendix C

Early Implementation Studies

Concurrence Documentation



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Bureau of Land Management
Communication

From: Alison Lipscomb
To: [Whitman, Lisa](#)
Cc: [Somer Shaw](#)
Subject: Re: [EXTERNAL] Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans
Date: Wednesday, August 1, 2018 3:41:53 PM

*******CAUTION: This email was sent from an EXTERNAL source. Think before clicking links or opening attachments.*******

Hi Lisa,

The BLM support's the stakeholder consensus for the early implementation of the study plans of AQ 1, GEO 1, GEO 2, and BOT 2 for 2018. We cannot share out internal signatory documentation page, but our specialists had concurrence with your request.

Thank you,
Alison

On Thu, Jul 19, 2018 at 4:55 PM Whitman, Lisa <LxWt@pge.com> wrote:

Kerckhoff Study Plan Development Participants:

At our study plan meeting in Fresno earlier this week, we confirmed that consensus has been reached on several key study plans that we have discussed implementing in advance of FERC's issuance of their Study Plan Determination on September 27, 2018. The study plans we would like to implement in September of 2018 include:

- *Study AQ 1 - Aquatic Habitat Mapping*
- *Study GEO 1 - Geomorphology*
- *Study GEO 2 - Project-related Sediment Management Practices in Kerckhoff Reservoir*
- *Study BOT 2 - Riparian and Wetland Resources.*

As we've discussed, implementing these studies this year, rather than in 2019, will inform and provide important information to us before implementing the remainder of the studies. Results from these early studies is important to assess impacts and PM&E measures as part of the license application. Waiting until after FERC's Study Plan Determination to conduct these four studies could result in delays of other studies that depend on the use of the resulting information, until 2020 or later.

Since PG&E's project team is proposing early implementation and incurring costs associated with these activities, we have requested key stakeholders provide emails

confirming your agreement with the consensus on these four study plans and supporting their early implementation. These emails will support my request to PG&E's management to take the risk of incurring costs of early data collection before FERC's Study Plan determination is issued.

Therefore, please email me by **Friday, August 3rd**, indicating your support for the consensus and the early implementation of *Studies AQ 1, GEO 1, GEO 2, and BOT 2* in 2018.

I appreciate your help and collaboration in this effort. If you have any questions, please contact me at Lisa.Whitman@pge.com or 415-973-7465.

Sincerely,

-Lisa

Lisa Whitman | License Project Manager, Hydro Licensing
Pacific Gas and Electric Company
415.973.7465 office | 415.265.9971 cell | Lisa.Whitman@pge.com

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Alison Lipscomb
Realty Specialist
CA DCA State Lead
Bakersfield Field Office
Desk- (661) 391-6177
Cell- (661) 401-8788
alipscomb@blm.gov

California Department of Fish and Wildlife
Communication

From: Leon, Abimael@Wildlife
To: [Whitman, Lisa](#)
Cc: [Guzman, Eric@Wildlife](#)
Subject: RE: Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans
Date: Monday, August 6, 2018 3:41:22 PM
Attachments: [FW Kerckhoff Relicensing Request for Email Confirming Consensus on Key Study Plans .msg](#)

*******CAUTION: This email was sent from an EXTERNAL source. Think before clicking links or opening attachments.*******

Hello Lisa,

The California Department of Fish and Wildlife (Region 4) concurs with the State Water Resources Control Board and the US Forest Service in their support for the following study plans that PG&E would like to implement in September of 2018:

- *Study AQ 1 - Aquatic Habitat Mapping*
- *Study GEO 1 - Geomorphology*
- *Study GEO 2 - Project-related Sediment Management Practices in Kerckhoff Reservoir*
- *Study BOT 2 - Riparian and Wetland Resources.*

Please let us know if you have any questions or concerns.

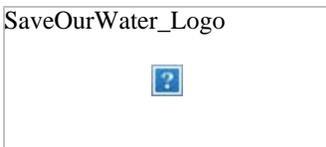
Best regards,
Abimael León

--

Abimael (Abi) León, Ph.D.
Senior Environmental Scientist (Specialist)
California Department of Fish and Wildlife
Central Region (Region 4)
Special Projects and FERC Coordinator
Ecosystem Conservation Division
Habitat Conservation Planning Branch
Environmental Planning and Review
1130 East Shaw Avenue,
Fresno, CA 93710
Office: (559)243-4014 ext.251
Fax: (559) 243-3004
E-mail: Abimael.Leon@wildlife.ca.gov

Every Californian should conserve water. Find out how at:

SaveOurWater_Logo



[SaveOurWater.com](#) · [Drought.CA.gov](#)

From: Whitman, Lisa <LxWt@pge.com>
Sent: Thursday, July 19, 2018 4:53 PM

To: Choy, Philip@Waterboards <Philip.Choy@Waterboards.ca.gov>; Guzman, Eric@Wildlife <Eric.Guzman@wildlife.ca.gov>; Leon, Abimael@Wildlife <Abimael.Leon@wildlife.ca.gov>; Alvarez, Dawn -FS (dalvarez@fs.fed.us) <dalvarez@fs.fed.us>; George, Jon -FS (jongeorge@fs.fed.us) <jongeorge@fs.fed.us>; smshaw@blm.gov; Alison Lipscomb <alipscomb@blm.gov>; Bowes, Stephen (stephen_bowes@nps.gov) <stephen_bowes@nps.gov>; Theresa Simsiman <theresa@americanwhitewater.org>; Christina McDonald (cmcdonald@northforkrancheria-nsn.gov) <cmcdonald@northforkrancheria-nsn.gov>; Honorable Ron W. Goode <Rwgoode911@hotmail.com>

Cc: Morimoto, Gina <GEMO@pge.com>; Cheslak, Edward <EFC3@pge.com>; Wayne Lifton <Wayne.Lifton@cardno.com>; Stacy Evans <stacy.evans@cardno.com>; Katie Ross-Smith (Katie.Ross-Smith@cardno.com) <Katie.Ross-Smith@cardno.com>; Armstrong, Matthew <MDAF@pge.com>

Subject: Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans

Kerckhoff Study Plan Development Participants:

At our study plan meeting in Fresno earlier this week, we confirmed that consensus has been reached on several key study plans that we have discussed implementing in advance of FERC's issuance of their Study Plan Determination on September 27, 2018. The study plans we would like to implement in September of 2018 include:

- *Study AQ 1 - Aquatic Habitat Mapping*
- *Study GEO 1 - Geomorphology*
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- *Study BOT 2 - Riparian and Wetland Resources.*

As we've discussed, implementing these studies this year, rather than in 2019, will inform and provide important information to us before implementing the remainder of the studies. Results from these early studies is important to assess impacts and PM&E measures as part of the license application. Waiting until after FERC's Study Plan Determination to conduct these four studies could result in delays of other studies that depend on the use of the resulting information, until 2020 or later.

Since PG&E's project team is proposing early implementation and incurring costs associated with these activities, we have requested key stakeholders provide emails confirming your agreement with the consensus on these four study plans and supporting their early implementation. These emails will support my request to PG&E's management to take the risk of incurring costs of early data collection before FERC's Study Plan determination is issued.

Therefore, please email me by **Friday, August 3rd**, indicating your support for the consensus and the early implementation of *Studies AQ 1, GEO 1, GEO 2, and BOT 2* in 2018.

I appreciate your help and collaboration in this effort. If you have any questions, please contact me at Lisa.Whitman@pge.com or 415-973-7465.

Sincerely,

-Lisa

Lisa Whitman | License Project Manager, Hydro Licensing
Pacific Gas and Electric Company
415.973.7465 office | 415.265.9971 cell | Lisa.Whitman@pge.com

State Water Resources Control Board
Communication

Iris Eschen

From: Choy, Philip@Waterboards <Philip.Choy@Waterboards.ca.gov>
Sent: Wednesday, July 25, 2018 10:36 AM
To: Whitman, Lisa
Cc: Morimoto, Gina; Cheslak, Edward; Leon, Abimael@Wildlife; Shaw, Somer; jongeorge@fs.fed.us; Alvarez, Dawn -FS; stephen_bowes@nps.gov; Monheit, Susan@Waterboards; Wayne Lifton; Katie Ross-Smith
Subject: RE: Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans

*******CAUTION: This email was sent from an EXTERNAL source. Think before clicking links or opening attachments.*******

Hi Lisa,

Please see below to view State Water Board staff concurrence with the following studies (as included in your original email):

- *Study AQ 1 - Aquatic Habitat Mapping*
- *Study GEO 1 - Geomorphology*
- *Study GEO 2 - Project-related Sediment Management Practices in Kerckhoff Reservoir*
- *Study BOT 2 - Riparian and Wetland Resources.*

Let me know if you have any questions.

Thank you,
Philip Choy

Philip Choy
Environmental Scientist
State Water Resources Control Board
Water Quality Certification Program
1001 I St., 14th floor Sacramento, CA 95814
(916) 341-5408

From: Monheit, Susan@Waterboards
Sent: Wednesday, July 25, 2018 10:25 AM
To: Choy, Philip@Waterboards <Philip.Choy@Waterboards.ca.gov>
Subject: RE: Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans

Philip,
Please convey to Lisa Whitman at PG&E my concurrence with your recommendation and support for the consensus and the early implementation of *Studies AQ 1, GEO 1, GEO 2, and BOT 2* in 2018.

Susan Monheit
Senior Environmental Scientist
Water Quality Certification Program
State Water Resources Control Board
1001 I St, 14th Floor, Sacramento, CA. 95814

Phone: 916.341.5341

FAX: 916.341.5400

From: Choy, Philip@Waterboards
Sent: Wednesday, July 25, 2018 9:45 AM
To: Monheit, Susan@Waterboards <Susan.Monheit@waterboards.ca.gov>
Subject: FW: Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans

Susan,

In regards to the Kerckhoff Hydroelectric Project (FERC No. 96), PG&E is requesting State Water Board concurrence with the four studies listed below (and attached) to implement them this year (prior to FERC's Study Plan Determination). Without implementation of these studies this year, the relicensing process may be delayed. It is my understanding that all active relicensing participants concur with these four study plans, as proposed by PG&E.

I recommend State Water Board concurrence with the four studies. Please let me know if you have any questions.

Thank you,
Philip Choy

Philip Choy
Environmental Scientist
State Water Resources Control Board
Water Quality Certification Program
1001 I St., 14th floor Sacramento, CA 95814
(916) 341-5408

From: Whitman, Lisa [<mailto:LxWt@pge.com>]
Sent: Thursday, July 19, 2018 4:53 PM
To: Choy, Philip@Waterboards <Philip.Choy@Waterboards.ca.gov>; Guzman, Eric@Wildlife <Eric.Guzman@wildlife.ca.gov>; Leon, Abimael@Wildlife <Abimael.Leon@wildlife.ca.gov>; Alvarez, Dawn -FS <dalvarez@fs.fed.us> <dalvarez@fs.fed.us>; George, Jon -FS <jongearge@fs.fed.us> <jongearge@fs.fed.us>; smshaw@blm.gov; Alison Lipscomb <alipscomb@blm.gov>; Bowes, Stephen (<stephen_bowes@nps.gov> <stephen_bowes@nps.gov>); Theresa Simsiman <theresa@americanwhitewater.org>; Christina McDonald <cmcdonald@northforkrancheria-nsn.gov> <cmcdonald@northforkrancheria-nsn.gov>; Honorable Ron W. Goode <Rwgoode911@hotmail.com>
Cc: Morimoto, Gina <GEMO@pge.com>; Cheslak, Edward <EFC3@pge.com>; Wayne Lifton <Wayne.Lifton@cardno.com>; Stacy Evans <stacy.evans@cardno.com>; Katie Ross-Smith (<Katie.Ross-Smith@cardno.com> <Katie.Ross-Smith@cardno.com>); Armstrong, Matthew <MDAF@pge.com>
Subject: Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans

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As we've discussed, implementing these studies this year, rather than in 2019, will inform and provide important information to us before implementing the remainder of the studies. Results from these early studies is important to assess impacts and PM&E measures as part of the license application. Waiting until after FERC's Study Plan Determination to conduct these four studies could result in delays of other studies that depend on the use of the resulting information, until 2020 or later.

Since PG&E's project team is proposing early implementation and incurring costs associated with these activities, we have requested key stakeholders provide emails confirming your agreement with the consensus on these four study plans and supporting their early implementation. These emails will support my request to PG&E's management to take the risk of incurring costs of early data collection before FERC's Study Plan determination is issued.

Therefore, please email me by **Friday, August 3rd**, indicating your support for the consensus and the early implementation of *Studies AQ 1, GEO 1, GEO 2, and BOT 2* in 2018.

I appreciate your help and collaboration in this effort. If you have any questions, please contact me at Lisa.Whitman@pge.com or 415-973-7465.

Sincerely,
-Lisa

Lisa Whitman | License Project Manager, Hydro Licensing
Pacific Gas and Electric Company
415.973.7465 office | 415.265.9971 cell | Lisa.Whitman@pge.com

U.S. Forest Service
Communication

From: George, Jon -FS
To: [Whitman, Lisa](#)
Cc: [Gould, Dean A -FS](#); [Alvarez, Dawn -FS](#)
Subject: RE: Kerckhoff Relicensing: Request for Email Confirming Consensus on Key Study Plans
Date: Friday, August 3, 2018 5:00:29 PM

*******CAUTION: This email was sent from an EXTERNAL source. Think before clicking links or opening attachments.*******

Lisa – The Sierra National Forest concurs with, and is in support of, conducting the studies during the below mentioned timeframes. Thank you.

From: Whitman, Lisa [mailto:LxWt@pge.com]

Sent: Thursday, July 19, 2018 4:53 PM

To: Philip Choy (Philip.Choy@Waterboards.ca.gov) <Philip.Choy@Waterboards.ca.gov>; Eric.Guzman@wildlife.ca.gov; Abimael.leon@wildlife.ca.gov; Alvarez, Dawn -FS <dalvarez@fs.fed.us>; George, Jon -FS <jongearge@fs.fed.us>; smshaw@blm.gov; Alison Lipscomb <alipscomb@blm.gov>; Bowes, Stephen (stephen_bowes@nps.gov) <stephen_bowes@nps.gov>; Theresa Simsiman <theresa@americanwhitewater.org>; Christina McDonald (cmcdonald@northforkrancheria-nsn.gov) <cmcdonald@northforkrancheria-nsn.gov>; rwgoode911@hotmail.com

Cc: Morimoto, Gina <GEMO@pge.com>; Cheslak, Edward <EFC3@pge.com>; Wayne Lifton <Wayne.Lifton@cardno.com>; Stacy Evans <stacy.evans@cardno.com>; Katie Ross-Smith (Katie.Ross-Smith@cardno.com) <Katie.Ross-Smith@cardno.com>; Armstrong, Matthew <MDAF@pge.com>

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will support my request to PG&E's management to take the risk of incurring costs of early data collection before FERC's Study Plan determination is issued.

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I appreciate your help and collaboration in this effort. If you have any questions, please contact me at Lisa.Whitman@pge.com or 415-973-7465.

Sincerely,
-Lisa

Lisa Whitman | License Project Manager, Hydro Licensing
Pacific Gas and Electric Company
415.973.7465 office | 415.265.9971 cell | Lisa.Whitman@pge.com

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Appendix D

PG&E's Study Plan Meeting Notes



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**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Study Plan Meeting Notes**

**Piccadilly Airport Inn - 5115 E McKinley Avenue, Fresno
Monday May 21, 2018
9:00 am – 4:00 pm**

**Organizer: Lisa Whitman
Facilitator: Marie Rainwater**

ATTENDEES

Participant	Affiliation
Paul Martzen	San Joaquin Paddlers; American Whitewater
John Hodge	Bureau of Land Management (BLM)
Alison Lipscomb	BLM
Somer Shaw	BLM
Gregg Wilkerson	BLM
Abimael Leon	California Department of Fish and Wildlife (CDFW)
Eric Guzman	CDFW
Stacy Evans	Cardno
Wayne Lifton	Cardno
Katie Ross-Smith	Cardno
Evan Williams	Federal Energy Regulatory Commission (FERC)
Stephen Bowes	National Parks Service (NPS)
Matthew Armstrong	Pacific Gas and Electric Company (PG&E)
Denny Boyles	PG&E
Daniel Clark	PG&E
Gina Morimoto	PG&E
Lisa Whitman	PG&E
Marie Rainwater	Rainwater & Associates
Philip Choy	State Water Resources Control Board (SWRCB)
Dawn Alvarez	United States Forest Service (USFS)

PARTICIPANTS BY PHONE

Participant	Affiliation
Ed Cheslak	PG&E
Theresa Simsiman	American Whitewater
John Mudre	FERC
Frank Winchell	FERC
Hatchell Malik	FERC
Kelly Kephart	PG&E
John Mintz	PG&E
Scott Steinberg	PG&E
Ann Roberts	USFS

ACTION ITEM SUMMARY

- Philip Choy will discuss clarifying rationale for only having three monitoring sites for turtles with Wayne Lifton (Cardno).
- PG&E will email the group for agreement on early study implementation at a future date.
- Philip will email PG&E his list of clarifying questions from the meeting, documenting for the consultation record items that were discussed, but did not require revisions to the study plans.
- PG&E will develop proposed language for GEO 2 to describe analysis.
- If available, Phillip will provide information about Rio Bravo to PG&E.
- For AQ 6, PG&E will discuss follow-up analysis and provide proposed language for review to group.
- For CUL 1, BLM will follow up with Amy Girado to clarify if she believes that changes are needed to the plan so that she can “live with it.”
- Matt will follow up with the BLM cultural leads regarding the historic San Joaquin Light and Power site.
- PG&E will attempt to include draft APE or Final APE with Revised Study Plan.
- PG&E will follow up with BOR, if appropriate.
- PG&E will add specifics about FERC process for a HPMP into study plan.
- PG&E will revise language to say “will retain an ethnographer”.
- USFS and BLM will let PG&E know if they have any additional comments on BOT 1.

- USFS and BLM will let PG&E know if they have any additional comments on WILD 1.
- PG&E will prepare a new redline version of WQ 1 with these edits and will send to the group for agreement.
- PG&E to schedule a follow up call with Ed and Gregg regarding WQ 2.
- PG&E to schedule a follow up call regarding WQ 2 with Philip.
- PG&E to consider adding E.coli language to WQ 2.
- Philip to follow up on the number of samples required as part of methodology for WQ 2.
- Schedule a follow up discussion regarding REC 1.
- PG&E to consider developing a map with runs and Access points.
- Dan will add distance for the surveys in response to FERC.
- BLM will follow up on providing supporting information for REC 3.
- PG&E will consider suggestions on REC 3.
- PG&E will discuss these options for REC 4 (spring/fall surveys, kiosks or online studies, contact user groups) internally.

Meeting Objectives

- PG&E reviewed the objectives of the meeting: (1) outline the process of reaching consensus on the study plans; and (2) discuss and work towards agreements on PG&E's proposed study plans.

ILP Study Plan Schedule and Status Update

- Lisa Whitman (PG&E) provided an update on the fatal incident below the K1 Powerhouse.
- Lisa summarized the ILP study plan process schedule and status update. The ILP schedule was included in FERC's Scoping Documents 1 and 2 (provided after the meeting notes).
- PG&E anticipates holding meetings and conference calls between now and July to work through study plans requiring additional discussion before the July 29 Stakeholder comment deadline and the Aug 28 Revised Study Plan deadline. PG&E's goal today is to collaboratively reach consensus on as many study plans as possible.
- Lisa noted that PG&E would like to implement a handful of studies in September, prior to FERC's Study Plan Determination, if consensus can be reached and documented, and if authorization can be obtained.
- Dawn Alvarez (USFS) asked if FERC can issue a pre-determination on plans with early start that have consensus. Evan Williams (FERC) said he would need to check on it.

Discussion on Proposed Study Plans

- PG&E reviewed comments received on the study plans included in the PAD and changes they made in response to comments that were included in the Proposed Study Plans filed with FERC on April 30.
- PG&E received no comments on four study plans:
 - AQ 5 Western Pond Turtles
 - HYD 1 Operations Simulation Model
 - HYD 2 Hydrology with and without the Project
 - AQ 3 Mussels and Aquatic Molluscs
- *Discussion on AQ 5 Western Pond Turtles*
 - Philip Choy (SWRCB) asked if other turtle species seen would be recorded, if they were found. PG&E said that all turtles that are captured will be recorded and measured. Biologists will record incidental observations of all species observed during field surveys, as noted on page AQ 5-5.
 - Philip noted that PG&E is proposing three monitoring sites. He asked for clarification on the rationale for only having three sites. PG&E responded that incidental observations of turtles will be noted during all aquatics surveys. The study did not specify more sites due to concern that access may limit having more trapping sites. **ACTION ITEM: Philip Choy will discuss clarifying rationale for only having three monitoring sites for turtles with Wayne Lifton (Cardno).**
- *Discussion on HYD 1 Operations Simulation Model*
 - No additional comments received on plan.
 - Attendees confirmed no objections and agreed to “green light”¹ (accept as presented) plan and consider it done.
- *Discussion on HYD 2 Hydrology with and without the Project*
 - No additional comments received on plan.
 - Attendees confirmed no objections and “green light” on plan.
- *Discussion on AQ 3 Mussels and Aquatic Molluscs*
 - Philip asked clarification if the location and abundance of invasive species would be noted during the surveys. PG&E replied that they would.
 - No additional comments received on plan.
 - Attendees confirmed no objections and “green light” on plan.

¹ Study plans in green indicate tentative agreement in PG&E’s Proposed Study Plan Tracking Summary table that is a tool to quickly assess the status of each study plan.

- PG&E discussed four studies that are proposed, under certain conditions, to start in September 2018:
 - AQ 1 Aquatic Habitat Mapping
 - GEO 1 Channel Form and Fluvial Processes
 - BOT 2 Riparian and Wetland Resources
 - GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir
 - Lisa discussed a proposed process for implementing these four studies early. The group decided that PG&E would email the agencies asking for support for these four plans and the agencies would reply with an email stating agreement on these plans.
 - **ACTION ITEM: PG&E will email the group for agreement on early study implementation at a future date.**
 - **ACTION ITEM: Philip will email PG&E his list of clarifying questions from the meeting, documenting for the consultation record items that were discussed, but did not require revisions to the study plans.**

- *Discussion on AQ 1 Aquatic Habitat Mapping*
 - Gina Morimoto (PG&E) summarized the modifications made in the plan by PG&E in response to comments received as well as adding LiDAR and aerial imagery to the reservoir and Project Bypass Reach. The Project Bypass Reach is included in GEO 1.
 - Philip asked if PG&E was planning to use thermometers when measuring the water temperatures of the isolated pools. Wayne Lifton (Cardno) replied that it would depend on the locations of the isolated pools and access to them. If staff can access them, then they will. If they cannot, the water temperature loggers would be used. PG&E may need to come back to the group to discuss.
 - Philip requested that the flow during the LiDAR be noted. Gina noted that the intent is to collect the LiDAR data at low flow so that the maximum amount of topographic data can be collected.
 - Philip asked if PG&E was going to do a stage-discharge relationship to determine if pools do become isolated the flow that may be necessary to make it continuous. PG&E is not proposing to do so at this time.
 - No additional comments received on this plan.
 - Attendees confirmed no objections and “green light” on plan.
 - Attendees confirmed consensus on early start for plan.

- *Discussion on GEO 1 Channel Form and Fluvial Processes*
 - No additional comments received on this plan.
 - Attendees confirmed no objections and “green light” on plan.
 - Attendees confirmed consensus on early start for plan.

- *Discussion on BOT 2 Riparian and Wetland Resources*
 - Philip asked if sediment and channel conditions would be discussed with respect to riparian vegetation. PG&E said it would.
 - No additional comments received on this plan.
 - Attendees confirmed no objections and “green light” on plan.
 - Attendees confirmed consensus on early start for plan.

- *Discussion on GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir*
 - Philip asked if PG&E has done any opportunistic studies for the amount of sediment released and impacts to the Project Bypass Reach during operations of the low level outlet (LLO). He also asked for consideration of a desktop exercise of the frequency of operations of the LLO by PG&E and the flows when the operations occurred. Gina replied that PG&E would be summarizing the current sediment management practices and will be doing a bathymetric survey to determine the amount of sediment in the reservoir. PG&E did not include a study to open up the LLO and document what happens downstream. **ACTION ITEM: PG&E will develop proposed language for GEO 2 to describe analysis.**
 - Philip is interested in the amount of sediment that is released, and suggested that PG&E consider estimating it using an approach similar to that which was used for Rio Bravo. PG&E will consider this approach; and Philip will find information on this approach. **ACTION ITEM: If available, Phillip will provide information about Rio Bravo to PG&E.**

- PG&E discussed plans that had minor clarifications in the PSP
 - AQ 2 Fish Populations
 - AQ 4 Entrainment
 - AQ 6 Rare Aquatic Species
 - BOT 1 Plant Communities, Special-Status Plants, Invasive Weeds
 - WILD 1 Special Status Wildlife Species
 - REC 2 Recreation Facility Assessment
 - WQ 1 Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach
 - WQ 2 Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir
 - CUL 1 Cultural Resources
 - CUL 2 Tribal Resources

- *Discussion on AQ 2 Fish Populations*
 - Gina provided an overview of the changes, which included the addition of an American shad spawning study based on consultation with the SWRCB and CDFW.
 - Philip asked if scales of striped bass would be measured. PG&E replied they would be if any striped bass are captured.

- Philip asked how the catch-per-unit-effort would be measured. Wayne replied it would be fisherman hours.
 - Eric Guzman (CDFW) asked if PG&E would be doing larval trapping for American shad. Wayne replied PG&E would do it experimentally. They will put out traps when doing the shad fishing, but PG&E was concerned about committing to a methodology as there was uncertainty if the traps would work for larval American shad. The results would be included in the memo. Eric said he was ok with just the larval traps.
 - Eric asked for clarification on the 20 fish that would be measured in the shad study component. Wayne said that he anticipated more than 20 would be caught, but clarified that only 20 would be measured.
 - Eric asked if PG&E would have a guide for the fishing trips. PG&E intends to use a guide, for consistency.
 - Philip asked if scales would be collected from other species of fish. Wayne replied the scale analyses are focused on the native and sport fish we are most interested in and those from which PM&Es would be developed.
 - Eric reminded PG&E that the Scientific Collecting Permits would need to be updated to include all the survey methods.
 - No additional comments received on this plan.
 - Attendees confirmed no objections and “green light” on plan.
- *Discussion on AQ 4 Entrainment*
 - Gina summarized changes in the plan, which incorporated comments on the draft PSPs. The study includes a desk top analysis of the mortality risk for fish going over the dam during spill, at the request of SWRCB.
 - Philip asked for clarification on when the studies would be conducted and the trigger for the Phase II component. Gina confirmed that Phase II, if it occurs, would be done in the fall of 2019 and spring of 2020. Philip commented that he may want to look to see if there is potential for a lot of YOY mortality.
 - No additional comments received on this plan.
 - Attendees confirmed no objections and “green light” on plan.
- *Discussion on AQ 6 Rare Aquatic Species*
 - Gina summarized the new study from comments received from the SWRCB and USFS.
 - Philip asked if PG&E would be doing replicate samples at each site. Gina replied that the technology is changing very quickly; and PG&E wanted to leave the sampling method open in the plan because the technology is changing so quickly. Prior to sampling, PG&E will confirm the methodology with the agencies.
 - Philip asked if there was a Phase II to the study if hits were found. He specifically asked if visual encounter surveys (VES) would be done for foothill yellow-legged frogs (FYLF) if there is a hit. He requested language

similar to the following: “If positive detections are found for FYLF, then Visual Encounter surveys would be discussed with the stakeholders to determine the abundance and distribution of the FYLF in the bypass reach.” He also requested adding that if there is a lamprey hit, PG&E will consult with the agencies prior to implementing the AQ 2 fish population studies.
ACTION ITEM: For AQ 6, PG&E will discuss follow-up analysis and provide proposed language for review to group.

- *Discussion on CUL 1 Cultural Resources*
 - Matt Armstrong (PG&E) summarized the changes to the plan, which focused on clarifying comments and responding to clarified coordination with BLM requirements.
 - PG&E did not add that all resources will be evaluated, but clarified under what circumstances under which evaluations would be done. PG&E did not think that evaluations would be needed in underground tunnels etc.
 - Matt asked BLM to clarify with their cultural specialist regarding her comment on surveys extending beyond the FERC Project boundary.
 - **ACTION ITEM: For CUL 1, BLM will follow up with Amy Girado to clarify if she believes that changes are needed to the plan so that she can “live with it.”**
 - **ACTION ITEM: Matt will follow up with the BLM cultural leads regarding the historic San Joaquin Light and Power site.**
 - Frank Winchell (FERC) requested that PG&E submit the area of potential effects (APE) to SHPO now so that they can approve it before going in the field. Matt replied that the APE has not been defined, it is part of the study plan, and it is premature to submit to SHPO prior to consultation with the agencies. Frank replied that they would like to see the APE in the study plan prior to study plan determination. PG&E will attempt to discuss the APE with the Tribes and agencies in the next couple of months.
 - Dawn asked for clarification when the cultural consultation would occur. Matt replied that he is trying to schedule a meeting in June. If resolution is met on the APE, it could include draft APE in the submitted revised study plan. Matt added that PG&E may not have SHPO response in the revised study plans based on when the APE would be submitted to the SHPO. Matt also clarified that PG&E’s meeting would not constitute formal Section 106 consultation, as that must be done by the agency.
 - **ACTION ITEM: PG&E will attempt to include draft APE or Final APE with Revised Study Plan.**
 - Somer added that BOR may also be interested in the cultural discussion.
 - **ACTION ITEM: PG&E will follow up with BOR, if appropriate.**
 - Plan will be next discussed at cultural coordination meeting in June, date TBD.

- *Discussion on CUL 2 Tribal Resources*
 - Matt summarized changes to the plan.
 - FERC requested that the preparation of a Historical Properties Management Plan (HPMP), consultation with the agencies in the development of the HPMP, how the plan would be developed, and that it would protect resources be specified in the study plan. FERC also asked that it be stated in the study plan that a draft HPMP will be in the DLA and a final will be in the FLA.
ACTION ITEM: PG&E will add specifics about FERC process for a HPMP into study plan.
 - FERC requested that language be changed in the plan to state that PG&E will retain a qualified ethnographer.
 - **ACTION ITEM: PG&E will revise language to say “will retain an ethnographer”.**
 - Plan will be next discussed at cultural consultation meeting in June, date TBD.

- *Discussion on BOT 1 Plant Communities, Special-Status Plants, Invasive Weeds*
 - Gina summarized the changes to the plan and clarified that Smalley Cove Road was removed from the Project roads list because it is also included on the Shared Roads list.
 - Dawn provided contingent approval but will need to follow up with the local Forest Service office to confirm.
 - BLM provided contingent approval but will need to follow up with Tim Keldsen to confirm.
 - **ACTION ITEM: USFS and BLM will let PG&E know if they have any additional comments on BOT 1.**

- *Discussion on WILD 1 Special Status Wildlife Species*
 - Gina summarized changes made to the plan, which were based on consultation with Tim Keldsen (BLM). PG&E added mist netting for bats as a potential survey method.
 - No additional comments received on this plan.
 - **ACTION ITEM: USFS and BLM will let PG&E know if they have any additional comments on WILD 1.**

- *Discussion on REC 2 Recreation Facility Assessment*
 - Dan Clark (PG&E) summarized changes to the plan. He clarified that this plan is a study for the project built recreation area, which is Smalley Cove. Recreation uses in other areas are addressed in the other studies.
 - Dawn asked if this study addressed the ADA and ABA standards. Dan clarified that this facility is on PG&E lands and would be subject to the state standards; ADA. Dawn will check about potential for ABA.

- Eric asked about improvements to the informal boat ramp facilities. Dan said that the study plan does not include a commitment to improve the informal boat ramp.
 - No additional comments received on this plan.
 - Attendees confirmed no objections and “green light” on plan.
- *Discussion on WQ 1 Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach*
 - Gina summarized changes made to the plan. PG&E added a site upstream of the dam and below the K1 tailrace. PG&E also clarified when the water temperature model might be needed.
 - The group discussed why the Project Bypass Reach was the focus of the study, and why it does not extend into Millerton Lake. Ed Cheslak (PG&E) explained that Millerton Lake is a separate system that PG&E has no control over, and that the Kerckhoff Project has little to no influence on the thermodynamics of Millerton Lake.
 - Evan noted that the legend for WQ 1-1 should include the water temperature gages. Eric requested that J2 is indicated as flow and temperature on the map and in the plan.
 - Philip requested the addition that this study relates to AQ 1.
 - Gregg Wilkerson (BLM) asked for PG&E to add a couple of sentences describing the rationale for the downstream extent of the water temperature monitoring. PG&E agreed to include the edit.
 - Eric asked PG&E to include an explanation on how having the loggers at different depths and locations, and having monthly profiles at one location would be used to examine stratification. Gina replied that they would.
 - **ACTION ITEM: PG&E will prepare a new redline version of WQ 1 with these edits and will send to the group for agreement.**
 - *Discussion on WQ 2 Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir*
 - Gina summarized the changes in the plan.
 - Gregg stated that he was concerned about contaminants in the water during high flows, and suggested using methods EPA method 1632; EPA 1620 A to determine the speciation and bioavailability of arsenic. Ed Cheslak (PG&E) replied that PG&E is proposing to test for total arsenic. If these levels are above the Basin Plan criteria, then PG&E would run an additional test.
 - **ACTION ITEM: PG&E to schedule a follow up call with Ed and Gregg regarding WQ 2.**
 - Philip asked for clarification on the sampling time period; as other relicensings have sampled in low and high flow seasons. He requested a later fall sampling period and during a rain event (rather than just during snow melt runoff). Ed replied that PG&E did not propose storm sampling due to the

- very dangerous conditions in this project during storms. Philip clarified that the rain event sampling would only need to be done below K2 Powerhouse.
- **ACTION ITEM: PG&E to schedule a follow up call regarding WQ 2 with Philip.** Philip encouraged PG&E to consider sampling *E. coli*. If the proposed standard is approved for the Basin Plan, then PG&E will need to do it. There might be issues if PG&E does not have the data, if it is approved for the Basin Plan. **ACTION ITEM: PG&E to consider adding *E.coli* language to WQ 2.**
 - Philip clarified the recreation bacteriological sampling methodology around the holidays. He suggested 2 samples before and 2 samples after the holiday so, samples are spaced around the peak holiday.
 - **ACTION ITEM: Philip to follow up on the number of samples required as part of methodology for WQ 2.**
 - Gregg also asked for PG&E to add similar language regarding the rationale for stopping water quality monitoring at K2 Powerhouse and not extending into Millerton Lake.
 - Follow-up planned with individual calls and also scheduled for June 28th meeting
- PG&E discussed plans that had a larger number of comments and identified as “needing discussion”:
 - REC 1 Whitewater Boating Assessment
 - REC 3 Recreation Visitor Use
 - REC 4 Recreation Visitor Use Surveys
 - GEO 3 Project Road-related Erosion (on agenda but not discussed during this meeting due to time constraints)
 - LAND 1 Project Roads and Trails Assessment (on agenda but not discussed during this meeting due to time constraints)
 - WQ 3 Bioaccumulation in Kerckhoff Reservoir (on agenda but not discussed during this meeting due to time constraints)
 - *Discussion on REC 1 Whitewater Boating Assessment*
 - Lisa summarized the changes to the plan; the PSP excluded the Millerton Lake Bottom Run.
 - Theresa Simsiman (American Whitewater) said that they would like the Millerton Lake Bottom Run included because boating is dependent on timing of flows through powerhouse.
 - Theresa stated concern about only having a single flow with the wide range of potential boating flows from 700 to 5,000 cfs. Theresa recommended following the methodology in the Gangemi approach. This approach includes at least 3 flows in the study, but not more than 4 flow studies; and dependent on results of Phase I and II. AW does not want to limit that process in the study plan. Theresa does not believe a single-flow study would be useful.

- John Mintz (PG&E) replied that the proposed study focuses on the lower end of the acceptable range, and that single-flow studies are also described in the Gangemi method. Theresa said AW would be okay with a compromise that could have fewer flows dependent upon the results of Phase I and II.
 - Theresa and Steve Bowes (NPS) said they were interested in the optimal flow, not the minimum acceptable flow. Paul Martzen (San Joaquin Paddlers) added it was important to understand the full range of flows, including the high end. He does not think a single flow study would be useful.
 - **Action Item: Schedule a follow up discussion regarding REC 1.**
 - Somer asked for an assessment of the access points.
 - Evan requested a map showing the runs and access points.
 - **ACTION ITEM: PG&E to consider developing a map with runs and Access points.**
 - Follow-up planned for June 19th meeting and will include Theresa, Steve, Somer, Lisa, Dave Martinez, John, Wayne, Karen Doran, Alison.
- *Discussion on REC 3 Recreation Visitor Use*
 - Dan summarized the changes in the plan.
 - Somer suggested adding observations of people in the river, as observed from the bridge (downstream of K1 Powerhouse) looking upstream and downstream. She suggested considering a larger study area than that which is defined in the plan.
 - Evan reiterated that the area studied needs to be a clear project nexus. Somer stated the release of flows from the project are the nexus. Evan stated that you have to make the distinction that any recreation that may be there is due to the project.
 - Somer asked for consideration of places for observations and note what people are doing and not just limit to the parking lot. The BLM wants to capture what is in the surrounding area and on river; and does not want observations limited to the specific extent shown in the figures in the plans. **ACTION ITEM: Dan will add distance for the surveys in response to FERC.**
 - Theresa suggested noting relationship to REC 1 for access to the river.
 - The group discussed the timing of the surveys. Somer suggested mid-March to early May and September through November as the time periods with heavier usage. Somer said recreation is very low throughout June, July, and August due to the heat. Somer suggested the 4th of July time period may not need to be sampled. **ACTION ITEM: BLM will follow up on providing supporting information for REC 3.**
 - **ACTION ITEM: PG&E will consider suggestions on REC 3.**
 - Follow-up planned for June 19th meeting

- *Discussion on REC 4 Visitor Use Surveys*
 - Dan provided a summary of the changes to the plan.
 - Somer suggested potentially adjusting the survey time period as above for REC 3. Somer said recreation is really low during the 4th of July due to the heat.
 - Eric suggested possibility of using kiosks or on-line surveys to execute this study.
 - Eric suggested contacting other users group about when people are using the area to capture times of high use.
 - **ACTION ITEM: PG&E will discuss these options for REC 4 (spring/fall surveys, kiosks or online studies, contact user groups) internally.**
 - Follow up planned for June 19th meeting

SCHEDULING

The group confirmed the following dates for follow-up discussions on the specific studies and resource areas listed:

- June 8th, 1 pm – 3 pm (Call/WebEx)– Discuss Water quality and Aquatics related studies, specifically WQ 1, WQ 2, AQ 6
- June 19th, 9:00 am – 4:00 pm (Meeting Fresno area) – Discuss Recreation and Land related studies, specifically REC1, REC3, REC4, LAND1, GEO2, GEO3 and potential roll-out of LAND2
- June 28th, 9:00 am – 4:00 pm (Meeting Fresno area)– Discuss any outstanding Water quality and Aquatics related studies, including Bioaccumulation (WQ 3) and potential BMI study
- July 17th and 18th, (Location and type TBD)– Placeholders for discussion of any outstanding study plans

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ILP Schedule from SD-2

Kerckhoff Hydroelectric Project Process Plan and Schedule

Shaded milestones are unnecessary if there are no study disputes. If the due date falls on a weekend or holiday, the due date is the following business day. Early filings or issuances will not result in changes to these deadlines.

Responsible Party	Pre-Filing Milestone^a	Date^b	FERC Regulation
Applicant	Issue Public Notice for NOI/PAD	11/16/17	5.3(d)(2)
Applicant	File NOI/PAD	11/16/17	5.5, 5.6
FERC	Issue Notice of Commencement of Proceeding and Scoping Document 1	1/16/18	5.8
FERC	Scoping Meetings and Project Site Visit	2/13/18 2/14/18	5.8(b)(viii)
All Stakeholders	File Comments on PAD/Scoping Document 1 and Study Requests	3/17/18	5.9
FERC	Issue Scoping Document 2 (if necessary)	4/30/18	5.10
Applicant	File Proposed Study Plan	4/30/18	5.11(a)
All Stakeholders	Proposed Study Plan Meeting	5/30/18	5.11(e)
All Stakeholders	File Comments on Proposed Study Plan	7/29/18	5.12
Applicant	File Revised Study Plan	8/28/18	5.13(a)
All Stakeholders	File Comments on Revised Study Plan	9/12/18	5.13(b)
FERC	Issue Director's Study Plan Determination	9/27/18	5.13(c)
Mandatory Conditioning Agencies	File Any Study Disputes	10/17/18	5.14(a)
Dispute Panel	Select Third Dispute Resolution Panel Member	11/1/18	5.14(d)
Dispute Panel	Convene Dispute Resolution Panel	11/6/18	5.14(d)(3)
Applicant	File Comments on Study Disputes	11/11/18	5.14(i)
Dispute Panel	Dispute Resolution Panel Technical Conference	11/16/2018	5.14(j)
Dispute Panel	Issue Dispute Resolution Panel Findings	12/6/18	5.14(k)
FERC	Issue Director's Study Dispute Determination	12/26/18	5.14(l)
Applicant	First Study Season	2019	5.15(a)
Applicant	File Initial Study Report	9/27/19	5.15(c)(1)
All Stakeholders	Initial Study Report Meeting	10/12/19	5.15(c)(2)
Applicant	File Initial Study Report Meeting Summary	10/27/19	5.15(c)(3)
All Stakeholders	File Disagreements/Requests to Amend Study Plan	11/26/19	5.15(c)(4)
All Stakeholders	File Responses to Disagreements/Amendment Requests	12/26/19	5.15(c)(5)
FERC	Issue Director's Determination on Disagreements/Amendments	1/25/20	5.15(c)(6)
Applicant	Second Study Season	2020	5.15(a)
Applicant	File Updated Study Report	9/26/20	5.15(f)
All Stakeholders	Updated Study Report Meeting	10/11/20	5.15(f)
Applicant	File Updated Study Report Meeting Summary	10/26/20	5.15(f)
All Stakeholders	File Disagreements/Requests to Amend Study Plan	11/25/20	5.15(f)
All Stakeholders	File Responses to Disagreements/Amendment Requests	12/25/20	5.15(f)
FERC	Issue Director's Determination on Disagreements/Amendments	1/24/21	5.15(f)

Responsible Party	Pre-Filing Milestone^a	Date^b	FERC Regulation
Applicant	File Preliminary Licensing Proposal (or Draft License Application) ^c	7/3/20	5.16(a)-(c)
All Stakeholders	File Comments on Preliminary Licensing Proposal (or Draft License Application)	10/1/20	5.16(e)
Applicant	File Final License Application	11/30/20	5.17
Applicant	Issue Public Notice of Final License Application Filing	12/14/20	5.17(d)(2)

^a The activity description is a good faith effort to summarize the pertinent regulation. The reader is encouraged to read the specific regulation.

^b 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.

^c This ILP schedule assumes that studies begin when FERC issues its Study Determination and may continue for two years or more.

**PG&E Kerckhoff Hydroelectric Project
Study Plan Meeting Agenda**

**Piccadilly Airport Inn, 5115 E McKinley Avenue, Fresno
May 21, 2018
9:00 am – 4:00 pm**

For Participants joining by phone:

Call-in: [1 \(855\) 225-9582](tel:18552259582) Conference ID: 3973562

Visual materials will be presented via Skype

link: → [Join Skype Meeting](#)

*Please note times included below are approximate and may be adjusted
during the course of the meeting*

- 9:00** **Welcome**
- 9:00 – 9:20** **Introductions, Safety, Ground Rules**
- 9:20 – 9:35** **ILP Study Plan Schedule and Status Update**
- 9:35 – 9:45** **Plans with No Comments Received**
- *AQ 5 Western Pond Turtles*
 - *HYD 1 Operations Simulation Model*
 - *HYD 2 Hydrology with and without the Project*
 - *AQ 3 Mussels and Aquatic Molluscs*
- 9:45 – 10:15** **Studies with Proposed 2018 Field Season**
- *AQ 1 Aquatic Habitat Mapping*
 - *GEO 1 Channel Form and Fluvial Processes*
 - *BOT 2 Riparian and Wetland Resources*
 - *GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir*
- 10:15 – 12:00** **Plans with Minor Clarifications**
- *AQ 2 Fish Populations*
 - *AQ 4 Entrainment*
 - *AQ 6 Rare Aquatic Species*
 - *BOT 1 Plant Communities, Special-Status Plants, Invasive Weeds*
 - *WILD 1 Special Status Wildlife Species*
 - *REC 2 Recreation Facility Assessment*

- *WQ 1 Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach*
- *WQ 2 Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir*
- *CUL 1 Cultural Resources*
- *CUL 2 Tribal Resources*

12:00 – 1:00 LUNCH (on own)

1:00– 2:15 Plans Needing Discussion

- *REC 1 Whitewater Boating Assessment*
- *REC 3 Recreation Visitor Use*
- *REC 4 Recreation Visitor Use Surveys*

2:15 – 2:30 BREAK

2:30– 3:45 Plans Needing Discussion

- *GEO 3 Project Road-related Erosion*
- *LAND 1 Project Roads and Trails Assessment*
- *WQ 3 Bioaccumulation in Kerckhoff Reservoir*

3:45 – 4:00 Meeting Close-out

- *Action Items and Next Steps*

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: AQ 7**

**Tuesday, May 29, 2018
3:00 pm – 4:00 pm**

ATTENDEES

Participant	Affiliation
Gina Morimoto	Pacific Gas and Electric Company (PG&E)
Wayne Lifton	Cardno
Lisa Whitman	PG&E
Philip Choy	State Water Resources Control Board (SWRCB)

During the call, we discussed the approach to benthic macroinvertebrate (BMI) sampling in the Project Bypass Reach and application of the Surface Water Ambient Monitoring Program (SWAMP) methodology. One of the first topics discussed was site selection. If study AQ 1 takes place during fall 2018, site selection for the BMI study will be based in part on the results of AQ 1. In order to apply the SWAMP Reach-Wide Benthos (RWB) methodology, we would need to find sufficient habitat with wadeable depths. There may be difficulty in finding sufficient wadeable habitat in safely accessible locations. PG&E's initial understanding of site conditions in the Project Bypass Reach is that a representative riffle approach may be more suitable to the habitat. Philip Choy (SWRCB) indicated a preference for the Targeted Riffle Composite (TRC) approach if the RWB procedure is not feasible.

It appears that it may be difficult to find suitable sampling sites between Kerckhoff 1 and Kerckhoff 2 powerhouses due to the steep gradient in large substrate. Philip asked that this explanation be included in AQ 7.

PG&E agreed to conduct RWB approach and a full set of habitat measurements at the site below Kerckhoff Dam, if the habitat is suitable based on habitat mapping and site access. Algae will also be measured at this site.

Philip would like PG&E to consider sampling a fourth site in the Patterson Bend area. PG&E agreed to add this fourth site as a contingency if suitable wadeable habitat and safe access is possible.

PG&E will meet with the resource agencies and other stakeholders to consult on site selection based on the results of habitat mapping. PG&E will incorporate the results of this discussion in study plan AQ 7.

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Study Plan Meeting Notes
Focus: WQ 2, WQ 3 and AQ 7**

June 8, 2018 Morning

ATTENDEES

Participant	Affiliation
Eric Guzman*	California Department of Fish and Wildlife (CDFW)
Wayne Lifton	Cardno
Ed Cheslak	Pacific Gas & Electric (PG&E)
Gina Morimoto	PG&E
Lisa Whitman	PG&E
Philip Choy	State Water Resources Control Board (SWRCB)

*Participated by phone

PURPOSE OF THE CALL

The purpose of the call was to discuss Study Plans WQ 2, WQ 3, and AQ 7. The first topic for discussion was WQ 2 (Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir).

WQ 2 (Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir)

- Fecal coliform and *E. coli* were the first topic of discussion due to the amount of labor involved in making multiple sampling trips. Sampling was discussed in terms of major holidays. It was proposed that we consider Memorial Day versus Labor Day. Philip Choy (SWRCB) suggested that he would prefer Memorial Day and Labor Day to be sampled. BLM had previously suggested that the Fourth of July was too warm in the canyon and may be a less desirable time to sample than during cooler holidays. The group decided to sample both Memorial Day and Labor Day. The group also agreed to add contingency language specifying that if Millerton Lake elevation is low on Labor Day weekend, then *E. coli* sampling would not be performed at K2 Powerhouse as a backwater effect would not exist with reservoir conditions. Sampling would start two weeks before the holiday, during the holiday, and continue for 2 weeks after the holiday.

WQ 3 (Bioaccumulation in Kerckhoff Reservoir)

- WQ 3 (Bioaccumulation in Kerckhoff Reservoir) was discussed regarding the number of constituents that would be analyzed. Analysis would focus on metals and a limited number of organics. A composite sample of 9 bass would be used for screening

purposes of PCBs, organochlorides, and PBDEs. In addition, 27 other samples would be analyzed for metals. Discussion focused on what contaminants might be reasonably expected to be found in the San Joaquin River in the Kerckhoff Project. Several other projects where such sampling occurred were discussed. Philip Choy (SWRCB) agreed to send Ed Cheslak (PG&E) a spreadsheet summarizing his recommendations and costs for further discussion. As part of the discussion the group discussed the priority for sampling fish for contaminants. The order of preference was 1) spotted bass, 2) sunfish, 3) carp, 4) crayfish, and 5) not to sample hardhead.

AQ 7 (Benthic Macroinvertebrates)

- AQ 7 (Benthic Macroinvertebrates) was briefly discussed. Philip Choy (SWRCB) was satisfied with the plan as is.

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: AQ 6, WQ 1, and WQ 2**

**Follow-up Call from May 21, 2018, Meeting
June 8, 2018 Afternoon Call**

ATTENDEES

Participant	Affiliation
Gregg Wilkerson	Bureau of Land Management (BLM)
Abimael Leon	California Department of Fish and Wildlife (CDFW)
Eric Guzman	CDFW
Stacy Evans	Cardno
Wayne Lifton	Cardno
Andie Herman	Pacific Gas & Electric (PG&E)
Ed Cheslak	PG&E
Gina Morimoto	PG&E
Lisa Whitman	PG&E
Philip Choy	State Water Resources Control Board (SWRCB)
Jon George	U.S. Forest Service (USFS)

PURPOSE OF THE CALL

The purpose of the call was to follow-up on comments from the May 21 Study Plan meeting addressing comments to Study Plans AQ 6, WQ 1, and WQ 2. Discussion started with study plan AQ 6 (Rare Aquatic Species).

AQ 6 (Rare Aquatic Species)

- **Gina Morimoto (PG&E)** sent out a redline version of the previous version of the study plan in response to comments.
- **Eric Guzman (CDFW)** asked if there any thoughts regarding surveying of foothill yellow-legged frogs (FYLF), if there are any eDNA detections. What would be the appropriate survey area, if FYLF are detected?

- **Andie Herman (PG&E)** responded that we would not be thinking about that until we saw where we had a positive response on eDNA, if any. We would then consult with the stakeholders on locations based on the results of positive detections.

The group decided to table this discussion until the scheduled June 28 meeting. A subsequent brief discussion on AQ 6 reviewed the potential need for replicate samples and what to do if there is a positive result. The group decided that once the Forest Service received input from their expert, the plan could be “green lighted”¹.

WQ 1 (Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach)

- **Ed Cheslak (PG&E)** led the discussion on the WQ 1 (Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach) study plan. It was pointed out that it was related to study AQ 1 (Aquatic Habitat Mapping) since water temperature affects habitat. Ed Cheslak then reviewed the temperature monitoring sites using the figures included in the plan. There was some discussion about temperature monitoring sites for this study compared with those that are being monitored for compliance with the existing license, such as at J-2. July should be added to the three monthly water temperature sampling. It was pointed out that it was already included. **Eric Guzman (CDFW)** stated that he would like to see monitoring continued into October.
- **Gregg Wilkerson (BLM)** requested a footnote for clarification on why Millerton Lake is not included. **Ed Cheslak (PG&E)** noted that lake level and stratification in Millerton Lake is not dependent upon the Kerckhoff Project. The focus of temperature monitoring is on fish and the Project Bypass Reach, not downstream in Millerton Lake. **Eric Guzman (CDFW)** stated that he would like the focus on native fish in the Project Bypass Reach. It provides information for comparing water temperatures with temperature tolerances of native fish species, as well as striped bass and American shad.

WQ 2 (Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir)

- Study plan WQ 2 (Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir) was discussed next. **Ed Cheslak (PG&E)** reviewed the plan with the group. He specifically addressed bacteriological sampling and the status of the inclusion of the fecal coliform and *E. coli* proposed changes to the Basin Plan. It was identified that approval of the Basin Plan amendment was likely in the near future. However, just in case requirements change, **Philip Choy (SWRCB)** recommended adding a sentence to use the approved *E. coli* protocol to allow flexibility. Sampling would occur in Kerckhoff Reservoir near Smalley Cove and at or near the dispersed recreation sites. In the Project Bypass Reach sampling would occur below K2 Powerhouse, only if Millerton Lake water surface elevation is greater than 545 mean sea level (MSL). If the elevation was lower, the area below K2 Powerhouse would be riverine and not suitable for sampling. Sampling would occur on Memorial Day and Labor Day. Fourth of July would not be sampled because it’s too hot and there is less recreational use at

¹ Study plans in green indicate tentative agreement in PG&E’s Proposed Study Plan Tracking Summary table that is a tool to quickly assess the status of each study plan.

that time. **Ed Cheslak (PG&E)** also explained that coliform sampling would occur over multiple weeks with the timing centered on the holiday weekends.

Water quality sampling would occur in two events (spring and fall): spring - during higher flows and fall - during low flows at the sampling locations identified in WQ 2 - 1. There was discussion of arsenic analysis; BLM had suggested U.S. Environmental Protection Agency (EPA) method 1632 to identify arsenic species. However, **Ed Cheslak (PG&E)** pointed out that there was no water quality objective for species of arsenic. It was decided to use total recoverable arsenic based on California Office of Environmental Health Hazard Assessment (OEHHA) standards. This would be done as a screening level; if arsenic exceeds water quality standards, then consider analyzing for species of arsenic. **Gregg Wilkerson (BLM)** asked what would be done if there is an exceedance. In a discussion by **Ed Cheslak (PG&E)** and **Philip Choy (SWRCB)** they identified that the state would issue an advisory, but it would not be due to the project or product operations. **Gregg Wilkerson (BLM)** identified that there is a difference in arsenic toxicity among species and in the first step may be to control arsenic discharges. It was discussed that the project is not a source of arsenic. Fish tissue analyzed for arsenic will provide information on bioavailability to consumers this is similar to how mercury/methylmercury is addressed. The information that is proposed for collection will allow for the issuance of a health advisory if necessary. **Gregg Wilkerson (BLM)** pointed out that EPA has specific methods for analyzing arsenic species. If that analysis is not important to the study, it need not be done. **Ed Cheslak (PG&E)** pointed out that there is no way to relate the results to an effects level. We recognize that it is an important scientific point, but often don't see how we can use it for deciding PM&E measures.

The group then discussed WQ 1 again, and the changes requested accepted to do 4 months of temperature profiles from June through September. Comments of the plan will be discussed at the next meeting.

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**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: GEO 2**

Thursday, June 14, 2018

ATTENDEES

Participant	Affiliation
Gina Morimoto	PG&E
Wayne Lifton	Cardno
Philip Choy	State Water Resources Control Board (SWRCB)

The purpose of the call was to follow-up with Philip Choy (SWRCB) on questions related to the GEO 2 study plan. During previous discussions, Philip expressed interest in the effects of Division of Safety of Dams (DSOD) low-level outlet tests at Kerckhoff Dam on potential release of sediment from Kerckhoff Reservoir. Philip had previously suggested that a methodology used for calculating sediment released from a different project on the Kern River, the Rio Bravo Project, might be applicable. Gina Morimoto (PG&E) and Wayne Lifton (Cardno) discussed reviewing the report referenced and explained that the method was based on observation of deposited materials and was therefore not appropriate to Kerckhoff Dam.

Philip was interested in investigating ways to encourage sediment transport through the low level outlets and deposit sediment in the Project Bypass Reach. There was a discussion of the possibility of studying sediment deposits behind the low-level outlet at Kerckhoff Dam before-and-after the DSOD tests in 2019. Several approaches to collecting data were discussed.

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**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Study Plan Meeting Notes
Focus: REC, GEO, and LAND Studies**

**Piccadilly Airport Inn - 5115 E McKinley Avenue, Fresno
Tuesday, June 19, 2018
9:00 am – 4:00 pm**

ATTENDEES

Participant	Affiliation
Marie Rainwater	Rainwater and Associates
Theresa Simsman	American Whitewater (AW)
Ron Goode	North Fork Mono Tribe
Karen Doran	Bureau of Land Management (BLM)
Somer Shaw	BLM
Alison Lipscomb*	BLM
Gregg Wilkerson*	BLM
Abimael Leon	CA Department of Fish and Wildlife (CDFW)
Carol Efird	Louis Berger
Stacy Evans	Cardno
Wayne Lifton	Cardno
Dave Martinez	Cardno
Katie Ross-Smith	Cardno
Stephen Bowes	National Parks Service (NPS)
Daniel Clark	Pacific Gas & Electric (PG&E)
John Mintz	PG&E
Gina Morimoto	PG&E
Scott Steinberg*	PG&E
Lisa Whitman	PG&E
Philip Choy*	State Water Resources Control Board (SWRCB)
Dawn Alvarez*	United States Forest Service (USFS)
Jody Nickerson	USFS
Ann Roberts*	USFS

*Participated by phone

ACTION ITEM SUMMARY

- PG&E to email Ron Goode Scoping Documents 1 and 2, which contain the Integrated Licensing Process (ILP) schedule from FERC's scoping document.
- PG&E to email Ron Goode the study plans.
- Ron Goode requested to add "Tribes" to the list of consultation with resource agencies and interested parties. PG&E agreed to make this edit
- PG&E to schedule call with BLM to discuss suspended load in the GEO 2 study.
- Philip Choy requested that the depth and type of sediment sampler for the cores be specified in the study plan, once it is determined. Gina Morimoto will email this information to Philip.
- PG&E will draft language to define minimum acceptable flow in the study plan; it is a flow based on users and targeting a broad base of users appropriate for the reach.
- PG&E will propose language for the number of Phase 3 flow studies and will provide to group for review.
- PG&E will remove the Squaws Leap language from the documents. PG&E will revise the plan in red line, and will provide refined language to stakeholders to review.
- AW will update the runs' names in their website.
- PG&E will provide revised REC 1 study plan to American Whitewater and NPS prior to the July 17 meeting.
- PG&E to add that whitewater boating including river access will be addressed in REC 1 in the relationship to other studies section.
- PG&E will revise the REC 3 and REC 4 plans with the agreed upon survey schedule and will send to stakeholders for review by June 29.
- PG&E will revise the REC 4 plan to include a latent use section after internal discussion, and will be discussed at the July 17 meeting.
- Dan will follow up with Somer on BLM's concerns that were to be included in LAND 2.
- PG&E will discuss with BLM fence and gate features that will be included in a map and/or table.

MEETING INITIATION

Marie Rainwater initiated the meeting, provided an overview of the agenda, and discussed the Proposed Study Plan Tracking Summary (hand out). Lisa Whitman (PG&E) provided an overview of the ILP schedule for the Kerckhoff Project. Comments from all stakeholders on the plans are due by July 29. PG&E will file revised study plans by August 28. Lisa also discussed the upcoming meetings:

- June 25: Cultural meeting, hosted by Matt Armstrong (PG&E)
- June 28: Discuss any outstanding Water Quality and Aquatics related studies, including WQ3 and potential BMI study
- July 17 and 18: Placeholder for discussion of any outstanding study plans

Action Item: PG&E to email Ron Goode Scoping Documents 1 and 2, which contain the ILP schedule from FERC’s scoping document

COMMENTS, QUESTIONS, AND DISCUSSION ON DRAFT PROPOSED STUDY PLANS

LAND 1 Project Roads and Trails Assessment

Dan Clark (PG&E) and Lisa Whitman provided an overview of the current status of and clarifications made by PG&E to more clearly identify the Project road and Shared road segments in the LAND 1 study plan. Somer Shaw (BLM) said that she believes that BLM’s comments have been addressed with the clarifications on which road segments are included in the relicensing studies or in the right-of-way. Ron Goode (North Fork Mono Tribe) asked if historical roads would be addressed. Lisa clarified that cultural resources are included in the CUL 1 and CUL 2 studies. No additional comments were received on the plan.

Attendees confirmed no objections and “green lighted”¹ the plan.

Action Item: PG&E to email Ron Goode the study plans.

GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir

Gina Morimoto (PG&E) provided an overview of the status of GEO 2 study plan and follow up discussions with stakeholders. Philip Choy (State Water Board) had asked PG&E to consider a desk top analysis similar to the one that was done for Rio Bravo. After review of this analysis and based on follow up discussions with Philip, it was determined that this approach would not be appropriate for the Kerckhoff Project. PG&E added contingency language in the plan to determine if additional information is needed to address sediment supply in Kerckhoff Reservoir that will be triggered by results of the GEO 2 sediment and bathymetric data. Philip identified several comments on the study plans. These comments were discussed, and edits made to the plans during the meeting that addressed the comments. Specifically edits addressed comments to clarify the contingency component of the study plan; the characterization of sediment management practices; the depth and type of sampler for the sediment cores; and the characterization of the sediment into Kerckhoff Reservoir.

Gregg Wilkerson (BLM) added that the sediment size will depend on the size of the storm. Wayne Lifton (Cardo) clarified the intent of the study is to characterize the sediment that is present during the dry season after flows have receded, as that is the supply that is reaching the reservoir. PG&E is not proposing to characterize suspended load. **Action Item: PG&E and BLM will discuss**

¹ Study plans in green indicate tentative agreement in PG&E’s Proposed Study Plan Tracking Summary table that is a tool to quickly assess the status of each study plan

suspended load in a follow up call. Marie discussed that this study is proposed to start early, and contracting will need to start next month. PG&E is hoping to resolve issues soon so that the study can start early. Philip asked to participate in the call.

Ron Goode provided general comments related to sediment and potential effects on fish in the reservoir, mussels, and fish. Wayne discussed that there are several aquatic studies that will be assessing fish and mussels, and other aquatic species. Ron will review the plans.

Action Item: Ron requested to add “Tribes” to the list of consultation with resource agencies and interested parties. PG&E agreed to make this edit.

Action Item: Philip requested that the depth and type of sediment sampler for the cores be specified in the study plan, once it is determined. Gina will email this information to Philip.

No other additional comments were received on the plan.

Attendees confirmed no objections on the plan, with the exception of the follow up discussion on suspended sediment load into the reservoir.

GEO 3 Project Road-related Erosion

Gina and Scott Steinberg (PG&E) provided an overview of the status of GEO 3 and follow up discussions. Scott clarified the purpose of the study to identify potential erosion issues associated with the roads. He clarified the methods for the study, including the desktop analysis; ground-truthing; and the reporting. Lisa added that the road segment clarifications were added to the plan. Somer said that Gregg Wilkerson and her maintenance staff will do a final review; but she thinks that the clarifications on the Project road and Shared road classifications address their comments.

No other additional comments were received on the plan.

Attendees confirmed no objections, with a final review by BLM geologist and maintenance staff.

REC 1 Whitewater Boating

Lisa provided an overview of the status of the REC 1 study and follow up discussions. Key previous comments received were about the runs included in the study and the number of flows in the boating study. PG&E has added the downstream run (Millerton Lake Bottom Run) to the study. For the flow study, PG&E proposes to conduct the flow studies with spills from the reservoir and proposes to do two flow studies. If the reservoir is not predicted to spill, PG&E would do one flow study.

Theresa Simsiman (American Whitewater) commented that they do not want to limit the Level 3 study to just one flow; they want a multi-flow study based on the Level 1 and 2 assessment, would like to see a multi-flow study in Phase 3. She believes that the boaters do not have a good understanding of the run; it is very difficult and there is a wide range of potential flows. There is also a concern that most of the boating experience was prior to the operation of K2 and there is uncertainty about what boaters in the past calibrated their flow estimates on. Theresa clarified that they would be OK with language that would cap the number of flows based on consultation with stakeholders after Phase 1 and 2 are complete, but do not want to limit study to one flow

until Phase 1 and 2 information is known. She would be OK with language that one to three flow studies could be conducted in Phase 3.

The definition of optimal and minimal boatable flow was discussed. Dave Martinez (Cardno) clarified that the minimum acceptable flow is the flow that is suitable for any type of craft that can boat it based on the boaters in the focus group. Theresa clarified that the optimal boatable flow definition is the flow range where the most people can enjoy the resource. The attendees agreed that the definitions are the same.

Action Item – PG&E will draft language to define minimum acceptable flow in the study plan; it is a flow based on users and targeting a broad base of users appropriate for the reach.

PG&E agreed to discuss up to three flows. PG&E will internally consider conditions that would make up to three flows acceptable, such as operational coordination, timing, etc. to manage costs. And, if conditions are identified, then PG&E may propose up to three flow studies. NPS and AW agree that sounds reasonable. **Action Item: PG&E will propose language for the number of Phase 3 flow studies and will provide to group for review.**

Ron Goode discussed concern with the name of the Squaw Leap run. Dave clarified that is the name used in the published literature. PG&E agreed that in PG&E-created documents, Squaw Leap run will be removed, and the runs will instead be identified as Run 1, Run 2, and Run 3, defined by the top and bottom of each run. Common names will not be used to reference the runs. Theresa will lead changes to the American Whitewater website.

Action Item – PG&E will remove the Squaws Leap language from the documents. PG&E will revise the plan in red line, and will provide refined language to stakeholders to review.

No other comments on REC 1.

Outstanding issues: The number of flow studies in Phase 3. This will be discussed at the July 17th meeting. **Action Item: PG&E will provide revised REC 1 study plan to American Whitewater and NPS prior to the July 17th meeting.**

REC 3 Recreation Visitor Use

Dan Clark (PG&E) provided an overview of PG&E's revisions to the plan to address comments from BLM, including clarifications on the areas for recreation areas and collection of non-Project recreation near the Project area. PG&E has included collection of non-Project recreation use near the Project boundary. For collection of visitor use observations where the data will be collected, PG&E is not proposing to document recreation down the viewshed that are non-Project, but will consider recreation uses near the Project boundary. PG&E is not proposing a monitoring location from the bridge. Carol Efird (Louis Berger) provided clarification of the study methods.

Somer replied that the BLM has concerns about documenting recreation in the river. The BLM sees the nexus as the historic use and access points that were created by PG&E and that recreation onsite and in the Project Bypass Reach is impacted by Project activities and operation. She added that the flows draw people to the river, but are also safety concerns. She reiterated that without a study, the level of activity would not be known. Theresa added that American Whitewater would like to know

what activities are occurring on the banks. Somer also expressed concern that the monitoring locations identified in the plan may not be at the best locations to capture recreation use.

PG&E proposed to modify the study plan to include observations of the reach with all recreation uses that could be seen from the circled areas on the map, and record information on the number of recreationists, the time, and recreation activities. The surveyors would use binoculars. Somer agreed this modification would satisfy their concerns. The circled areas on the map would still be inventoried for recreation use impacts.

Action Item: PG&E to add that whitewater boating including river access will be addressed in REC 1 in the relationship to other studies section.

The attendees discussed and revised the timing of the surveys. Carol told the group that there is summer recreation use at Smalley Cove based on the Form 80 data, and some survey efforts should occur in the summer. The boat observations will also follow this schedule. Reservoir and river surveys will follow the same schedule. The following survey schedule was agreed upon (26 total survey days):

Holiday Weekends:	Memorial Day and Labor Day
Non-Holiday Weekends:	March, April: 2 days per month
	May – August: 1 day per month
	Sept, Oct: 2 days per month
Weekdays:	March, April: 2 days per month
	May – August: 1 day per month
	Sept, Oct: 2 days per month

Action Item: PG&E will make these revisions to the plan and will send to stakeholders for review. PG&E will distribute to stakeholders the end of next week or beginning of the following week, and it will be added to the 17th meeting agenda.

Tentative agreement on the plan; no other comments on the plan.

REC 4 Recreation Visitor Use Surveys

Dan and Carol discussed PG&E's revisions to the REC 4 study plan. Carol explained that PG&E did not include kiosk data collection. She explained that based on her previous experience using them, there is often quite a bit of data, but they are often incomplete or can't read them. She said that more useful data are collected from actually talking with people.

Somer suggested talking with other user groups, such as anglers, tribal community, disability groups, mountain bikers, equestrian groups, and trail runners, who may not be captured in the surveys.

In response, PG&E proposed to add a latent demand component to the study plan. The proposed scope of the study could include the use of existing information to characterize the types of organized uses in the area. PG&E would secure permits from applicable land managers for

activities on their lands and will review and compile the information. PG&E would then follow up with phone calls to the key contacts on the permits and would also ask about desired use and types of uses. PG&E also will include a study element to work with the land manager to identify potential other user groups. PG&E will discuss internally and may revise the plan accordingly.

Action Item: PG&E may revise the plan to include a latent use section after internal discussion, and will be discussed at the July 17th meeting.

Somer agrees with this approach. Lisa would like to discuss internally further.

Lisa discussed the proposed LAND 2 study. PG&E has decided to not propose this study. PG&E has other existing programs that better address the issues that were to be included in the LAND 2 study. The relicensing process is a very long process, and it is not adaptable to address immediate needs. **Action Item: Dan will follow up with Somer on BLM's concerns that were to be included in LAND 2.**

Karen Doran (BLM) asked where gates and fencing that were to be included in LAND 2 would be addressed. BLM is concerned about how these features are affecting BLM recreation opportunities. **Action Item: PG&E will discuss with BLM fence and gate features that will be included in a map and/or table.**

**PG&E Kerckhoff Hydroelectric Project
Study Plan Meeting Agenda
Focus: REC, GEO, and LAND Studies**

**Piccadilly Airport Inn, 5115 E McKinley Avenue, Fresno
June 19, 2018
9:00 am – 4:00 pm**

For Participants joining by phone:

WebEx Link: <https://pge.webex.com/pge/j.php?MTID=mea17ae01e7a35ebb26f9c13852909fd0>

Call-in no.: 1-800-603-7556 / Access code: 745 430 157

WebEx details:

- Click on the link above to establish video connection.
 - If the video connection isn't loading, click on "run a temporary application" to start the video
- To establish audio connection it is best to click on the Large Phone Icon/Button that says "Call me at ..."

Please note times included below are approximate and may be adjusted during the course of the meeting

9:00 Welcome

9:00 – 9:15 Introductions, Safety

9:15 – 9:30 Review Agenda, Status of Plans, and Schedule

9:30 – 10:15 *GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir*

10:15 – 11:00 *GEO 3 Project Road-related Erosion*

11:00 – 11:45 *LAND 1 Project Roads and Trails Assessment*

11:45 – 12:45 **LUNCH (on own)**

12:45 – 1:30 *REC 3 Recreation Visitor Use*

1:30 – 2:15 *REC 4 Recreation Visitor Use Surveys*

2:15 – 3:30 *REC 1 Whitewater Boating*

3:30 – 4:00 Meeting Close-out

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: AQ 5**

June 21, 2018

ATTENDEES

Participant	Affiliation
Gina Morimoto	Pacific Gas and Electric Company (PG&E)
Wayne Lifton	Cardno
Andie Herman	PG&E
Philip Choy	State Water Resources Control Board (SWRCB)

The purpose of the call was to respond to questions and clarifications related to Study Plan AQ 5 (Western Pond Turtles). Philip Choy (SWRCB) asked why three sites were chosen for western pond turtle trapping in the Project Bypass Reach. Wayne Lifton (Cardno) responded that three sites were sampled in similar habitat on Southern California Edison's Big Creek No. 4 Project, and they captured around 50 turtles within the three sites. Philip would like a fourth trapping site to be considered, and requested that contingency language be added to AQ 5. PG&E agreed to add a fourth trapping site, should appropriate habitat exist and consideration given to the number of western pond turtles observed during Study AQ 1 (Aquatic Habitat Mapping). The fourth trapping site would also be contingent on safe access. Philip agreed with the contingency language.

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**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: GEO 2**

June 21, 2018

ATTENDEES

Participant	Affiliation
Gina Morimoto	Pacific Gas and Electric Company (PG&E)
Wayne Lifton	Cardno
Mitchell Katzel	Cardno
Ed Cheslak	PG&E
Gregg Wilkerson	BLM

Gregg Wilkerson (BLM) was interested in why we are not proposing to sample suspended sediment during storm events to understand sediment dynamics in the reservoir.

Mitch Katzel (Cardno) explained the study objectives, the data collection, and analyses proposed. The main purpose of the GEO 2 study plan is to characterize the volume of reservoir sediment storage and water volume changes over time. Additionally GEO 2 will examine sediment particle size characteristics, but PG&E is not studying sediment movements associated with individual storm events. PG&E has very little operational control over the sediment load either entering the reservoir or passing through the reservoir. The GEO 2 study essentially integrates the net effect of all flow/storm events that carry sediment into the reservoir, because it measures the net total change of sediments in storage. The amount of sediment in storage is a result of all sediments deposited and all sediments transported downstream past the dam by all flow events. By comparing the total sediment load stored in the reservoir with past studies and known historical reservoir storage capacity, any trends toward aggradation and sediment accumulation in the reservoir can be identified. The net sediment loading to the reservoir is the main concern and focus for PG&E, irrespective of sediment transport associated with individual storm flow events.

Additionally, the study plan will sample and analyze the representative particle sizes deposited in the reservoir, rather than particle sizes in transport during a specific flow event. This gives a more complete picture of the particle sizes actually entering and captured in the reservoir, by distinguishing the proportions of silt, sand, gravel, cobble, particle sizes. Based on recent past studies (2012), it is anticipated that the majority of sediments stored in the reservoir are sand size.

Ed Cheslak (PG&E) explained that we were not doing a sediment transport study. Gregg said that people look at it as a package deal, looking at multiple projects. First impression is that it was not a standard approach. The plan should better clarify this in the objectives. Gina Morimoto (PG&E) said that we could rewrite the objectives in GEO 2 to clarify this. Gregg responded that he would be satisfied with a clarification of the study plan objectives.

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Study Plan Meeting Notes
Focus: CUL 1 and CUL 2**

**Sierra National Forest, High Sierra Ranger Station, Prather, CA
June 25, 2018
1:00 pm—3:00 pm**

ATTENDEES

Participant	Affiliation
Lisa Whitman	Pacific Gas and Electric Company (PG&E)
Matt Armstrong	PG&E
Gina Morimoto	PG&E
Shelly Davis-King	Davis-King & Associates
Chris Acree	Dumna Wowah
Erin Potter	United States Forest Service (USFS)
Jeff Irwin	USFS
Somer Shaw	Bureau of Land Management (BLM)
Christina McDonald	North Fork Rancheria (NFR)
Frank Winchell*	Federal Energy Regulatory Commission (FERC)
Polly Allen	Cardno
Crystal West	Cardno
Miles Baty	Big Sandy Rancheria

*Participated by phone

ACTION ITEM SUMMARY

- Matt Armstrong: Will investigate comments made by Christina McDonald regarding potential site damage to an archaeological site outside of the Project. Further information redacted from these public meeting notes for the purposes of confidentiality. Note: Outside of this license but pertinent from a Cultural Resource Management (CRM) perspective.
- Matt Armstrong: Will work with PG&E to identify whether tribal members could work with PG&E or Cardno to help identify sites. Matt Armstrong and team will review any liability or safety concerns regarding this type of activity.

- Matt Armstrong (PG&E): Will confirm whether repeaters are part of Project or outside of license?
- Matt Armstrong: Will look into any Information Center data restrictions on sharing records with tribes.
- Gina Morimoto and Matt Armstrong: Will discuss locations of Wildlife Watering Sites and determine whether they are in the proposed Area of Potential Effects (APE).
- Lisa Whitman: Will review and report back on process regarding PG&E commitments if Temperance Flat or similar project were to be built and change operations.
- Matt Armstrong: Will talk to PG&E colleague regarding Bureau of Indian Affairs (BIA) allotment history in Kerckhoff Project Area.

AGENDA ITEMS DISCUSSED

- PG&E led Introductions and the Agenda Review and held a Safety Minute. Lisa Whitman of P&E noted that the invitation sent to all on cultural resource distribution list (~60+), tribes, and agency cultural resource staff.
- Lisa Whitman of PG&E presented an overview of the FERC Relicensing process and status of Project activities
- Matt Armstrong of PG&E presented overview data and information regarding the facilities and location of the Kerckhoff Hydroelectric Project.
- Matt Armstrong of PG&E presented an overview of the CUL-1 and CUL-2 Study Plans. He noted that the Proposed Study Plans have been circulated to stakeholders for review and comment and that comments on the Proposed CUL 1 and CUL 2 Study Plans are due to FERC on July 29th, 2018. PG&E will review comments and incorporate into the Revised Study Plan for submittal to FERC.
- Matt Armstrong of PG&E led discussion regarding the APE for Cultural and Tribal Studies, stating that FERC has requested that the Licensee work with stakeholders early in the process to seek consensus on the definition of the APE. Matt Armstrong stated that one purpose of today's meeting is to present information and solicit comments on the proposed APE prior to development of the Revised Study Plan and that the Revised Study Plan will include a Proposed APE.

Following discussion of the above agenda items, PG&E held an open floor for all attendees to provide questions and/or comments regarding the CUL-1 and CUL-2 Study Plans. The following comments and/or questions were discussed:

- **Christina McDonald:** How many meetings are planned prior to Study Implementation?
Matt Armstrong: At least one more meeting prior to Study Implementation. Also, if there are any questions, comments, or additional data needs Matt would like people to reach out to him directly by telephone or email to discuss.

- **Jeff Irwin:** Is PG&E considering indirect effects in relation the Area of Potential Effect (APE)? The APE included in the meeting material seems targeted toward a Direct APE but what about indirect?

Matt Armstrong: The APE will consider direct and indirect effects related to Project Operations and Maintenance (O&M). Effects will be further identified during the course of the studies. We haven't made a decision on that. Depends on what comes up in studies, particularly the ethnographic studies. APE will not consider items that are not related to the Project, including any proposed or unrelated projects (i.e. Temperance Flat, Crane Valley operations). The nexus for this APE is O&M of the Kerckhoff Project. **Frank Winchell:** Relicensing APE can only consider effects that are related to O&M of this Project. This can be flexible if there's some kind of new development/proposal. Indirect effects – for things such as Traditional Cultural Properties (TCP), APE can certainly be expanded to account for them, but you may not need additional survey work. Project nexus is always going to be a true potential or existing project effect. **Crystal West:** Other Projects including Temperance Flat would have their own studies as part of their permitting process. Also, if there were additional projects PG&E would want to do after issuance of the Kerckhoff licensing that would be analyzed on a case-by-case basis as well.
- **Christina McDonald:** Noted looting and damage to a site outside of the Kerckhoff Project. Further information redacted from the public meeting notes for purposes of confidentiality. **Matt Armstrong:** Noted that this was not part of this license but stated that he would look into this and report back on next steps.
- **Christina McDonald:** Made comments regarding archaeological inventory approach that are redacted from public meeting notes for the purposes of confidentiality.
- **Matt Armstrong and Lisa Whitman:** Comments on Proposed Study Plans are due to FERC on July 29, 2018. Comments can be submitted on the FERC website or directly to PG&E. It is very important to submit all comments to FERC on proposed plan to be part of the Project record and part of the development of the Study Plans.
- **Somer Shaw:** Are repeaters considered part of the Project or are they related to transmission? **Matt Armstrong:** PG&E will confirm answer to this question.
- **Christina McDonald:** Noted that maps should better show where Crane Valley does or does not intersect with Kerckhoff (shown on maps as adjacent but out of Study Area).
- **Lisa Whitman, Matt Armstrong, and Gina Morimoto:** There are several other study plans that will also be done in consultation with tribal stakeholders, including botanical, wildlife, and mussels/aquatic mollusks studies. Additionally, stakeholders are welcome to be involved in other studies that may be of interest. There are 25 proposed studies.
- **Miles Baty:** Can known sites and data regarding cultural sites be shared with tribes? **Matt Armstrong:** PG&E will look into this to ensure that there are not any issues related to Information Center data restrictions. He would like to be able to share this information. **Polly Allen:** Typically, as part of these inventories and evaluations and implementation of the Technical Working Group around cultural resources, we share data and information with the group. Having the information explained is part of the working group process and is important.

- **Chris Acree:** – What if we share confidential information with you? Can you keep it confidential? **Matt Armstrong:** Yes, we have a special drive that only cultural resource staff has access to. Additionally, GIS layer containing that information is only available to cultural resource staff that has the proper training and qualifications. Nothing you don't want shared will be shared.
- **Somer Shaw:** Are Wildlife Watering Sites in APE? **Matt Armstrong** and **Gina Morimoto** will discuss locations of sites and report back.
- **Christina McDonald:** Made comments regarding archaeological site locations that are redacted from public meeting notes for the purposes of confidentiality.
- **Jeff Irwin:** Asked a question regarding archaeological site locations that is redacted from public meeting notes for the purposes of confidentiality.
- **Christina McDonald:** Would tribal participants (Brother) be able to go with consultants on surveys, in boats, to record or document sites? **Matt Armstrong:** Will make a note that you asked that, also please submit an electronic comment to FERC. There are liability concerns. PG&E is heavily scrutinized for safety due to high-profile things that have occurred over the past 10 years. Therefore we need to limit who we have in the field and conditions which they are there. Also, surveys will likely be land based. **Jeff Irwin:** Could they go out as a Cardno employee or consultant? **Matt Armstrong:** If they met certain conditions, and were qualified to be an archeological field technician. Good question that has come up on other projects. PG&E and Cardno will check feasibility of having tribal person on Cardno's field crew.
- **Jeff Irwin:** Any wildlife crossing studies? **Gina Morimoto:** No, because Project does not have canals. **Miles Baty:** Noted that there are plenty of times when the deer cross the reservoirs in this area.
- **Miles Baty, Christina McDonald** (and others): If Temperance Flat is built, does this mean PG&E's agreements are void? **Lisa Whitman:** Will investigate this process and report back. Decommissioning has its own suite of studies, etc.
- **Matt Armstrong:** We anticipate a lot of sites, but don't know how many are in our APE at this point.
- **Jeff Irwin:** What is the status of A.G. Wishon Powerhouse? **Matt Armstrong:** Nothing related to the historic Crane Valley Project hydro features is eligible.
- **Miles Baty:** In the original licensing for the Project, that dam stopped the salmon from going farther up. Was there any settlement with the tribes at that time? **Matt Armstrong:** Given the conditions at that time, I would think no. **Gina Morimoto:** Noted that because there is not passage at Friant Dam, there is no potential passage for salmon populations at the Kerckhoff Project.
- **Jeff Irwin:** North of A.G. Wishon Powerhouse, there is a tribal allotment that was applied for but to this day it is unresolved. Allotment application occurred in the 1950s. Danny Lewis's mother applied for the allotment, but it's outside of your Project area. But it's something to keep in mind whether any allotment applications occurred in the first half of the 20th century. You'd have to get in touch with BIA. USFS made recommendation to

BIA but was never resolved. On route 222. **Matt Armstrong:** Will talk to Jennifer Thomas (PG&E) about who to talk with at BIA regarding unresolved allotments in the Project area.

- **Matt Armstrong:** Anything else outstanding that we should discuss? Want to clarify two elements: 1. Sharing info with the tribes, Matt doesn't see a problem but wants to check. 2. Having third parties go out – we're not anticipating any boat surveys because it doesn't typically provide useful information, but if you think so please comment on the study plan. Having a third party out does create liability issues for PG&E. Team will check on options for having a tribal member work with Cardno as contractor. Will need to resolve this for CUL 2 field work as well.
- **Jeff Irwin:** If it's easier for USFS to share the site data, we can always share our portion and BLM could share their portion. **Matt Armstrong:** That may be the way to go.

MEETING ADJOURNED

Follow Up Note regarding Action Items: Matt Armstrong transmitted a follow-up summary regarding the meeting minutes and action items discussed on August 6, 2018 via email and mail to the Cultural Resources Technical Working Group. The Transmittal included responses to all action items discussed.

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Cultural and Tribal Resources Study Plan Meeting Agenda**

**Sierra National Forest, High Sierra Ranger Station
29688 Auberry Road, Prather, CA 93651
June 25, 2018
1:00 pm – 4: 00 pm**

1:00 - 1:15	Introductions & Agenda Review, Safety Minute
1:15 - 1:30	Overview of FERC Relicensing process and status of Project activities
1:30 - 1:45	Overview of Kerckhoff Hydroelectric Project
1:45 - 2:15	Proposed Cultural and Tribal Study Plans: Status and Background
2:30 - 3:00	Consultation Regarding proposed Area of Potential Effects (APE) for Cultural and Tribal Studies
3:00 - 4:00	Open Floor: Questions, Comments, Information Requests

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Study Plan Meeting Notes
Focus: AQ and WQ Studies**

**Piccadilly Airport Inn - 5115 E McKinley Avenue, Fresno
Tuesday, June 28, 2018
9:00 am – 3:30 pm**

ATTENDEES

Participant	Affiliation
Marie Rainwater	Rainwater and Associates
Alison Lipscomb	Bureau of Land Management (BLM)
Somer Shaw	BLM
Tim Keldsen	BLM
Eric Guzman	CA Department of Fish and Wildlife (CDFW)
Stacy Evans	Cardno
Wayne Lifton	Cardno
Katie Ross-Smith	Cardno
Lisa Whitman	Pacific Gas & Electric (PG&E)
Gina Morimoto	PG&E
Andie Herman	PG&E
Ed Cheslak	PG&E
Philip Choy	State Water Resources Control Board (SWRCB)
Dawn Alvarez	United States Forest Service (USFS)
Jon George	USFS
Kenneth Woodrow*	Wukasche Indian Tribe/Eshom Valley Band

*Participated by phone

ACTION ITEM SUMMARY

- PG&E will revise the consultation text in the study plans: “resource agencies, tribal interests, and interested parties”.
- PG&E will follow up with Ron Goode (North Fork Mono Tribe) to confirm consultation text is acceptable.
- PG&E to prepare language to be inserted into AQ 2 and AQ 6 to clarify the lamprey sampling methods, and to send to the stakeholders to review. The revisions will be discussed on during the July 17th meeting.
- PG&E to check the PAD to see if it includes turbidity data sampled when the low level outlets were open.
- PG&E will send the latest version of GEO 2 from today to Gregg Wilkerson (BLM).
- CDFW and BLM will review today’s version of GEO 2 with their technical staff to identify any fatal flaws. They will contact Gina Morimoto (PG&E) if any are identified.
- PG&E will prepare text for CDFW and State Water Board review to clarify the prioritization of the species for sampling in WQ 3.
- PG&E to provide clean versions of the green-lighted¹ plans and red lines of the study plans.
- PG&E to send out an updated Study Plan Status matrix, and a list of the green-lighted plans.

MEETING INITIATION

Marie Rainwater opened the meeting and provided an overview of the agenda. Lisa Whitman (PG&E) provided an overview of the Kerckhoff ILP schedule and upcoming meetings:

- July 17th and 18th: Placeholder for discussion of any outstanding study plans
- July 29th: Comments on the Proposed Study Plans are due to FERC
- August 28th: PG&E will file Revised Study Plans
- September 12th: Comments on the Revised Study Plans are due to FERC
- September 27th: FERC Study Plan Determination

PG&E followed up on the request by Ron Goode (North Fork Mono Tribe) during the June 19th meeting to add “Tribes” to the list of consultation with resource agencies and interested parties in the study plans. The participants agreed the following change should be made to all the study plans regarding consultation: “resource agencies, tribal interests, and interested parties”.

¹ Study plans in green indicate tentative agreement in PG&E’s Proposed Study Plan Tracking Summary table that is a tool to quickly assess the status of each study plan.

Action Item: PG&E will revise the consultation text in the study plans: “resource agencies, tribal interests, and interested parties”

Action Item: PG&E to follow up with Ron Goode (North Fork Mono Tribe) about this change.

Katie Ross-Smith (Cardno) provided a PowerPoint presentation showing the geomorphology and sediment conditions of Kerckhoff Reservoir and the San Joaquin River in the vicinity of the Kerckhoff Project.

COMMENTS, QUESTIONS, AND DISCUSSION ON DRAFT PROPOSED STUDY PLANS

AQ 2 – Fish Populations

Gina Morimoto (PG&E) provided an overview of the revisions to the study plan. PG&E revised the plan to allow flexibility in the timing of the sampling period of American shad spawning, based on PG&E’s recent discussions with professional guides.

Eric Guzman (CDFW) checked with the Licensing Branch to see if guide logs are available. The files are unorganized; therefore, PG&E can request to look through the guide logs.

No additional comments on the plan. Attendees “green lighted” the plan.

AQ 5 – Western Pond Turtles

Andie Herman (PG&E) provided an overview of PG&E’s revisions to AQ 5 – Western Pond Turtle study plan. The revisions included clarifications and flexibility in survey methods, including a contingency of an additional survey site. The meeting participants discussed PG&E’s revisions and made “on-screen” edits for additional clarification on the plan during the meeting. The participants discussed the process for selecting the study sites: the results of the AQ 1 Aquatic Habitat Mapping study will be reviewed over the winter and discussed with the stakeholders in the spring, prior to the start of the field work.

No additional comments on the plan. Attendees “green lighted” the plan.

AQ 6 – Rare Aquatic Species

Andie Herman (PG&E) provided an overview of PG&E’s revisions to AQ 6 – Rare Aquatic Species study plan, which included clarifications regarding replicate sampling and the next steps if there are positive eDNA detections for foothill yellow-legged frogs (FYLF) or lamprey. The meeting participants discussed eDNA sampling, lamprey field sampling approach, and electrofisher settings for lamprey. Gina explained that eDNA is the “back stop” to determine presence of lamprey if none are captured during the AQ 2 – Fish Population study.

PG&E discussed that sampling for lamprey would occur at the AQ 2 – Fish Populations study sites. If there is appropriate habitat for lamprey immediately adjacent to the fish population sites (approximately 10 meters), then PG&E would do a qualitative sampling pass to target lamprey. Gina explained that additional quantitative sites would be very expensive. She clarified that if

eDNA results are positive, PG&E would still be doing the electrofishing surveys as part of AQ 2 – Fish Populations.

Action Item: PG&E to prepare language to be inserted into AQ 2 and AQ 6 to clarify the lamprey sampling methods, and to send to the stakeholders to review. The revisions will be discussed on during the July 17th meeting.

The participants discussed the need for abundance data for lamprey, in addition to presence data. PG&E replied that they think the level of effort in the plan and discussed above is sufficient to explore the issue of presence of the species. With eDNA data and electrofishing efforts, PG&E believes it is making a good faith effort to determine if the species is there. If positive results are found, PG&E will review the data and consult with the stakeholders.

AQ 7 – Benthic Macroinvertebrates

Gina Morimoto (PG&E) provided an overview of the AQ 7 – Benthic Macroinvertebrate study plan. The plan was requested by the State Water Board, and was developed in consultation with Philip Choy (State Water Board). Gina discussed the sampling methods, and study area and sampling sites. The study will be implemented in the Project Bypass Reach in reaches that are wadeable and safety accessible, which may be challenging to find. PG&E is proposing three study sites, with a contingency for a fourth site, if a suitable fourth site is identified based on data collected during the AQ 1 Aquatic Habitat Mapping. Flexibility is included in the plan if adjustments in methods are needed due to site conditions.

No additional comments on the plan. Attendees “green lighted” the plan.

GEO 2 – Project-related Sediment Management Practices in Kerckhoff Reservoir

Gina Morimoto (PG&E) updated the meeting participants on the revisions made to the plan based on recent discussions with BLM and the State Water Board. PG&E clarified the objectives of the study, at the request of BLM. Gina also discussed the uncertainty of the sampling methods for the sediment cores. PG&E’s boat does not have a winch, and would not be able to pull up heavy samples if a hand core is used.

The meeting participants discussed the potential for requiring opening of the low level outlets during lower flows to release some sediment into the system. Ed Cheslak (PG&E) explained that PG&E does not operate the low level outlets for sluicing sediment. They are opened during the Department of Dam Safety (DSOD) inspections and during high flows to relieve pressure on the dam. PG&E has done limited turbidity monitoring during some of the low level outlet exercises. There is an initial spike in turbidity when the low level outlets are initially opened, but returns to background turbidity levels relatively quickly; indicating that there is limited sediment transported through the operation of the low level outlet.

Action Item: PG&E to check the PAD to see if it includes turbidity data when the low level outlets were opened.

PG&E said that the technical memo will include a summary of all existing information.

Philip Choy (State Water Board) stated that he is interested in the change of storage over time and understanding the sediments that are near the low level outlet, including below the surface sediments. Philip Choy said that he is interested in if there might be cobbles below the finer surface sediments that might be exposed after the release. The meeting participants discussed various sampling approaches to characterize the sediments that may be below the surficial layer. The meeting participants revised the text in the plan to consider bathymetric surveys before and after operations of the low level outlet in 2019 if additional information is determined to be needed:

If additional information on the effect of the low level outlets is found to be needed after consultation by PG&E and stakeholders, a before/after bathymetric evaluation of the sediment upstream of the low level outlets would be performed after the cessation of natural spill in 2019, if spill occurs. This evaluation would only take place if operationally feasible.

Action Item: PG&E will send the last version of GEO 2 from today to Gregg Wilkerson (BLM).

Action Item: CDFW and BLM will review today’s version of the plan with their technical staff to identify any fatal flaws. They will contact Gina Morimoto (PG&E) if any are identified.

WQ 1 – Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach

Ed Cheslak (PG&E) discussed the revisions to the plan, which included clarification of the study reaches, timing of the monthly water temperature profile measurements to cover all the summer months, and relationship with AQ 1 Aquatic Habitat Mapping.

No additional comments on the plan. Attendees “green lighted” the plan.

WQ 2 – Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir

Ed Cheslak reviewed PG&E’s revisions to the plan. PG&E has agreed to conduct both fecal coliform and *E. coli* sampling. The revisions to the plan reflect this agreement - with changes to Table WQ 2-1; the seasonal sampling schedule and study period; the location of sampling; and addition of flexibility for the sampling protocol. In addition, PG&E will analyze samples for total dissolved recoverable arsenic rather than the bioavailable arsenic fraction because there is no water quality criterion for bioavailable arsenic.

No additional comments on the plan. Attendees “green lighted” the plan.

WQ 3 – Bioaccumulation in Kerckhoff Reservoir

Ed Cheslak updated the meeting participants and reviewed PG&E’s revisions to the plan. PG&E continued discussions with the State Water Board on the metals and organics that would be analyzed as part of the study. Recent sampling results for 303d listing downstream of the Project did not find any issues with some of the organics and metals. The list was revised and sampling for organics was dropped to a screening level analysis based on this information and additional discussions with the State Water Board.

Eric Guzman (CDFW) commented that he would prefer that PG&E sample crayfish and other non-native fish and not sample trout. The meeting attendees discussed the prioritization of the species for testing: bass, sunfish, and crayfish. On-screen edits were made to clarify that trout will not be sampled. **Action Item: PG&E will prepare text for CDFW and State Water Board review to clarify the prioritization of the species for sampling.**

No additional comments on the plan. Attendees “green lighted” the plan with the additional of the language.

Study Plan Process Update

Marie Rainwater discussed the study plan process moving forward and emphasized the importance of communication among the participants to let everyone know what they are doing and that everyone agrees on the process to make it as efficient as possible.

Philip Choy (State Water Board) and Somer Shaw (BLM) requested clean versions of the agreed upon draft study plans. They also requested red line versions of the plans (compared to the Proposed Study Plan). Somer requested the green lighted plans as soon as possible, as BLM is beginning to draft their response.

Action Item: PG&E to provide clean versions of the green-lighted plans and red lines of the study plans.

Action Item: PG&E to send out an updated Study Plan Status matrix, and a list of the green-lighted plans.

**PG&E Kerckhoff Hydroelectric Project
Study Plan Meeting Agenda
Focus: AQ and WQ Studies**

**Piccadilly Airport Inn, 5115 E McKinley Avenue, Fresno
June 28, 2018
9:00 am – 3:30 pm**

For Participants joining by phone:

WebEx Link: <https://pge.webex.com/pge/j.php?MTID=m0e991d90b048d482d8b08c1348f65839>

Call-in no.: 1-800-603-7556 / Access code: 744 529 485

Times included below are approximate and may be adjusted during the course of the meeting

- | | |
|--------------|--------------------------------------------------------------------------------------------|
| 9:00 | Welcome and Introductions |
| 9:15 | Review Agenda, Safety, and Schedule |
| 9:30 | Project Bypass Reach Slideshow and Discussion |
| 10:15 | <i>AQ 2 – Fish Populations</i> |
| 10:30 | <i>AQ 5 – Western Pond Turtles</i> |
| 11:00 | <i>AQ 6 – Rare Aquatic Species</i> |
| 11:30 | <i>AQ 7 – Benthic Macroinvertebrates</i> |
| 12:00 | LUNCH (on own) |
| 1:00 | <i>GEO 2 Update (Project-related Sediment Management Practices in Kerckhoff Reservoir)</i> |
| 1:15 | <i>WQ 1 – Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach</i> |
| 1:30 | <i>WQ 2 – Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir</i> |
| 2:00 | <i>WQ 3 – Bioaccumulation in Kerckhoff Reservoir</i> |
| 2:45 | Meeting Close-out |

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**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: WQ 3 and AQ 2**

July 9, 2018

ATTENDEES

Participant	Affiliation
Gina Morimoto	Pacific Gas and Electric (PG&E)
Wayne Lifton	Cardno
Eric Guzman	California Department of Fish and Wildlife (CDFW)

The purpose of the call was to respond to questions and clarifications related to Study Plan WQ 3 (Bioaccumulation in Kerckhoff Reservoir) and discuss potential lamprey habitats to be sampled under Study AQ 2 (Fish Populations). For Study WQ 3, Eric Guzman (CDFW) checked with his management regarding preferences and concerns for fish species to be collected for tissue sampling and bioaccumulation analysis. Eric Guzman stated that the use of rainbow trout will be acceptable. Other tissue samples for bioaccumulation may be taken from spotted bass, crayfish, other non-native fish species, and Sacramento pikeminnow. This also is the order of preference for use. Hardhead are not to be used for tissue sampling.

Potential Kern brook lamprey habitat that may be sampled as part of Study AQ 2 (Fish Populations) also was discussed. Within each of the AQ 2 quantitative electrofishing sampling sites in the Project Bypass Reach, any depositional areas will be sampled for the potential presence of lampreys. Based on the results of Study AQ 1 Aquatic Habitat Mapping, PG&E will attempt to locate 3-4 additional sites that may be potentially electrofished for the presence of lampreys, if they are not found in the fish population quantitative sampling sites. Potential sites that PG&E will look to identify will be characterized by low gradient containing depositional areas with sand, silt, and/or other small substrates. They will need to be less than one meter in depth so they can be sampled safely using backpack electroshockers. The sites also will need to be safely accessible with a nearby helicopter landing site. Electroshocking for lampreys will be qualitative.

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**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: CUL 1 and CUL 2**

**July 13, 2018
11:15 am –12:00 pm**

ATTENDEES

Participant	Affiliation
Matt Armstrong	PG&E
Amy Girado	Bureau of Land Management (BLM)

During the call, Matt Armstrong and Amy Girado discussed the BLM comments regarding the CUL-1 and CUL-2 Proposed Study Plans. The following comments were discussed:

Cultural Resources (CUL-1) Study Plan

BLM Comment: Past and historic use of the FERC boundary created cultural resources on the landscape beyond the initial expected boundary. This land pattern is likely to continue into the future license and use of the project area. Previous documentation of cultural resources related to the existing FERC license were not complete. The results of incomplete documentation were used to make decisions about eligibility on the whole hydro-system. Generally accepted cultural resource expectations include, when feasible, cultural resource boundaries would be documented fully and in relation to site formation processes and are not based solely upon project boundaries.

Teleconference Discussion: Matt Armstrong stated to Amy Girado that he understood this to be expressing a concern that the boundaries for the hydroelectric system were not sufficiently developed when the system was evaluated as not eligible for the National Register of Historic Places (NRHP). Amy Girado confirmed that this was the case, and added that there is a concern that some materials left behind from construction of the hydroelectric system may become the BLM's management responsibility if PG&E does not create an Area of Potential Effect (APE) that covers all areas likely to be used during the ongoing use of the hydroelectric system. Matt Armstrong stated that he believed that the language that described the extent of site recording (sites encountered during the study will be recorded to their full extent, except for under conditions stated in the study plan) would encompass the known areas where this may be a concern (the old PG&E construction camp, residential area, and associated debris scatter, possibly including an incinerator). Amy Girado agreed that this was likely, but wanted to obtain a GIS shapefile of the APE in order to better examine it. (The BLM was subsequently provided with a shapefile that documented the APE on 7/19/2018 and 8/13/2018).

BLM Comment: In development of the APE, the BLM will need access to specific details, including record search results, shapefiles of the proposed APE(s), and maps of a scale that are

reasonably large enough to view the data. Maps provided in the recent 6/25/18 meeting are too small to facilitate questions about the APE. **Teleconference Discussion:** Matt Armstrong confirmed to Amy Girado that PG&E would develop the spatial data to depict the APE and convey to the BLM. The BLM was subsequently provided with a shapefile that documented the APE on 7/19/2018 and 8/13/2018.

BLM Comment: FERC needs to clarify which portions of the FERC license are above ground and which are sub-surface, preferably with shapefiles and relevant attribute data. **Teleconference Discussion:** Matt Armstrong confirmed to Amy Girado that PG&E would develop the spatial data to depict the above ground and below ground portions of the APE and convey to the BLM. The BLM was subsequently provided with a shapefile that documented the APE on 7/19/2018 and 8/13/2018 that depicted above ground and below ground areas.

BLM Comment: The timeline for development of the APE by February 2019 is supported by the BLM, provided that the BLM is afforded adequate time to provide input and review of the draft APE. **Teleconference Discussion:** Matt Armstrong confirmed that this was approved by the BLM.

BLM Comment: Bureau of Reclamation (BOR) lands are not adequately described and displayed on FERC project maps. BOR lands that are managed by the BLM are displayed as being owned by the BLM. FERC seems to be confusing BLM recreation maps with official land status. This has the potential to create confusion, for example, identification of an appropriate agency to take the lead in the event of a Native American Graves Protection and Repatriation Act (NAGPRA) discovery could be delayed if FERC does not recognize that BOR lands are within the license area. BLM has provided current shapefiles for the correct official land status. BLM will not take lead on NAGPRA and Archaeological Resources Protection Act (ARPA) processes on BOR Lands. **Teleconference Discussion:** Matt Armstrong clarified that the land ownership/management was determined by a variety of map sources, not simply using the BLM's maps, and Amy Girado stated that, though that may be the case, she knew of BOR land that was not being labelled as such. Matt Armstrong stated that he would request that the PG&E/Cardno team contact the BLM land specialist to get a clearer understanding of the complex land ownership and management situation. **Post-Conference Call Update:** BLM provided additional information showing that BOR lands are within the project area, and the BOR therefore will be responsible for NAGPRA and ARPA on those lands.

BLM Comment: Areas not surveyed as a result of steep slope, or other access areas, should still be addressed in field documentation even if excluded from survey. If this methodology were applied across the Sierra Nevada, a majority of the gold mining sites would be excluded from review. FERC needs to find a way to address such resources, should they exist on the landscape. **Teleconference Discussion:** Amy Girado expressed concern that this would result in areas being written off without consideration. Matt Armstrong described a method that he had previously used in other areas with known gold mining activity, where binoculars or a similar device were used to examine slopes that could not be surveyed safely, and the field crew made every effort to note on maps locations that did or were likely to contain resources. Amy Girado agreed that this was a more appropriate method, as gold mining activity often took place on steep slopes that may not be surveyed.

BLM Comment: CUL 1a Technical Study Report (TSR) needs to include a clear definition of the APE used in the field studies as well as an appendix containing the California Office of Historic Preservation (CA OHP) Information Center (IC) records search. **Teleconference Discussion:** Matt Armstrong and Amy Girado agreed that this is a standard procedure, and the study plan would be edited to ensure that it specifically called this out.

BLM Comment: CUL 1b / CUL 1c TSRs –Notification of the BLM needs to occur prior to notification of NRHP evaluation findings to SHPO for sites located on BLM parcels. **Teleconference Discussion:** Matt Armstrong and Amy Girado agreed that this is standard procedure, but as there is a history of the BLM not having been consulted appropriately in the past, the study plan language would be changed to appropriately address this and ensure that PG&E consult appropriately with land management agencies before the NRHP recommendations are submitted to SHPO.

BLM Comment: In order for the BLM to review the TSR's, FERC will provide access to GIS data and record search information used in the development of the TSR's. This information is also needed for BLM NEPA/ NHPA review of the Right of Way (ROW) process related to the K2 facilities. **Teleconference Discussion:** Matt Armstrong stated that he did not believe that this would pose a problem, but would review the agreements with the information center to identify any trouble ahead of time and prevent it.

BLM Comment: The Organic Act applies to the USDA. For the BLM (in contrast the United States Forest Service [USFS]), non-invasive studies (i.e. archaeological survey) and subsurface testing are subject to ARPA. **Teleconference Discussion:** Matt Armstrong and Amy Girado engaged in a lengthy discussion of the Organic Act and the agencies subject to it, as well as the applicability of ARPA to non-excavation work. The decided upon resolution was to simply alter the language in the study plan to note that the appropriate permits and authorizations would be obtained for the agency on whose land the archaeologists were working.

Cultural Resources (CUL-2) Study Plan

BLM Comment: FERC proposed to interview tribal elders and other tribal representatives by contacting Native American Tribes. This process would not include non-federally recognized Native American leadership that has been identified to FERC from the BLM. FERC needs to incorporate measures to ensure all Native American voices are included in the ethnographic study.

Teleconference Discussion: Amy Girado explained that BLM policy includes both federally recognized tribes, and non-recognized tribes, organizations, and individuals. Matt Armstrong explained that PG&E had been compiling a cultural group list that incorporated these same organizations, groups, and individuals, and had sought to keep them informed of events and invite all to meetings. Amy Girado agreed that this was appropriate, and noted that this was stated early in the study plan, but was concerned that the language was inconsistent throughout the document and did not wish for there to be any confusion or loopholes. Matt Armstrong agreed that the study plan language should be changed to address inclusion consistently.

BLM Comment: For site visits between the ethnographer and Native American leadership, the BLM would need to be notified in advance regarding proposed locations on BLM lands to ensure

compliance with any permit requirements. **Teleconference Discussion:** Matt Armstrong agreed, and stated that he would seek to address this in the study plan language.

BLM Comment: All steps, including NRHP evaluations and Traditional Cultural Properties (TCP) studies, identified by FERC within the CUL-2 Study Plan should involve input from Federally and non-Federally recognized tribes and individuals, as well as tribal museums and tribal organizations, such as California Indian Basketweavers' Association (CIBA). This is stated at the beginning of the document, but is not consistent throughout the text, as a result, the intent is not clear. **Teleconference Discussion:** Matt Armstrong agreed, and stated that he would seek to address this in the study plan language.

Following discussion of BLM's filed comments, Amy Girado again requested that PG&E discuss BOR lands with the BLM GIS contact, and that PG&E provide GIS information for the proposed APE so that Amy Girado could better evaluate the adequacy of the proposed APE. Matt Armstrong agreed to request both from the PG&E/Cardno team, and the data was supplied following the call on 7/19/2018 and 8/13/2018. Amy Girado and Matt Armstrong then proceeded to discuss other matters regarding PG&E activity in the San Joaquin River gorge, but unrelated to relicensing, primarily the on-going vegetation management work being done along the transmission and distribution lines in the area.

Following the teleconference, Matt Armstrong sent his summary notes of the teleconference to Amy Girado for review. On 8/9/2018 Amy Girado added the following clarifying items to the record via email:

- Update on the ARPA / Organic Act conversation. For the BLM, our permits are issued under FLPMA, however, they are commonly referred to as ARPA permits similar to the conversation we had about the Organic Act and the USFS.
- I did receive a shapefile of the APE from you, however, I had requested that the shapefiles differentiated between surface features and sub-surface features. The shapefile provided on July 19 is a single feature with no attribute information. The pdf map resolution is too small to distinguish such information. (**Update:** PG&E provided BLM with an updated shapefile addressing the subsurface features on 8/13/2018).
- Amy Girado stated that she was working on reviewing the updates to the Draft Revised Study Plans provided by PG&E and that comments would come in a separate email.

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Study Plan Meeting Notes
Focus: WILD, BOT, GEO and REC Studies**

**Piccadilly Airport Inn - 5115 E McKinley Avenue, Fresno
Tuesday, July 17, 2018
9:00 am – 5:00 pm**

ATTENDEES

Participant	Affiliation
Marie Rainwater	Rainwater and Associates
Somer Shaw	Bureau of Land Management (BLM)
Karen Doran*	BLM
Gregg Wilkerson	BLM
Amy Girado*	BLM
Ron Goode	North Fork Mono Tribe
Abimael Leon	CA Department of Fish and Wildlife (CDFW)
Stacy Evans	Cardno
Paul Martzen	American Whitewater
Wayne Lifton	Cardno
Katie Ross-Smith	Cardno
Lisa Whitman	Pacific Gas and Electric Company (PG&E)
Gina Morimoto	PG&E
Dan Clark	PG&E
Ed Cheslak*	PG&E
Laura Burkholder*	PG&E
Kelly Kephart*	PG&E
John Mintz	PG&E
Matt Armstrong	PG&E
Teresa Simsiman	American Whitewater
Philip Choy	State Water Resources Control Board (SWRCB)
Dawn Alvarez*	United States Forest Service (USFS)
Jon George	USFS

*Participated by phone

ACTION ITEM SUMMARY

- PG&E will make the following global changes in the study plans: change (1) “tribal interests” to “tribes”; and (2) “Native American tribes” to “California Native American tribes” when discussing formal consultation.
- Lisa Whitman (PG&E) will send an email asking for agreement on concurrence of the four early implementation study plans by the end of this week (7/20); requesting a response by August 3rd (two week turn around).
- PG&E will revise GEO 3 to include the turnouts and laydown areas in the study area.
- PG&E will connect with BLM about the ROW needs.
- The gold references provided by BLM for the GEO studies will be shared with the cultural team leads.
- PG&E will meet internally to discuss how to address BLM’s comments on REC 3 and will schedule a follow up discussion with BLM (face-to-face).
- PG&E will meet internally to discuss REC 4 and will schedule a follow up discussion with BLM (face-to-face).
- Amy Girado (BLM) will send PG&E the map that shows the Bureau of Reclamation (BOR) lands. PG&E will continue to work with BLM to obtain the GIS shapefiles.
- Matt Armstrong (PG&E) will discuss the edits to CUL 1 and CUL 2 with Amy Girado, Ron Goode, and Jeff Irwin. He will copy Alison Lipscomb and Somer Shaw on correspondences with the BLM.
- PG&E will send an email on Thursday with the PDF, clean copies and the negotiated, track changes versions compared to the Proposed Study Plan (PSP) filing.
- By the end of the week, PG&E will email the clean versions of the four study plans with early implementation requesting agreement on consensus on the plans within two weeks. REC 3, REC 4, CUL 1, and CUL 2 are still in progress and will not be included in the email package.
- PG&E will email Somer with track-changes versions of the plans prior to the next meeting.

MEETING INITIATION

Marie Rainwater initiated the meeting and provided an overview of the agenda. Upcoming milestones of the Kerckhoff Integrated Licensing Process (ILP) schedule include:

- July 29: Comments on the Proposed Study Plan are due to FERC
- August 28: PG&E will file Revised Study Plan
- September 12: Comments on the Revised Study Plan are due to FERC
- September 27: FERC study plan determination

Lisa Whitman provided an overview of the plans that will be provided to the agencies. PG&E will provide clean copies and a red-line version that compares the most recent version with PG&E's Proposed Study Plan filing.

Lisa Whitman also reviewed the plans that PG&E would like to start early: GEO 1, GEO 2, BOT 2, and AQ 1, and the process that was previously discussed to document consensus on these four study plans. PG&E will send an email to the stakeholders stating that consensus has been reached among the stakeholders on these plans and will ask for a return emails confirming consensus as well as support for early implementation. Projected start date for the early studies is September 2018; with August for planning; contracting; and budgeting. **Action Item: Lisa will send the email asking for agreement on concurrence of the four plans by the end of this week (7/20); requesting a response by August 3 (two week turn around).**

Ron Goode (North Fork Mono Tribe) asked if there would be an opportunity to add to the early implementation studies at a later date. Wayne Lifton (Cardno) clarified that the four studies provide information that will be used to inform study site selection and approaches for data collection for other studies that will start in 2019, which will be done in consultation with the stakeholders:

- AQ 1 is aquatic habitat mapping and the data will be used to inform the selection of study sites for other aquatic studies;
- GEO 1 is the channel geomorphology study which will be used to stratify the reach based on the channel characteristics;
- BOT 2 is the riparian study and is proposed for early implementation to take advantage of the helicopter use with GEO 1; and
- GEO 2 includes the bathymetric data collection and high definition imagery of the reach and reservoir that will be used for planning purposes.

In addition, as part of the ILP process, there is an opening to add studies when the results of year one studies are reviewed with interested parties.

Marie Rainwater summarized PG&E's PSP Tracking Summary table that is a tool to quickly assess the status of each study plan: study plans in green indicate tentative agreement; those in yellow are close to consensus; and red indicate those plans on which the group agrees to disagree.

COMMENTS, QUESTIONS, AND DISCUSSION ON DRAFT PROPOSED STUDY PLANS

Ron Goode requested two global edits in the study plan text: (1) use "tribes" rather than tribal interests; and (2) change "Native American tribes" to "California Native American tribes" (when formal consultation).

Action Item: PG&E will make the following global changes in the study plans: change: (1) "tribal interests" to "tribes"; and (2) "Native American tribes" to "California Native American tribes" when discussing formal consultation.

WILD 1 – Special-status Wildlife Species

Gina Morimoto (PG&E) summarized the status of the revised WILD 1 study plan. PG&E received comments from BLM on 3/16/18 on the Draft Proposed Study Plan (filed on 11/16/17). PG&E discussed the comments with BLM on 4/4/18 and study plan revisions at the Study Plan Meeting on 5/21/18. PG&E asked the agencies if there were any additional comments on the plan.

No additional comments on the plan. Attendees “green lighted” the plan.

BOT 1 – Plant Communities, Special-status Plant Species, and Invasive Weeds

Gina Morimoto summarized the status of the revised BOT 1 study plan. PG&E received comments from BLM on 3/16/18 on the Draft Proposed Study Plan (filed on 11/16/17). PG&E discussed the comments with BLM on 4/4/18 and study plan revisions at the Study Plan Meeting on 5/21/18. PG&E asked the agencies if there were any additional comments on the study plan.

No additional comments on the plan. Attendees “green lighted” the plan.

AQ 6 – Rare Aquatic Species

Gina Morimoto provided an overview of the recent revisions to the plan. After further discussion with Philip Choy (SWRCB) and Eric Guzman (CDFW) regarding Kern brook lamprey electrofishing sampling, the sampling was added to the AQ 2 Fish Populations study plan and removed from the AQ 6 study plan. PG&E added a bullet to document incidental observations of Kern brook lamprey and added a cross-reference between the AQ 2 and AQ 6 studies. PG&E asked the agencies if there were any additional comments on the study plan.

No additional comments on the plan. Attendees “green lighted” the plan.

AQ 2 – Fish Populations

Gina Morimoto summarized the recent changes to the AQ 2 study plan. Recent changes were related to the Kern brook lamprey sampling approach, which was moved from the AQ 6 study plan. PG&E will select up to three additional qualitative sampling sites if additional wadeable depositional areas are located outside the other quantitative electrofishing sites to target Kern brook lamprey. Abimael Leon (CDFW) requested that agencies be consulted during site selection; the edit was made to the plan. PG&E asked the agencies if there were any additional comments on the study plan.

No additional comments on the plan. Attendees “green lighted” the plan.

REC 1 – Whitewater Boating Assessment

John Mintz (PG&E) updated the meeting participants on the revisions to the REC 1 study plan. These changes included changes in the reach names; incorporating a hydrologic assessment into Phase I with boatable days by water year type as defined by the Department of Water Resources; defining the term “minimum acceptable flow” based on discussions with American Whitewater; and expanded Phase 3 to include up to three flows for the boating study. The boating study is planned for 2019 and PG&E will try to utilize natural flows. The study would include evaluation of the put in and take out areas, including those at Kerckhoff Reservoir and the dam. The study

plan includes language that PG&E is committed to provide flows, if a spill does not occur in 2019 and that the study could occur in 2020 if PG&E is unable to provide the flows due to dry water year conditions in 2019. Theresa Simsiman (American Whitewater) shared that the run names have been changed on American Whitewater's website.

No additional comments on the plan. Attendees "green lighted" the plan.

LAND 1 – Project Roads and Trails Assessment

PG&E received comments from BLM on the LAND 1 study plan (shared with PG&E on 7/11/18). Dan Clark (PG&E) commented that PG&E was working through these comments. Somer Shaw (BLM) provided an overview of their comments. She stated that BLM has two processes: the right-of-way (ROW) and the study plan to address roads. BLM is looking at what might be missing from the ROW that could be captured in the studies to inform the license. BLM wants to make sure they have what is needed for their assessment of the project. BLM clarified several of their comments.

Dan Clark asked for clarification on BLM's request for including turnouts and laydown areas in this study; as PG&E included these locations in the erosion assessment in GEO 3. **Action Item: PG&E will revise GEO 3 to specify that turnouts and laydown areas are included in the study.**

Somer Shaw clarified that additional information on Project roads was requested because they are in the ROW and the information will help them understand existing use and potential conflicts between these uses and recreation use in the area. She added that many Project roads are used by recreationists. Dan replied that the purpose of this study is to assess road condition to keep them at a certain level or repair. PG&E understands that information will need to be collected for the ROW.

Somer Shaw clarified that the information is used by BLM engineers to estimate road use. The study plan was edited to include an estimation of the frequency of use and types of vehicle use on the Project roads by PG&E and their affiliated companies, and a reference to REC 4 in the "relationship to other studies" section in the study plan for collection of information on pedestrian traffic on roads

Action Item – PG&E will connect with BLM about the ROW needs.

No additional comments on the plan. Attendees "green lighted" the plan.

REC 3 – Recreation Visitor Use

Dan Clark reviewed BLM's comments on REC 3. Many of the comments were related to safety. Lisa commented that PG&E is still reviewing the draft comments BLM shared on 7/11, and is considering ways to address them. Addressing many of them through existing PG&E safety programs and processes will be faster than addressing them through the relicensing process, since a new project license won't be issued for many years.

Somer Shaw commented that BLM wants information to inform future recreation safety needs associated specifically with the project, including how infrastructure may be affecting recreation. BLM also would like to change the locations of the observations for the surveys and to include safety and use in the questionnaire. BLM would like to include language in the study plan Project

nexus section that safety is a priority, including in the Project Bypass Reach, and to broaden the survey area to capture uses near and around the FERC Project boundary. Lisa replied that PG&E is still considering these comments, and how to address them in the study plan.

Somer Shaw clarified that BLM would like to use the trail counters to estimate use at different access points to the Project Bypass Reach and to identify when use is occurring. This would help them know where and when to inform the public when planned events are to occur, and to focus safety efforts on more popular access points. They would also like information on user type – horse, bike, pedestrian – to identify potential conflicts with vehicles. PG&E expressed concern with data quality from these types of counters, and stated that the methodology currently proposed would provide better data. Somer said that the requested trail counters to provide additional information on access to the bypass reach, the change in the location of the observation point to include viewing a larger area in the bypass reach, and documentation of use in the bypass reach would cover their information needs for use in the bypass reach.

Dan Clark clarified that Kerckhoff Reservoir would be surveyed by boat, as most of the shoreline is only accessible by boat. Somer clarified that BLM is most interested in the Project Bypass Reach in the areas near K1 and K2, but they would like to include the entire Project Bypass Reach in the studies. **Action Item: PG&E will meet internally to discuss how to address BLM's comments on REC 3 and will schedule a follow up discussion with BLM (face to face).**

REC 4 – Recreation Visitor Use Surveys

The group agreed that most of BLM's comments related to REC 4 were covered in the discussion of REC 3. **Action Item: PG&E will meet internally to discuss REC 4 and will schedule a follow up discussion with BLM (face to face).**

WQ 3 – Bioaccumulation in Kerckhoff Reservoir

Gina Morimoto summarized recent edits to the plan based on follow up discussions with Philip Choy and Eric Guzman regarding the prioritization of the species that would be captured as part of the AQ 2 studies and used for the AQ 6 analysis. If insufficient bass were available crayfish and other fish would be used. The order of preference would be: bass, crayfish, rainbow trout, sunfish and other fish; and that hardhead would be excluded. PG&E also revised the text regarding the crayfish sampling. Ron Goode requested that suckers be added to the fish that could be potential analyzed. The edit was made to the study plan. PG&E asked the agencies if there were any additional comments on the study plan.

No additional comments on the plan. Attendees “green lighted” the plan.

GEO 2 – Project-related Sediment Management Practices in Kerckhoff Reservoir

Gina Morimoto summarized the revisions made to the plan in response to BLM's comments. BLM clarified that they want to state that the study does not characterize the trapped sediment in the reservoir and that only surficial sediments will be sampled. Edits were made during the meeting to address the comment.

BLM clarified that their interest in the studies to evaluate gold in the sediments is related to recreational gold panning, and that PG&E's sediment management practices influence the release of

sediment, including gold, below the dam. BLM would like to see a discussion between sediment management practices and gold panning. PG&E clarified that PG&E is not managing sediment in the reservoir and is not proposing to change their current operations. PG&E clarified that this study is focused on characterizing the surficial sediments. If there are changes in the sediment downstream during different flows, it is probably related to high flows in different water year types and not how PG&E operates. PG&E clarified that the low level outlets are only used for dam safety to relieve pressure during high flow events and during DSOD inspections, and are not used to flush sediment from the reservoir. PG&E also clarified that turbidity monitoring during use of the low level outlet has shown that little sediment is released when they are opened. BLM said that the REC 3 and REC 4 studies may address the gold panning use, but would not address how the operations of the flow may assist the gold panning recreation user group. PG&E replied that the GEO 2 plan would not be revised to include gold. The REC 3 and REC 4 studies would capture use by gold panners in the visitor surveys and visitor use observations. PG&E will document BLM's comment in the Response to Comments table that will be filed with the Revised Study Plan.

Ron Goode commented that gold has a long history in the watershed. He suggested there could be a long term study to look at the correlation between gold and PG&E's operations. Gregg Wilkerson responded that it might be appropriate for USGS to take a regional approach over the long term.

BLM provided clarification on their request to include language in the plan that states the plan is not intended to address hazardous materials. BLM requested this language be added because others familiar with Superfund sites or hazardous waste management might expect this to be included in the plan. This clarification was added to the plan. Additional edits to the plan were made during the meeting to clarify the equipment that would be used and consultation with the agencies regarding the bathymetric survey.

No additional comments on the plan. Attendees "green lighted" the plan.

GEO 3 – Project Road-related Erosion

Gina Morimoto summarized the recent changes to the study plan based on comments received from BLM on the purpose of the study, and that turnouts and laydown areas would be included in the extent of the study area. PG&E asked the agencies if there were any additional comments on the study plan.

No additional comments on the plan. Attendees "green lighted" the plan.

GEO 1 – Channel Form and Fluvial Processes

The GEO 1 study plan had previously been green-lighted by the meeting participants, but BLM commented on the plan in their draft comments (shared with PG&E on 7/11/18), and PG&E wanted to discuss those comments. BLM clarified that they want PG&E to specify that the CERCLA handbook is not part of this study, and that they are not evaluating hazardous materials in the channel sediments. Wayne Lifton (Cardno) and Ed Cheslak (PG&E) commented that PG&E included this in the GEO 2 study (instead of the GEO 1 study) because GEO 2 evaluates the sediments, while GEO 1 is focused on the channel morphology. In addition, the fish tissue analysis conducted under WQ 3 in 2019 will address potential hazardous materials in the reservoir and will

provide information on the potential for hazardous materials to be in the aquatic biota and for human consumption. PG&E asked the agencies if there were any additional comments on the study plan.

No additional comments on the plan. Attendees “green lighted” the plan.

CUL 1 – Cultural Resources

Matt Armstrong (PG&E) discussed the comments from BLM and additional comments received from participating stakeholders during the meeting on the CUL 1 study plan.

Matt Armstrong confirmed that PG&E will record the full resources that intersect the Project APE and will extend the survey to include the resources of interest to BLM. PG&E will survey the portion of Smalley Cove that is in the FERC Project boundary. He added that cultural resources may not be recorded along long linear features in full. He clarified that PG&E will examine the Kerckhoff system as a historical landscape; a bullet would be added to the study plan. For resources in Kerckhoff Reservoir, PG&E will document them if there is sufficient drawdown of the reservoir during other activities. Ron Goode requested language be included into the HPMP requiring that resources within the reservoir will be documented when water conditions allow, if they are not during the relicensing process. Revisions were made to the plan during the meeting. For areas that cannot be safely accessed, PG&E will add a sub-bullet under survey methods that these areas will be reviewed by binoculars and any resources will be plotted on maps to the best of the archeologists’ abilities. **Action Item: The gold references provided by BLM for the GEO studies will be shared with the cultural team leads.**

The BLM had comments regarding the BOR lands that are not shown on the study plan maps. PG&E explained that they were using county assessor maps to determine the landownership. **Action Item: Amy Girado (BLM) will send Cardno the map that shows the BOR lands. Cardno will continue to work with BLM to obtain the GIS shapefiles.**

The stakeholders discussed the information that will be contained in the report. Under products, PG&E will add a bullet that an appendix will be included as part of the report with the records obtained during the record search. PG&E agreed to provide GIS data used in the development of the study reports to BLM. The report will clearly define the APE. PG&E will add references to the individual reports in the McCarthy et al. (2011) reference.

The stakeholders agreed on several additional edits to the study plan: (1) PG&E will consult with the appropriate land management agency on the NRHP findings before consulting with SHPO; (2) correct legal authorities will be cited; (3) the appropriate permits and authorizations will be obtained prior to conducting field work; (4) PG&E will consult with the California Native American Tribes as required and to the extent allowed by state and federal law and policy if any human remains are identified or disturbed. Ron Goode commented that he has a new ethnobotanical study from 1992.

CUL 2 – Tribal Resources

Matt Armstrong (PG&E) discussed the comments from BLM and additional comments received from participating stakeholders during the meeting on the CUL 2 study plan.

The meeting attendees made several revisions to the plan including clarifying that PG&E is working to discuss resources and the project with a wider range of parties than just federally recognized tribes; clarifying that PG&E will obtain the appropriate permits from the land management agencies prior to starting surveys; and clarifying the consultation requirements throughout the plan.

Ron Goode suggested that PG&E use the 2009 State Water Plan Update as a reference for the California Native American Tribes language used in the CUL 1 and CUL 2 study plans. Ron also requested a reference to the Archival Research section in the study plan in the Relevant Information section, as the list is more expansive.

Action Item: Matt Armstrong (PG&E) will discuss the edits to CUL 1 and CUL 2 with Amy Girado, Ron Goode, and Jeff Irwin. He will copy Alison Lipscomb and Somer Shaw on correspondences with the BLM.

Study Plan Process Update

Follow up meeting: August 13 at the Piccadilly Inn, 9 am to 4 pm to discuss the REC 3, REC 4, CUL 1, and CUL 2 study plans.

Next Steps:

- **Action Item: PG&E will send an email on Thursday with the PDF, clean copies and the negotiated, track changes versions compared to the PSP filing.**
- **Action Item: By the end of the week, PG&E will email the clean versions of the four study plans with early implementation requesting agreement on consensus on the plans within two weeks. REC 3, REC 4, CUL 1, and CUL 2 are still in progress and will not be included in the email package.**
- **Action Item: PG&E will email Somer with track-changes versions of the plans prior to the next meeting.**

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**PG&E Kerckhoff Hydroelectric Project
Study Plan Meeting Agenda
Focus: WILD, BOT, GEO and REC Studies**

**Piccadilly Airport Inn, 5115 E McKinley Avenue, Fresno
July 17, 2018
9:00 am – 5:00 pm**

For Participants joining by phone:

WebEx Link: <https://pge.webex.com/pge/j.php?MTID=mbfa41ffd6d45910abe3ea47b2f731111>

Call-in no.: 1-800-603-7556 / Access code: 749 983 120

Times included below are approximate and may be adjusted during the course of the meeting

9:00	Welcome and Introductions
9:15	Review Agenda, Safety, Schedule, and Next Steps
9:45	<i>WILD 1 - Special-Status Wildlife Species</i>
10:00	<i>BOT 1 - Plant Communities, Special-Status Plants, and Invasive Weeds</i>
10:15	<i>AQ 6 - Rare Aquatic Species</i>
10:30	Break
10:45	<i>AQ 2 - Fish Populations</i>
11:00	<i>WQ 3 - Bioaccumulation in Kerckhoff Reservoir</i>
11:15	<i>GEO 2 - Project-related Sediment Management Practices in Kerckhoff Reservoir</i>
11:30	<i>GEO 3 - Project Road-Related Erosion</i>
11:45	<i>REC 1 - Whitewater Boating Assessment</i>
12:30	LUNCH (on own)
1:30	<i>REC 3 - Recreation Visitor Use</i>

- 2:00** *REC 4 - Recreation Visitor Use Surveys*
- 2:30** **Break**
- 2:45** *LAND 1 – Project Roads and Trails Assessment*
- 3:15** *CUL 1 - Cultural Resources*
- 3:45** *CUL 2 - Tribal Resources*
- 4:15** *GEO 1 – Channel Form and Fluvial Processes*
- 4:30** **Next Steps and Meeting Close-out**
- 5:00** End Meeting

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Study Plan Meeting Notes
Focus: CUL and REC Studies**

**Piccadilly Airport Inn - 5115 E McKinley Avenue, Fresno
Monday, August 13, 2018
9:00 am – 12:30 pm**

ATTENDEES

Participant	Affiliation
Marie Rainwater	Rainwater and Associates
Somer Shaw	Bureau of Land Management (BLM)
Alison Lipscomb	BLM
Amy Girado	BLM
Ron Goode	North Fork Mono Tribe
Christina McDonald*	North Fork Rancheria of Mono Indians
Steve Bowes	National Park Service
Abimael Leon	CA Department of Fish and Wildlife (CDFW)
Stacy Evans	Cardno
Wayne Lifton	Cardno
Katie Ross-Smith	Cardno
Wayne Kicklighter	Cardno
Lisa Whitman	Pacific Gas & Electric (PG&E)
Carol Efird	Louis Berger
Dan Clark	PG&E
John Mintz	PG&E
Matt Armstrong	PG&E
Teresa Simsiman*	American Whitewater
Dawn Alvarez*	United States Forest Service (USFS)

*Participated by phone

ACTION ITEM SUMMARY

- Ron Goode (North Fork Mono Tribe) will provide PG&E with a link to the Department of Water Resource's definition for California Native American Tribes, and PG&E will revise Study CUL 1 and Study CUL 2 as appropriate. PG&E will check other plans for consistency.
- PG&E will follow up with Ron Goode (North Fork Mono Tribe), Amy Girado (BLM), Christina McDonald (North Fork Rancheria of Mono Indians), and the Forest Service to discuss and resolve the final text edits in the cultural study plans in the next week.
- PG&E will revise Study CUL 1 to clarify the Area of Potential Effects (APE) to satisfy the State Historic Preservation Office (SHPO) and agencies, and differentiate direct and indirect APE.
- PG&E will revise the Study CUL 2 text to specify that local elders would be interviewed.

MEETING INITIATION

Marie Rainwater (Rainwater and Associates) provided an overview of the agenda and safety. Lisa Whitman (PG&E) discussed that PG&E will be filing the Revised Study Plan (RSP) on August 28th. Lisa thanked the agencies for the documentation of their support for the early studies. She is working with PG&E management now and she will provide an update to the group once she receives the approval.

COMMENTS, QUESTIONS, AND DISCUSSION ON DRAFT PROPOSED STUDY PLANS

REC 3 – Recreation Visitor Use

Carol Efird (Louis Berger) provided an overview of the changes to the REC 3 study plan since the plans were last discussed at the July 17, 2018 study plan meeting.

- The Public Safety Plan reference was added as one of the sources of relevant information for the plan.
- PG&E evaluated the trail counter request from BLM and thinks that there is merit to add the trail counters to better characterize river recreation. Specifically, the trail counters could provide information about recreation use with the Project and supplement the data collection currently proposed in the plan. PG&E proposes five counters; and will use them during the same time as the other surveys (Mar-Oct). The trail counters are proposed on trails near the river to document use of trails to the river. Carol (Louis Berger) discussed that all the trail counters would be calibrated with surveyors counting people to compare to the trail counter data. During the calibration, surveyors will also document user type. BLM was in agreement with the trail counter locations and collection of information on user type during calibration.

- PG&E did not include trail counters at pass-through locations proposed by BLM. BLM was in agreement that they did not need trail counters at those locations.
- Carol discussed the challenges of using trail counters. The plan includes language that if a trail counter is vandalized, it will not be replaced. PG&E feels confident that sufficient information will be available from the other data collection methods for the License Application if one is vandalized.
- PG&E also added a bullet about potential conflicting use in the study plan. Carol (Louis Berger) clarified that conflicting use is within the context of visitor use, which will come through with the survey information in Study REC 4. Study REC 3 is really focused on identifying where people are going and how many people.

No additional comments on the plan. Attendees “green lighted¹” the plan.

REC 4 – Recreation Visitor Use Surveys

Carol (Louis Berger) provided an overview of the revisions to the REC 4 study plan to address stakeholder comments. PG&E clarified the timing of the visitor surveys near K1 and K2 powerhouses.

No additional comments on the plan. Attendees “green lighted” the plan.

CUL 1- Cultural Resources

Matt Armstrong (PG&E) provided an overview of the changes made by PG&E since the plan was last discussed at the July 17, 2018 study plan meeting.

- Matt clarified that PG&E will need to consult with Bureau of Reclamation on the APE and they have not participated to-date in the APE discussions. The APE will not be finalized in the study plan as FERC had previously requested. PG&E will need to consult with BOR before the APE can be finalized; and this language was added to the study plan.
- Matt updated the meeting participants that PG&E had provided shapefiles to the BLM and have maps to discuss the underground facilities with BLM.
- PG&E added several clarifications to the plan, including language that more accurately reflects the legal authorities under which PG&E will obtain the appropriate permits from the participating land management agencies; and clarified procedures if human remains are encountered on public or private lands in order to be more directly in keeping with relevant laws and regulations.
- Ron Goode (North Fork Mono Tribe) asked for clarification of the California Native American Tribe definition that was included in the study plan. He said it is not the description that was in accordance with the Water Plan clause. Matt explained that PG&E

¹ Study plans in green indicate tentative agreement, in PG&E’s Proposed Study Plan Tracking Summary table that is a tool to quickly assess the status of each study plan.

started with that definition, but PG&E wanted to make sure that the definition included everyone whom they might be talking with. Ron stated that the definition in the Water Plan was developed in consultation with tribes to include all, not just federally recognized tribes. Ron requested that PG&E use the Water Plan definition for California Native American Tribes, and then include other tribes and individuals listed by the California Native American Heritage Commission (NAHC). Amy Girado (BLM) commented that she wanted to make sure “individuals” was included in the list. **Action Item: Ron Goode (North Fork Mono Tribe) will provide PG&E with a link to the Department of Water Resource’s definition for California Native American Tribes, and PG&E will revise Study CUL 1 and Study CUL 2 as appropriate. PG&E will check other plans for consistency.**

- Ron Goode (North Fork Mono Tribe) and Amy Girado (BLM) requested that tribal consultation be added to the study plans in a couple of additional locations. These edits were made during the meeting.
- Amy Girado (BLM) asked for clarification on the survey spacing. Matt Armstrong (PG&E) replied that a range of survey spacing was included in the plan because land agencies have different requirements and to allow flexibility depending on the topography. He added that the survey spacing would be consistent with the agency permits.
- The meeting participants discussed the recording of large cultural features and the APE. Matt Armstrong (PG&E) clarified that PG&E would do sufficient ethnographic and documentary research for the whole resource, but surveys would not be completed for certain types of large resources (such as linear features) that extend way beyond the APE. For resources such as archaeological sites, the entire resource would be recorded, including the portion outside of the APE. The participants discussed differentiating between the direct and indirect APE. An indirect APE would be developed to include resources in areas where no direct impacts would occur, but in which resources may experience indirect impacts as a result of Project activities, such as damage to an archaeological site that is part of an archaeological district. No archaeological study would be performed in the indirect APE, but further archival and ethnographic study may be necessary. **Action Item: PG&E will revise Study CUL 1 to clarify the approach for identifying the APE to satisfy the State Historic Preservation Office (SHPO) and agencies, and differentiate direct and indirect APE.**

Ron Goode (North Fork Mono Tribe) asked for clarification on the surveys at Kerckhoff Reservoir. Matt Armstrong (PG&E) clarified that if reservoir levels are low enough during the study, then PG&E will do the surveys in exposed portions of the reservoir. However, if they are not low enough, then the submerged sites would be recommended for surveys in the future at a time when reservoir levels are down. **Action Item: PG&E will follow up with Ron Goode (North Fork Mono Tribe), Amy Girado (BLM), Christina McDonald (North Fork Rancheria of Mono Indians), and the Forest Service to discuss and resolve the final text edits in the cultural study plans in the next week.**

Ron Goode (North Fork Mono Tribe) asked about compensation for Native American participation in work in the field and with interviews, including the ethnographic research in

Study CUL 2. Matt Armstrong (PG&E) explained that PG&E would likely compensate for Native American participation for work in the field requested by PG&E and with interviews, but PG&E will need to discuss further; and will include in the budget as appropriate. Christina McDonald (North Fork Rancheria of Mono Indians) followed that there was interest in participating for part of the surveys of the submerged sites.

CUL 2 – Tribal Resources

Matt Armstrong (PG&E) provided an overview of the changes that were made to the study plan since the July 17, 2018 meeting. Matt discussed that PG&E will update the CA Native American Tribe language in Study CUL 2 discussed for Study CUL 1.

Christina McDonald (North Fork Rancheria of Mono Indians) requested that the study element for the interviews with elders be modified to be more specific for the interview of local elders. **Action Item: PG&E will revise the Study CUL 2 text to specify that local elders would be interviewed.**

No additional comments on the plan.

Conclusion

Marie Rainwater (Rainwater and Associates) concluded the meeting, and summarized the next steps. There are no big outstanding issues on study plans, and Matt Armstrong (PG&E) will work with the final text revisions in the cultural study plans. Marie encouraged the meeting participants to work together to avoid surprises in finalizing the study plans and the RSP filing. She encouraged the meeting participants to call Lisa Whitman (PG&E) and for PG&E to call the agencies if any issues arise prior to PG&E's RSP filing.

Stakeholder meetings were tentatively set starting in January 2019. First meeting in 2019 will be January 23th with subsequent monthly meetings on the 2nd Wednesdays of the month beginning in February 2019.

**PG&E Kerckhoff Hydroelectric Project
Study Plan Meeting Agenda
Focus: CUL and REC Studies**

**Piccadilly Airport Inn, 5115 E McKinley Avenue, Fresno
August 13, 2018
9:00 am – 12:30 pm**

For Participants joining by phone:

WebEx Link: <https://pge.webex.com/pge/j.php?MTID=mca8af8e845a1b062ae03b2642bbd067d>

Call-in no.: 1-800-603-7556 / Access code: 747 865 822

Times included below are approximate and may be adjusted during the course of the meeting

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9:15	Review Agenda, Safety, Schedule, and Next Steps
9:30	<i>REC 3 - Recreation Visitor Use</i>
10:15	<i>REC 4 - Recreation Visitor Use Surveys</i>
11:00	Break
11:15	<i>CUL 1 - Cultural Resources</i>
11:45	<i>CUL 2 - Tribal Resources</i>
12:15	Next Steps and Meeting Close-out
12:30	End Meeting

**Pacific Gas and Electric Company
Kerckhoff Hydroelectric Project
Conference Call Notes
Focus: CUL 1 and CUL 2**

**August 16, 2018
10:00 am –10:45 am**

ATTENDEES

Participant	Affiliation
Matt Armstrong	Pacific Gas and Electric Company (PG&E)
Polly Allen	Cardno
Amy Girado	Bureau of Land Management (BLM)
Alison Lipscomb	BLM

Invited but not in Attendance: Christina MacDonald (North Fork Rancheria of Mono Indians [NFR]), Ron Goode (North Fork Mono Tribe [NFMT]), Erin Potter (U.S. Forest Service), Jeff Irwin (U.S. Forest Service)

During the call, group discussed any comments regarding the Draft CUL-1 and CUL-2 Revised Study Plans.

Cultural Resources (CUL-1 and CUL-2) Study Plans

The following comments were discussed and incorporated:

Amy Girado (BLM) requested that PG&E re-insert "interested parties" as defined in 36 CFR 800 where appropriate. This language was inserted into Revised Study Plans.

Matt Armstrong informed the BLM regarding requested changes from tribal members that were incorporated into the Revised Study Plans. BLM approved changes.

Matt Armstrong informed the BLM that Christina McDonald of (NFR) had questions regarding whether confidential material might be released under Freedom of Information Act (FOIA). Matt Armstrong forwarded regulatory language regarding the privileged status of cultural resources to confirm that sensitive information would not be released.

After discussing plans, Amy Girado confirmed that the BLM had no further comments regarding the draft versions of the Revised Study Plans circulated by PG&E for review.

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