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April 30, 2018

Via Electronic Submittal (E-File)

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Docket Room
Washington, D.C. 20426-0001

**Subject: FERC Project No. 96-045, Kerckhoff Hydroelectric Project
Proposed Study Plan, Study Plan Meeting Announcement,
and Response to Comments**

Dear Secretary Bose:

On January 16, 2018, the Federal Energy Regulatory Commission (FERC) issued Scoping Document 1 (SD1) to parties interested in the relicensing proceeding for Pacific Gas and Electric Company's (PG&E or Licensee) Kerckhoff Hydroelectric Project, FERC Project No. 96 (Project). SD1 provides interested parties with FERC's preliminary list of issues and alternatives to be addressed in an Environmental Assessment (EA) analyzing conditions of a new Project license. FERC requested that interested parties file comments on SD1 and PG&E's November 16, 2017 Pre-Application Document (PAD), as well as submit formal study requests, no later than March 17, 2018. Because the PAD included draft proposed study plans as Appendix D, comments submitted to FERC included input on those draft studies.

Comments on SD1, the PAD, draft proposed study plans, and new study requests were received from seven parties. These parties are listed in Attachment A. PG&E's responses are provided in Attachment B, Tables B-1 through B-7. This attachment includes responses to both comments and study plan requests. A summary index of comments on draft proposed study plans is provided in Attachment C. Copies of the comment letters from interested parties are included in Attachment D.

PG&E has consulted with stakeholders on the draft proposed study plans since the PAD was filed on November 16, 2017. PG&E hosted a study plan meeting with interested stakeholders on March 28, 2018, to discuss the draft proposed study plans and study requests. Attachment E provides the notes of the March 28, 2018, study plan meeting, as well as a table listing additional conference calls held with interested stakeholders. The table includes the date of the meeting, participants, and topics addressed in each

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discussion. Based on input from the resource agencies and other stakeholders, PG&E has revised many of the draft proposed studies to produce the PSP.

As required by 18 CFR § 5.11, Licensees must file a PSP with FERC within 45 days of the deadline for interested parties to file comments on the PAD. PG&E is therefore submitting the attached PSP (Attachment F) with FERC. The PSP contains 24 proposed studies, including revised versions of the 22 study plans that were in the PAD and two additional study plans (related to rare aquatic species and bioaccumulation) that resulted from stakeholder study requests. PG&E is continuing to discuss other study requests with stakeholders.

PG&E believes the information developed through the PSP, when combined with existing information (as summarized in the PAD), will provide the information needed to evaluate potential resource issues related to the ongoing operations and maintenance of the Project. Information obtained through these studies 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.

Study Plan Meeting Announcement

As required by 18 CFR § 5.11(e), PG&E will hold a study plan meeting with the relicensing participants. The meeting information is as follows:

Monday, May 21, 2018
9:00 AM to 4:00 PM
Piccadilly Inn Airport, 5115 East McKinley Avenue
Fresno, California

The purpose of the study plan meeting is to: 1) clarify PG&E's Proposed Study Plan; 2) clarify information gathering or study requests submitted by interested parties; and 3) begin to resolve any outstanding issues with respect to the Proposed Study Plan through dialog and collaboration. Participants that are unable to attend the study plan meeting in person may participate by phone by calling 1-855-225-9582, and entering Conference ID 3973562.

After this preliminary Study Plan meeting, it is anticipated that additional meetings will be held to develop the information needed to prepare the Revised Study Plan.

The PSP is directly available on FERC's eLibrary. Information about how to access the PSP, and other Project-related FERC filings, is available at www.pge.com/kerckhoff.

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

Sincerely,



Lisa Whitman
License Project Manager

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

Attachments:

- Attachment A - Comments Received Table
- Attachment B - Response to Comments Table
- Attachment C - Index of Comments by Study Plan
- Attachment D - Comments Received
- Attachment E - Consultation Record
- Attachment F - Proposed Study Plans

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ATTACHMENT A

Comments Received by Commenter and Type

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Table A-1 Comments Received by Commenter and Type

	Name	Organization	Comment Type			
			Comment on SD-1	Comment on PAD	Comment on Study Plans	New Study Request
1	Philip Choy	State Water Resources Control Board	X	X	X	X
2	John Hodge	Bureau of Land Management Bakersfield Field Office	X	X	X	X
3	Dean Gould, Forest Supervisor	US Forest Service			X	
4	Barbara Rice	National Park Service Hydropower Assistance Program, Pacific West Region			X	
5	Jean Prijatel	US Environmental Protection Agency	X			
6	Theresa L. Simsiman	American Whitewater			X	X
7	Anita Lodge	Friends of the San Joaquin River Gorge		X		

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ATTACHMENT B

Response to Comments Tables

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Table B-1: Response to Comments Received from the State Water Resources Control Board (State Water Board) on March 16, 2018

Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
1	Philip Choy, Water Quality Certification Unit, SWRCB			2	1	Based upon the Process Plan and Schedule PG&E put forth in its PAD, State Water Board staff provides the following initial estimate of process milestones for water quality certification: <ul style="list-style-type: none"> • Application for water quality certification: March 2021 • issuance of draft water quality certification for public review: July 2023 • issuance of final water quality certification: July 2024 	Thank you for providing this information.
2	Philip Choy, Water Quality Certification Unit, SWRCB	PAD	2.2 Proposed Communication Protocols	Attachment A, page 1	2-3	State Water Board staff appreciates PG&E developing the Kerckhoff relicensing website. State Water Board staff requests the website include a calendar to display meeting dates and deadlines and a reference section containing Project-related documents and other pertinent information related to the relicensing of the Project. For meetings conducted by PG&E that are not specifically required by FERC's regulations, PG&E states that an independent facilitator may be used. State Water Board staff recommends PG&E use an impartial facilitator for relicensing meetings to encourage and facilitate effective communication for all relicensing participants.	Clarification. PG&E will consider the State Water Board's request when updating the Project website. Clarification. PG&E has used neutral facilitators for the Kerckhoff Hydroelectric Project stakeholder meetings not convened by FERC.
3	Philip Choy, Water Quality Certification Unit, SWRCB	PAD	4.11.2 License Deviations	Attachment A, page 1	4	Section 4.11.2, page 4-60 states, "A total of two minimum flow deviations and three oil spills have been reported to date." Please discuss each oil spill incident and the corrective actions that were implemented to protect water quality.	Clarification. PG&E filed Incident Reports with FERC for each incident. These are available through FERC's eLibrary.
4	Philip Choy, Water Quality Certification Unit, SWRCB	PAD	4.11.3 Temporary Variance	Attachment A, page 1	5	Section 4.11.3, page 4-61 describes three temporary variances in 2001, 2014, and 2015 to suspend minimum shad flow requirements. Section 5.4.3.4, pages 5-141 to 5-150, discusses American shad and monitoring associated with the 2001 temporary variance. Please discuss any shad monitoring that was conducted in association with the 2014 and 2015 temporary variances.	Clarification. No monitoring of shad was conducted in association with the temporary variances in 2014 and 2015.
5	Philip Choy, Water Quality Certification Unit, SWRCB	PAD	5.4.3.4 Millerton Lake	Attachment A, page 1	6	Section 5.4.3.4, page 5-141 identifies a limited recreational fishery for American shad, citing a FERC 1979 Environmental Impact Statement for the project. Please discuss the current recreational fishery for American shad below Kerckhoff 2 Powerhouse to Millerton Reservoir and in the Bypass Reach. In addition, please identify primary fishing locations and access within or adjacent to the Project area.	Clarification. The PAD contained existing, relevant, and reasonably available information relating to the Project. Requests for supplemental information will be considered for inclusion with the license application, after consulting with participating stakeholders, and consideration of the Project nexus and relevance to assessing Project impacts and protection, mitigation, and enhancement measures. These issues may be more appropriate for discussion under recreation.

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
6	Philip Choy, Water Quality Certification Unit, SWRCB	DSP	Study HYD 1- Operations Simulation Model	Attachment A, page 2	7	State Water Board staff generally supports this draft study to model hydrology in the Project-affected area. State Water Board staff is interested in coordinating operations of the Project with upstream hydroelectric projects to enhance flow conditions, with an emphasis on spill recession. State Water Board staff requests that PG&E discuss potential coordinated operations with PG&E's Crane Valley Hydroelectric Project (FERC Project No. 1354) and Southern California Edison's Big Creek Hydroelectric System (FERC Project Nos. 2175, 67, 120, 2085, 2086, 2174, and 2017), and if possible and appropriate, incorporate potential coordinated operations in the operations simulation model.	Clarification. The Kerckhoff Hydroelectric Project is not currently operated in coordination with other licensed projects and PG&E is not proposing to alter Project operations to do so. Due to the small amount of storage available to the Project, water flowing into Kerckhoff Reservoir is either diverted for generation or released to the river downstream. The model proposed in <i>Study HYD 1, Operations Simulation Model</i> will be able to reflect operations for historic/existing flow conditions and future changes in inflows or releases.
7	Philip Choy, Water Quality Certification Unit, SWRCB	DSP	Study AQ 1- Aquatic Habitat Mapping	Attachment A, page 2	8-9	<p>State Water Board staff generally supports this draft study to characterize the aquatic habitat in the Project-affected area. State Water Board staff requests PG&E include background information on the species of riparian vegetation found in the Bypass Reach, specifically the flow rates that are necessary for establishment. It is necessary for State Water Board staff to understand what flow conditions are necessary to promote a native riparian community.</p> <p>In additional, Study AQ 1 proposes to identify potential passage barriers to fishes (rainbow trout and native minnows) using aerial imagery, from helicopter, or on the ground. However, it is unclear if this study will also identify the potential for fish to be isolated in pools during the summer if the Bypass Reach is, to an extent, disconnected. Water temperatures in the Bypass Reach can exceed 27 degrees Celsius (PAD page 5-67). State Water Board staff is concerned that fishes will be unable to find thermal refuge if pools in the Bypass Reach are disconnected.</p> <p>State Water Board staff looks forward to discussions with PG&E and relicensing participants to determine if Study AQ 1 provides information on the potential isolation and suitability of summer aquatic habitat, or if an additional habitat study to collect this information is appropriate and feasible.</p>	<p>Clarification. Riparian vegetation is addressed under <i>Study BOT 2, Riparian and Wetland Resources</i>. Riparian species life history and hydrologic requirements will be summarized as part of the <i>BOT 2</i> study.</p> <p>Accepted with Modification. <i>Study AQ 1, Aquatic Habitat Mapping</i> has been modified to include an assessment of potential passage barriers and pool isolation in the Project Bypass Reach during field surveys. The field surveys may include a combination of on-the-ground surveys (dependent on access and safety), helicopter surveys, and aerial imagery analysis. <i>Study AQ 1</i> will be conducted during the low flow season, so any observations of isolated pools will be noted. Water temperatures that are not suitable for aquatic species present in the reach will be addressed in <i>Study WQ 1, Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach</i>. The study plan has also been modified to clarify the passage criteria.</p>
8	Philip Choy, Water Quality Certification Unit, SWRCB	DSP	Study AQ 2 – Fish Populations	Attachment A, page 2-3	10-11	<p>State Water Board staff generally supports this draft study to characterize the fish composition, distribution, and abundance in Kerckhoff Reservoir and the Bypass Reach. However, the current monitoring proposal does not target seasonal visitors into the Bypass Reach, which include spawning American shad (<i>Alosa sapidissima</i>) and striped bass (<i>Morone saxatilis</i>). Additional surveys for these species may be necessary, as both species spawn in the Project-affected areas (Bypass Reach and immediately downstream of Kerckhoff Powerhouse 2). State Water Board staff understands that high flows during the American shad and striped bass spawning seasons are a potential safety hazard for snorkel surveys, but requests that PG&E collaborate with relicensing participants and State Water Board staff to discuss a potential study that would be safe and provide information on spawning American shad and striped bass.</p> <p>Historic information on these species is present but potentially outdated. The most recent American shad survey documented in the PAD occurred</p>	Accepted with Modification. <i>Study AQ 2, Fish Populations</i> has been modified to include a combination of hook and line sampling and review of guide logs submitted to CDFW (if available) to confirm the presence of spawning adult American shad. The surveys will occur four times during the spawning season (May 15 th – June 30 th). The fourth sampling event will be scheduled after June 30 th to target spawned out American shad. Up to 20 shad will be measured during each trip; information on weight, length, and gonadal status will be recorded. Scale samples will be collected for age analysis. Measurements of any caught striped bass also will be recorded. PG&E will utilize a guide for a least one of the hook and line trips.

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20180430-1052 FERC PER (no. 11-1-18) 7:33:00

Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						in 2011 (as discussed on page 5-150). Striped bass is discussed in the PAD on pages 5-137 and 5-139 to 5-141; the most recent referenced fish surveys that observed striped bass in the Bypass Reach occurred in 1982.	
9	Philip Choy, Water Quality Certification Unit, SWRCB	DSP	Study WQ 1- Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach	Attachment A, page 3	12-13	<p>State Water Board staff generally supports this draft study to characterize water temperatures in the Project-affected area. In addition to the sites proposed by PG&E, State Water Board staff suggests a water temperature monitoring site approximately 0.1 km downstream of the Kerckhoff Powerhouse 1 tailrace, as determined by site access. This site is necessary to distinguish potential water temperature impacts resulting from Kerckhoff Powerhouse 1 discharge. If data from Study WQ 1 suggests that the Project influences water temperature to an extent that could be detrimental to aquatic species, PG&E should develop a water temperature model.</p> <p>The purpose of the water temperature model would be to simulate current and potential future water temperature conditions. The model would: (1) simulate reservoir and stream water temperatures resulting from Project operations; (2) accurately reproduce observed reservoir and Project influenced stream water temperatures, within acceptable calibration standards over a range of water year types; and (3) demonstrate sensitivity to both stream flow and ambient weather conditions. If data from Study WQ 1 suggests Project operations influence water temperature, it is necessary for State Water Board staff to understand how water temperature is influenced by current and future Project operations.</p>	<p>Accepted with Modification. Study WQ 1, Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach has been modified to include two additional water temperature monitoring locations between the K1 and K2 powerhouses (one in the K1 tailrace and another just upstream of K2).</p> <p>Accepted with Modification. PG&E added a contingency for the development of a water temperature model if results of the water temperature monitoring indicate that the flow releases by the Project may affect water temperatures to the detriment of aquatic species.</p>
10	Philip Choy, Water Quality Certification Unit, SWRCB	DSP	Study WQ 2- Water Quality Sampling in the Project Bypass Reach and Kerckhoff Reservoir	Attachment A, page 3-4	14-15	<p>State Water Board staff generally supports this draft study to characterize water quality in the Project-affected area. In addition to the parameters proposed by PG&E, state water Board staff suggests PG&E monitor an additional bacteria parameter, E. coli (<i>Escherichia coli</i>). E coli is the bacterial indicator for contact recreation (beneficial use) in the United States Environmental Protection Agency (1986) criteria (Note: the E. coli concentration, based on a minimum of not less than five samples equally spaced over a 30 day period, shall not exceed a geometric mean of 126 most probable unit (MPN)/100 ml and shall not exceed 235 MPN/100 ml in any single sample) and the proposed Bacteria Provisions for Inland Surface Waters (Note: the proposed Bacteria Provisions for Inland Surface Waters is being finalized for the State Water Board to consider adopting later this year. The bacteria water quality objective for all waters where the salinity is equal to or less than 1 parts per thousand (ppt) 95 percent or more of the time during the calendar year is: a six-week rolling geometric mean of E. coli not to exceed 100 colony forming units (cfu) per 100 milliliters (mL), calculated weekly, and a statistical threshold value of 320 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a single month). The current parameter measured for the State Water Board's contact recreation beneficial use is fecal coliform and total coliform.</p> <p>PG&E proposes to "characterize water quality in Kerckhoff Reservoir (one location near dam) and Project Bypass Reach (up to three locations if needed)." State Water Board staff recommends additional sites in</p>	<p>Accepted with Modification. Study WQ 2, Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir has been modified to clarify the water quality sampling locations and schedule. The full suite of parameters identified in Table WQ 2-1 will be collected at three depths from the location near the dam in Kerckhoff Reservoir and at three locations below Kerckhoff Dam (above K1 Powerhouse, between K1 and K2 powerhouses, and below K2 Powerhouse). Sampling at the site between K1 and K2 powerhouses will only occur if K1 Powerhouse is operating at the time of the sampling. Seasonal samples will be collected in the late spring/early summer (May/June) and late summer (August/September).</p> <p>PG&E added sampling for fecal coliforms in Kerckhoff Reservoir at two locations: near Smalley Cove Recreation Area and near the adjacent dispersed recreation area. Two sampling efforts will occur and be focused around the Memorial Day and Labor Day weekends. Protocol-level recreation-related bacteriological sampling will be used to determine if fecal coliform concentrations meet Basin Plan objectives for the protection of water contact recreation (REC-1). Bacteriological sampling below K2 Powerhouse will only occur if Millerton Lake is creating a backwater effect at the K2 Powerhouse.</p> <p>If the proposed E. coli objective, currently in provisional status, is approved by the State Water Board prior to the 2019 sampling, then E. coli will be sampled too.</p>

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						Kerckhoff Reservoir and potential additional sites in the Bypass Reach. Monitoring locations and frequency should be collaboratively determined with relicensing participants to ensure adequate information is collected. At a minimum, PG&E should monitor bacteria levels at Smalley Cove and other primary recreation sites (i.e., informal recreation sites, whitewater put-in/take-out) in Project-affected areas.	
11	Philip Choy, Water Quality Certification Unit, SWRCB	DSP	Study AQ 4-Entrainment	Attachment A, page 4	16	State Water Board staff generally supports this draft study to characterize levels of entrainment into the Kerckhoff Powerhouse 1 and Kerckhoff Powerhouse 2 intakes. In addition to calculating potential loss of biota through the intakes, State Water Board staff suggests that PG&E also assess the potential for fish survival over Kerckhoff Dam. This additional information, collected through desktop assessment, would more accurately calculate the total net loss of biota that move downstream of Kerckhoff Reservoir. State Water Board staff believes it is necessary to understand how the Project affects the aquatic community in order to develop appropriate and commensurate mitigation measures.	Accepted with Modification. Study AQ 4, Entrainment has been modified to include a literature review of potential mortality of fish going over dams of similar size to Kerckhoff Dam.
12	Philip Choy, Water Quality Certification Unit, SWRCB	DSP	Study REC 1-Whitewater Boating Assessment	Attachment A, page 4	17	State Water Board staff generally supports this draft study to assess whitewater boating opportunities in the Bypass Reach. PG&E has divided this study into three phases (initial information gathering and evaluation; hydrology assessment; and focus group sessions), with the latter two phases to be conducted if needed. The Project area includes the beneficial use for canoeing and rafting. American Whitewater has confirmed whitewater boating use in the Project area. State Water Board staff believes all phases of the study are necessarily to fully assess whitewater boating and recommends PG&E conduct them.	Accepted with Modification. PG&E has revised Study REC 1, Whitewater Boating Flow Assessment to include the three phases identified in Whittaker et al. (2005), as needed.
13	Philip Choy, Water Quality Certification Unit, SWRCB	SD1	Section 3.1.1 - Existing Project Facilities	Attachment B, page 1	2-3	Commission staff has identified one recreation development, Smalley Cove Recreation Area. An additional informal recreation area is located within the FERC Project Boundary on the north bank of Kerckhoff Reservoir, approximately a quarter of a mile upstream of Smalley Cove Recreation Area (identified in PG&E'S Pre-Application Document on page 5-235). State Water Board staff visited the informal recreation area and identified significant public use and potential use by PG&E for operations and maintenance of Project facilities. State Water Board staff recommends the Commission include this informal recreation area as an existing Project recreation facility. PG&E owns and maintains stream gage stations J1 (Kerckhoff Reservoir 11-2466.50), J2 (San Joaquin R Nr Auberry), J3 (Kerckhoff Powerhouse #1), and J6 (Kerckhoff #2). State Water Board staff believes these stream gages are necessary for the continued operations and maintenance of the Project, and recommends the Commission include these stream gages as existing Project facilities.	Clarification. PG&E will assess the dispersed recreation area on Kerckhoff Reservoir as part of Study REC 3, Recreation Visitor Use. This information will be used to develop potential protection, mitigation, and enhancement measures for the Project. Clarification. As part of the relicensing process, PG&E will identify facilities and features necessary for the operation and maintenance of the Project, and will propose modification to the FERC Project Boundary to include those facilities.
14	Philip Choy, Water Quality Certification	SD1	Section 4.2.2-Aquatic Resources	Attachment B, page 1	4	Commission staff has identified dissolved oxygen, water temperature, aquatic habitat, fish, macroinvertebrates, and aquatic invasive species that could be affected by continued Project operation and maintenance. State Water Board staff recommends the Commission also include amphibians,	Clarification. Water quality and water temperature measurements and studies have been incorporated into the proposed study plans to provide information on these issues.

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20180430-052 FERC PDP (Title 16)

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	Unit, SWRCB					<p>turtles, and additional water quality parameters in its analysis. Amphibians and turtles are aquatic species present in the Project-affected area that could be affected by the Project. Additional water quality parameters include in situ (specific conductance, pH, turbidity), general water quality (dissolved organic carbon, solids, inorganic ions, nutrients, metals), bioaccumulation (metals), and recreation-related (bacteria) parameters. These water quality parameters are necessary to fully assess water quality in the project area.</p>	
15	Philip Choy, Water Quality Certification Unit, SWRCB	Other: Study Plan Request		Attachment C, page 2-3	8-16	<p>Bioaccumulation Study</p> <p><u>Goal and Objective of the Bioaccumulation Study</u></p> <p>The goals of the Bioaccumulation Study are to: (1) collect information to develop fish consumption advisories for Kerckhoff Reservoir and (2) promote public safety. The objective of the study is to characterize the concentration of methyl mercury, arsenic, cadmium, copper, selenium, silver, polychlorinated biphenyls(PCBs), legacy pesticides, polychlorinated dibenzodioxins (PCDDs), polycyclic aromatic hydrocarbons (PAHs), tributyltin (TBT), microcystin, Omega-3 fatty acids, and other emerging contaminants in resident, edible-sized sport fish in Kerckhoff Reservoir.</p> <p><u>Resource Management Goal of the State Water Board</u></p> <p>The State Water Board has broad authority under the federal Clean Water Act (33 U.S.C. S 1251-1387), the state constitution, and the state water code and regulations to restore and maintain the chemical, physical, and biological integrity of the state's waters, and to regulate water diversion and use through the water right priority system in accordance with the State Water Board's reasonable use and public trust responsibilities. Section 401 of the federal Clean Water Act allows for broad application of appropriate state and federal environmental laws when entities apply for new or renewed federal licenses that may result in a discharge to navigable waters of the state (33 U.S.C. 1341).</p> <p>Throughout the Commission's relicensing process, the State Water Board maintains independent regulatory authority to condition the operation of the Project to protect water quality and beneficial uses of stream reaches consistent with section 401 of the federal Clean Water Act, the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan), State Water Board regulations, CEQA, and any other applicable state laws. The project has the potential to impact water quality in the san Joaquin River sources to Millerton Lake, including multiple beneficial uses such as fishing.</p> <p><u>Existing Information</u></p> <p>The Pre-Application Document (PAD) does not contain information regarding bioaccumulation. State Water Board staff is not aware of any bioaccumulation data for fishes in Kerckhoff Reservoir. Office of Environmental Health Hazard Assessment (OEHHA) developed a fish consumption advisory for the san Joaquin River from Friant Dam to the Port of Stockton (the consumption advisory can be found at the following</p>	<p>Accepted with Modification. Following consultation with stakeholders, PG&E has proposed <i>Study WQ 3, Bioaccumulation in Kerckhoff Reservoir</i>. The study includes the collection of nine specimens from three different sport fish (27 samples in total) that will be processed for tissue concentrations of two metals (total mercury and arsenic). The 27 individual samples will then be combined into composite samples of 3-5 fish of the same species for a maximum number of 9 composites that will be analyzed for PCBs. PG&E believes the request for the large suite of metals and organics is beyond the scope necessary for relicensing, and is unnecessary for the development of future license conditions. PG&E has proposed constituents that it believes have a Project nexus.</p>

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>website: https://oehha.ca.gov/advisories/san-joaquin-river-triant-dam-port-stockton), which is downstream of the Project area.</p> <p>Project Nexus</p> <p>Impoundment of water (with the incidental accumulation of sediment) and operation of project facilities have the potential to increase the concentration of metals and methylated mercury in the system, making them available for bioaccumulation through various trophic levels of the aquatic ecosystem. Fishing occurs at Kerckhoff Reservoir, and consumption recommendations for target species should be developed to promote public safety.</p> <p>Study Methodology</p> <p>The study methods consist of the following four steps: 1) select fish/crayfish species for the study; 2) collect tissue samples; 3) analyze samples; and 4) prepare report. Target fish and/or crayfish species should be determined in consultation with relicensing participants, PG&E, and State Water Board staff. Tissue samples could be collected while implementing other relicensing studies, such as PG&E's proposed Study AQ 2 Fish Populations.</p> <p>Bioaccumulation samples should be collected in a manner that can be used by OEHHA to prepare a consumption recommendation for Kerckhoff Reservoir. The appropriate methods can be found in the General Protocol for Sport Fish Sampling and Analysis (Gassel and Brodberg 2005: https://oehha.ca.gov/media/downloads/fish/document/fishsamplingprotocol2005.pdf).</p> <p>Level of Effort and Cost</p> <p>Based upon previous relicensing processes in California that have conducted similar bioaccumulation studies, State Water Board staff estimates the cost of this study to be approximately \$15,000 to \$45,000.</p>	
16	Philip Choy, Water Quality Certification Unit, SWRCB	Other: Study Plan Request		Attachment C, page 3-4	17-25	<p>Benthic Macroinvertebrate Study</p> <p>Goal and Objective of the Benthic Macroinvertebrate Study. The goal and objective of the Benthic Macroinvertebrate Study is to characterize physical habitat characteristics and benthic macroinvertebrates (BMI) taxonomical, biomass, and density assemblages within Project-affected reaches downstream of Kerckhoff Dam using the Surface Water Ambient Monitoring Program (SWAMP) protocol (Ode et al. 2016) or a similar protocol deemed appropriate.</p> <p>Resource Management Goal of the State Water Board. The State Water Board has broad authority under the federal Clean Water Act (33 U.S.C. 1251-1387), the state constitution, and the state water code and regulations to restore and maintain the chemical, physical, and biological integrity of the state's waters, and to regulate water diversion and use through the water right priority system in accordance with the State Water Board's reasonable use and public trust responsibilities. Section 401 of the federal Clean Water Act allows for broad application of appropriate state and federal environmental laws when entities apply for new or</p>	<p>Clarification. PG&E is continuing to consult with the Kerckhoff Project stakeholders in considering this requested study. Further discussions are needed in order to reach agreement on this issue.</p> <p>PG&E believes that a BMI study is unnecessary unless triggered by issues related to water quality or fish condition and feeding. It is highly unlikely that there are water quality issues associated with the Project, such as point sources, that BMIs would be helpful in diagnosing. In the case of fish condition and feeding, if after examination of data from the <i>Study AQ 2, Fish Populations</i> there is an indication of fish with poor condition factors or poor growth, a BMI study could be useful in examining possible causes. Absent such indicators, a BMI study would not contribute to the formulation of protection, mitigation, and enhancement measures.</p>

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>renewed federal licenses that may result in a discharge to navigable waters of the state (33 U.S.C. 1341).</p> <p>Throughout the Commission’s relicensing process, the State Water Board maintains independent regulatory authority to condition the operation of the Project to protect water quality and beneficial uses of stream reaches consistent with section 401 of the federal Clean Water Act, the Basin Plan, State Water Board regulations, CEQA, and any other applicable state laws.</p> <p>The Project has the potential to impact BMI populations and composition. The State Water Board is charged with ensuring that Project operations are protective of the designated beneficial uses for cold freshwater habitat and warm freshwater habitat that support freshwater ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. Furthermore, BMI are important forage for other aquatic resources and can serve as spatial and temporal indicators of water quality.</p> <p><u>Existing Information</u></p> <p>PAD Volume 1 Section 5.4.5.2 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. The PAD does not contain BMI information or data from the Bypass Reach.</p> <p><u>Project Nexus</u></p> <p>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. Information gathered will help State Water Board staff characterize stream health and adherence to water quality objectives.</p> <p><u>Study Methodology</u></p> <p>The study methods consist of the following five steps: 1) select sampling reaches from within the Project-affected area; 2) collect data; 3) analyze data; 4) QA/QC data; and 5) prepare report. Sampling sites should be developed in consultation with relicensing participants, PG&E, and State Water Board staff.</p> <p>Sampling methods should conform to the standard reachwide benthic (RWB) method for documenting and describing BMI and algal assemblages and physical habitat contained in the State Water Board’s SWAMP protocol (Ode et al. 2016) (Note: SWAMP 2016. Ode, P.R., A.E., Fetscher, and L.B. Busse. 2016. Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 004), to the extent possible. Given the challenging access and constraints of the Bypass Reach, an alternative protocol that achieves SWAMP objectives could be</p>	

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>considered in lieu of SWAMP protocol.</p> <p>Level of Effort and Cost</p> <p>State Water Board staff estimates the cost of this study to be approximately \$50,000 and \$150,000. The wide range of estimated cost is due to the specific protocol selected, number of sites, and number of BMI in each sample (or subsample) to identify.</p>	
17	Philip Choy, Water Quality Certification Unit, SWRCB	Other: Study Plan Request		Attachment C, pages 4-6	26-37	<p>Rare Aquatic Species Study</p> <p>Goal and Objective of the Rare Aquatic Study. The goal of the Rare Aquatic Species Study is to determine species presence in the Project-affected area that are challenging to observe (i.e., rare or cryptic species). Specific study objectives include:</p> <ul style="list-style-type: none"> • Collect environmental DNA (eDNA) samples at sites in Kerckhoff Reservoir and the Bypass Reach, with sample collection focused on determining presence of foothill yellow legged frog (<i>Rana boylei</i>) and Kern brook lamprey (<i>Lampetra hubbsi</i>). • Analyze samples to determine aquatic species presence, with a focus on foothill yellow legged frog and Kern brook lamprey. • Identify the need for additional monitoring to determine rare species' abundances. • Identify the need for additional studies to protect rare species from Project operation and maintenance, and other factors that are influenced by Project operations and maintenance (e.g., invasive species). <p>Resource Management Goal of the State Water Board</p> <p>The State Water Board has broad authority under the federal Clean Water Act (33 U.S.C. 1251-1387), the state constitution, and the state water code and regulations to restore and maintain the chemical, physical, and biological integrity of the state's waters, and to regulate water diversion and use through the water right priority system in accordance with the State Water Board's reasonable use and public trust responsibilities. Section 401 of the federal Clean Water Act allows for broad application of appropriate state and federal environmental laws when entities apply for new or renewed federal licenses that may result in a discharge to navigable waters of the state (33 U.S.C. 1341).</p> <p>Throughout the Commission's relicensing process, State Water Board staff maintains independent regulatory authority to condition the operation of the Project to protect water quality and beneficial uses of stream reaches consistent with section 401 of the federal Clean Water Act, the Basin Plan, State Water Board regulations, CEQA, and any other applicable state laws.</p> <p>The Project-affected area has the potential to be inhabited by species that have not been or have not recently been observed in the Project-affected area. It is important that the Commission and the State Water Board are aware of all species, especially rare species in the Project-affected area, to</p>	<p>Accepted with Modification. Following consultation with stakeholders, PG&E has proposed a modified <i>Study AQ 6, Rare Aquatic Species</i>. The study will analyze eDNA in water samples collected in the San Joaquin River below Kerckhoff Dam to assess the potential presence of foothill yellow-legged frogs (FYLF) and Kern brook lamprey. The samples will be collected during FYLF breeding/Kern brook lamprey spawning season in spring/early summer from five locations in the Project Bypass Reach. Water samples for FYLF eDNA will be collected from two locations in Kerckhoff Reservoir and one additional location in Fish Creek (a tributary to Kerckhoff Reservoir).</p>

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>ensure appropriate measures are taken to mitigate Project impacts. The State Water Board is charged with ensuring that Project operations are protective of the designated beneficial uses for cold freshwater habitat and warm freshwater habitat that support ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. In addition, the State Water Board is charged with ensuring that Project operations are protective of the designated beneficial uses for wildlife habitat that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.</p> <p>Existing Information</p> <p>PAD Volume 1, Table 5.4-1 identifies fish and mollusc species reported or suspected to currently occur in the Project Aquatic Study Area and nearby. PAD Volume 1 Table 5.4-15 identifies amphibians and aquatic reptile species occurring or potentially occurring in the Project Aquatic Study Area.</p> <p>In regards to foothill yellow legged frog, the PAD Volume 1, Section 5.4.6.3 states “habitat was deemed suitable for foothill yellow-legged frog in the San Joaquin River Gorge, but current hydroelectric operations of the Project (BoR 2008b), as well as additional PG&E and Southern California Edison company (SCE) hydroelectric projects upstream have altered the natural hydrology in the San Joaquin River Watershed.” The PAD further states “the nearest known foothill yellow legged frog] population resides upstream of SCE’s Big Creek No. 3 Powerhouse in Jose Creek, but it is over 24 km (15 mi.) away and upstream of two dams (SCE 2008). No other [foothill yellow legged frog] populations are known in the San Joaquin River Watershed.”</p> <p>In regards to Kern brook lamprey, the PAD Volume 1, Section 5.4.3.3 states “Kern brook lamprey (<i>Lampetra hubbsi</i>) are potentially present in the [Project area]. Bureau of Reclamation studies (2008b) indicate that ammocoetes (larvae), possibly Kern brook lamprey, were collected in the upper San Joaquin River between Kerckhoff Dam and Millerton Lake 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.”</p> <p>Project Nexus</p> <p>The Project alters instream flows in the Bypass Reach, which affects aquatic habitat and aquatic species.</p> <p>Study Methodology</p> <p>The study area should include Kerckhoff Reservoir and the Bypass Reach. The number and location of sites should provide adequate assurance whether foothill yellow legged frog and Kern brook lamprey are present or absent in the area. A determined volume of water will be filtered at each site using a 0.22 micron filter, with replicates. In the lab,</p>	

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>DNA should be extracted from the filter and analyzed. An established field protocol that prevents contamination should be employed (The United States Geological Survey protocol for eDNA sample collection is available at the following website: https://labs.wsu.edu/edna/documents/2015/05/field-protocol.pdf).</p> <p>A genetic marker for foothill yellow legged frog has been developed. It is unclear if a marker for Kern brook lamprey has been developed; however, use of a genetic marker for the lamprey genus (<i>Lampetra</i>) can be developed at minimal cost and be used for this study.</p> <p><u>Level of Effort and Cost</u></p> <p>State Water Board staff estimates the cost of this study to be approximately \$25,000 to \$80,000. The cost is dependent on development of study specifics and the potential for eDNA samples to be collected while onsite for other studies. State Water Board staff estimates the cost to develop a marker for the lamprey genus (if not already available) would cost less than \$2,000.</p>	

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Table B-2: Response to Comments Received from the Bureau of Land Management (BLM) on March 16, 2018

Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
1	John Hodge, BLM Bakersfield Field Office	SD1	Introduction	Scoping Document 1 Comments, page 1	1	BLM is required to issue a right-of-way for all PG&E features and facilities not included in the FERC Project boundary. The current right-of-way for transmission lines associated with the Project will expire on November 30, 2022. BLM will consider all features and facilities not included within the Project boundary or a BLM authorization to be in trespass.	Thank you for providing this information.
2	John Hodge, BLM Bakersfield Field Office	SD1	3.2.1, Proposed Project Facilities and Operations	Scoping Document 1 Comments, page 1	2	BLM requests the current GIS layers for the FERC Project boundary and any updates/modifications to these layers throughout the process in order to analyze the resources within and adjacent to the Project, and in anticipation of considering a PG&E right-of-way. This request has been made directly to PG&E and they have thus far been unable to provide this information critical to the analysis of the Project.	Clarification. PG&E provided the GIS layers for the FERC Project Boundary to BLM via email on September 26, 2017.
3	John Hodge, BLM Bakersfield Field Office	SD1	3.2.2, Proposed Environmental Measures	Scoping Document 1 Comments, page 1	3	BLM anticipates requesting changes to license conditions regarding Protection Mitigation and Enhancement (PM&E) measures specifically noting licensee's responsibilities in regard to PG&E wildlife watering sites.	Clarification. PG&E will use information included in the PAD and from the studies to develop protection, mitigation, and enhancement of resources for the Project. PG&E is continuing to work with BLM regarding the responsibilities for the wildlife watering sites as part of a separate right-of-way agreement between PG&E and BLM. Currently, BLM is responsible for maintaining the wildlife watering sites per the Wildlife Habitat Plan and stipulations that are part of this right-of-way agreement.
4	John Hodge, BLM Bakersfield Field Office	SD1	4.2.5, Recreation Resources	Scoping Document 1 Comments, page 1	4	Effects of project operation and maintenance on recreational access and use in lands and waters adjacent to the project area should be addressed including the bypass reaches of the Project. Recreation resources within BLM's San Joaquin River Gorge (SJRG) should be included in the evaluation of impacts to recreation from project operation and maintenance. Information in regard to adequacy of access to recreational opportunities to meet current and future demand, and potential impacts to visitors recreating in the bypass reaches, including but not limited to fishing, swimming, whitewater boating, bouldering, and recreational gold panning, are of particular interest to BLM. BLM is also concerned with public safety affected by the Project.	Clarification. PG&E believes that FERC should only consider this comment to the extent that there is a clear Project nexus.
5	John Hodge, BLM Bakersfield Field Office	SD1	4.2.6, Cultural Resources	Scoping Document 1 Comments, page 1	5	An evaluation of cultural resources characterized as a dispersed series of trash piles and encompassing pre-historic sites should be evaluated. This area of concern was reported to PG&E in 2009 and requires further analysis which may include a hazardous waste determination in coordination with BLM. These resources are historic trash related to Kerckhoff Powerhouse 1.	Clarification. In the proposed study plan, the archaeological surveys will record resources such as the one mentioned here. Whether it will be subject to NRHP-eligibility evaluation is dependent on the potential for the Project to impact the resource. The potential for hazardous waste is unclear, and assessment for hazardous waste falls outside of the scope of a cultural study. Treatment of hazardous waste is outside of the purview of cultural resources studies, except when such treatment requires data recovery or similar mitigation measures.

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
6	John Hodge, BLM Bakersfield Field Office	SD1	4.2.6, Cultural Resources	Scoping Document 1 Comments, page 1-2	6-8	<p>The area of potential effects should include all proposed use areas needed by FERC as well as the areas used by PG&E and FERC historically. The area of potential effects should be surveyed at a Class III level. PG&E will obtain a Field Work Authorization from BLM prior to conducting survey.</p> <p>The BLM should be included in the development of the Area of Potential Effects (APE) of the undertaking under National Historic Preservation Act (NHPA).</p> <p>The BLM requests full copies of reports, record searches, and geospatial data.</p>	<p>Clarification. The study plan will focus on areas potentially impacted by PG&E's ongoing and future operations and maintenance. Modifications were made to <i>Study CUL 1, Cultural Resources</i> in an effort to address these comments.</p>
7	John Hodge, BLM Bakersfield Field Office	SD1	4.2.6, Cultural Resources	Scoping Document 1 Comments, page 2	9	<p>An ethnographic study is needed and should include local tribal leadership from federal and non-federal groups.</p>	<p>Clarification. An ethnographic study is included in <i>Study CUL 2, Tribal Resources</i>.</p>
8	John Hodge, BLM Bakersfield Field Office	PAD	Table 4.5-1	Pre-Application Document Comments, page 1	1-2	<p>The list of Project Facilities and Features does not include fencing (including gates and cattle guards) around access roads to K2 access tunnels, discharge area, or tailings/spoils pile near access road 6. Please see attached map, <i>Kerckhoff Facilities at K2</i>.</p> <p>Access road 6 should be defined as K1 headworks to K2 discharge area and includes Project specific and shared road sections.</p>	<p>Clarification. PG&E will identify facilities and features that are used for the operation and maintenance of the Project as part of the Kerckhoff relicensing process, and, as appropriate, may propose modifying the FERC Project Boundary to include those facilities. To the extent that fencing is within the FERC Project Boundary or included in the Project's Public Safety Plan, it will be included in the license application.</p> <p>The classification of Access Road 6 has been clarified in the proposed study plans. Access Road 6 has two segments that are considered Project roads: (1) from Access Road 5 to the K1 Surge Chamber, and (2) from the K2 Switchyard to the K2 Portal Door and Access Tunnel.</p>
9	John Hodge, BLM Bakersfield Field Office	PAD	4.5.6 - 4.5-4b	Pre-Application Document Comments, page 1	3	<p>Smalley Road should be listed as a Shared Access Road. See comment under 4.5.6 – 4.5-4c for description.</p>	<p>Clarification. The sections of Smalley Road on BLM property are subject to existing right-of-way or other road use agreements between PG&E and BLM, and PG&E will work with BLM to renew these agreements outside of the relicensing process.</p> <p>By definition, Project Roads and Trails are used almost exclusively by PG&E to operate and maintain the Project. Shared Access Roads are used and cooperatively maintained by various parties; use of these roads by the general public is prevented by a gate located on the Shared Access Road. Non-Project General Access Roads are not considered Project Roads because they are primary public travel corridors and PG&E does not restrict access. Smalley Road is therefore not a Shared Access Road. Although BLM can restrict access to Smalley Road, it is the road used by the public to access BLM's public recreation facilities, and PG&E does not restrict access to this road segment.</p>

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
10	John Hodge, BLM Bakersfield Field Office	PAD	4.5.6 - 4.5-4c	Pre-Application Document Comments, page 1	4-5	<p>Smalley Road is listed as a Non-Project General Access Road and defined by PG&E:</p> <p>“Non-Project General Access Roads are not considered Project Roads because they are used as the primary travel corridors through the watershed and are open to unrestricted public use.”</p> <p>The section of road referred to as Smalley Road, located within Bureau of Land Management (BLM)’s management area is not a County maintained road, and is not subject to unrestricted public use. The realignment of Smalley Road was completed by PG&E, upon completion jurisdiction was turned over to BLM. BLM has discretion on access.</p>	See response to BLM Comment No. 9.
11	John Hodge, BLM Bakersfield Field Office	DSP	Study LAND 1- Project Roads and Trails Assessment	Pre-Application Document Comments, page 1	6-7	<p>BLM requests that STUDY LAND 1 be modified to include this section of [Smalley] road for analysis and should be included under the Table identified as Table LAND 1-2b.</p> <p>Project Nexus</p> <p>Shared access roads are required for ingress and egress for Project related operations and maintenance.</p>	Not Accepted. See response to BLM Comment No. 9.
12	John Hodge, BLM Bakersfield Field Office	PAD	Section 5.2	Pre-Application Document Comments, page 1	9	BLM requests PG&E’s bedrock geology GIS layer and descriptions relative to the geology layer.	Accepted. PG&E provided the requested information to BLM on April 20, 2018.
13	John Hodge, BLM Bakersfield Field Office	PAD	5.8.2.2	Pre-Application Document Comments, page 1-2	10-11	<p>BLM disagrees with the following statement:</p> <p>“Due to the rugged terrain and lack of access roads, the majority of the reach is not easily accessible by the public. The exception to this is the Yeh-Gu Weh-Tuh Trailhead, which provides trail access to and over the SJR (see Kerckhoff 1 Powerhouse Area).”</p> <p>Additional access points include:</p> <ul style="list-style-type: none"> • Ya-Gub-Weh-Tuh Trailhead and campground connecting the BLM’s San Joaquin River Trail, Bridge Trail, Pa’san Ridge and Wuh-ki-o trails. • An unmarked trail Access Point across from the Nuck-a-hee Learning Center which follows the PG&E’s project road to a small connecting trail above K1. This is a common access point by equestrian users that crosses the San Joaquin River. • San Joaquin River Trail accessed via Sky Harbor Road/South Fine Gold area located on Millerton Lake State Recreation Area connected to the south of BLM’s SJRG and provides access to the San Joaquin River. • Wellbarn Road is another access point south of BLM’s SJRG which connects to the San Joaquin River Trail (SJRT) that visitors use to access SJRG SRMA and the San Joaquin River. It should be noted that this road crosses private land and State Parks prior to terminating at the SJRG. This appears to be a popular access point for mountain bike users and runners. 	Thank you for providing this information. This information will be discussed as part of the license application.

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<ul style="list-style-type: none"> River Access Day Use Area (for description see comment under 5.8.2.2 Existing Facilities: Kerckhoff 2 Powerhouse Area). 	
14	John Hodge, BLM Bakersfield Field Office	PAD	5.8.2.2	Pre-Application Document Comments, page 2	12	Minor correction: “Yeh-Gu Weh-Tuh” should read “Ya-Gob-Weh-Tuh”	Thank you for identifying this correction. It will be corrected in future documents.
15	John Hodge, BLM Bakersfield Field Office	PAD	5.8.2.2	Pre-Application Document Comments, page 2	13-14	<p>While there are no PG&E maintained Project-specific recreation facilities, there are developed recreation facilities managed by BLM in the Project boundary. Developed Recreation Facilities in the Project area include:</p> <p><i>River Access Day Use Area</i> includes a parking area, picnic area, and accessible vault restroom. This is in the vicinity of K2 switchyard. Visitors have the option of a short river/fishing/recreational gold panning access trail to the river or connecting to the SJRT by walking a portion of the Project road to access one of two small connecting trails to the SJRT. This is a popular travel path to access the Millerton Caves and for river play. A portion of the Project area is understood by BLM to be used as a Helicopter Landing Zone but is also used by the public to for parking (a potentially conflicting use without coordination).</p>	Thank you for providing this information.
16	John Hodge, BLM Bakersfield Field Office	PAD	5.8.2.4	Pre-Application Document Comments, page 2	15-16	<p>The bypass reach associated with this project contains two distinct segments of Wild & Scenic eligible sections of river. In addition to the segment described in the PAD, the second segment from K1 to Millerton Lake was found to be eligible for its outstanding recreation values.</p> <p>The following interim protective management guidelines would apply to both segments:</p> <p>(a) Approve no actions altering the free-flowing nature of the suitable segment through impoundments, diversions, channeling, or riprapping;</p> <p>(b) Approve no actions that would measurably diminish the stream segment’s identified outstandingly remarkable value(s); and</p> <p>(c) Approve no actions that would modify the setting or level of development of the suitable river segment to a degree that would change its identified classification.</p>	<p>Clarification: Thank you for this additional information; PG&E will consider both the Wild & Scenic eligible segments in the development of the license application.</p> <p>Section 3.2.8 of BLM’s Wild and Scenic Rivers Suitability Report, notes in part in the Suitability Criteria Sections, the current existing uses. For example:</p> <p><i>Suitability Criteria 7. Historical or existing rights that could be adversely affected with designation: If designated, the hydroelectric facilities along the segment would continue to operate according to existing terms and conditions. All existing water rights, including water required for hydroelectric power generation, would be senior to a water right for protecting the ORVs, though current use levels are commensurate with protecting the identified values. Future projects related to or in addition to the current facilities may-not be permitted if they are on or directly affect the river.</i></p> <p>PG&E is not proposing future additions to the Project under its relicensing proposal.</p>
17	John Hodge, BLM Bakersfield Field Office	PAD	5.9.2	Pre-Application Document Comments, page 2-3	17	BLM requests to be involved in all steps of the National Historic Preservation Act (NHPA) Section 106 process, including development of the Area of Potential Effect (APE), cultural inventory methodology, tribal consultation, and issuance of a BLM Cultural Resources Use Permit (CRUP) and Field Work Authorization (FWA) for all cultural review.	Clarification. PG&E will continue to work with the Native Americans, BLM, and Forest Service in the development of the cultural study plans and implementation of the studies.
18	John Hodge, BLM Bakersfield	PAD	5.9.2	Pre-Application Document Comments, page	18-19	The area of potential effects should include all proposed use areas needed by FERC as well as the areas used by PGE and FERC historically. The	Clarification. See response to BLM Comment No. 17.

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
	Field Office			3		area of potential effects should be surveyed at a class III level. The BLM would like full copies of reports, record searches, and geospatial data.	
19	John Hodge, BLM Bakersfield Field Office	PAD	5.9.3	Pre-Application Document Comments, page 3	20	An ethnographic study is needed and should include local tribal leadership from federal and non-federal groups.	Clarification. See response to BLM Comments No. 7 and 17.
20	John Hodge, BLM Bakersfield Field Office	DSP	Study BOT 1- Plant Communities, Special-Status Plants, and Invasive Weeds	Pre-Application Document Comments, page 3	21	In regard to ground based surveys and mapping BLM requests surveys for invasive weed species to extend to two years. Depending on climate conditions, invasive species may be dormant from one year to the next. Thus it is recommended to search and map over multiple years. Two years is good. 5 years is best.	Not Accepted. PG&E and BLM discussed this comment during a conference call on 04/04/2018. BLM agreed with the methodology of one year of surveys, understanding that future license conditions would likely require PG&E to update noxious weed baseline surveys to capture population change over time. PG&E believes this request is beyond the scope necessary for relicensing, and is unnecessary for the development of future license conditions. More than one year of botanical surveys is not needed to detect invasive weeds. Most of invasive weed species in this watershed would not lay dormant and would not be difficult to find; they are perennial species or widespread species. The focus of the study is to gather enough information to inform the license application and development of protection, mitigation, and enhancement measures. PG&E believes that one year of surveys in <i>Study BOT 1, Plant Communities, Special-Status Plants, and Invasive Weeds</i> will provide sufficient information on the presence and distribution of invasive weeds within the FERC Project Boundary to inform future license conditions and development of protection, mitigation, and enhancement measures.
21	John Hodge, BLM Bakersfield Field Office	DSP	Study WILD 1- Special-Status Wildlife Species	Pre-Application Document Comments, page 3	22	Field transect surveys for sensitive wildlife and habitat should be extended to two years. Rare and secretive wildlife species can easily be missed with one year of study. Two years is better and cameras help greatly. BLM recommends the use of cameras to help determine the presence of rare wildlife species.	Not Accepted. PG&E and BLM discussed this comment during a conference call on 04/04/2018. BLM agreed with the methodologies for the species' surveys as described in <i>Study WILD 1, Special-Status Wildlife Species</i> and for one year of surveys. PG&E believes this request is beyond the scope necessary for relicensing, and is unnecessary for the development of future license conditions. PG&E believes that one year of study will provide enough information on the locations of potential habitat for sensitive wildlife species to inform the license application and development of protection, mitigation, and enhancement measures.
22	John Hodge, BLM Bakersfield Field Office	DSP	Study WILD 1- Special-Status Wildlife Species	Pre-Application Document Comments, page 3	23	In addition to Bald Eagle nesting, roosting, and foraging habitat surveys, other raptor and owl surveys should be conducted. Species that should be surveyed for include golden eagles, prairie falcon, Coopers hawk, spotted owls, and California condors.	Not Accepted. PG&E and BLM discussed this comment during a conference call on 04/04/2018. BLM agreed with the methodologies for the species' surveys as described in <i>Study WILD 1, Special-Status Wildlife Species</i> . PG&E believes this request is beyond the scope necessary for relicensing, and is unnecessary for the development of future license conditions. Focused surveys for other raptor species are not needed for informing future license conditions. The habitat-based approach in <i>Study WILD 1, Special-Status Wildlife Species</i> will provide sufficient information for the

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							development of the license application and protection, mitigation, and enhancement measures.
23	John Hodge, BLM Bakersfield Field Office	DSP	Study WILD 1-Special-Status Wildlife Species	Pre-Application Document Comments, page 3	24	In regard to visual and acoustic surveys for Special Status Bat Species, BLM recommends the use of mist nets to identify sensitive bat species.	Accepted with Modification. PG&E believes that mist nets can cause unnecessary injury to bats. PG&E and BLM discussed this comment during a conference call on 04/04/2018. PG&E will use mist nets in limited, focused areas where species or species group identification could not be accomplished by acoustic or visual surveys. Study <i>WILD 1, Special-Status Wildlife Species</i> has been modified to reflect this change.
24	John Hodge, BLM Bakersfield Field Office	DSP	Study LAND 1-Project Roads and Trails Assessment	Pre-Application Document Comments, page 3	25	The study includes references to Table LAND 1-1b. The table is labeled "Table LAND 1-2b Gated shared roads with the BLM and USFS". Please correct.	Accepted. The correction has been made to <i>Study LAND 1, Project Roads and Trails Assessment</i> .
25	John Hodge, BLM Bakersfield Field Office	DSP	Study LAND 1-Project Roads and Trails Assessment	Pre-Application Document Comments, page 3	26	Table LAND 1-2b Gated shared roads with the BLM and USFS: The PAD incorrectly defines Smalley Road as a county/general access road. Smalley Road is a BLM road. BLM's current Travel and Transportation plans lists this road as "Open." Smalley Road is heavily used by PG&E for access to Project facilities, and as such Smalley Road should be included in the table and study. Access via Smalley Road may be restricted at BLM's discretion.	See response to BLM Comment No. 9.
26	John Hodge, BLM Bakersfield Field Office	DSP	Study LAND 1-Project Roads and Trails Assessment	Pre-Application Document Comments, page 3	27	Please clarify the use of the phrase "select" as mentioned in STUDY LAND 1: POTENTIAL INFORMATION GAPS. What Shared Access Roads will not be included in the proposed study?	Clarification. PG&E has revised <i>Study LAND 1, Project Roads and Trails Assessment</i> to clarify that one Shared Access Road (Smalley Cove Recreation Area Road) will be included in this study. The section of Access Road 6 that is shared with BLM is subject to existing right-of-way or other road use agreements between PG&E and BLM, and PG&E will work with BLM to renew these agreements outside of the relicensing process, and will not be evaluated as part of <i>Study LAND 1, Project Roads and Trails Assessment</i> .
27	John Hodge, BLM Bakersfield Field Office	DSP	Study LAND 1-Project Roads and Trails Assessment	Pre-Application Document Comments, page 4	28-33	The BLM requests the consideration of the following be added to the study. STUDY METHODS AND ANALYSIS: 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 Shared Access Roads identified on Table LAND 1-2b (including the portion of Smalley Road under the jurisdiction of BLM). Identify the frequency and types of vehicles accessing the roads by PG&E and their affiliated companies (contractors and subcontractors). <ul style="list-style-type: none"> • Include approximate weight of the vehicle can be determined by the model/type of vehicle and the load per axle for vehicles pulling trailers. The weight of a vehicle and number of axles would produce the most stress on the road surface and material. • BLM requests monitoring of the average speeds of vehicles along roads. Extent of Study Area: BLM request modification to the proposed study to	Clarification. See responses to BLM Comment Nos. 9 and 26.

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						<p>include turnouts, turnarounds, or any area that is used for staging vehicles or equipment off of the road bed.</p> <p>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.</p> <p>Resource Assessment: In regard to - "location of areas along the roads and trails identified" please modify to include turnout areas and areas used for staging vehicles off road.</p>	
28	John Hodge, BLM Bakersfield Field Office	DSP	Study REC 2- Recreation Facility Assessment, Study REC 3- Recreation Visitor Use, Study REC 4- Recreation Visitor Use Surveys	Pre-Application Document Comments, page 4-5	34-41	<p>The BLM finds the Project analysis inadequate. BLM requests that the proposed studies also analyze Project related impacts to recreational resources at BLM's San Joaquin River Gorge Special Recreation Management Area (SJRG). See attached map entitled <i>BLM SJRG_Rec_map</i>.</p> <p>BLM would like to be included in the development of surveys in regard to recreation.</p> <p>Project Nexus:</p> <p>The Project reservoir, shoreline, and Project Bypass Reach and its adjacent 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.</p> <ul style="list-style-type: none"> • Recreation at the SJRG has the potential to be highly concentrated in and in close proximity to the FERC Project boundary. Visitors access the trail system and cross the San Joaquin River at the SJRG Bridge in close proximity to PG&E's K1. They may also access the trail system at several other access points with the potential to be in close proximity to K1, K2 and other Project related features and facilities. The project has multiple direct and indirect effects on recreation opportunities and public safety on BLM managed public lands. • Operation of the Project affects flows and potentially affects resources in the following river reaches: <ul style="list-style-type: none"> - The Project Bypass Reach, which includes the SJR from Kerckhoff Dam downstream to the K1 Powerhouse (8 mi.) and from the K1 Powerhouse to the K2 Powerhouse (1.8 mi.); and the 1-km (0.62-mi.) reach immediately below K2 Powerhouse to Millerton Lake, a BOR facility. <p>According to the <i>Bakersfield Field Office Record of Decision and Approved Resource Management Plan</i>, "The enormous increase in population in the Planning Area [inclusive of the SJRG] has intensified the demand for open space and recreation opportunities on public land. Not only has demand increased, but the kinds of recreation taking place</p>	<p>Clarification. Study REC 3, Recreation Visitor Use and Study REC 4, Recreation Visitor Use Surveys have been revised to include the vicinity of Kerckhoff 1 and Kerckhoff 2 powerhouses.</p> <p>Study REC 2, Recreation Facility Assessment has not been revised because it is an assessment of PG&E's Project-related recreation facilities (Smalley Cove Recreation Area).</p> <p>PG&E is continuing to consult with the Kerckhoff Project stakeholders in considering this comment and in reaching agreement on this topic.</p>

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						<p>on public lands have also increased...”</p> <p>(2014). It is BLM’s objective to manage the recreational resources within the SJRG to address the growing demand for recreation and provide for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety that may be affected as a result of the Project.</p> <p>The proposed studies are intended to address the lack of information regarding potential impacts of Project related activities (facilities and features/operations and maintenance), direct or indirect, to recreation resources and opportunities on lands managed by the BLM within the SJRG.</p> <p>These identified sections highlight changes to the current studies that could be adopted and potentially incorporated into PG&E’s APPENDIX D - Proposed Draft Study Plans.</p>	
29	John Hodge, BLM Bakersfield Field Office	DSP	Study REC 2- Recreation Facility Assessment	Pre-Application Document Comments, page 5-6	42-47	<p>The BLM requests the consideration of the following be added to the study.</p> <p>Potential Resource Issues</p> <ul style="list-style-type: none"> • Current geographic scope is inadequate. BLM requests the inclusion of lands and waters immediately adjacent to the Project be included in the study. <p>Project Nexus</p> <ul style="list-style-type: none"> • In regard to the Project Bypass Reach include the adjacent shoreline. <p>Potential Information Gaps</p> <ul style="list-style-type: none"> • Study how existing Project facility layout, design, condition and safety features affect recreation opportunities and public safety on immediately adjacent lands and waters. <p>Proposed Study or Information Gathering</p> <p>Recreation Facility Inventory</p> <ul style="list-style-type: none"> • Project recreation facilities and those on adjacent lands and waters at each powerhouse will be inventoried and evaluated as to how they support recreation uses in the local area and how they could be modified to enhance such recreation uses and improve public safety. 	Not Accepted. PG&E is continuing to consult with the Kerckhoff Project stakeholders in considering this comment and in reaching agreement on this topic. <i>Study REC 2, Recreation Facility Assessment</i> has not been revised to accept this comment because <i>Study REC 2</i> is an assessment of PG&E’s Project-related recreation facilities (Smalley Cove Recreation Area).
30	John Hodge, BLM Bakersfield Field Office	DSP	Study REC 3- Recreation Visitor Use	Pre-Application Document Comments, page 6-7	48-60	<p>The BLM requests the consideration of the following be added to the study.</p> <p>Potential Resource Issues</p> <ul style="list-style-type: none"> • Locations of Project-related effects (operations, maintenance and locations of facilities and features) to recreational resources on public lands managed for recreation. <p>Potential Information Gaps</p> <ul style="list-style-type: none"> • Locations of Project-related effects (operations, maintenance and locations of facilities and features) to recreational resources on 	Accepted with Modification. The use assessment proposed in <i>Study REC 3, Recreation Visitor Use</i> has been revised to include the vicinity of Kerckhoff 1 and Kerckhoff 2 powerhouses.

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						<p>BLM public lands managed for recreation. This includes BLM's public lands at the SJRG that will be impacted by the Project.</p> <p><u>Proposed Studies/Analysis to Address Identified Significant Information Gaps</u></p> <p>PAD: "Project reservoir shoreline and water surface use assessment—Kerckhoff Reservoir will be assessed to report the level, timing, and type of reservoir boating use and shoreline recreation use."</p> <ul style="list-style-type: none"> Current geographic scope is inadequate and will need to include Project Bypass Reach shoreline. <p>PAD: "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 nonpeak seasons."</p> <ul style="list-style-type: none"> Current geographic scope is inadequate. Project study should include lands and waters adjacent to the Project where recreation takes place on public lands (specifically BLM's SJRG). <p>PAD: "Recreation use impact assessment—Project lands will be inventoried to report locations of recurrent dispersed recreation, describe the level, timing, and type of recreation use, and identify any visually evident effects on environmental resources at these locations."</p> <ul style="list-style-type: none"> Current geographic scope is inadequate and needs to include lands adjacent to the Project. <p><u>Extent of Study Area</u></p> <ul style="list-style-type: none"> Include Project Bypass Reach for water surface and shoreline study area. Include SJRG for developed recreation facility use assessment. Include public land managed by the BLM for the Recreation use impact assessment. <p><u>Study Methods and Analysis</u></p> <ul style="list-style-type: none"> Project Reservoir Shoreline and Water Surface Use Assessment Include Bypass Reach. BLM requests that sampling days taking place at the SJRG occur from January 1 to June 30. <p><u>Developed Recreation Facility Use Assessment</u></p> <ul style="list-style-type: none"> Include SJRG campgrounds and day use areas. Locations for spot survey should be developed with BLM for the SJRG. <p><u>Recreation Use Impact Assessment</u></p> <ul style="list-style-type: none"> Include Project Bypass Reach and land adjacent to FERC Project Boundary. 	
31	John Hodge, BLM	DSP	Study REC 4-Recreation	Pre-Application Document	61-70	The BLM requests the consideration of the following be added to the	Accepted with Modification. The survey proposed in <i>Study REC 4, Recreation Visitor Use Surveys</i> has been revised to include the vicinity of

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	Bakersfield Field Office		Visitor Use Surveys	Comments, page 7-8		<p>study.</p> <p>Potential Resource Issues</p> <ul style="list-style-type: none"> Current geographic scope is inadequate. BLM requests the inclusion of lands and waters immediately adjacent to the Project be included in the study. <p>Project Nexus</p> <ul style="list-style-type: none"> Include the Project Bypass Reach and its adjacent shoreline. Recreation at the SJRG is concentrated in close proximity to and in the FERC Project boundary. Operation of the Project affects flows and potentially affects resources in the following river reaches: <ul style="list-style-type: none"> The Project Bypass Reach, which includes the SJR from Kerckhoff Dam downstream to the K1 Powerhouse (8 mi.) and from the K1 Powerhouse to the K2 Powerhouse (1.8 mi.); and the 1-km (0.62-mi.) reach immediately below K2 Powerhouse to Millerton Lake, a BOR facility. <p>Potential Information Gaps</p> <ul style="list-style-type: none"> The Project has direct and indirect affects to recreation, including but not limited to, visitors losing gear due to unexpected fluctuations in water level and visitors being concerned with safety as it relates to recreational opportunities. <p>Proposed Studies/Analysis to Address Identified Significant Information Gaps</p> <ul style="list-style-type: none"> Current geographic scope is inadequate. BLM requests the inclusion of lands and waters adjacent to the Project. <p>Extent of Study Area</p> <ul style="list-style-type: none"> Include BLM public lands in the SJRG. <p>Visitor Survey</p> <ul style="list-style-type: none"> BLM requests to consultation for development of study questions. BLM requests that sampling days taking place at the SJRG occur between January 1 to June 30 to achieve accurate results. 	Kerckhoff 1 and Kerckhoff 2 powerhouses.
32	John Hodge, BLM Bakersfield Field Office	DSP	Study GEO 1-Channel Form and Fluvial Processes	Pre-Application Document Comments, page 8-9	71-81	<p>The BLM requests the consideration of the following be added to the study.</p> <p>Relevant Information/References</p> <ul style="list-style-type: none"> Bateman, Paul C. and Alan J. Busacca, 1982, Geology of the Millerton Lake Quadrangle, West-Central Sierra Nevada, California, U.S. Geological Survey, Map GQ-1548. <p>Potential Information Gaps</p> <ul style="list-style-type: none"> Gold content of sediments entering and leaving Kerckhoff Reservoir Volume of gold-bearing sediments in Kerckhoff Reservoir 	<p>Not Accepted. On 4/11/18, PG&E discussed these comments with BLM. <i>Study GEO 1, Channel Form and Fluvial Processes</i> focuses on river geomorphology and channel processes, while <i>Study GEO 2, Project-related Sediment Management Practices in Kerckhoff Reservoir</i> will evaluate sediments in the reservoir. During the call with BLM on 4/11/18, BLM agreed that a study on the gold content is not necessary.</p> <p>PG&E believes this request is beyond the scope necessary for relicensing, and is unnecessary for the development of future license conditions. A study of gold concentrations in the reservoir and the river is not needed for the development of future license conditions or protection, mitigation, and enhancement measures.</p>

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						<ul style="list-style-type: none"> Gold content of sediments between Kerckhoff Dam and Millerton Lake Gold content of sediments from Kerckhoff Dam to Millerton Lake <p>Proposed Studies/Analysis to Address Identified Significant Information Gaps</p> <ul style="list-style-type: none"> Analysis of gold quality, quantity and distribution in the project area, and in impacted reaches of San Joaquin River <p>Study Methods and Analysis</p> <ul style="list-style-type: none"> Prepare a sampling plan for <ol style="list-style-type: none"> Sediments upstream of the Kerckhoff Reservoir Sediments in Kerckhoff Reservoir Sediments in the San Joaquin River between Kerckhoff Dam and Millerton Lake <p>Analyze samples for gold content, describe opportunities for recreational gold panning</p> <p>Products</p> <ul style="list-style-type: none"> Maps showing variations in gold concentration along the San Joaquin River Maps showing variations in gold concentration in Kerckhoff Reservoir 	
33	John Hodge, BLM Bakersfield Field Office	DSP	Study GEO 2-Project-related Sediment Management Practices in Kerckhoff Reservoir	Pre-Application Document Comments, page 9-10	82-93	<p>The BLM requests inclusion of the attached <i>BLM proposed Gold Study</i> into Geo 2 Study.</p> <p>Project Nexus</p> <p>In the Bakersfield Resource Management Plan, inventory and management of the recreational gold panning resource of the SJRG was identified. Operation of the Kerckhoff Dam and reservoir restricts this resource because gold is retained in the Kerckhoff Reservoir and not allowed to move down the San Joaquin River where gold panners historically operated.</p> <p>Potential Resources Issue(s)</p> <ul style="list-style-type: none"> BLM requests an estimation of time in regard to sedimentation completely filling the Kerckhoff Reservoir and impacts to recreational gold panning, boating, and recreation. BLM requests an analysis of sedimentation impacts on recreational gold panning. <p>Relevant Information/References</p> <ul style="list-style-type: none"> Bateman, Paul C. and Alan J. Busacca, 1982, Geology of the Millerton Lake Quadrangle, West-Central Sierra Nevada, California, U.S. Geological Survey, Map GQ-1548. <p>Potential Information Gaps</p>	See response to BLM Comment No. 32.

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						<ul style="list-style-type: none"> The historical and current characteristics of gold particle size, abundance and character in sediments 1) upstream of Kerckhoff Reservoir, 2) in Kerckhoff Reservoir, and 3) Between Kerckhoff Dam and Millerton Lake <p>Proposed Studies/Analysis to Address Identified Significant Information Gaps</p> <ul style="list-style-type: none"> Evaluate gold resource using procedures outlined in the BLM Handbook for Mineral Examiners, H-3890-1. Identify immediate sources of sediment and gold content thereof to Kerckhoff Reservoir and their characteristics including the area surrounding Kerckhoff Reservoir, Fish Creek and the San Joaquin River as it enters Kerckhoff Reservoir, based on reconnaissance observations. <p>Extent of Study Areas</p> <ul style="list-style-type: none"> Expand to include the San Joaquin River between Kerckhoff Reservoir and Millerton Lake. <p>Study Methods and Analysis</p> <ul style="list-style-type: none"> BLM requests when sampling, to sample the entire sediment column, not just the surface. BLM also recommends the use of Vibroseise raft-mounted sampler. Figure 1. Vibroseise sampler at the Buena Vista Mercury Mine pond. <p>Products</p> <ul style="list-style-type: none"> BLM requests that sediment size and gold distributions and comparisons will be provided in tabular format. BLM requests sampling results be presented on respective maps. 	
34	John Hodge, BLM Bakersfield Field Office	DSP	Study GEO 3-Project Road-Related Erosion	Pre-Application Document Comments, page 10	94-97	<p>The BLM requests inclusion of the attached <i>BLM proposed Arsenic Study</i> into Geo 3 Study.</p> <p>Proposed Studies/Analysis to Address Identified Significant Information Gaps</p> <ul style="list-style-type: none"> BLM requests the installation of sediment monitoring stations at affected tributaries downstream of roads and requests the measurement of sediment discharges. BLM requests the total sediment contribution estimation to Kerckhoff Reservoir from road erosion for next 50 years. <p>Study Methods and Analysis</p> <ul style="list-style-type: none"> BLM requests the installation of sediment monitoring stations to get quantitative data about sedimentation contributions from roadways. 	<p>Not Accepted. PG&E believes this request is beyond the scope necessary for relicensing, and is unnecessary for the development of future license conditions. PG&E will analyze water quality samples collected in Kerckhoff Reservoir and in the San Joaquin River below Kerckhoff Dam for the suite of parameters specified in <i>Study WQ 2, Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir</i>, which includes arsenic (see response to State Water Board Comment No. 10). PG&E modified the plan to include a contingency for an analysis of bioavailable arsenic, if the total arsenic concentrations exceed the National Recommended Water Quality Criteria for Freshwater Aquatic Life Protection in any of the samples analyzed from the reservoir. In addition, arsenic is one of the metals that will be included in the fish tissue analysis in the proposed new <i>Study WQ 3, Bioaccumulation in Kerckhoff Reservoir</i> (see response to State Water Board Comment No. 15). Based on discussion with BLM (4/11/18), it was agreed that <i>Study GEO 3, Project Road-Related Erosion</i> should clarify that the proposed approach to evaluating road-related erosion is a reconnaissance level analysis, rather than a quantitative measurement of sediment volumes from roads. PG&E will identify road-related erosion problems, including contributions from all features of the road footprint, and PG&E will</p>

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							develop a rating to characterize the extent to which erosion from roads may be delivered to receiving waterbodies. PG&E will not be actively monitoring and measuring sediment volumes derived from roads. Erosion problems identified will be addressed through protection, mitigation, and enhancement measures, which will include consideration of BLM standards for road maintenance practices and design.
35	John Hodge, BLM Bakersfield Field Office	DSP	Study WQ 1- Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach	Pre-Application Document Comments, page 10-11	98-99	<p>The BLM requests the consideration of the following be added to the study.</p> <p><u>Proposed Studies/Analysis to Address Identified Significant Information Gaps</u></p> <ul style="list-style-type: none"> BLM requests more information including, what depths the water will be sampled and for a detailed environmental condition of when water is sampled. 	<p>Accepted with Modification. Study WQ 1, Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach has been modified to clarify the depths at which water temperature measurements will be sampled. Water temperatures will be measured and recorded at three locations within the reservoir. In the deeper portion of the reservoir near the dam, PG&E will collect samples at the surface, mid-depth, and near the bottom of the reservoir. The reservoir shallows with distance upstream from the dam; and the number of samples and depth increments will depend on the total depth. Water temperature will also be measured via recorders in the tailrace of A.G. Wishon Powerhouse in Kerckhoff Reservoir. The locations of the measurement sites will be based on the bathymetric data collected for Study GEO 2, Project-related Sediment Management Practices in Kerckhoff Reservoir. The total depth of each of the sampling locations will also be measured in the field. The study plan also identifies the suite of environmental parameters that will be recorded during the sampling efforts.</p>
36	John Hodge, BLM Bakersfield Field Office	DSP	Study WQ 2- Water Quality Sampling in the Project Bypass Reach and Kerckhoff Reservoir	Pre-Application Document Comments, page 11	100-104	<p>The BLM requests the consideration of the following be added to the study.</p> <p><u>Potential Information Gaps</u></p> <ul style="list-style-type: none"> Water quality varies with precipitation; BLM requests the study identifies differences between typical and storm water sampling events. <p><u>Proposed Studies/Analysis to Address Identified Significant Information Gaps</u></p> <ul style="list-style-type: none"> BLM requests the characterization of water quality be separated into three different water flow conditions: maximum, minimum, and average. <p><u>Study Methods and Analysis</u></p> <ul style="list-style-type: none"> BLM requests tests be conducted to see what trace elements are bioavailable and bioaccessible because trace element concentrations by themselves give incomplete information about toxicity. <p><u>Table WQ 2-1 Parameters for the Water Quality Assessment Program</u></p> <ul style="list-style-type: none"> BLM requests that arsenic (a common toxic element) be added to this table. BLM also requests that tests on metals be conducted in a manner that identifies if the element is bioavailable or bioaccessible. 	<p>Not Accepted. PG&E believes this request is beyond the scope necessary for relicensing, and is unnecessary for the development of future license conditions. PG&E will sample water quality during the spring runoff period and low flow period in late summer to identify potential water quality issues in Project waters. PG&E does not have control over flows during storm events. The purpose of the study is to gather information that can be used to determine if the Project is adversely affecting the aquatic environment or human health. The study is not intended to be an evaluation of point and non-point source discharges. PG&E has modified the plan to clarify the objective of the study and that the Project does not generate waste or toxins or add contaminants to the water.</p> <p>See response to BLM Comment No. 34 and State Water Board Comment 15.</p>

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
37	John Hodge, BLM Bakersfield Field Office	DSP	Study CUL 1- Cultural Resources	Pre-Application Document Comments, page 11-14	105-127	<p>Potential Resource Issue(s)</p> <ul style="list-style-type: none"> The BLM would like to add <i>unrecorded and unidentified</i> cultural resources to the list of potential resource issues. <p>Project Nexus</p> <ul style="list-style-type: none"> The BLM would like to add regulatory compliance with Executive Order 13007 (sacred sites), the Native American Graves Protection and Repatriation Act (NAGPRA), and the Archaeological Resources Protection Act (ARPA). <p>Relevant Information</p> <ul style="list-style-type: none"> 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 BLM, and may not be 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 BLM. The following excerpt references documentation that may not directly address the study area (i.e. Crane Valley) and the BLM requests that references be directly relevant to the Project area, including ethnography and contextual studies. The Nettles and Cimino (2013) document did not seek comment from the BLM regarding the APE prior to SHPO consultation. The BLM has noted that the 2013 document is inadequate as it leaves out a large number of unrecorded resources directly related to the Kerckhoff Project. The APE was a background review of existing documentation, only and did not include fieldwork to identify known and unrecorded resources. Existing and unrecorded resources need to be considered. The 1977 archaeological study is out of date and needs to be updated to meet current industry and agency requirements. <ul style="list-style-type: none"> - Information about the history of the Project and select Project facilities is available from a number of primary sources including the following: <ul style="list-style-type: none"> ▪ Archaeological Testing, Resource Evaluation, and Management Planning for the Crane Valley Hydroelectric Project Area (Goldberg et al. 1986); ▪ Ethnographic, Ethnohistoric, and Traditional Cultural Property Study for the Crane Valley Hydroelectric Project (McCarthy et al. 2011); ▪ National Register of Historic Places Evaluation of the Kerckhoff 	<p>Accepted with Modifications. <i>Study CUL 1, Cultural Resources</i> has been revised to address a number of these issues, including information related to regulatory compliance, consultation, potential information gaps, and the scope of the study area.</p> <p>Please note:</p> <ul style="list-style-type: none"> The Crane Valley cultural documents are included because they contain information about resources within the Kerckhoff Reservoir area, and are therefore relevant to the current project. Additionally, PG&E agrees that the 1977 studies are out of date and not sufficient for the current relicensing, but they were included in the document because they informed the PAD and provide useful background information. SHPO concurred with the finding that the Kerckhoff Hydroelectric system is not eligible for the NRHP. It is understood that the BLM disagrees with excluding the archaeological remains and non-hydro buildings from the resource, though doing so is consistent with long-standing practice for evaluating hydroelectric facilities in the region. <i>Study CUL 1, Cultural Resources</i> has been revised to include consideration of additional resources related to the construction and management of the Kerckhoff Project. As the purpose of the relicensing is to identify ongoing and potential future impacts, not to deal with impacts of up to a century past, the cultural resources studies will be limited to those areas that could potentially be impacted by the ongoing operation and maintenance of the Kerckhoff Hydroelectric Project. NRHP-eligibility evaluations will be carried out on resources likely to be impacted by project operation and maintenance that cannot be avoided through the application of standard avoidance measures. As archaeological testing is inherently destructive to the resources, it will be avoided except when necessary. The need for non-destructive evaluation of historic structures or archaeological sites related to those structures for NRHP will be determined through consultation between the licensee and the agencies. Many of the specific concerns regarding impacts, avoidance measures, and evaluation will be addressed in the Historic Properties Management Plan (HPMP). The APE should include, as appropriate, resources that intersect the APE (such as the area near the BLM's visitor center), however, the APE should be appropriate to the current undertaking rather than being used to address past land use. Background information will be obtained to 1 mile in order to

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						<p>Hydroelectric Project (Nettles and Cimino 2013) and</p> <ul style="list-style-type: none"> ▪ Archaeological Investigations for the Kerckhoff Hydroelectric Project (Varner and McCormick 1977). <p>Potential Information Gaps</p> <ul style="list-style-type: none"> • The BLM should be involved in the determination of the APE with FERC and SHPO. • The BLM requests that NRHP documentation and evaluation of all cultural resources, includes the built environment, unrecorded sites created by the Kerckhoff project since its inception, regardless of the previously approved FERC boundary. FERC and PG&E have historically used and maintained areas beyond the boundary. Many of these resources are over 50 years in age. One example is the domestic encampment that was largely demolished in the 1960's including a large refuse dump that may contain hazardous materials. <p>Proposed Studies/Analysis to Address Identified Significant Information Gaps</p> <ul style="list-style-type: none"> • The BLM should be involved in the establishment of the APE in coordination with the FERC and SHPO. The APE should contain all areas proposed for inclusion in the FERC boundary, as well as all areas used historically (including domestic use areas) by FERC and PG&E as part of operations and maintenance. • The BLM requests completion of NRHP evaluations of all cultural resources that could potentially be affected by Project operation and maintenance activities. The use of historic and archaeological resources is not inclusive of the types of resources located within the Project and only covers NRHP evaluations for Criteria D. Criteria A, B, and C must also be considered in the identification process. • Complete NRHP evaluations of all cultural resources that may have been affected by past Project operation and maintenance activities. • Conduct impact assessments based upon the results of the planned studies. The BLM recommends the development of a NAGPRA plan of action for the duration of the Project. <p>Extent of Study Area</p> <ul style="list-style-type: none"> • The BLM requests that the study area include the area within 1.0 miles of the FERC Project Boundary and any Project facility that resides within 1.0 miles 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. It is critical to include the Squaw Leap geologic feature within the study area. • Field surveys will require a BLM CRUP and FWA be obtained by a professional archaeologists prior to any scheduled field surveys as part of BLM compliance with FLPMA and ARPA. As noted in the development of the APE, the BLM requests to be 	<p>provide better context. Including the Squaw Leap geological formation in the ethnographic study discussions makes sense, as the project facility is in the view shed. However, aside from providing background information, it is unclear why the BLM considers it critical for the archaeological/historic architecture studies.</p> <ul style="list-style-type: none"> • Performing evaluations for all resources will be unnecessarily time and cost consuming, and, in the case of archaeological sites, will be inherently damaging to the sites. PG&E will perform evaluations on resources that are likely to be impacted by the project, but those that are avoidable should be avoided. Many issues, such as this, will be clarified when the HPMP is created for the project. •

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						<p>involved in order to expedite the CRUP and FWA required for fieldwork. FERC's current description of the APE does not appear to meet the BLM's minimum standards for fieldwork.</p> <p>Study Methods and Analysis</p> <ul style="list-style-type: none"> The BLM Bakersfield Field Office Cultural Resources Program requests to be added to the list of sources for which additional information may be available to supplement the information that was completed for the PAD. <p>Field Surveys</p> <ul style="list-style-type: none"> The BLM requests a Class III inventory of the entire APE plus a 200 foot buffer for the identification of cultural and archaeological resources. Transect spacing shall be limited to a maximum of 15 meters with any exclusion areas clearly identified using GPS technology and mapped appropriately. The criteria listed in the PAD for moderate-high archaeological sensitivity is vague and does not adequately document cultural resources in such areas, once defined. The BLM requests a maximum of 15 meter transects be used instead of the following section from the PAD: <ul style="list-style-type: none"> Conduct reconnaissance-level (pedestrian transects of no less than 30 meters [m] [98 ft.] in areas of moderate-high archaeological sensitivity) or focused (revisiting previously recorded site locations only) surveys to re-examine previously surveyed areas within the APE. The BLM requests that all fieldwork be conducted under a BLM CRUP as defined by the Federal Land Policy and Management Act (FLPMA) and ARPA. <p>National Register of Historic Places Evaluations</p> <ul style="list-style-type: none"> The BLM requests that all cultural resources located within the APE be evaluated. For the items listed in this section, a BLM CRUP and FWA are requested. In order for the BLM to respond efficiently, this process should be clarified with FERC well in advance of any field studies associated with NRHP evaluations. <p>Consistency With Generally Accepted Scientific Practice</p> <ul style="list-style-type: none"> The BLM requests that the BLM California Protocol be added to the list of documents in this section. The most current version of this document can be found online at: https://www.blm.gov/sites/blm.gov/files/CA%20Protocol.pdf <p>Products</p> <ul style="list-style-type: none"> The Draft CUL 1 TSR will be submitted to appropriate resource agencies and interested parties for a 90-day review and comment period. <p>Possible Early Schedule</p>	

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response																
						<ul style="list-style-type: none"> The BLM requests to be included in and notified regarding the following scheduled events. A BLM CRUP and FWA may be required by the BLM. <table border="1"> <thead> <tr> <th>Date</th> <th>Activity</th> </tr> </thead> <tbody> <tr> <td>April–May 2018</td> <td>Establish APE in consultation with FERC, BLM and SHPO</td> </tr> <tr> <td>June 2018</td> <td>Conduct detailed review of previous survey reports and records</td> </tr> <tr> <td>December 2018–March 2019</td> <td>Conduct field surveys, after obtaining BLM CRUP</td> </tr> <tr> <td>January–May 2019</td> <td>Develop NRHP Work Plan in consultation with tribes and resource agencies (as appropriate)</td> </tr> <tr> <td>July–September 2019</td> <td>Conduct NRHP eligibility studies, after obtaining BLM CRUP</td> </tr> <tr> <td>October–November 2019</td> <td>Prepare Draft CUL 1 TSR and distribute for review and comment by authorized participants</td> </tr> <tr> <td>June 2020</td> <td>Comments will be addressed and the final CUL 1 TSR will be distributed with Draft License Application to authorized participants</td> </tr> </tbody> </table>	Date	Activity	April–May 2018	Establish APE in consultation with FERC, BLM and SHPO	June 2018	Conduct detailed review of previous survey reports and records	December 2018–March 2019	Conduct field surveys, after obtaining BLM CRUP	January–May 2019	Develop NRHP Work Plan in consultation with tribes and resource agencies (as appropriate)	July–September 2019	Conduct NRHP eligibility studies, after obtaining BLM CRUP	October–November 2019	Prepare Draft CUL 1 TSR and distribute for review and comment by authorized participants	June 2020	Comments will be addressed and the final CUL 1 TSR will be distributed with Draft License Application to authorized participants	
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38	John Hodge, BLM Bakersfield Field Office	DSP	Study CUL 2- Tribal Resources	Pre-Application Document Comments, page 14-16	128-136	<p>Potential Resource Issue(s)</p> <ul style="list-style-type: none"> The BLM requests that Executive Order 13007 (sacred sites) be listed as a potential resource issue. <p>Relevant Information</p> <ul style="list-style-type: none"> The BLM requests to be added FERC’s list of databases and information available to determine tribal resources study needs. The BLM maintains a list of tribal contacts and has extensive contacts in this area. <p>Potential Information Gaps</p> <ul style="list-style-type: none"> The BLM finds that there is inadequate identification of Native American community respondents. <p>Proposed Studies/Analysis to Address Identified Significant Information Gaps</p> <ul style="list-style-type: none"> The BLM requests that FERC address how they plan to address inadequate identification of Native American community respondents. The items listed here do not address the potential data gap item addressed in the previous section. <p>Extent Of Study Area</p> <ul style="list-style-type: none"> The BLM requests that the study area include the area within 1.0 miles of the FERC Project Boundary and any Project facility that resides within 1.0 miles 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. It is critical to include the Squaw Leap geologic feature within the study area. Fieldwork may require a BLM CRUP and FWA be obtained by a 	<p>Accepted with Modifications. <i>Study CUL 2, Tribal Resources</i> has been revised to address a number of these issues. Including to make it clear that the purpose is to identify resources that may be directly or indirectly affected by Project activities:</p> <ul style="list-style-type: none"> <i>Study CUL 2, Tribal Resources</i> has been revised to include discussion of indirect effects, but individual features in the study plan have not been named so as not to bias the study Review periods for the Study Reports will be approved by FERC. 																

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						<p>professional archaeologists prior to any scheduled fieldwork as part of BLM compliance with FLPMA and ARPA. As noted in the development of the APE, the BLM requests to be involved in order to expedite the CRUP and FWA required for fieldwork.</p> <p>Archival Research</p> <ul style="list-style-type: none"> The BLM requests to be added to the list in this section as the Bakersfield Field Office Cultural Resources Program may contain relevant information not curated elsewhere. <p>Products</p> <ul style="list-style-type: none"> The inventory and evaluation report will be submitted to appropriate resource agencies and stakeholders for a 90-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 December 2019. <p>Schedule</p> <ul style="list-style-type: none"> The BLM requests to be included in and notified regarding the following scheduled events. A BLM CRUP and FWA may be required by the BLM. <table border="1"> <thead> <tr> <th>Date</th> <th>Activity</th> </tr> </thead> <tbody> <tr> <td>April–June 2018</td> <td>Conduct archival research</td> </tr> <tr> <td>June–November 2018</td> <td>Tribal consultation and site visits</td> </tr> <tr> <td>December 2018–January 2019</td> <td>Identify potential Project impacts and determine need for NRHP eligibility studies in consultation with tribes and the BLM</td> </tr> <tr> <td>February 2019–March 2019</td> <td>Develop NRHP work plan in consultation with tribes and resource agencies</td> </tr> <tr> <td>April–June 2019</td> <td>Conduct NRHP eligibility studies</td> </tr> <tr> <td>July–August 2019</td> <td>Stakeholders review and provide comments on Draft CUL 2 TSR (90 days)</td> </tr> <tr> <td>September–October 2019</td> <td>Resolve comments and prepare Final CUL 2 TSR</td> </tr> </tbody> </table>	Date	Activity	April–June 2018	Conduct archival research	June–November 2018	Tribal consultation and site visits	December 2018–January 2019	Identify potential Project impacts and determine need for NRHP eligibility studies in consultation with tribes and the BLM	February 2019–March 2019	Develop NRHP work plan in consultation with tribes and resource agencies	April–June 2019	Conduct NRHP eligibility studies	July–August 2019	Stakeholders review and provide comments on Draft CUL 2 TSR (90 days)	September–October 2019	Resolve comments and prepare Final CUL 2 TSR	
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39	John Hodge, BLM Bakersfield Field Office	DSP		Appendix A, page 1-3	1-14	<p>Study Plan Criteria: Arsenic Contamination (18 CFR 5.9(b))</p> <p>Any information or study request must contain the following:</p> <ol style="list-style-type: none"> Describe the goals and objectives of each study proposal and the information to be obtained; <p>This study will inventory the character and volume of arsenic sediments and solutions in the project area. This inventory has long-term consequences for managing the arsenic in the project area. The objective is to identify the distribution of arsenic in sediments and waters of the project area and provide alternatives for how this resource could be managed to reduce human and environmental exposure to arsenic</p> <ol style="list-style-type: none"> If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be 	Not Accepted. See response to BLM Comment No. 34.																

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>studied;</p> <p>In the Bakersfield Resource Management Plan, inventory and management of the arsenic and other toxic chemicals in the Bakersfield Field Office was identified. Operation of the Kerckhoff Dam and reservoir collects arsenic because arsenic is retained in the Kerckhoff Reservoir and not allowed to move down the San Joaquin River.</p> <p>3. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;</p> <p>Requester is the Bureau of Land Management</p> <p>4. Describe existing information concerning the subject of the study proposal, and the need for additional information;</p> <p>There are no known arsenic studies in the area.</p> <p>5. Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;</p> <p>Sedimentation of the Kerckhoff Reservoir collects arsenic. Management of sediment is necessary for the long-term operation of the power plant. This management could be designed to recovery unwanted arsenic in the project area. This study could be conducted in concert with the Gold study</p> <p>6. Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge; and</p> <p>The arsenic inventory would include stream sediment sampling in the San Joaquin River between the Kerckhoff Dam and Millerton Lake. The inventory would also include characterization of the arsenic quality and quantity in Kerckhoff Reservoir. This would be measured through a Vibroseise sampling plan. Samples would be assayed for arsenic content and also classify them according to bioavailability and bioaccessibility</p> <p>7. Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.</p> <p>No alternative studies are proposed. A sampling plan for the project area would be</p> <ul style="list-style-type: none"> • Kerckhoff Reservoir: \$ 15,000 • San Joaquin River: \$5, 000 • Arsenic assay and characterization \$30,000 • Total \$50,000 	

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40	John Hodge, BLM Bakersfield Field Office	DSP/Other		Appendix B, page 4-6	15-29	<p>Study Plan Criteria: Recreational Gold Panning (18 CFR Section 5.9(b))</p> <p>Any information or study request must contain the following:</p> <p>8. Describe the goals and objectives of each study proposal and the information to be obtained;</p> <p>This study will inventory the character and volume of gold-bearing sediments in the project area. This inventory has long-term consequences for managing the recreational gold panning resource. The objective is to identify the distribution of gold in sediments of the project area and provide alternatives for how this resource could be managed to improve gold panning opportunities.</p> <p>9. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;</p> <p>In the Bakersfield Resource Management Plan, inventory and management of the recreational gold panning resource of the San Joaquin River Gorge Special Management Area was identified. Operation of the Kerckhoff Dam and reservoir restricts this resource because gold is retained in the Kerckhoff Reservoir and not allowed to move down the San Joaquin River where gold panners historically operated.</p> <p>10. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;</p> <p>Requester is the Bureau of Land Management</p> <p>11. Describe existing information concerning the subject of the study proposal, and the need for additional information;</p> <p>Historic information about gold mining, including placer mining, in the project area are summarized on the U.S. Geological Survey abandoned mine database. See https://mrdata.usgs.gov/mrds/</p> <p>12. Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;</p> <p>Sedimentation of the Kerckhoff Reservoir limits accessibility to gold for recreational gold panning. Management of sediment is necessary for the long-term operation of the power plant. This management could be designed to increase gold recovery in the project area by recreational gold panners. This study could be done concurrently with the ARSENIC study.</p> <p>13. Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers</p>	Not Accepted. See response to BLM Comment No. 32.

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						<p>relevant tribal values and knowledge; and</p> <p>The gold inventory would include stream sediment sampling in the San Joaquin River between the Kerckhoff Dam and Millerton Lake. The inventory would also include characterization of the gold quality and quantity in Kerckhoff Reservoir. This would be measured through a Vibroseise sampling plan</p> <p>14. Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.</p> <p>No alternative studies are proposed. A sampling plan for the project area would be</p> <ul style="list-style-type: none"> • Kerckhoff Reservoir: \$15,000 • San Joaquin River: \$5, 000 • Gold assays (gravity separation) \$3,000 • Total \$23,000 	

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Table B-3: Response to Comments Received from the US Forest Service (USFS) on March 16, 2018

Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
1	Dean Gould, Forest Supervisor, USDA Forest Service – Sierra National Forest	DSPs		1	1	The Forest Service provides the following comments on the Kerckhoff Hydroelectric Project (Project) Pre-Application Document (PAD) Appendix D, Proposed Draft Study Plans. The Forest has reviewed the Proposed Studies in the PAD, and agrees they are relevant and will help inform operations and management, pertinent to relicensing. The studies should provide necessary information to help develop plans and management actions that will maintain, restore or enhance water quality and habitat for riparian and aquatic species, consistent with the Sierra National Forest Land and Resource Management Plan (LRMP).	Thank you for providing this information.
2	Dean Gould, Forest Supervisor, USDA Forest Service – Sierra National Forest	DSP	Study WQ 1 - Water Temperature in Kerckhoff Reservoir and Project Bypass Reach	1-2	7-8	The Forest Service would like clarification on temperature monitoring in Kerckhoff reservoir. The bullet at the top of page WQ 1-2 says water temperature profiles will be measured from a boat, but the Study Methods and Analysis says that continuous water temperature data recorders will be used at three stations in Kerckhoff reservoir, with an additional site in the tailrace of the A.G. Wishon Powerhouse. It isn't clear whether the intent is to continuously record temperature at these locations and only take water profiles during three months at the dam, or if the intent is to only take three monthly water readings at all sites including the dam. The Forest Service suggests using continuous water temperature arrays at 5 locations within Kerckhoff reservoir: <ol style="list-style-type: none"> 1. San Joaquin River upstream of the reservoir 2. In the tailrace or just downstream from the A.G. Wishon Powerhouse 3. Above Smalley Cove in reservoir 4. Downstream of Smalley Cove in reservoir 5. Just upstream of the dam 	Accepted with Modification. Study WQ 1, Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach and Study WQ 2, Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir have been modified to clarify the sampling approach and locations (see responses to State Water Board Comment Nos. 9 and 10 and BLM Comment No. 35). Water temperature will also be measured via recorders in A.G. Wishon Powerhouse tailrace and upstream of Kerckhoff Reservoir in the San Joaquin River. PG&E believes that the three locations for continuous monitoring with recorders set at three depths will provide sufficient information to understand the thermal regime in the reservoir and to develop new license conditions and PM&E measures.
3	Dean Gould, Forest Supervisor, USDA Forest Service – Sierra National Forest	DSP	Study WQ 2 - Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir	2	9	The timing of the sample collections should be specified.	Accepted. Study WQ 2, Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir has been modified to clarify the timing of the sampling collections (see response to State Water Board Comment No. 10).
4	Dean Gould, Forest Supervisor, USDA Forest Service – Sierra National Forest	DSP	Study AQ 1 - Aquatic Habitat Mapping	2	10	Sample locations limited to safe access points mentioned here and in other studies will bias results. This should be kept in mind in the data analysis, interpretation. Some idea of how representative survey sites are relative to the other habitats in bypass reach should be articulated.	Clarification. PG&E will map the entirety of the Project Bypass Reach for Study AQ 1, Aquatic Habitat Mapping. The mapping will be performed with ground surveys where it is safe to conduct the surveys, or by helicopter for any areas that were unsafe. Aerial imagery may also be used. The surveys will be conducted in the fall when flows are low.
5	Dean Gould, Forest	DSP	Study AQ 2 -	2	11-12	During this study, AQ 3, and AQ 5 the Forest Service recommends recording aquatic invasive non-native species (e.g., bass, bullfrogs,	Clarification. During field studies, PG&E will document incidental sightings of aquatic invasive non-native species. PG&E will discuss

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	Supervisor, USDA Forest Service – Sierra National Forest		Fish Populations			<p>mudsnails) encountered and including this information in the reports for these studies or in a separate report. This information will be used in the development of a collaborative interagency and Licensee control/prevention/removal plan (in cooperation with California Department of Fish and Wildlife (CDFW), Bureau of Land Management, Bureau of Reclamation, PG&E, and the Forest Service) in relation to Project facilities and Project operations and maintenance.</p> <p>Project Nexus: there is no recent quantifiable data available on the presence and extent of invasive aquatic species in the project area. Conditions created by the project provide abundant suitable habitat for such undesired and harmful species to gain a foothold, to thrive and spread to other more natural areas, where they can prey on or outcompete native species of concern (i.e., hardhead minnows, western pond turtles, foothill yellow-legged frogs). Early detection and control of such invasive species will protect a variety of important resources and equipment most efficiently and effectively, and reduce stressors to rare and sensitive species, allowing for their recovery or restoration.</p>	potential proposals for a controlled/prevention/removal plan as part of potential PM&E measures.
6	Dean Gould, Forest Supervisor, USDA Forest Service – Sierra National Forest	DSP	Study AQ 3 - Mussels and Aquatic Mussels	2	13	The Forest Service recommends using environmental DNA (eDNA) to survey for sensitive mollusk species if they are not detected during surveys.	<p>Not Accepted. On 4/9/18, PG&E and stakeholders had a conference call to discuss the eDNA study (<i>Study AQ 6, Rare Aquatic Species</i>). During that call, the USFS agreed to withdraw the request for eDNA sampling for special-status molluscs, as no special-status or USFS sensitive species are known to occur in the SJR below Kerckhoff Dam.</p> <p><i>Study AQ 3, Mussels and Aquatic Molluscs</i> will survey for aquatic mollusc species. No special-status or USFS sensitive species are known to occur in the SJR below Kerckhoff Dam. The western pearlshell mussel (<i>Margaritifera falcata</i>) has been reported to occur in this reach. The western pearlshell mussel is an important species for local Native American Tribes, but has no special state or federal conservation status. The field surveys will be conducted by experienced biologists who specialize in these surveys, and are familiar the state and federal-listed species.</p>
7	Dean Gould, Forest Supervisor, USDA Forest Service – Sierra National Forest	DSP	Study WILD 1 - Special-status Species	3	18-19	<p>The Forest Service recommends including eDNA sampling for detection of foothill yellow-legged frog in suitable habitat within the project area. This is a relatively new (post-licensing) but inexpensive and reliable scientific method for finding hard-to-detect species.</p> <p>Project Nexus: Timing of flows, water temperatures, and water level affect frog reproductive success, and thus operations can displace or destroy egg masses and/or tadpoles. Environmental DNA testing is a relatively new (post-licensing) but inexpensive and reliable scientific method for finding hard-to-detect species. Because foothill yellow-legged frog is rare on the forest, historically present, and currently under consideration for listing, it would be desirable to include this type of sampling. Other species of frogs and invasives can also be detected with this method.</p>	Accepted with Modification. See response to State Water Board Comment No. 17.
8	Dean Gould, Forest	DSP	Study REC 2 - Recreation	3	22-23	The Forest Service recommends identifying any additional suitable locations and means for interpretation/outreach/education to provide	Clarification. PG&E will continue to discuss this recommendation with the USFS during development of the PM&E measures for the Project.

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
	Supervisor, USDA Forest Service – Sierra National Forest		Facility Assessment			<p>public information specific to the area, regarding site-specific topics such as invasive plant and animal species, and highlight natural history, cultural history, aquatic resources, and recreation opportunities.</p> <p>Project Nexus: Prevent/reduce new introductions of invasive species. Increase awareness and build understanding and appreciation for the area: educate on benefits of the system and maintaining natural areas that provide clean, high quality, functioning hydrologic resources for plants, fish, frogs, turtles, and people (can include public safety messages and also reduces vandalism, trash, etc.)</p>	
9	Dean Gould, Forest Supervisor, USDA Forest Service – Sierra National Forest			3-4	28-29	<p>The following are Sierra National Forest Objectives for protection and maintenance of TES species and habitat relative to operations and maintenance of hydropower facilities, and the Kerckhoff relicensing project:</p> <ul style="list-style-type: none"> • Emphasize habitat improvements for sensitive, threatened, endangered and harvest species; • Maintain in stream flow requirements and habitat conditions that maintain, enhance, or restore all life stages of native aquatic species, and that maintains or restores riparian resources, channel integrity, and fish passage. • Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses. • Ensure that management activities do not adversely affect water temperatures or flows necessary for native local aquatic- and riparian-dependent species assemblages. • Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species. • Identify and enhance low to moderate quality fish habitat that has potential to improve from structural or nonstructural improvement; • Manage fish, wildlife and plant habitats to maintain viable populations of indigenous fish, wildlife and plant species. Maintain and restore habitat to support viable populations of native plant, invertebrate, and vertebrate riparian-dependent species. • Work collaboratively with CDFW to identify, remove, and reduce invasive species, Prevent new introductions of invasive species. Maintain populations of non-native desired recreational fish species where not in conflict with objectives for native TES species maintenance or restoration. 	Thank you for providing this information and confirming these are the Sierra National Forest’s objectives.

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Table B-4: Response to Comments Received from the National Park Service (NPS) on March 16, 2018

Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
1	Barbara Rice, Program Manager, Rivers, Trails and Conservation and Hydropower Assistance Programs, NPS	DSP	Study REC 1- Whitewater Boating Assessment	1-2	3-6	<p>The NPS commends the applicant’s decision to conduct a whitewater boating study (Study REC 1: Whitewater Boating Assessment) following the guidelines laid out in <i>Flows and Recreation: A Guide to Studies for River Professionals</i> (Whittaker, Shelby, and Gangemi 2005), as noted in Appendix D of Volume 1, Part 2 of the PAD under Study Methods and Analysis on page REC-3. However, the NPS notes that the applicant’s proposed whitewater boating study deviates from the methods outlined in Whittaker et al (2005), which are consistent with generally accepted practices in the scientific community, and have been used in whitewater boating studies for numerous FERC hydropower-licensing projects. The methods described in the Whittaker et al (2005) involve a phased approach where the results of a “Level 1” assessment are used to determine whether a “Level 2” assessment is warranted, while the results of a “Level 2” assessment determines if a “Level 3” assessment is warranted. In Study REC 1 of the PAD, the applicant also proposes a phased approach, although in a greatly modified form.</p> <p>Level 1 of the phased approach in the Whittaker et al (2005) guide outline the “desk-top options,” which include 1) literature review, 2) hydrology assessment, 3) structured interviews, recreation focus group, and stakeholder meeting, and 4) documenting identified needs and explicit criteria for progressing to Level 2 studies. In the proposed whitewater boating study presented as REC 1 in the PAD, the applicant’s phased approach replaces “Levels” with “Phases,” which include Phase 1) Information Gathering, Phase 2) Hydrology Assessment, and Phase 3) Focus Group Sessions. Other than documenting the need to progressing to Level 2 studies, Level 1 of Whittaker et al. (2005) method and the three phases of the applicant’s proposed study in the PAD are identical. However, that is where the similarities between the two study methods ends as the applicant did not consider the subsequent study levels identified in Whittaker et al (2005).</p> <p>In Whittaker et al (2005), Level 2 involves the “limited reconnaissance options,” which includes site visits for boating feasibility assessments and expert judgement assessments. Level 2 also involves documenting identified needs and explicit criteria for progressing to Level 3 studies. Following this, Level 3 provides guidance for “intensive study options,” which include 1) multiple flow reconnaissance assessments, 2) flow comparison surveys of experienced users, 3) controlled flow studies, and 4) supply and demand/use assessments.</p> <p>As identified above, the decision to conduct a Level 2 study would occur after careful scrutiny of the data gathered from the Level 1 study. Similarly, the decision to conduct a Level 3 study would occur after careful scrutiny of the data gathered from the Level 2 study. Making these decisions would generally include the involvement of agencies and other stakeholders who have an interest in the outcome.</p>	<p>Accepted with Modification. PG&E has revised <i>Study REC 1, Whitewater Boating Assessment</i> to include consideration of the three phases identified in Whittaker et al. (2005), if needed. The study also has been revised in an effort to address concerns regarding safety and access.</p>

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
2	Barbara Rice, Program Manager, Rivers, Trails and Conservation and Hydropower Assistance Programs, NPS	DSP/New Study	Study REC 1 – Whitewater Boating Assessment	3-6	9-32	<p><u>NPS Study Request: Whitewater Boating Study</u></p> <p>The following study request addresses each of the seven study criteria as required under 18 CFR §5.9.</p> <p><u>Criteria 1: Study Description and Objectives (§5.9(b)(1)):</u></p> <p>This purpose of this study is to evaluate the impacts of the Project on existing and potential recreation whitewater boating use. The focus of this study is the San Joaquin River downstream of Kerckhoff Dam and includes the following areas: Patterson Bend Run (Kerckhoff Dam to Powerhouse #1), Squaw Leap Run (Powerhouse #1 to Powerhouse #2), Millerton Lake Bottom Run (Powerhouse #2 to Millerton Lake), Smalley Cove put-in, the public put-in outside of Smalley Cove, and the Kerckhoff Reservoir.</p> <p>The components of the study should include: (1) hydrologic analysis and description of the San Joaquin River; (2) recreation user and stakeholder focus group; (3) the potential for a controlled flow study to determine minimum and optimal flows for boating, if warranted by findings of hydraulic analysis; and (4) report on recreation opportunity and potential improvements.</p> <p><u>Criteria 2: Resource Management Goals (§5.9(b)(2)):</u></p> <p>The Project has the potential to affect 14.7 river miles of whitewater resources including; the Patterson Bend Run; the Squaw Leap Run; and the Millerton Lake Bottom Run. As part of the licensing effort, a comprehensive look at recreation needs should be conducted per FERC guidance to evaluate existing and potential future recreation needs (18 CFR 4.51).</p> <p>The NPS has authority to consult with the FERC and applicants concerning a proposed project’s effects on outdoor recreation resources under the Federal Power Act (18 CFR §§ 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (PL 88-29) and the NPS Organic Act (16 USC et seq.). The WSR Act (section 11(b)) also directs the NPS to assist, advise, and cooperate with governments, landowners, or individuals to plan, protect, and manage river and river-related resources. It is thus the policy of the NPS to represent the national interest regarding recreation and to assure that hydroelectric projects subject to licensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. FERC guidelines and the Federal Power Act, also provide direction to give equal consideration to other non-hydropower resources.</p> <p><u>Criteria 3: Resource Agency Status of Requestor and Relevant Public Interest (§5.9(b)(3))</u></p> <p>The NPS is a resource agency. It is in the public’s interest to fully document recreation opportunities and potential for improvements in this important window of relicensing. Whitewater boating on the San Joaquin is impacted by project operations and as part of the licensing effort</p>	Accepted with Modification. See response to NPS Comment No. 1.

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>recreation needs must be considered as per FERC guidance to evaluate existing and potential future recreation needs (18 C.F.R. 4.51).</p> <p><u>Criteria 4: Existing Information and Need for Additional Information (§5.9(b)(4))</u></p> <p>The PAD utilizes existing information from <i>American Whitewater National River Database</i> and Holbeck and Stanley's <i>The Best Whitewater in California</i> but does not include information from Daniel Brasuell's websites, which area as follows:</p> <ul style="list-style-type: none"> • www.awetstate.com/SanJoaquinPB.html • www.awetsate.com/SanJoaquinSL.html <p>Information from the above websites should be included. Additional information is also needed on Project Area hydrology, whitewater boating opportunities, Project operations effects on those opportunities, and how recreationists access boatable reaches in the Project Area. The PAD also lacks a description of potential improvements that could be conducted to help enhance real time hydrology information on boatable flows or other options for enhancing the experience.</p> <p><u>Criteria 5: Nexus to Project (§5.9(b)(5))</u></p> <p>A clear nexus exists between Project operations and recreational opportunities on the San Joaquin River. Recreation boating opportunities occur directly below Kerckhoff Dam, a Project facility, and operation of that dam has direct impacts of flow levels. Recreational boating activities are dependent upon flow levels.</p> <p><u>Criteria 6: Study Methodology (§5.9(b)(6))</u></p> <p>The recommended study methods are those presented in <i>Flows and Recreation: A Guide to Studies for River Professionals</i> (Whittaker, Shelby and Gangemi 2005). The methods described in the guide are consistent with generally accepted practices in the scientific community. This is a phased approach where the results of a "Level 1" assessment are used to determine whether a "Level 2" assessment is warranted, while the results of a Level 2 assessment are used to determining whether a "Level 3" assessment is warranted.</p> <p>A Level 1 Assessment includes:</p> <ol style="list-style-type: none"> 1. Literature Review: Review and summarize existing documents with information about recreation opportunities or the river's physical characteristics that make it attractive for recreation. 2. Hydrology Assessment: Summarize hydrology for the reach and the hydrologic relationship between river gauges and the river flows of this reach. Describe how the project operations work and affect the hourly, daily, and monthly flows and potential recreation opportunities. This summary of information may also include interviews with people knowledgeable about the river system and the gauges on the river. 3. Interviews, Recreation Focus Group, and Stakeholder Meeting: Interviews should be conducted with key resource experts and 	

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>recreation users to gain additional information about recreational opportunities and the Project’s hydrology. A stakeholder and focus group meeting should be conducted with recreation users with the purpose to further identify the recreation flows, access to the project, and potential needs. The meeting should include a presentation on the results of the hydrology analysis and existing information on recreation access and boatable flows. It should also serve as a way to gather input from recreation users on use, optimum boatable flows access, and other potential needs for improvements to enhance the experience.</p> <p>The focus groups should include whitewater boaters, NGOs, and agency recreation staff. They should include questions about 1) how people use the river, with the goal to describe the character of recreation opportunities and identify flow-dependent attributes; 2) the effects of flows on those attributes and whether participants can identify specific flows that affect the quality of opportunities; and 3) how to prioritize opportunities and identify recreation users’ need for improved access and flow information. Interviews with agency staff will include questions about facility and use information, as well as relevant hydrology information.</p> <p>4. Report: The results of the two study components should be summarized in a report that describes the hydrology optimum recreation boating flows, and project effects on recreation flows; recreation access to the project; and potential improvements and information needs to consider as part of the licensing process. The report should be released in draft form to interested stakeholders with an opportunity to provide comment.</p> <p>The report should also include documentation of the recreational needs and explicit analysis for whether studies should progress to Level 2. The decision rests on the answers to these basic questions:</p> <ul style="list-style-type: none"> a) Are there flow-dependent recreation opportunities available in the subject stream reaches? b) Are flow-dependent opportunities affected by project operations? c) Are flow-dependent recreation opportunities “important” relative to other resources or foregone generation? d) Does Level 1 information precisely define flow ranges? <p>If the answers to these questions are outstanding, a Level 2 Assessment will be necessary. This involves:</p> <ul style="list-style-type: none"> 1. Site Visits: A site visit with experienced whitewater boaters will provide stakeholders with an enhanced understanding of Project operations and an opportunity for dialogue on what, if any, changes may be desirable. Participants should scout each river reach to examine the quality and characteristics of boating opportunities, estimate potential flow ranges, identify obvious hazards, and determine whether an on the water flow study is necessary to 	

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						<p>evaluate whitewater recreation opportunities.</p> <p>A site visit should be planned for the spring or early summer. This will offer a greater probability of observing higher than base flow levels. It also provides sufficient time to develop preliminary hydrology information about higher flows, become familiar with the resource via interviews and existing literature, and set up logistics with local whitewater boaters who may help guide the site visit. The site visit should include evaluations of the three reaches for all recreation opportunities.</p> <p>2. Report: The Level 2 report should include an assessment of the study participant's evaluations of the potential quality and characteristics of the boating opportunities, including difficulty, type of run, and the type of craft suitable for the run. The report should also describe potential flow ranges, obvious hazards, and recommendations for implementing an on the water flow study, if necessary.</p> <p>The Level 2 report should include explicit decisions about whether additional study is necessary. The applicants and their consultants would outline the issues in the report, but review by agencies and stakeholders (via working groups) can make those decisions more collaborative or identify disputes. The decision of whether to launch a more intensive Level 3 study is the critical study output, dependent on answers to the same questions discussed for the adequacy of Level 1 efforts.</p> <p>If warranted, a Level 3 Assessment should involve an on the water-controlled flow study where boaters can determine acceptable and optimal instream flow conditions. The Level 3 report should describe the whitewater boating attributes of the range of flows studied (including difficulty, unique features, and portage requirements), the acceptable and optimal flows for each reach, and the frequency of availability of the identified flows under current and any proposed project operation. The report should also incorporate results from the other studies that may be relevant to identifying competing uses or resource needs.</p> <p>Criteria 7: Level of Effort and Cost (§5.9(b)(7))</p> <p>The cost would be contingent on the billing rate arrangement with the applicants' consultant (rate is not known) and the number of study levels that are determined necessary as the study progresses, but would consistent with the cost of equivalent studies. With these factors in mind, a rough estimate of cost is between \$40,000 and \$70,000. The lower estimate is based on a Level 1 Assessment being sufficient to collect the needed information, while the higher estimate is based upon the need to conduct a Level II Assessment and possibly a Level III Assessment.</p>	

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Table B-5: Response to Comments Received from US Environmental Protection Agency (USEPA) on March 16, 2018

Comment Number	Commented By	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
1	Jean Prijatel, USEPA	SD1	Purpose and Need	1	1-2	<p>EPA recommends that the draft Environmental Assessment (EA) or draft Environmental Impact Statement (EIS) for the proposed project clearly identify the underlying purpose and need to which the Federal Energy Regulatory Commission (Commission) is responding in proposing the range of alternatives (40 CFR 1502.13). The <i>purpose</i> of the proposed action is typically the specific objectives of the activity, while the <i>need</i> for the proposed action may be to eliminate a broader underlying problem or take advantage of an opportunity.</p> <p>The project purpose is essential for defining the range of alternatives to be considered for the project. The purpose and need should be a clear, objective statement of the rationale for the proposed project, as it provides the framework for identifying project alternatives. The draft EA or EIS should concisely identify why the project is being proposed, why it is being proposed now, and should focus on the specific desired outcomes of the project (e.g. hydropower generation) rather than prescribing a predetermined resolution.</p>	PG&E recognizes that the EPA’s comments were provided to assist FERC in the development of an EA or DEIS.
2	Jean Prijatel, USEPA	SD1	Alternatives Analysis	1	3-6	<p>In the draft document, evaluate in detail all reasonable alternatives that fulfill the project’s purpose and need, including alternatives outside the legal jurisdiction of the Commission (40 CFR Section 1502.14(c)). Provide a clear discussion of the reasons for the elimination of alternatives that are not evaluated in detail.</p> <p>A robust range of alternatives will include options for avoiding significant environmental impacts. The draft document should clearly describe the rationale used to determine whether impacts of an alternative are significant or not. Determine thresholds of significance by considering the context and intensity of an action and its effects (40 CFR 1508.27).</p> <p>The environmental impacts of the proposed action and alternatives should be presented in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14). The potential environmental impacts of each alternative should be quantified to the greatest extent possible (e.g. acres of wetlands impacted; quantity of emissions).</p> <p>To ensure a robust environmental analysis of a project license that may be issued, at least one alternative should include the mandatory conditions required by other state and federal agencies. These conditions may include provisions for fish passage, habitat connectivity and enhancements, sediment transport, and flow regimes.</p>	See response to EPA Comment No. 1.

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Comment Number	Commented By	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
3	Jean Prijatel, USEPA	SD1	Scope of Assessment	1	7	In determining the appropriate scope of the assessment to be conducted, please refer to the Council on Environmental Quality (CEQ) regulation at 40 CFR 1508.25, which defines the scope of an individual EIS as consisting of the range of actions, alternatives (see above), and impacts to be considered.	See response to EPA Comment No. 1.
4	Jean Prijatel, USEPA	SD1	Scope of Assessment: Indirect and Cumulative Impacts	1	8	Discussions of cumulative impacts are usually more effective when included in the larger discussions of environmental impacts from the action (the environmental consequences chapter), as opposed to discussing cumulative impact analyses in a separate chapter.	See response to EPA Comment No. 1.
5	Jean Prijatel, USEPA	SD1	Scope of Assessment: Indirect and Cumulative Impacts	2	10	For the cumulative impacts assessment, we recommend focusing on resources of concern or resources that are “at risk” and/or are significantly impacted by the proposed project, before mitigation. For this project, the Commission should conduct a thorough assessment of the cumulative impacts to aquatic and biological resources, especially in the context of the other projects operating and proposed in the watershed.	Clarification. Upstream projects deliver water to the Kerckhoff Project. The Kerckhoff Project has a small amount of storage and essentially operates as a run-of-the-river project. Inflows are typically discharged within hours of arrival. Therefore, there is minimal potential for the Kerckhoff Project to contribute to cumulative impacts.
6	Jean Prijatel, USEPA	SD1	Scope of Assessment: Indirect and Cumulative Impacts	2	11	EPA recommends that the draft document identify which resources are analyzed, which ones are not, and why. For each resource analyzed, the draft document should: <ul style="list-style-type: none"> Identify the current condition of the resource as a measure of past impacts. For example, the percentage of species habitat lost to date. Identify the trend in the condition of the resource as a measure of present impacts. For example, the health of the resource is improving, declining, or in stasis. Identify all on-going, planned, and reasonably foreseeable projects in the study areas which may contribute to cumulative impacts. Identify the future condition of the resource based on an analysis of impacts from reasonably foreseeable projects or actions added to existing conditions and current trends. Assess the cumulative impacts contribution of the proposed alternatives to the long-term health of the resource, and provide a specific measure for the projected impact from the proposed alternatives. 	See response to EPA Comment No. 1.

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Comment Number	Commented By	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
7	Jean Prijatel, USEPA	SD1	Scope of Assessment: Indirect and Cumulative Impacts	2	12-13	<p>The draft document should consider the cumulative impacts associated with other projects proposed in the area and the potential impacts on various resources including: water supply, endangered species, and habitat.</p> <p>The draft EA or EIS should quantify cumulative impacts across resources areas, as well as describe and evaluate feasible mitigation measures to avoid and minimize the identified adverse cumulative impacts. Although these mitigation measures may be outside the jurisdiction of the Commission or project proponents, describing them in the draft document would serve to alert other agencies or officials who can implement these extra measures (CEQ 40 Questions No. 19(b)).</p>	See response to EPA Comment No. 5.
8	Jean Prijatel, USEPA	SD1	Scope of Assessment: Indirect and Cumulative Impacts	2	14	<p>The Bureau of Reclamation published a Draft Environmental Impact Statement for the Upper San Joaquin River Basin Storage Investigation (USJRBSI) in 2014, proposing a new dam and reservoir between Millerton Lake and Kerckhoff Dam. In addition to evaluating the cumulative environmental impacts associated with this project, in the draft EA or EIS discuss the status of the USJRBSI and how its implementation would impact the license for Kerckhoff Project. In particular, discuss if the license would be reopened or amended to address flow regimes, sediment sluicing, and the operation or decommissioning of the project's powerhouses should the USJRBSI reservoir be implemented.</p>	Clarification. Temperance Flat (USJRBSI) is currently not funded, and therefore is not a reasonably foreseeable project that should be analyzed in the relicensing of the Kerckhoff Project.
9	Jean Prijatel, USEPA	SD1	Scope of Assessment: Biological Resources, Habitat, and Wildlife	3	15	<p>The draft document should identify all petitioned and listed threatened and endangered species and critical habitat that might occur within the project area. The document should identify and quantify which species or critical habitat might be directly, indirectly, or cumulatively affected by each alternative and mitigate impacts to these species; emphasis should be placed on the protection and recovery of species due to their status or potential status under the federal or state Endangered Species Act.</p>	See response to EPA Comment No. 1.
10	Jean Prijatel, USEPA	SD1	Scope of Assessment: Water Quality	3	16-17	<p>The purpose of the Clean Water Act (CWA) is to restore and maintain the chemical, physical and biological integrity of waters of the United States. The CWA requires states to develop a list of impaired waters that do not meet water quality standards, and to establish priority rankings and develop action plans, called Total Maximum Daily Loads (TMDLs), to improve water quality. EPA recommends that the Commission provide, in the draft EA or EIS, information on CWA Section 303(d) impaired waters in the project area and how the project would impact these impairments.</p> <p>In the Affected Environment section of the Water Quality chapter, discuss anticipated changes to the watershed in terms of quantity and timing of snowpack, runoff, and precipitation. Discuss how these changes may impact the hydrology in the project area and the operations of the project. This discussion should include impacts to water temperature, flow, sediment transport, and beneficial uses.</p>	See response to EPA Comment No. 1.
11	Jean Prijatel,	SD1	Scope of	3	19	EPA recommends that the draft EA or EIS describe the process and	See response to EPA Comment No. 1.

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Comment Number	Commented By	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
	USEPA		Assessment: Consultation with Tribal Governments			outcome of government-to government consultation between the Commission and each of the tribal governments within the plan area, issues that were raised (if any), and how those issues were addressed in the selection of the preferred alternative. As a general resource we recommend the document <i>Tribal Consultation: Best Practices in Historic Preservation</i> (http://www.nathpo.org/PDF/Tribal_Consultation.pdf), published by the National Association of Tribal Historic Preservation Officers.	
12	Jean Prijatel, USEPA	SD1	Scope of Assessment: Consultation with Tribal Governments	4	21	Executive Order 13007 "Indian Sacred Sites" (May 24, 1996) requires federal land managing agencies to accommodate access to and ceremonial use of, Indian sacred sites by Indian religious practitioners, and to avoid adversely affecting the physical integrity, accessibility, or use of sacred sites. It is important to note that a sacred site may not meet the National Register criteria for a historic property and that, conversely, a historic property may not meet the criteria for a sacred site. It is also important to note that sacred sites may not be identified solely in consulting with tribes located within geographic proximity of the project. Tribes located outside of the plan area may also have religiously significant ties to lands within the plan area and should, therefore, be included in the consultation process.	See response to EPA Comment No. 1.
13	Jean Prijatel, USEPA	SD1	Scope of Assessment: Consultation with Tribal Governments	4	22	EPA recommends that the draft EA or EIS address the existence of Indian sacred sites in the project areas. Explain how the proposed action would address Executive Order 13007, distinguish it from Section 106 of the NHP A, and discuss how the Commission would ensure that the proposed action would avoid adversely affecting the physical integrity, accessibility, or use of sacred sites. Provide a summary of all coordination with Tribes and with the SHPO/THPO, including identification of NRHP eligible sites and development of a Cultural Resource Management Plan.	See response to EPA Comment No. 1.

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Table B-6: Response to Comments from American Whitewater Received on March 16, 2018

Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
1	Theresa L. Simsiman, California Stewardship Director, American Whitewater	DSP	Study HYD 1- Operations Simulation Model	2	4-7	<p>An economic analysis included in the HYD 1 Operations Simulation Model study would augment and inform recreational resource studies.</p> <p>Though PG&E proposed an Operations Simulation Model study, the American Whitewater recommends an operations model that would be able to compute power generation at the Kerckhoff Powerhouse #1 and #2 resulting from Project operations. The model should include the capability of reflecting operations to shape power generation to meet energy demands. If needed, post-processing of daily model output could be developed to simulate hourly operations of the powerhouses to simulate inter-day variations in releases from each powerhouse. This post-processor needs to be able to produce outputs in revenue as well as generation. Revenue projections should be based on the most current pricing data available. The outputs need to include standard generation, as well as any ancillary services provided by the project.</p> <p>Note that the water balance/operations model runs on a daily time step and cannot directly simulate shorter time period power operations. So, to simulate the range, rate of change and occurrence of flows within a day, post-processing of the water balance/operations model output can be accomplished using Excel spreadsheets to apply hourly or 15 minute patterns to the daily flows for a representative period of interest.</p> <p>Overall, PG&E should collaborate with Relicensing Participants on the more variable, discretionary elements of project operations, model output and additional post-processing needs for refined analysis and information.</p>	<p>Accepted with Modification. The model proposed in <i>Study HYD 1, Operations Simulation Model</i> can contribute to a revenue analysis as a consequence of alternatives scenarios; however, PG&E does not disclose financial information around this issue. The operations model can be used to evaluate and compare various scenarios during development of PM&E measures. 15-minute or hourly data will be evaluated as part of the hydrologic analyses included in <i>Study REC 1, Whitewater Boating Assessment</i>.</p>
2	Theresa L. Simsiman, California Stewardship Director, American Whitewater	DSP	Study REC 1 – Whitewater Boating Assessment	2-3	8-14	<p>A Hydrographic Analysis of Spills should be included to help identify recreational flow opportunities within a natural hydrograph that are mutually beneficial to Species of Concern and Native Aquatic Species.</p> <p>Since the management of naturally occurring spills within a natural hydrograph regime could provide opportunity for whitewater recreational flows and benefit species of concern as well as native aquatic species, American Whitewater recommends a Hydrographic Analysis of Spills that incorporates the following components:</p> <ul style="list-style-type: none"> • Historic 15-minute or hourly gauge information from PG&E loading the data to DSSVue for visualization and analysis using the US Army Corps of Engineers DSSVue software. • Corresponding daily flow data for USGS records in DSSVue format. • Characterize historic spill characteristics for spills more than 1000 cfs from 15-minute or hourly hydrological data including plots, identification of magnitude, timing, duration, recession rate, and possible multiple peak flows by year and water year-type • Characterize Kerckhoff lake levels, inflows into Kerckhoff Lake, the Kerckhoff Diversion Intakes and both Powerhouses #1 and #2. • Summarize PG&E’s contractual agreements for flows 	<p>Accepted with Modification. See response to NPS Comment No. 1. This includes a hydrographic analysis of spills using 15-minute or hourly flow gage data.</p>

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<ul style="list-style-type: none"> Summarize existing infrastructure capabilities for controlling spills. Prepare a report that includes methods and findings with annual plot illustrating showing multiple spills by water year; tabulations and plots of spill recessions, as well as inflows to and outflows from Kerckhoff Lake during spills. The memo should identify the constraints to operation, capacity and the ability to control spills. <p>Overall, spill cessation has been or is currently being addressed on other FERC hydroelectric projects including the Upper Drum-Spaulding Project 2310, the Yuba-Bear Project 2266 and the Big Creek 4 Project 2017. This analysis can be addressed within a proposed Whitewater Boating Study.</p> <p>An analysis of upstream flows coming out of the Southern California Edison Big Creek 4 Project 2017 should be included to help identify recreational flow opportunities available from coordinated operations.</p> <p>It should be noted that upstream on the Southern California Edison Big Creek 4 Project 2017 that Long Term Operating Rules are currently being formulated to provide license required recreational flows. These recreational flows and potential pulse flows would be available to play through the downstream reaches within the Kerckhoff Project.</p> <p>Specifically, an analysis of the whitewater flow releases generated in 2013 on the Big Creek 4 Project could shed light on recreational flow opportunities for whitewater resources within the Kerckhoff Project.</p>	
3	Theresa L. Simsiman, California Stewardship Director, American Whitewater	DSP	Study REC 1 – Whitewater Boating Assessment	3-7	15-47	<p><u>Study Request: Whitewater Recreation Study</u></p> <p><u>Whitewater Boating Study</u></p> <p>The following study request addresses each of the seven study criteria as required in 18 C.F.R. §5.9(b).</p> <p>§5.9(b)(1) —Describe the goals and objectives of each study proposal and the information to be obtained.</p> <p>The purpose of this study is to evaluate the impacts of the hydropower project on existing and potential recreational whitewater boating use in major streams within the Project, including: the Smalley Cove Put-in on Kerckhoff Reservoir; the Patterson Bend Run from below Kerckhoff Dam to Kerckhoff Powerhouse #1; Squaw Leap Run from Kerckhoff Powerhouse #1 to Kerckhoff Powerhouse #2; and Millerton Lake Bottom Run from Kerckhoff Powerhouse #2 to Millerton Reservoir.</p> <p>Generally, the components of the study should include: (1) an analysis of the hydrology including Spill Cessation Analysis, Big Creek 4 Project 2017 Coordinated Flow Analysis and a description of project operations and their impact on flows in the San Joaquin Watershed; (2) conducting recreation user and stakeholder focus groups; (3) conducting a site visit; (4) the potential for conducting a controlled flow study to determine minimum and optimal flows for boating, if warranted by findings of the hydrologic analysis; and (5) a report on the outcome of these components,</p>	Accepted with Modification. See response to NPS Comment No. 1.

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>describing existing and potential recreation opportunities and improvements to access.</p> <p>§5.9(b)(2) —If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.</p> <p>The Project has the potential to affect 14.7 river miles of whitewater resources including; the Patterson Bend Run; the Squaw Leap Run; and the Millerton Lake Bottom Run.</p> <p>The NPS has authority to consult with the FERC and applicants concerning a proposed project’s effects on outdoor recreation resources under the Federal Power Act (18 CFR §§ 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (PL 88-29) and the NPS Organic Act (16 USC et seq.). This is especially important for National Wild & Scenic eligible watersheds, such as the San Joaquin River Gorge. It is thus the policy of the NPS to represent the national interest regarding recreation and to assure that hydroelectric projects subject to licensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. FERC guidelines and the Federal Power Act, also provide direction to give equal consideration to other non-hydropower resources.</p> <p>§5.9(b)(3) —If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.</p> <p>Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. To fully evaluate the Project’s effect on recreation, a whitewater recreation study is relevant to the Commission’s public interest determination.</p> <p>Whitewater recreation takes place on the San Joaquin when flows allow, which are impacted by project operations. As part of the licensing effort, a comprehensive look at recreation needs should be conducted per FERC guidance to evaluate existing and potential future recreation needs (18 C.F.R. 4.51).</p> <p>§5.9(b)(4) — Describe existing information concerning the subject of the study proposal, and the need for additional information.</p> <p>The PAD utilizes existing information from <i>American Whitewater National River Database</i> and Holbeck and Stanley’s <i>The Best Whitewater in California</i> but does not include information from Daniel Brasuell’s website:</p> <ul style="list-style-type: none"> • www.awetstate.com/SanJoaquinPB.html and • www.awetsate.com/SanJoaquinSL.html 	

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>The PAD lacks information that would characterize Spill Cessation.</p> <p>The PAD lacks information that would help identify opportunities available from coordinated operations with the upstream Southern California Edison Big Creek 4 Project 2017 license required recreational flows.</p> <p>The PAD also lacks a description of potential improvements that could be conducted to help enhance real time hydrology information on boatable flows or other options for enhancing the experience.</p> <p>§5.9(b)(5) — Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.</p> <p>Project operations impact all flow-dependent recreational opportunities and the aesthetic experience of those who engage in river-based recreation in the project area. Results from a whitewater boating study will inform relevant license requirements that could address impacts that are identified. The results will also inform the public interest determination regarding whether to relicense this project.</p> <p>§5.8(b)(6) — Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field seasons(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.</p> <p>The recommended study methodology is to follow those summarized in <i>Flows and Recreation: A Guide to Studies for River Professionals</i> (Whittaker, Shelby and Gangemi 2005). The methodology described in the guide is consistent with generally accepted practices in the scientific community. This is a phased approach where the results of a “Level 1” assessment are used to determine whether “Level 2” and “Level 3” assessments are warranted.</p> <p>A Level 1 Assessment includes:</p> <ul style="list-style-type: none"> • Hydrology Assessment. Summarize the hydrology of the Project area and the hydrologic relationship between river gages and the river flows of the relevant reaches. Characterize historic Spill Cessation. Characterize potential flow opportunities from coordinated operations with the upstream Big Creek 4 Project 2017. Information can be used from the Big Creek 4 Project experimental whitewater flow releases done in 2013. (SCE 2014) Describe how the project operations work and affect the hourly, daily, and monthly flows and potential recreation opportunities. This summary of information may also include interviews with people knowledgeable about the river system and the gages on the river. • Interviews, Recreation Focus Group, and Stakeholder Meetings. Interviews should be conducted with key resource experts and 	

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>recreation users to gain additional information about recreational opportunities and the Project’s hydrology. A stakeholder and focus group meeting should be conducted with recreation users with the purpose further identifying recreation flows, access to the project, and potential needs. The meeting should include a presentation on the results of the hydrologic analysis and existing information on recreation access and boatable flows. It should also serve as a way to gather input from recreation users on use, optimum boatable flows, access and other potential needs for improvements to enhance the experience.</p> <p>The focus groups should include whitewater boaters, NGOs, and agency recreation staff. They should include questions about 1) how people use the river, with the goal to describe the character of recreation opportunities and identify flow-dependent attributes; 2) the effects of flows on those attributes and whether participants can identify specific flows that affect the quality of opportunities; and 3) how to prioritize opportunities and identify recreation users’ need for improved access and flow information. Interviews with agency staff will include questions about facility and use information, as well as relevant hydrology information.</p> <ul style="list-style-type: none"> • Report. The results of the two study components should be summarized in a report that describes the hydrology, optimum recreation boating flows, and project effects on recreation flows; recreation access to the project; and potential improvements and information needs to consider as part of the licensing process. The report should be released in draft form to interested stakeholders with an opportunity to provide comment. <p>The report should also include documentation of the recreational needs and explicit analysis for whether studies should progress to Level 2. The decision rests on the answers to these basic questions:</p> <ol style="list-style-type: none"> 1) Are there flow-dependent recreation opportunities available in the subject stream reaches? 2) Are flow-dependent opportunities affected by project operations? 3) Are flow-dependent recreation opportunities “important” relative to other resources or foregone generation? 4) Does Level 1 information precisely define flow ranges? <p>If the answers to these questions are outstanding, a Level 2 Assessment will be necessary. This involves:</p> <ul style="list-style-type: none"> • Site Visits: A site visit with experienced whitewater boaters will provide stakeholders with an enhanced understanding of Project operations and an opportunity for dialogue on what, if any, changes may be desirable. Participants should scout each river reach to examine the quality and characteristics of boating 	

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Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Text of Comment	PG&E Response
						<p>opportunities, estimate potential flow ranges, identify obvious hazards, and determine whether an on the water flow study is necessary to evaluate whitewater recreation opportunities.</p> <p>A site visit should be planned for the spring or early summer. This will offer a greater probability of observing higher than base flow levels. It also provides sufficient time to develop preliminary hydrology information about higher flows, become familiar with the resource via interviews and existing literature, and set up logistics with local whitewater boaters, who may help guide the site visit. The site visit should include evaluations of the three reaches for all recreation opportunities.</p> <ul style="list-style-type: none"> • <u>Report</u>: The Level 2 report should include an assessment of the study participant's evaluations of the potential quality and characteristics of the boating opportunities, including difficulty, type of run, and the type of craft suitable for the run. The report should also describe potential flow ranges, obvious hazards, and recommendations for implementing an on the water flow study, if necessary. <p>If warranted, a Level 3 Assessment should involve an on the water controlled flow study where boaters can determine acceptable and optimal instream flow conditions. The Level 3 report should describe the whitewater boating attributes of the range of flows studied (including difficulty, unique features, and portage requirements), the acceptable and optimal flows for each reach, and the frequency of availability of the identified flows under current and any proposed project operation. The report should also incorporate results from the other studies that may be relevant to identifying competing uses or resource needs.</p> <p>§5.9(b)(7) —Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.</p> <p>The cost will depend on what information is readily available and what requires additional work, and is estimated to be \$65,000, based upon whether or not on the water flow studies are conducted.</p>	

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Table B-7: Response to Comments Received from Friends of the San Joaquin River Gorge on March 27, 2018

Comment Number	Commented by	SD1/PAD/DSP?	Relevant Section	Comment Page Number	Comment Paragraph Number	Comment	PG&E Response
1	Anita Lodge, Friends of the San Joaquin River Gorge	PAD	Section 6	1	1-2	<p>I would like to commit about the camping area at Smalley Cove and the problems of the parking along Power House Rd. Smalley Cove is a beautiful camping and allows access to Kerckhoff Lake. However it is very under used with boater preferring to park along the road rather than use the camp ground. I would like PG&E to concenter a second camping area in the San Joaquin Gorge Recreations Area. This area is already being managed by BLM. The engineered plans for RV camping area have been drawn up. I feel a partnership with BLM, PG&E and Friends of the San Joaquin River Gorge could create a manageable area for trailer camping in the already developed San Joaquin River Gorge Management Area. PG&E crews now camp out in this area without the benefit of a RV camp site. An RV camping area would be a great addition to the Gorge Area recreation.</p> <p>Southern California Edison has their campground at Shave Lake, Camp Edison, it would only make since that PG&E could help to create something a similar project along the San Joaquin River Gorge.</p>	<p>Clarification. The results of PG&E’s proposed recreation studies will be used to determine potential Project effects on recreation resources and to develop PM&E measures for recreation resources.</p>

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ATTACHMENT C

Index of Comments by Study Plan

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Table C-1 Index of Comments Filed on Existing Study Plans (by Study Plan)

Summary of Study Comment	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
STUDY HYD 1 – Operations Simulation Model								
Comment No. 6 (SWRCB) <ul style="list-style-type: none"> Discuss potential coordinated operations with PG&E's Crane Valley Hydroelectric Project and Southern California Edison's Big Creek Hydroelectric System. 	•							Table B-1 response to comment No. 6.
Comment No. 1 (AW) <ul style="list-style-type: none"> An economic analysis included in the HYD 1 Operations Simulation Model study would augment and inform recreational resource studies. American Whitewater recommends an operations model that would be able to compute power generation at the Kerckhoff Powerhouse #1 and #2 resulting from Project operations. The model should include the capability of reflecting operations to shape power generation to meet energy demands. 						•		Table B-6 response to comment No. 1.
STUDY HYD 2 – Hydrology With and Without the Project								
<ul style="list-style-type: none"> No comments received 								Not applicable.
STUDY GEO 1 – Channel Form and Fluvial Processes								
Comment No. 32 (BLM) <ul style="list-style-type: none"> BLM requests the consideration of the following be added to the study: Bateman, Paul C. and Alan J. Busacca, 1982, Geology of the Millerton Lake Quadrangle, West-Central Sierra Nevada, California, U.S. Geological Survey, Map GQ-1548. BLM requests an analysis of gold quantity, quality and distribution in the project area, and in the impacted reach of the San Joaquin River. Sediment upstream of Kerckhoff Reservoir, in the reservoir, and in the San Joaquin River between Kerckhoff Dam and Millerton Lake should be sampled. 		•						Table B-2 response to comment No. 32
STUDY GEO 2 – Project-Related Sediment Management Practices in Kerckhoff Reservoir								
Comment No. 33 (BLM) <ul style="list-style-type: none"> BLM requests inclusion of the BLM Proposed Gold Study into Geo 2 Study. BLM requests an evaluation of gold resources, and identification of the immediate sources of sediment and gold content to Kerckhoff Reservoir and their characteristics including the areas surrounding the reservoir, Fish Creek, and the San Joaquin River as it enters into Kerckhoff Reservoir, based on reconnaissance observations. BLM requests an estimation of time in regard to sedimentation completely filling the Kerckhoff Reservoir and impacts to recreational gold panning, boating, and recreation. BLM requests an analysis of sedimentation impacts on recreational gold panning. BLM requests when sampling, to sample the entire sediment column, not just the surface. BLM also recommends the use of Vibroseise raft-mounted sampler. 		•						Table B-2 response to comment No. 32.
STUDY GEO 3 – Project Road-Related Erosion								
Comment No. 34 (BLM) <ul style="list-style-type: none"> The BLM requests: inclusion of the BLM Proposed Arsenic Study into Geo 3 Study; installation of sediment monitoring stations at affected tributaries downstream of roads and requests measurement of sediment discharges; and estimation of the total sediment contribution to Kerckhoff Reservoir from road erosion for the next 50 years. 		•						Table B-2 response to comment No. 34.

Proposed Study Plan

Summary of Study Comment	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
STUDY WQ 1 – Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach								
Comment No. 9 (SWRCB) <ul style="list-style-type: none"> State Water Board staff suggests a water temperature monitoring site approximately 0.1 km downstream of the Kerckhoff Powerhouse 1 tailrace to distinguish potential water temperature impacts resulting from Kerckhoff Powerhouse 1 discharge. If data from Study WQ 1 suggest that the Project influences water temperature to an extent that could be detrimental to aquatic species, PG&E should develop a water temperature model. 	•							Table B-1 response to comment No. 9.
Comments No. 35 (BLM) <ul style="list-style-type: none"> BLM requests more information on the depths the water will be sampled and for a detailed environmental condition of when water is sampled. 		•						Table B-2 response to comment No. 35.
Comment No. 2 (USFS) <ul style="list-style-type: none"> The Forest Service would like clarification on temperature monitoring in Kerckhoff reservoir methods and schedule. 			•					Table B-3 response to comment No. 2.
STUDY WQ 2 – Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir								
Comment No. 10 (SWRCB) <ul style="list-style-type: none"> State Water Board staff suggests PG&E monitor an additional bacteria parameter, E. coli, the bacterial indicator for contact recreation (beneficial use) in the United States Environmental Protection Agency (1986) criteria and the proposed Bacteria Provisions for Inland Surface Waters. Additionally, State Water Board staff recommends additional [water quality characterization] sites in Kerckhoff Reservoir and potential additional sites in the Bypass Reach. At a minimum, PG&E should monitor bacteria levels at Smalley Cove and other primary recreation sites (i.e., informal recreation sites, whitewater put-in/take-out) in Project-affected areas. 	•							Table B-1 response to comment No. 10.
Comments No. 36 (BLM) <ul style="list-style-type: none"> BLM requests: identification of differences between typical and storm water sampling events; characterization of water quality be separated into three different water flow conditions: maximum, minimum, and average; conduct tests to see what trace elements are bioavailable and bioaccessible; and addition of arsenic to Table WQ 2-1. 		•						Table B-2 response to comment No. 36.
Comment No. 3 (USFS) <ul style="list-style-type: none"> Specify the timing of the sample collections. 			•					Table B-3 response to comment No. 3.
STUDY AQ 1 – Aquatic Habitat Mapping								
Comment No. 7 (SWRCB) <ul style="list-style-type: none"> Include background information on the species of riparian vegetation found in the Bypass Reach, specifically the flow rates that are necessary for establishment. State Water Board staff is concerned that fishes will be unable to find thermal refuge if pools in the Bypass Reach are disconnected. 	•							Table B-1 response to comment No. 7.
Comment No. 4 (USFS) <ul style="list-style-type: none"> Sample locations limited to safe access points mentioned here and in other studies will bias results. This should be kept in mind in the data analysis, interpretation. Some idea of how representative survey sites are relative to the other habitats in bypass reach should be articulated. 			•					Table B-3 response to comment No. 4.

Summary of Study Comment	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
STUDY AQ 2 – Fish Populations								
Comment No. 8 (SWRCB) <ul style="list-style-type: none"> The current monitoring proposal does not target seasonal visitors into the Bypass Reach, which include spawning American shad (<i>Alosa sapidissima</i>) and striped bass (<i>Morone saxatilis</i>). Additional surveys for these species may be necessary, as both species spawn in the Project-affected areas (Bypass Reach and immediately downstream of Kerckhoff Powerhouse 2). Collaborate with relicensing participants and State Water Board staff to discuss a potential study that would be safe and provide information on spawning American shad and striped bass. 	•							Table B-1 response to comment No. 8.
Comment No. 5 (USFS) <ul style="list-style-type: none"> The Forest Service recommends recording aquatic invasive non-native species (e.g., bass, bullfrogs, mudsnails) encountered and including this information in the reports for these studies or in a separate report. 			•					Table B-3 response to comment No. 5.
STUDY AQ 3 – Mussels and Aquatic Molluscs								
Comment No. 6 (USFS) <ul style="list-style-type: none"> The Forest Service recommends using environmental DNA (eDNA) to survey for sensitive mollusk species if they are not detected during surveys. 			•					Table B-3 response to comment No. 6.
STUDY AQ 4 – Entrainment								
Comment No. 11 (SWRCB) <ul style="list-style-type: none"> In addition to calculating potential loss of biota through the intakes, State Water Board staff suggests that PG&E also assess the potential for fish survival over Kerckhoff Dam. This additional information, collected through desktop assessment, would more accurately calculate the total net loss of biota that move downstream of Kerckhoff Reservoir. 	•							Table B-1 response to comment No. 11.
STUDY AQ 5 – Western Pond Turtles								
Comment No. 5 (USFS) <ul style="list-style-type: none"> The Forest Service recommends recording aquatic invasive non-native species (e.g., bass, bullfrogs, mudsnails) encountered and including this information in the reports for these studies or in a separate report. 			•					Table B-3 response to comment No. 5.
STUDY BOT 1 – Plant Communities, Special-Status Plants, and Invasive Weeds								
Comment No. 20 (BLM) <ul style="list-style-type: none"> BLM requests surveys for invasive weed species to extend to two years; 5 years is best. 		•						Table B-2 response to comment No. 20.
STUDY BOT 2 – Riparian and Wetland Resources								
<ul style="list-style-type: none"> No comments received 								Not applicable

Proposed Study Plan

Summary of Study Comment	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
STUDY WILD 1 – Special-Status Wildlife Species								
Comments Nos. 21, 22, 23, (BLM) <ul style="list-style-type: none"> BLM recommends: field transect surveys for sensitive wildlife and habitat should be extended to two years; use of cameras to help determine the presence of rare wildlife species; surveys for other raptor and owl including golden eagles, prairie falcon, Coopers hawk, spotted owls, and California condors; and the use of mist nets to identify sensitive bat species. 		•						Table B-2 response to comment Nos. 21, 22, 23.
Comment No. 7 (USFS) <ul style="list-style-type: none"> The Forest Service recommends including eDNA sampling for detection of foothill yellow-legged frog in suitable habitat within the project area. 			•					Table B-1 response to comment No. 17.
STUDY LAND 1 – Project Roads and Trails Assessment								
Comments Nos. 11, 24, 25, 26, 27 (BLM) <ul style="list-style-type: none"> The section of road referred to as Smalley Road, located within BLM’s management area is not a County maintained road, and is not subject to unrestricted public use. BLM has discretion on access. BLM requests that STUDY LAND 1 be modified to include this section of road for analysis and should be included under the Table identified as Table LAND 1-2b. BLM request modification to the proposed study to include turnouts, turnarounds, or any area that is used for staging vehicles or equipment off of the road bed. 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 Shared Access Roads identified on Table LAND 1-2b (including the portion of Smalley Road under the jurisdiction of BLM). Identify the frequency and types of vehicles accessing the roads by PG&E and their affiliated companies (contractors and subcontractors). Include approximate weight of the vehicle 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 roads. In regard to -“Overall road condition, identify 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. 		•						Table B-2 response to comment Nos. 9, 24, 26.
STUDY REC 1 – Whitewater Boating Assessment								
Comment No. 12 (SWRCB) <ul style="list-style-type: none"> PG&E has divided this study into three phases (initial information gathering and evaluation; hydrology assessment; and focus group sessions), with the latter two phases to be conducted if needed. The Project area includes the beneficial use for canoeing and rafting. American Whitewater has confirmed whitewater boating use in the Project area. State Water Board staff believes all phases of the study are necessarily to fully assess whitewater boating and recommends PG&E conduct them. 	•							Table B-1 response to comment No. 12.
Comment No. 1 (NPS) <ul style="list-style-type: none"> The NPS notes that the applicant’s proposed whitewater boating study deviates from the methods outlined in Whittaker et al. (2005). 				•				Table B-4 response to comment No. 1.
Comment No. 2 (NPS) <ul style="list-style-type: none"> NPS proposes a study to evaluate the impacts of the Project on existing and potential recreation whitewater boating use. The components of the study should include: (1) hydrologic analysis and description of the San Joaquin River; (2) recreation user and stakeholder focus group; (3) the potential for a controlled flow study to determine minimum and optimal flows for boating, if warranted by findings of hydraulic analysis; and (4) report on recreation opportunity and potential improvements. 				•				Table B-4 response to comment No. 1.
Comment No. 2 (AW) <ul style="list-style-type: none"> A Hydrographic Analysis of Spills should be included to help identify recreational flow opportunities within a natural hydrograph that are mutually beneficial to Species of Concern and Native Aquatic Species. 						•		Table B-6 response to comment No. 2 and Table B-4 response to comment No. 1.

Summary of Study Comment	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
<p>Comment No. 3 (AW)</p> <ul style="list-style-type: none"> American Whitewater proposed a study to evaluate the impacts of the hydropower project on existing and potential recreational whitewater boating use in major streams within the Project. Generally, the components of the study should include: (1) an analysis of the hydrology including Spill Cessation Analysis, Big Creek 4 Project 2017 Coordinated Flow Analysis and a description of project operations and their impact on flows in the San Joaquin Watershed; (2) conducting recreation user and stakeholder focus groups; (3) conducting a site visit; (4) the potential for conducting a controlled flow study to determine minimum and optimal flows for boating, if warranted by findings of the hydrologic analysis; and (5) a report on the outcome of these components, describing existing and potential recreation opportunities and improvements to access. 						•		Table B-4 response to comment No. 1.
STUDY REC 2 – Recreation Facility Assessment								
<p>Comments Nos. 28, 29 (BLM)</p> <ul style="list-style-type: none"> BLM requests: that the proposed studies also analyze Project related impacts to recreational resources at BLM’s San Joaquin River Gorge Special Recreation Management Area (SJRG); inclusion of lands and waters immediately adjacent to the Project be included in the study; and an inventory of Project recreation facilities and those on adjacent lands and waters at each powerhouse and evaluate how they support recreation uses in the local area and how they could be modified to enhance such recreation uses and improve public safety. 		•						Table B-2 response to comment Nos. 28, 29.
<p>Comment No. 8 (USFS)</p> <ul style="list-style-type: none"> The Forest Service recommends identifying any additional suitable locations and means for interpretation/outreach/education to provide public information specific to the area, regarding site-specific topics such as invasive plant and animal species, and highlight natural history, cultural history, aquatic resources, and recreation opportunities. 			•					Table B-3 response to comment No. 8.
STUDY REC 3 – Recreation Visitor Use								
<p>Comments Nos. 28, 30 (BLM)</p> <ul style="list-style-type: none"> BLM requests: that the proposed studies also analyze Project related impacts to recreational resources at BLM’s San Joaquin River Gorge Special Recreation Management Area (SJRG); and that the study area include the Bypass Reach, the SJRG campground and day use areas for the recreation facility use assessment, and public land managed by BLM for the recreation use impact assessment. 		•						Table B-2 response to comments Nos. 28, 30.
STUDY REC 4 – Recreation Visitor Use Surveys								
<p>Comments Nos. 28, 31 (BLM)</p> <ul style="list-style-type: none"> BLM requests: that the proposed studies also analyze Project related impacts to recreational resources at BLM’s San Joaquin River Gorge Special Recreation Management Area (SJRG); and that the study area include lands and waters immediately adjacent to the Project, including the Project Bypass Reach and the reach between the K2 Powerhouse and Millerton Lake. 		•						Table B-2 response to comment Nos. 28, 31.
STUDY CUL 1 – Cultural Resources								
<p>Comment No. 37 (BLM)</p> <ul style="list-style-type: none"> The BLM would like to add unrecorded and unidentified cultural resources to the list of potential resource issues. The BLM should be involved in the determination of the APE with FERC and SHPO. The BLM requests: that NRHP documentation and evaluation of all cultural resources includes the built environment, unrecorded sites created by the Kerckhoff project since its inception; the study area include the area within 1.0 mile of the FERC Project Boundary and any Project facility that resides within 1.0 mile outside of the FERC Project Boundary; a Class III inventory of the entire APE plus a 200-foot buffer for the identification of cultural and archaeological resources; and a maximum of 15-meter transects be used. 		•						Table B-2 response to comment No. 37.

Proposed Study Plan

Summary of Study Comment	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
STUDY CUL 2 – Tribal Resources								
Comment No. 38 (BLM) <ul style="list-style-type: none"> The BLM requests: that Executive Order 13007 (sacred sites) be listed as a potential resource issue; to be added FERC’s list of databases and information available to determine tribal resources study needs; and that the study area include the area within 1.0 mile of the FERC Project Boundary and any Project facility that resides within 1.0 mile outside of the FERC Project Boundary The BLM finds that there is inadequate identification of Native American community respondents. 		•						Table B-2 response to comment No. 38.

Notes:

AW = American Whitewater

BLM = Bureau of Land Management;

NPS = National Park Service Hydropower Assistance Program, Pacific West Region

SWRCB = State Water Resources Control Board;

USEPA = US Environmental Protection Agency

USFS = US Forest Service

Table C-2 Index of Comments Filed for New Study Plans (by Study Plan)

Study Request	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
STUDY WQ 3 - Bioaccumulation in Kerckhoff Reservoir								
Comment No. 15 (SWRCB) <ul style="list-style-type: none"> The goals of the Bioaccumulation Study are to: (1) collect information to develop fish consumption advisories for Kerckhoff Reservoir and (2) promote public safety. The objective of the study is to characterize the concentration of methyl mercury, arsenic, cadmium, copper, selenium, silver, polychlorinated biphenyls(PCBs), legacy pesticides, polybrominated diphenyl ethers (PBDEs), dioxins, dibenzofurans, organophosphates, polycyclic aromatic hydrocarbons (PAHs), tributyltin (TBT), microcystin, Omega-3 fatty acids, and other emerging contaminants in resident, edible-sized sport fish in Kerckhoff Reservoir. 	•							Table B-1 response to comment No. 15.
Benthic Macroinvertebrate Study								
Comment No. 16 (SWRCB) <ul style="list-style-type: none"> The goal and objective of the Benthic Macroinvertebrate Study is to characterize physical habitat characteristics and benthic macroinvertebrates (BMI) taxonomical, biomass, and density assemblages within Project-affected reaches downstream of Kerckhoff Dam using the Surface Water Ambient Monitoring Program (SWAMP) protocol (Ode et al. 2016) or a similar protocol deemed appropriate. 	•							Table B-1 response to comment No. 16.
STUDY AQ 6 - Rare Aquatic Species								
Comment No. 17 (SWRCB) <ul style="list-style-type: none"> The goal of the Rare Aquatic Species Study is to determine species presence in the Project-affected area that are challenging to observe (i.e., rare or cryptic species). Specific study objectives include: Collect environmental DNA (eDNA) samples at sites in Kerckhoff Reservoir and the Bypass Reach, with sample collection focused on determining presence of foothill yellow legged frog (<i>Rana boylei</i>) and Kern brook lamprey (<i>Lampetra hubbsi</i>). Analyze samples to determine aquatic species presence, with a focus on foothill yellow legged frog and Kern brook lamprey. Identify the need for additional monitoring to determine rare species' abundances. Identify the need for additional studies to protect rare species from Project operation and maintenance, and other factors that are influenced by Project operations and maintenance (e.g., invasive species). 	•							Table B-1 response to comment No. 17.
Arsenic Contamination Study								
Comment No. 34 (BLM) <ul style="list-style-type: none"> This study will inventory the character and volume of arsenic sediments and solutions in the project area. 		•						Table B-2 response to comment No. 34.
Comment No. 30 (BLM) <ul style="list-style-type: none"> This study will inventory the character and volume of arsenic sediments and solutions in the project area. 		•						Table B-2 response to comment No. 34

Proposed Study Plan

Study Request	State Water Resources Control Board (SWRCB)	Bureau of Land Management Bakersfield Field Office (BLM)	US Forest Service (USFS)	National Park Service Hydropower Assistance Program, Pacific West Region (NPS)	US Environmental Protection Agency (USEPA)	American Whitewater (AW)	Friends of the San Joaquin River Gorge	PG&E Response
Recreational Gold Panning								
Comment No. 40 (BLM) <ul style="list-style-type: none"> This study will inventory the character and volume of gold-bearing sediments in the project area. This inventory has long-term consequences for managing the recreational gold panning resource. The objective is to identify the distribution of gold in sediments of the project area and provide alternatives for how this resource could be managed to improve gold panning opportunities. 		•						Table B-2 response to comment No. 32.

Notes:

AW = American Whitewater

BLM = Bureau of Land Management;

NPS = National Park Service Hydropower Assistance Program, Pacific West Region

SWRCB = State Water Resources Control Board;

USEPA = US Environmental Protection Agency

USFS = US Forest Service

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
FERC Project No. 96-045 – Kerckhoff Hydroelectric Project
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ATTACHMENT D

Comments Received

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
FERC Project No. 96-045 – Kerckhoff Hydroelectric Project
April 30, 2018
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EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIGUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

MAR 16 2018

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

Dear Secretary Bose:

STUDY REQUESTS AND COMMENTS ON THE PRE-APPLICATION DOCUMENT AND SCOPING DOCUMENT 1 FOR KERCKHOFF HYDROELECTRIC PROJECT, FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 96; FRESNO AND MADERA COUNTIES

Pacific Gas and Electric Company (PG&E or Licensee) owns and operates the Kerckhoff Hydroelectric Project (Project), also known as Federal Energy Regulatory Commission (Commission) Project No. 96. On November 16, 2017, PG&E filed its Project's Pre-Application Document (PAD) with the Commission. On January 16, 2018, the Commission issued Scoping Document 1 (SD1) for the Project. On February 13, 2018, the Commission and the State Water Resources Control Board (State Water Board) held joint meetings with the state and federal agencies, Tribes, and public (Code of Federal Regulation [CFR]: 18 CFR 4.38(b); 18 CFR 16.8(b)).

Under the Integrated Licensing (ILP) Process, resource agencies, Tribes, and members of the public must provide the Commission with written comments on the PAD and SD1, including information needs and study requests, not later than sixty days after the Commission's notice of commencement of proceeding and scoping (18 CFR 5.9(b)). State Water Board staff's comments on PG&E's PAD and the Commission's SD1 are provided in Attachment A and Attachment B, respectively. State Water Board staff's study requests are provided in Attachment C. PG&E and State Water Board staff discussed PG&E's PAD on December 21, 2017. A PG&E summary of that discussion and follow-up information provided to the State Water Board by PG&E is provided in Attachment D.

Items 1 and 3 of the *Pre-Application Filing Activities Under the Integrated Licensing Process* section of the Memorandum of Understanding (MOU) executed between the Commission and State Water Board on November 19, 2013¹ apply to this phase of the ILP process. Based upon

¹ A copy of the MOU is available online at:
http://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/ferc_mou/index.shtml.

Secretary Bose

MAR 16 2018

the Process Plan and Schedule PG&E put forth in its PAD, State Water Board staff provides the following initial estimate of process milestones for water quality certification²:

- Application for water quality certification: March 2021
- Issuance of draft water quality certification for public review: July 2023
- Issuance of final water quality certification: July 2024

Regulatory Authority

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.

Under section 303 of the CWA and under the Porter-Cologne Water Quality Control Act, the Central Valley Regional Water Quality Control Board adopted, and the State Water Board and United States Environmental Protection Agency approved, the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan). The Basin Plan designates the beneficial uses of waters to be protected along with the water quality objectives necessary to protect those uses. The Project facilities are located in the *San Joaquin River sources to Millerton Lake* identified in the Basin Plan, which have the following beneficial uses: municipal and domestic supply; irrigation; stock watering; power; contact recreation; canoeing and rafting; other noncontact recreation; warm freshwater habitat; cold freshwater habitat; and wildlife habitat.

The beneficial uses together with the water quality objectives that are contained in the Basin Plan, along with state and federal anti-degradation requirements, constitute California's water quality standards under section 303 of the CWA. The water quality objectives set or describe the water quality necessary to achieve and protect the beneficial uses. 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 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.

PG&E must file an application for water quality certification once the Commission issues the Notice of Ready for Environmental Analysis for the Project. 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). A complete application for a water quality certification must include a description of any steps that have been, or will be taken to avoid,

² These milestones assume the draft National Environmental Policy Act (NEPA) document will provide substantial information to support the development of the State Water Board's California Environmental Quality Act document. The timeline assumes the draft NEPA document will be released approximately 12 months following the Commission's release of the Ready for Environmental Analysis.

Secretary Bose

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minimize, or compensate for loss of or significant adverse impacts to beneficial uses of water (Cal. Code Regs. tit. 23, § 3856, subd. (h)(6)). If the Project does not comply with one or more of the water quality objectives or criteria, then PG&E must describe the actions that it will take to bring the Project into compliance in order to protect and maintain the beneficial uses of the State's waters. During the licensing process, State Water Board staff will 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.

If you have questions regarding this letter, please contact me at (916) 341-5408 or by email at Philip.Choy@waterboards.ca.gov. Written correspondence should be directed to: State Water Resources Control Board, Division of Water Rights - Water Quality Certification Program, Attn: Philip Choy, P.O. Box 2000, Sacramento, CA 95812-2000.

Sincerely,



Philip Choy, Environmental Scientist
Water Quality Certification Unit
Division of Water Rights

Enclosures: Attachment A – Comments on the Pre-Application Document for the Kerckhoff Hydroelectric Project
Attachment B – Comments on Scoping Document 1 for the Kerckhoff Hydroelectric Project
Attachment C – Study Plan Requests for the Kerckhoff Hydroelectric Project
Attachment D – December 21, 2017 Call Notes and Follow-up for the Kerckhoff Hydroelectric Project

cc: Mr. Dean Gould
United States Forest Service
1600 Tollhouse Road
Clovis, CA 93611

Mr. Abimael León,
California Department of Fish and Wildlife
1130 East Shaw Avenue,
Fresno, CA 93710

Ms. Lisa Whitman
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Ms. Somer Shaw
Bureau of Land Management
3801 Pegasus Drive
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Ms. Dawn Alvarez
United States Forest Service
1323 Club Drive
Vallejo, CA 94592

Ms. Debra Mahnke
CV Regional Water Quality Control Board
1685 E Street
Fresno, CA 93706

ATTACHMENT A:
COMMENTS ON THE PRE-APPLICATION DOCUMENT
FOR THE KERCKHOFF HYDROELECTRIC PROJECT

Pre-Application Document Comments

The following comments are provided by State Water Resources Control Board (State Water Board) staff on the Pre-Application Document (PAD) for Pacific Gas and Electric Company's (PG&E) Kerckhoff Hydroelectric Project (Project), Federal Energy Regulatory Commission (Commission or FERC) Project No. 77. PG&E filed its PAD with the Commission on November 16, 2017.

PAD Volume 1, Section 2.2 – Proposed Communication Protocols

PG&E created a website³ that provides information regarding the Project. PG&E plans to update the website with additional information as the relicensing process for the Project progresses. State Water Board staff appreciates PG&E developing the Kerckhoff relicensing website. State Water Board staff requests the website include a calendar to display meeting dates and deadlines and a reference section containing Project-related documents and other pertinent information related to the relicensing of the Project.

For meetings conducted by PG&E that are not specifically required by FERC's regulations, PG&E states that an independent facilitator may be used. State Water Board staff recommends PG&E use an impartial facilitator for relicensing meetings to encourage and facilitate effective communication for all relicensing participants.

PAD Volume 1, Section 4.11.2 License Deviations

Section 4.11.2, page 4-60 states, "A total of two minimum flow deviations and three oil spills have been reported to date." Please discuss each oil spill incident and the corrective actions that were implemented to protect water quality.

PAD Volume 1, Section 4.11.3 Temporary Variance

Section 4.11.3, page 4-61 describes three temporary variances in 2001, 2014, and 2015 to suspend minimum shad flow requirements. Section 5.4.3.4, pages 5-141 to 5-150, discusses American shad and monitoring associated with the 2001 temporary variance. Please discuss any shad monitoring that was conducted in association with the 2014 and 2015 temporary variances.

PAD Volume 1, Section 5.4.3.4 Millerton Lake

Section 5.4.3.4, page 5-141 identifies a limited recreational fishery for American shad, citing a FERC 1979 Environmental Impact Statement for the Project⁴. Please discuss the current recreational fishery for American shad below Kerckhoff 2 Powerhouse to Millerton Reservoir

³ PG&E's website for the relicensing of the Kerckhoff Project can be found online at:
https://www.pge.com/en_US/safety/electrical-safety/safety-initiatives/kerckhoff-relicensing/kerckhoff-relicensing-project.page?WT.mc_id=Vanity_kerckhoff.

⁴ Federal Energy Regulatory Commission. 1979. Final Environmental Impact Statement, Kerckhoff Project No. 96. February 1979. Office of Electric Power Regulation.

ATTACHMENT A:
COMMENTS ON THE PRE-APPLICATION DOCUMENT
FOR THE KERCKHOFF HYDROELECTRIC PROJECT

and in the Bypass Reach⁵. In addition, please identify primary fishing locations and access within or adjacent to the Project area.

PAD Volume 2, Study HYD 1– Operations Simulation Model

PG&E proposes Study HYD 1 *Operations Simulation Model*. State Water Board staff generally supports this draft study to model hydrology in the Project-affected area. State Water Board staff is interested in coordinating operations of the Project with upstream hydroelectric projects to enhance flow conditions, with an emphasis on spill recession. State Water Board staff requests that PG&E discuss potential coordinated operations with PG&E's Crane Valley Hydroelectric Project (FERC Project No. 1354) and Southern California Edison's Big Creek Hydroelectric System (FERC Project Nos. 2175, 67, 120, 2085, 2086, 2174, and 2017), and if possible and appropriate, incorporate potential coordinated operations in the operations simulation model.

PAD Volume 2, Study AQ 1– Aquatic Habitat Mapping

PG&E proposes Study AQ 1 *Aquatic Habitat Mapping*. State Water Board staff generally supports this draft study to characterize the aquatic habitat in the Project-affected area. State Water Board staff requests PG&E include background information on the species of riparian vegetation found in the Bypass Reach, specifically the flow rates that are necessary for establishment. It is necessary for State Water Board staff to understand what flow conditions are necessary to promote a native riparian community.

In additional, Study AQ 1 proposes to identify potential passage barriers to fishes (rainbow trout and native minnows) using aerial imagery, from helicopter, or on the ground. However, it is unclear if this study will also identify the potential for fish to be isolated in pools during the summer if the Bypass Reach is, to an extent, disconnected. Water temperatures in the Bypass Reach can exceed 27 degrees Celsius (PAD page 5-67). State Water Board staff is concerned that fishes will be unable to find thermal refuge if pools in the Bypass Reach are disconnected. State Water Board staff looks forward to discussions with PG&E and relicensing participants to determine if Study AQ 1 provides information on the potential isolation and suitability of summer aquatic habitat, or if an additional habitat study to collect this information is appropriate and feasible.

PAD Volume 2, Study AQ 2– Fish Populations

PG&E proposes Study AQ 2 *Fish Populations*. State Water Board staff generally supports this draft study to characterize the fish composition, distribution, and abundance in Kerckhoff Reservoir and the Bypass Reach. However, the current monitoring proposal does not target seasonal visitors into the Bypass Reach, which include spawning American shad (*Alosa sapidissima*) and striped bass (*Morone saxatilis*). Additional surveys for these species may be necessary, as both species spawn in the Project-affected areas (Bypass Reach and immediately downstream of Kerckhoff Powerhouse 2). State Water Board staff understands that high flows during the American shad and striped bass spawning seasons are a potential

⁵ The Bypass Reach includes the San Joaquin River from Kerckhoff Dam downstream to the Kerckhoff 1 Powerhouse and from Kerckhoff 1 Powerhouse to the Kerckhoff 2 Powerhouse.

ATTACHMENT A:
COMMENTS ON THE PRE-APPLICATION DOCUMENT
FOR THE KERCKHOFF HYDROELECTRIC PROJECT

safety hazard for snorkel surveys, but requests that PG&E collaborate with relicensing participants and State Water Board staff to discuss a potential study that would be safe and provide information on spawning American shad and striped bass.

Historic information on these species is present but potentially outdated. The most recent American shad survey documented in the PAD occurred in 2011 (as discussed on page 5-150). Striped bass is discussed in the PAD on pages 5-137 and 5-139 to 5-141; the most recent referenced fish surveys that observed striped bass in the Bypass Reach occurred in 1982.

PAD Volume 2, Study WQ 1– Water Temperatures in Kerckhoff Reservoir and San Joaquin River Bypass Reach

PG&E proposes Study WQ 1 *Water Temperature in Kerckhoff Reservoir and San Joaquin River Bypass Reach*. State Water Board staff generally supports this draft study to characterize water temperatures in the Project-affected area. In addition to the sites proposed by PG&E⁶, State Water Board staff suggests a water temperature monitoring site approximately 0.1 km downstream of the Kerckhoff Powerhouse 1 tailrace, as determined by site access. This site is necessary to distinguish potential water temperature impacts resulting from Kerckhoff Powerhouse 1 discharge.

If data from Study WQ 1 suggests that the Project influences water temperature to an extent that could be detrimental to aquatic species, PG&E should develop a water temperature model. The purpose of the water temperature model would be to simulate current and potential future water temperature conditions. The model would: (1) simulate reservoir and stream water temperatures resulting from Project operations; (2) accurately reproduce observed reservoir and Project influenced stream water temperatures, within acceptable calibration standards over a range of water year types; and (3) demonstrate sensitivity to both stream flow and ambient weather conditions. If data from Study WQ 1 suggests Project operations influence water temperature, it is necessary for State Water Board staff to understand how water temperature is influenced by current and future Project operations.

PAD Volume 2, Study WQ 2– Water Quality Sampling in the Project Bypass Reach and Kerckhoff Reservoir

PG&E proposes Study WQ 2 *Water Quality Sampling in the Project Bypass Reach and Kerckhoff Reservoir*. State Water Board staff generally supports this draft study to characterize water quality in the Project-affected area. In addition to the parameters proposed by PG&E⁷, State Water Board staff suggests PG&E monitor an additional bacteria parameter, *E. coli* (*Escherichia coli*). *E. coli* is the bacterial indicator for contact recreation (beneficial use) in the

⁶ PG&E proposes to monitor water temperature in the Bypass Reach at 4 locations: Gage J-2 below Kerckhoff Dam; between J-2 and the Kerckhoff Powerhouse 1 tailrace (equivalent of J-7 location); immediately upstream of the Kerckhoff Powerhouse 2 tailrace; and approximately 0.1 km downstream of the Kerckhoff Powerhouse 2 tailrace.

⁷ PG&E's proposed parameters for the water quality assessment program (i.e., Study WQ 2) can be found in the PAD, Volume 2, Table WQ 2-1, page WQ 2-6.

ATTACHMENT A:
COMMENTS ON THE PRE-APPLICATION DOCUMENT
FOR THE KERCKHOFF HYDROELECTRIC PROJECT

United States Environmental Protection Agency (1986) criteria⁸ and the proposed Bacteria Provisions for Inland Surface Waters⁹. The current parameter measured for the State Water Board's contact recreation beneficial use is fecal coliform and total coliform.

PG&E proposes to "characterize water quality in Kerckhoff Reservoir (one location near dam) and Project Bypass Reach (up to three locations if needed)." State Water Board staff recommends additional sites in Kerckhoff Reservoir and potential additional sites in the Bypass Reach. Monitoring locations and frequency should be collaboratively determined with relicensing participants to ensure adequate information is collected. At a minimum, PG&E should monitor bacteria levels at Smalley Cove and other primary recreation sites (i.e., informal recreation sites, whitewater put-in/take-out) in Project-affected areas.

PAD Volume 2, Study AQ 4– Entrainment

PG&E proposes Study AQ 4 *Entrainment*. State Water Board staff generally supports this draft study to characterize levels of entrainment into the Kerckhoff Powerhouse 1 and Kerckhoff Powerhouse 2 intakes. In addition to calculating potential loss of biota through the intakes, State Water Board staff suggests that PG&E also assess the potential for fish survival over Kerckhoff Dam. This additional information, collected through desktop assessment, would more accurately calculate the total net loss of biota that move downstream of Kerckhoff Reservoir. State Water Board staff believes it is necessary to understand how the Project affects the aquatic community in order to develop appropriate and commensurate mitigation measures.

PAD Volume 2, Study REC 1– Whitewater Boating Assessment

PG&E proposes Study REC 1 *Whitewater Boating Assessment*. State Water Board staff generally supports this draft study to assess whitewater boating opportunities in the Bypass Reach. PG&E has divided this study into three phases (initial information gathering and evaluation; hydrology assessment; and focus group sessions), with the latter two phases to be conducted if needed. The Project area includes the beneficial use for canoeing and rafting. American Whitewater has confirmed whitewater boating use in the Project area. State Water Board staff believes all phases of the study are necessarily to fully assess whitewater boating and recommends PG&E conduct them.

⁸ The E. coli concentration, based on a minimum of not less than five samples equally spaced over a 30 day period, shall not exceed a geometric mean of 126 most probable unit (MPN)/100 ml and shall not exceed 235 MPN/100 ml in any single sample.

⁹ The proposed Bacteria Provisions for Inland Surface Waters is being finalized for the State Water Board to consider adopting later this year. The bacteria water quality objective for all waters where the salinity is equal to or less than 1 parts per thousand (ppt) 95 percent or more of the time during the calendar year is: a six-week rolling geometric mean of E. coli not to exceed 100 colony forming units (cfu) per 100 milliliters (mL), calculated weekly, and a statistical threshold value of 320 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a single month.

ATTACHMENT B:
COMMENTS ON SCOPING DOCUMENT 1
FOR THE KERCKHOFF HYDROELECTRIC PROJECT

Scoping Document 1 Comments

The following comments are provided by State Water Resources Control Board (State Water Board) staff on Scoping Document 1 (SD1) for Pacific Gas and Electric Company's (PG&E) Kerckhoff Hydroelectric Project (Project), Federal Energy Regulatory Commission (Commission or FERC) Project No. 96. The Commission issued SD1 on January 16, 2018.

Section 3.1.1 – Existing Project Facilities

Commission staff has identified one recreation development, Smalley Cove Recreation Area. An additional informal recreation area is located within the FERC Project Boundary on the north bank of Kerckhoff Reservoir, approximately a quarter of a mile upstream of Smalley Cove Recreation Area (identified in PG&E's Pre-Application Document on page 5-235). State Water Board staff visited the informal recreation area and identified significant public use and potential use by PG&E for operations and maintenance of Project facilities. State Water Board staff recommends the Commission include this informal recreation area as an existing Project recreation facility.

PG&E owns and maintains streamgauge stations J1 (Kerckhoff Reservoir 11-2466.50), J2 (San Joaquin R Nr Auberry), J3 (Kerckhoff Powerhouse #1), and J6 (Kerckhoff #2). State Water Board staff believes these streamgages are necessary for the continued operations and maintenance of the Project, and recommends the Commission include these streamgages as existing Project facilities.

Section 4.2.2– Aquatic Resources

Commission staff has identified dissolved oxygen, water temperature, aquatic habitat, fish, macroinvertebrates, and aquatic invasive species that could be affected by continued Project operation and maintenance. State Water Board staff recommends the Commission also include amphibians, turtles, and additional water quality parameters in its analysis. Amphibians and turtles are aquatic species present in the Project-affected area that could be affected by the Project. Additional water quality parameters include in situ (specific conductance, pH, turbidity), general water quality (dissolved organic carbon, solids, inorganic ions, nutrients, metals), bioaccumulation (metals), and recreation-related (bacteria) parameters. These water quality parameters are necessary to fully assess water quality in the Project area.

ATTACHMENT C:
STUDY PLAN REQUESTS FOR THE
KERCKHOFF HYDROELECTRIC PROJECT

Study Plan Requests

Information collected through the implementation of study plans in the Federal Energy Regulatory Commission (Commission or FERC) process will be used by the Commission to develop license conditions and fulfill its requirements under the National Environmental Policy Act, and by other agencies that must take permitting actions during the Commission's relicensing proceedings. Study plan information will assist the State Water Resources Control Board (State Water Board) in developing water quality certification conditions to ensure compliance with the Clean Water Act and California Environmental Quality Act (CEQA). The State Water Board will act as lead agency for the Kerckhoff Hydroelectric Project's (Project) CEQA process.

As a mandatory conditioning agency under the Commission's relicensing process, the State Water Board will act in an advisory role to inform Pacific Gas and Electric Company (PG&E) of the information that is necessary to fulfill the requirements of the water quality certification process. The State Water Board exercises independent authority in issuing water quality certifications; therefore, its role in any pre-decisional activities is advisory, rather than reflective of the State Water Board's ultimate determinations.

In this advisory role, State Water Board staff will participate in the Study Plan Development process and submit study plan requests and comments in accordance with the Commission's Integrated Licensing Process (included below). If the study plans approved by the Commission do not include those requested by State Water Board staff, or are otherwise insufficient to provide information needed in connection with the issuance of the water quality certification, the State Water Board may choose to request such information under the Porter-Cologne Water Quality Control Act (Cal. Wat. Code, § 13000 et seq.), Water Code section 13383, or other applicable authority.

In an effort to avoid unnecessary delays in the Project's relicensing process, State Water Board staff strongly encourages PG&E to consider the below requested studies, and to work collaboratively with State Water Board staff and other relicensing participants to resolve differences. Working collaboratively with all relicensing participants often expedites resolution to issues.

State Water Board staff appreciates PG&E being proactive and developing a list of proposed draft study plans. In general, State Water Board staff supports the draft study plans and looks forward to working with PG&E and all relicensing participants to further develop the study plans and ensure studies adequately analyze potential Project impacts and meet the regulatory needs of all resource agencies. State Water Board staff comments regarding the draft study plans are included in Attachment B.

In addition to PG&E's proposed draft study plans, State Water Board staff requests the following three studies:

- 1) Bioaccumulation Study
- 2) Benthic Macroinvertebrate Study
- 3) Rare Aquatic Species Study

Study plan requests by State Water Board staff are described, using the study plan criteria outlined in Appendix A of the Commission's Scoping Document 1 for the Project, below.

ATTACHMENT C:
STUDY PLAN REQUESTS FOR THE
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1. Bioaccumulation Study

Goal and Objective of the Bioaccumulation Study

The goals of the Bioaccumulation Study are to: (1) collect information to develop fish consumption advisories for Kerckhoff Reservoir and (2) promote public safety.

The objective of the study is to characterize the concentration of methyl mercury, arsenic, cadmium, copper, selenium, silver, polychlorinated biphenyls(PCBs), legacy pesticides, polybrominated diphenyl ethers (PBDEs), dioxins, dibenzofurans, organophosphates, polycyclic aromatic hydrocarbons (PAHs), tributyltin (TBT), microcystin, Omega-3 fatty acids, and other emerging contaminants in resident, edible-sized sport fish in Kerckhoff Reservoir.

Resource Management Goal of the State Water Board

The State Water Board has broad authority under the federal Clean Water Act (33 U.S.C. § 1251-1387), the state constitution, and the state water code and regulations to restore and maintain the chemical, physical, and biological integrity of the state's waters, and to regulate water diversion and use through the water right priority system in accordance with the State Water Board's reasonable use and public trust responsibilities. Section 401 of the federal Clean Water Act allows for broad application of appropriate state and federal environmental laws when entities apply for new or renewed federal licenses that may result in a discharge to navigable waters of the state (33 U.S.C. § 1341).

Throughout the Commission's relicensing process, the State Water Board maintains independent regulatory authority to condition the operation of the Project to protect water quality and beneficial uses of stream reaches consistent with section 401 of the federal Clean Water Act, the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan), State Water Board regulations, CEQA, and any other applicable state laws. The Project has the potential to impact water quality in the *San Joaquin River sources to Millerton Lake*, including multiple beneficial uses such as fishing.

Existing Information

The Pre-Application Document (PAD) does not contain information regarding bioaccumulation. State Water Board staff is not aware of any bioaccumulation data for fishes in Kerckhoff Reservoir. Office of Environmental Health Hazard Assessment (OEHHA) developed a fish consumption advisory for the San Joaquin River from Friant Dam to the Port of Stockton¹⁰, which is downstream of the Project area.

Project Nexus

Impoundment of water (with the incidental accumulation of sediment) and operation of Project facilities have the potential to increase the concentration of metals and methylated mercury in the system, making them available for bioaccumulation through various trophic levels of the aquatic ecosystem. Fishing occurs at Kerckhoff Reservoir, and consumption recommendations for target species should be developed to promote public safety.

¹⁰ The consumption advisory can be found at the following website: <https://oehha.ca.gov/advisories/san-joaquin-river-friant-dam-port-stockton>.

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Study Methodology

The study methods consist of the following four steps: 1) select fish/crayfish species for the study; 2) collect tissue samples; 3) analyze samples; and 4) prepare report. Target fish and/or crayfish species should be determined in consultation with relicensing participants, PG&E, and State Water Board staff. Tissue samples could be collected while implementing other relicensing studies, such as PG&E's proposed Study AQ 2 *Fish Populations*.

Bioaccumulation samples should be collected in a manner that can be used by OEHHA to prepare a consumption recommendation for Kerckhoff Reservoir. The appropriate methods can be found in the General Protocol for Sport Fish Sampling and Analysis (Gassel and Brodberg 2005)¹¹.

Level of Effort and Cost

Based upon previous relicensing processes in California that have conducted similar bioaccumulation studies, State Water Board staff estimates the cost of this study to be approximately \$15,000 to \$45,000.

2. Benthic Macroinvertebrate Study

Goal and Objective of the Benthic Macroinvertebrate Study

The goal and objective of the Benthic Macroinvertebrate Study is to characterize physical habitat characteristics and benthic macroinvertebrates (BMI) taxonomical, biomass, and density assemblages within Project-affected reaches downstream of Kerckhoff Dam using the Surface Water Ambient Monitoring Program (SWAMP) protocol (Ode et al. 2016) or a similar protocol deemed appropriate.

Resource Management Goal of the State Water Board

The State Water Board has broad authority under the federal Clean Water Act (33 U.S.C. § 1251-1387), the state constitution, and the state water code and regulations to restore and maintain the chemical, physical, and biological integrity of the state's waters, and to regulate water diversion and use through the water right priority system in accordance with the State Water Board's reasonable use and public trust responsibilities. Section 401 of the federal Clean Water Act allows for broad application of appropriate state and federal environmental laws when entities apply for new or renewed federal licenses that may result in a discharge to navigable waters of the state (33 U.S.C. § 1341).

Throughout the Commission's relicensing process, the State Water Board maintains independent regulatory authority to condition the operation of the Project to protect water quality and beneficial uses of stream reaches consistent with section 401 of the federal Clean Water Act, the Basin Plan, State Water Board regulations, CEQA, and any other applicable state laws.

The Project has the potential to impact BMI populations and composition. The State Water Board is charged with ensuring that Project operations are protective of the designated beneficial uses for cold freshwater habitat and warm freshwater habitat that support freshwater

¹¹ OEHHA's protocol to develop fish consumption advisories can be found at the following website: <https://oehha.ca.gov/media/downloads/fish/document/fishsamplingprotocol2005.pdf>.

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ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. Furthermore, BMI are important forage for other aquatic resources and can serve as spatial and temporal indicators of water quality.

Existing Information

PAD Volume 1 Section 5.4.5.2 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. The PAD does not contain BMI information or data from the Bypass Reach¹².

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. Information gathered will help State Water Board staff characterize stream health and adherence to water quality objectives.

Study Methodology

The study methods consist of the following five steps: 1) select sampling reaches from within the Project-affected area; 2) collect data; 3) analyze data; 4) QA/QC data; and 5) prepare report. Sampling sites should be developed in consultation with relicensing participants, PG&E, and State Water Board staff.

Sampling methods should conform to the standard reachwide benthic (RWB) method for documenting and describing BMI and algal assemblages and physical habitat contained in the State Water Board's SWAMP protocol (Ode et al. 2016)¹³, to the extent possible. Given the challenging access and constraints of the Bypass Reach, an alternative protocol that achieves SWAMP objectives could be considered in lieu of SWAMP protocol.

Level of Effort and Cost

State Water Board staff estimates the cost of this study to be approximately \$50,000 and \$150,000. The wide range of estimated cost is due to the specific protocol selected, number of sites, and number of BMI in each sample (or subsample) to identify.

3. Rare Aquatic Species Study

Goal and Objective of the Rare Aquatic Species Study

The goal of the Rare Aquatic Species Study is to determine species presence in the Project-affected area that are challenging to observe (i.e., rare or cryptic species).

¹² The Bypass Reach includes the San Joaquin River from Kerckhoff Dam downstream to the Kerckhoff 1 Powerhouse and from Kerckhoff 1 Powerhouse to the Kerckhoff 2 Powerhouse.

¹³ SWAMP. 2016. -- Ode, P.R., A.E., Fetscher, and L.B. Busse. 2016. Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 004.

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Specific study objectives include:

- Collect environmental DNA (eDNA) samples at sites in Kerckhoff Reservoir and the Bypass Reach, with sample collection focused on determining presence of foothill yellow legged frog (*Rana boylei*) and Kern brook lamprey (*Lampetra hubbsi*).
- Analyze samples to determine aquatic species presence, with a focus on foothill yellow legged frog and Kern brook lamprey.
- Identify the need for additional monitoring to determine rare species' abundances.
- Identify the need for additional studies to protect rare species from Project operation and maintenance, and other factors that are influenced by Project operations and maintenance (e.g., invasive species).

Resource Management Goal of the State Water Board

The State Water Board has broad authority under the federal Clean Water Act (33 U.S.C. § 1251-1387), the state constitution, and the state water code and regulations to restore and maintain the chemical, physical, and biological integrity of the state's waters, and to regulate water diversion and use through the water right priority system in accordance with the State Water Board's reasonable use and public trust responsibilities. Section 401 of the federal Clean Water Act allows for broad application of appropriate state and federal environmental laws when entities apply for new or renewed federal licenses that may result in a discharge to navigable waters of the state (33 U.S.C. § 1341).

Throughout the Commission's relicensing process, State Water Board staff maintains independent regulatory authority to condition the operation of the Project to protect water quality and beneficial uses of stream reaches consistent with section 401 of the federal Clean Water Act, the Basin Plan, State Water Board regulations, CEQA, and any other applicable state laws.

The Project-affected area has the potential to be inhabited by species that have not been or have not recently been observed in the Project-affected area. It is important that the Commission and the State Water Board are aware of all species, especially rare species in the Project-affected area, to ensure appropriate measures are taken to mitigate Project impacts. The State Water Board is charged with ensuring that Project operations are protective of the designated beneficial uses for cold freshwater habitat and warm freshwater habitat that support ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. In addition, the State Water Board is charged with ensuring that Project operations are protective of the designated beneficial uses for wildlife habitat that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Existing Information

PAD Volume 1, Table 5.4-1 identifies fish and mollusc species reported or suspected to currently occur in the Project Aquatic Study Area¹⁴ and nearby. PAD Volume 1, Table 5.4-15

¹⁴ The Aquatic Study Area includes areas within the FERC Project Boundary, along with the San Joaquin River from Kerckhoff Dam to immediately below the Kerckhoff 2 Powerhouse.

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identifies amphibians and aquatic reptile species occurring or potentially occurring in the Project Aquatic Study Area.

In regards to foothill yellow legged frog, the PAD Volume 1, Section 5.4.6.3 states "habitat was deemed suitable for foothill yellow-legged frog in the San Joaquin River Gorge, but current hydroelectric operations of the Project (BoR 2008b)¹⁵, as well as additional PG&E and Southern California Edison company (SCE) hydroelectric projects upstream have altered the natural hydrology in the San Joaquin River Watershed." The PAD further states "the nearest known [foothill yellow legged frog] population resides upstream of SCE's Big Creek No. 3 Powerhouse in Jose Creek, but it is over 24 km (15 mi.) away and upstream of two dams (SCE 2008)¹⁶. No other [foothill yellow legged frog] populations are known in the San Joaquin River Watershed."

In regards to Kern brook lamprey, the PAD Volume 1, Section 5.4.3.3 states "Kern brook lamprey (*Lampetra hubbsi*) are potentially present in the [Project area]. Bureau of Reclamation studies (2008b) indicate that ammocoetes (larvae), possibly Kern brook lamprey, were collected in the upper San Joaquin River between Kerckhoff Dam and Millerton Lake 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."

Project Nexus

The Project alters instream flows in the Bypass Reach, which affects aquatic habitat and aquatic species.

Study Methodology

The study area should include Kerckhoff Reservoir and the Bypass Reach. The number and location of sites should provide adequate assurance whether foothill yellow legged frog and Kern brook lamprey are present or absent in the area. A determined volume of water will be filtered at each site using a 0.22 micron filter, with replicates. In the lab, DNA should be extracted from the filter and analyzed. An established field protocol that prevents contamination should be employed¹⁷.

A genetic marker for foothill yellow legged frog has been developed. It is unclear if a marker for Kern brook lamprey has been developed; however, use of a genetic marker for the lamprey genus (*Lampetra*) can be developed at minimal cost and be used for this study.

Level of Effort and Cost

State Water Board staff estimates the cost of this study to be approximately \$25,000 to \$80,000. The cost is dependent on development of study specifics and the potential for eDNA samples to be collected while onsite for other studies. State Water Board staff estimates the cost to develop a marker for the lamprey genus (if not already available) would cost less than \$2,000.

¹⁵ United States Bureau of Reclamation Biological resource technical reports: Upper San Joaquin basin storage investigation; draft aquatic biological resources technical report.

¹⁶ Southern California Edison. 2008. Final Native Aquatic Species Management Plan (NASMP). Big Creek, CA. July.

¹⁷ The United States Geological Survey protocol for eDNA sample collection is available at the following website: <https://labs.wsu.edu/edna/documents/2015/05/field-protocol.pdf/>

ATTACHMENT D:
DECEMBER 21, 2017 CALL NOTES AND FOLLOW-UP FOR THE
KERCKHOFF HYDROELECTRIC PROJECT

Call Notes and Follow-up on Pre-Application Document

Background

On December 21, 2017, State Water Resources Control Board (State Water Board) staff discussed the Kerckhoff Hydroelectric Project (Project) Pre-Application Document (PAD) with Pacific Gas and Electric Company (PG&E). The purpose of the call was to respond to State Water Board staff questions and clarify information regarding the PAD in order to facilitate efficient State Water Board staff review of the PAD. On March 7, 2018, PG&E provided call notes and responses to follow-up items. That information is provided below and can be used by the Federal Energy Regulatory Commission and relicensing participants to supplement information in the PAD and understand State Water Board staff interests in the Project.

**Pacific Gas and Electric Company (PG&E)
Kerckhoff Hydroelectric Project Relicensing
Draft State Water Board Call Notes
December 21, 2017**

Participant	Affiliation
Lisa Whitman	PG&E
Gina Morimoto	PG&E
Wayne Lifton	Cardno
Katie Ross-Smith	Cardno
Philip Choy	State Water Board

The objective of the call was to discuss Philip Choy's (State Water Board) earlier questions regarding the Kerckhoff study plans and Pre-Application Document (PAD) and to see if he had any additional questions.

Philip had asked Lisa several questions prior to the call regarding the study schedule, woody debris management, and the existence of any previous sediment studies related to the recent low level outlet (LLO) construction activity. Lisa responded that PG&E proposed to start some studies in 2018, pending stakeholder agreement and PG&E authorization. She also noted that PG&E's preference is to pass all woody debris over the dam to the extent possible. The size of the wood gathered at the trash rack and boom ranges from 2-inch branches to full-sized trees. Gina discussed the types of data that were collected during the previous LLO activities. No quantitative measurements were performed; however, turbidity monitoring has been conducted when the gates were open. In 1998 and 2012, there were small, brief, spikes in turbidity when the LLOs were open, but it quickly dropped.

During the call, Philip asked for clarification on several topics in the PAD, and the proposed draft studies contained in the PAD. These questions and the responses are summarized below.

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AQ 2 – Fish Populations

The call participants discussed several topics related to the draft fish studies.

The group discussed the distribution and spawning timing of striped bass and shad, as well as the shad flows in the existing FERC license. Monitoring studies conducted in 2001 by PG&E concluded that successful shad spawning occurred in the early spawning season.

Philip asked if the proposed study included specific monitoring of the plunge pool below the dam to see if the fish population was different from the rest of the reach, in particular if hardhead might be found in it. PG&E did not include specific monitoring of the plunge pool because spill velocities are very high and there is very limited refuge habitat during spills.

The call participants discussed the background of the development and implementation of the shad flows. The license requirement is focused on the flow velocities, and PG&E can provide the shad flows from either K1 or K2 powerhouses. When Millerton Lake is higher, then higher flows are needed from K2 to achieve the velocities needed to keep the shad eggs suspended in the water column. Philip asked if PG&E had any data before and after the 1993 shad order, to determine if the shad population is improving and evaluate how dependent the shad are on the spawning flows. PG&E to confirm. *Follow up: PG&E has prepared a list of surveys to share with Philip.*

The call participants discussed the timing of the fish surveys near the K2 Powerhouse. Philip asked if the surveys would be timed with striped bass and shad movement upstream. Since the movement upstream occurs during spring runoff, for safety reasons PG&E has not proposed surveys during this time. Previous American shad surveys were done by splash counts from a boat due to this reason. PG&E's study plan proposes fish monitoring at the end of the summer to include young-of-the-year, as well as other life stages of native fish.

HYD 1 – Flow Balance Model

The call participants discussed the HEC-Res Sim model that PG&E proposed to use for modeling in the HYD 1 study plan. Philip asked if power generation could be calculated.

HYD 2 – Hydrology with and without the Project

The call participants discussed the types of analyses that would be completed for the proposed draft study. As proposed, the analysis includes use of indicators of hydrologic alteration (IHA) software. An evaluation of outputs that characterize spills and the rate of change would be used. PG&E noted that inflows into Kerckhoff Reservoir are dependent on upstream sources, the reservoir has a small storage capacity, and PG&E does not have much ability to control recession rates. The current license does not have a ramping rate requirement largely due to the small amount of storage and PG&E cannot buffer inflows.

GEO 2 – Project-related Sediment Management Practices in Kerckhoff Reservoir

The call participants discussed sediment information included in the PAD and proposed draft sediment studies for the reservoir and Project Bypass Reach. Sediment chemical analyses conducted in conjunction with previous a bathymetric survey were inadvertently omitted from the PAD. *Follow up: PG&E filed this information with FERC on 2/8/18, and also shared it with the*

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State Water Board. The State Water Board is interested in the amount of sediment that might be released through the LLOs. PG&E shared that the area of sediment entrainment is limited to the area near the outlets.

GEO 3 – Project-related Erosion and Sedimentation and LAND 1 – Project Roads and Trails Assessment

Philip asked about the estimated level of the frequency of road maintenance to help the State Water Board understand the potential for erosion from these activities and construction. PG&E to confirm. *Follow up: Road maintenance is conducted on an as-needed basis annually. Crews also address storm damage on access roads then needed to repair or prevent damage that may occur during the year.*

WQ 1 – Water Temperature in Kerckhoff Reservoir and the Project Bypass Reach of the SJR

The call participants discussed the potential for thermal stratification in large pools in the Project Bypass Reach. No data currently exist to suggest that there is thermal stratification. Philip noted that a water temperature model study was not proposed by PG&E. PG&E clarified the intent of the WQ 1 study is to collect enough data to determine whether temperature modeling is necessary. PG&E does not think that the reservoir typically stratifies and, if it does, it would be temporary due to the small size of the reservoir. The water temperature coming into Kerckhoff Reservoir comes from the upstream hydroelectric projects and PG&E will not likely be able to affect it. Philip indicated that he supports not doing a water temperature model at this time.

WQ 2 – Water Quality Sampling in SJR Bypass Reach and Kerckhoff Reservoir

The call participants discussed the methods and locations for water quality sampling. Philip suggested moving one of the fecal coliform sampling sites to the Smalley Cove area, and a couple of other places in the reservoir rather than just by the dam.

Philip indicated that the State Water Board would likely ask for a bioaccumulation study, which was not proposed by PG&E in the PAD, due to concerns about mercury, PCBs, and anything that could bioaccumulate. He added that one-time sampling would likely be requested.

AQ 4 – Entrainment

Philip asked for clarification on the focus of the proposed entrainment study. PG&E clarified that the proposed study is a desktop exercise to determine likely entrainment at the intakes and survival with turbine passage based on the available literature. The evaluation does not include an assessment of fish survival with spills over the dam.

BOT 2 – Riparian and Wetland Resources

The call participants discussed that the San Joaquin River below the dam is steep with limited floodplain development. It is a bedrock-boulder incised channel with few deposition bars that would not be supportive of extensive riparian habitat.

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WILD 1 – Special-status Wildlife

The call participants discussed the draft proposed WILD 1 study plan. Specific surveys for golden eagles and peregrine falcons were not proposed, but surveys would be conducted for their potential habitat within the Study Area. Potential recreation effects on special-status wildlife also were discussed. There are no existing data that document disturbance by recreation on special-status wildlife, but that would be evaluated in the proposed study.

Other studies

The call participants discussed two potential studies that were not proposed by PG&E in their PAD.

The call participants discussed the potential need for an amphibian study. Philip commented that some stakeholders may be interested in a bullfrog study, as well as a foothill-yellow legged frog (FYLF) and Kern brook lamprey survey (if a primer is available for eDNA). eDNA was mentioned as a possible tool for indicating potential presence of the species within the reach. Philip said that he would not advocate for a full survey [(e.g., visual encounter surveys) for FYLF [at this time]. *Follow-up: no eDNA primer exists for Kern brook lamprey.*

Philip discussed the State Water Board's rationale for the potential need for a bullfrog study and the potential need to control for invasive species. He thought that the surveys could potentially be coupled with other studies already proposed. The group discussed potentially tying the need for a bullfrog ground survey to the results of the FYLF eDNA. If there are no FYLF in the reach, there would not seem to be a Project nexus.

Philip noted that the State Water Board usually wants protocol-level benthic macroinvertebrate (BMI) surveys to determine overall river health; however, looking at the reach, he noted the substrate may not be amenable to the SWAMP protocol sampling. The call participants discussed the possibility of a trigger-based approach, based on the condition of the fish for needing a BMI study. If the fish are in good condition, a BMI study may not be needed. Philip commented that neither a shad nor striped bass spawning study was proposed. The call participants discussed that fish population and distribution studies have been proposed; and extensive shad spawning studies were already conducted as part of the current license.

Process

Philip asked how PG&E sees the approval process moving forward for studies to be implemented in 2018. PG&E discussed that they are conducting initial outreach to the agencies to start the conversation about starting studies early. *Follow up: Studies will be conducted on the timeframe presented by FERC in Scoping Document 1.*

Beneficial Uses

The call participants discussed why shad and striped bass are of interest to the State Water Board, as one of the beneficial uses for waters associated with the project includes recreation. PG&E asked Philip how the State Water Board would look at the native versus non-native fish protection. Philip replied that shad spawn in May and June, and they assume that the native species spawn about the same time. He hopes that the spawning lines up for the species. He

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added that they would try to balance native species and shad/striped bass so it doesn't impede PG&E operations.

Action Items

- Cardno to provide the shad report references to Philip on CD.
- Gina and Wayne to check to see if there were surveys after the 2001 flow suspension.
- PG&E will follow up and determine if any data are available on the amount of sediment that may have been released with the low level outlets were opened.
- PG&E to check where information on chemical testing of the sediment in the reservoir is in the PAD
- PG&E to follow up on the frequency of road maintenance.
- Gina to send Philip a photo below the dam during spill.
- Gina to look for past shad studies.
- Gina to follow up with DWR and Forest Service on availability of eDNA primers for Kern brook lamprey.

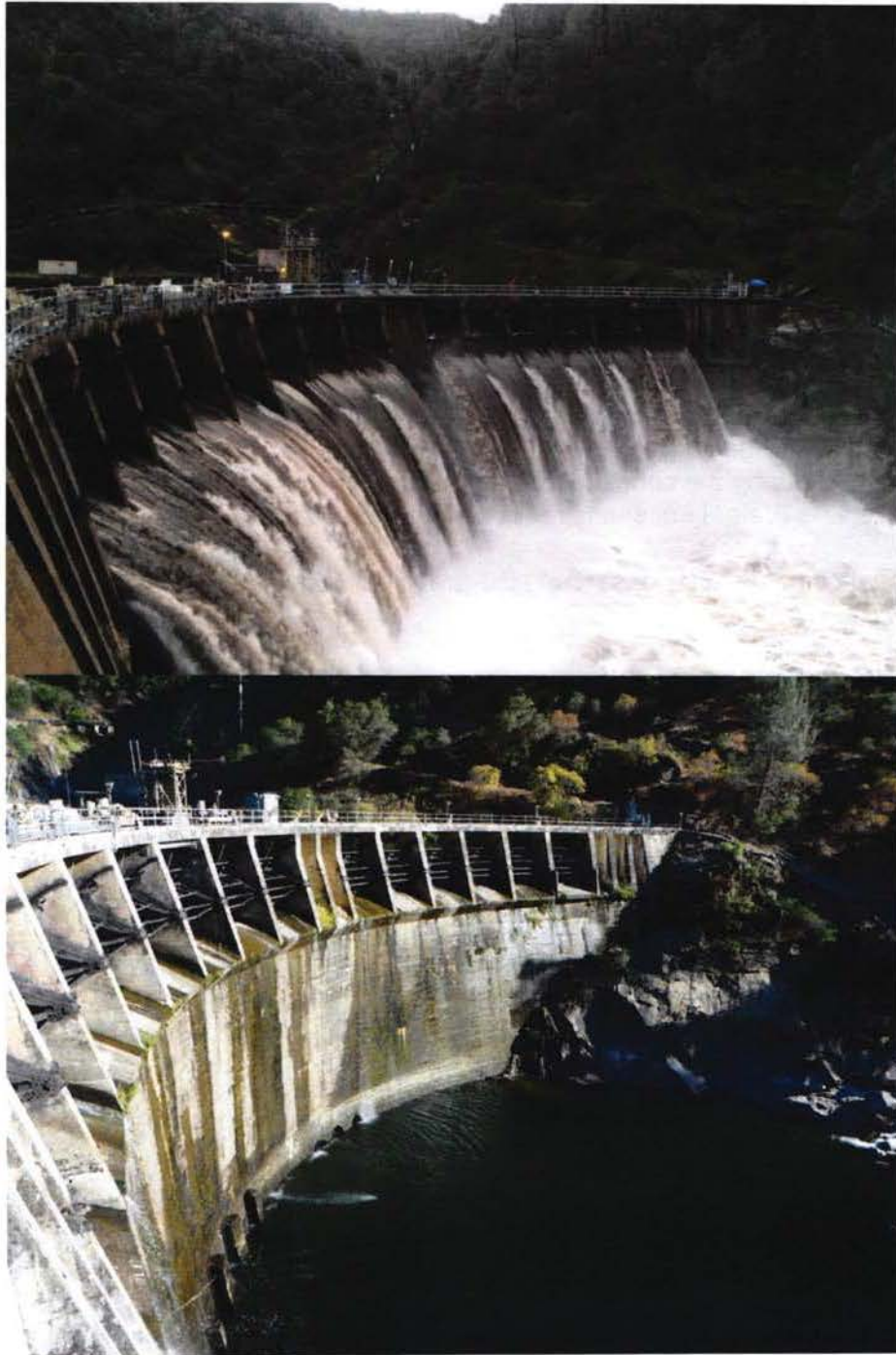
Follow-up Items for Philip Choy (SWRCB), from 12/21/17 Call with PG&E Regarding Kerckhoff Relicensing PAD

- Were any American shad spawning surveys conducted after the 2001 flow suspension?
 - Monitoring conducted in May 2001 concluded that successful shad spawning occurred in the early spawning season; thus, no additional shad spawning surveys were conducted following the 2001 flow suspension.
- Cardno to provide the shad report references to Philip on CD.
 - A CDROM with American shad references was mailed to Philip.
- In regards to GEO-2, Philip was interested if there is sediment passage from Kerckhoff Dam, and if there is, how much, when the gates are opened. PG&E will follow up to see if there are any data.
 - Turbidity monitoring has been conducted at least twice when the low level outlets (LLO) were exercised.
 - On June 10, 1998, two LLOs were opened and closed one at a time to verify functionality of the LLOs and sluice a minor amount of sediment during heavy snowmelt. Representatives from FERC, USFWS, Reclamation, and CA State Parks/Millerton attended the site visit on June 10 to observe the LLO exercise. Inflows to Kerckhoff Reservoir were approximately 12,000 cfs. One LLO was opened and closed between 1000 to 1230 hours, while the second LLO was opened and closed between 1230 to 1430 hours. Turbidity, dissolved oxygen (DO), and settleable solids were measured at two stations: 1) 0.25-mile downstream of Kerckhoff Dam and 2) approximately 8 miles downstream near the Kerckhoff 1 Powerhouse. Turbidity peaked at 25.0 NTU at station 1, while turbidity measurements at station 2 ranged from 3.2 to 6.8 NTU. DO ranged from 10.1 to 11.3 mg/L at station 1 and from 11.2 to 11.6 mg/L at station 2. Background turbidity was 12.3 NTU and DO was 10.7 mg/L at station 1.

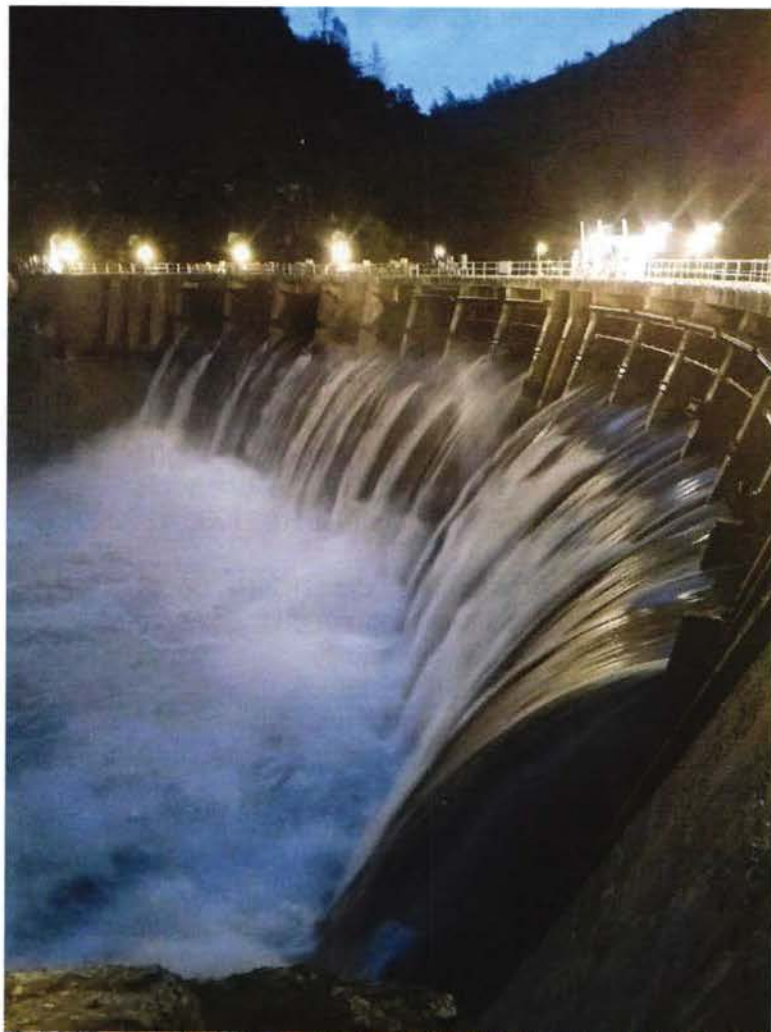
ATTACHMENT D:
DECEMBER 21, 2017 CALL NOTES AND FOLLOW-UP FOR THE
KERCKHOFF HYDROELECTRIC PROJECT

- To support trunnion work at Kerckhoff Dam, LLO #2 was opened to lower the reservoir for safe worker access on November 5, 2012. Turbidity was monitored at the J-2 gage. LLO #2 was opened and closed from 0925 to 1350 hours. Background turbidity averaged 2.28 NTU. Turbidity peaked at 6.42 NTU at 1100 hours, but dissipated quickly. The daily average turbidity on November 5 was 2.83 NTU.
- Water quality was also monitored during the more recent replacement of the LLOs from September through November 2015. Approximately 800 cubic yards of sediment was removed in front of the LLOs and trash rack. A turbidity curtain was used to contain the material. The WDR and Streambed Alteration Agreement required the measurement of turbidity, DO, settleable solids, pH, water temperature, and specific conductance. These parameters were monitored at a downstream station (K-1) located just below the plunge pool and at the K1 Intake (K-2). Background turbidity was 0 NTU. The 24-hour average did not exceed 2.1 NTU during the construction work. The other parameters did not exceed Receiving Water Limitations required by the WDR.
- Send Philip sediment chemical analyses during the previous bathymetric survey (completed).
- Regarding GEO-3 – what is the frequency of road maintenance (as related to potential for erosion from road maintenance and construction activities)?
 - Road maintenance is conducted on an as-needed basis annually. Crews also address storm damage on access roads when needed to repair or prevent damage that may occur during the year.
- Provide a photo of the SJR below Kerckhoff Dam during spill in 2017.
 - Photos of similar angles are provided for comparison purposes.

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- Were any shad population surveys conducted prior to and after the 1993 FERC Order establishing the permanent shad flow regime?
 - American Shad surveys (and striped bass surveys) have been conducted in Millerton Lake/San Joaquin River from 1978 – 1992. Flow changes are also included in the list below.
 - 1978 – egg, larval, and young-of-year (YOY) surveys conducted throughout Millerton Lake up to Kerckhoff 2 Powerhouse (K2 PH) site; included a station in Friant-Kern Canal below Friant Dam (egg and larval survey, beach seining).
 - 1979 – 1982 – adult surveys (gill nets and Lake Merwin trap), fish migration survey (1979 only; radio transmitter), egg and larval surveys (stationary and plankton tows), YOY surveys (electrofishing, beach seines, midwater trawl, angler surveys, hydrological surveys (estimate transport time between K1 and K2 PHs and movement through Millerton Lake), water quality, Millerton Lake height, inflow measurements. Baseline survey was in 1979 (pre-K2 PH construction); 1980-1982 during construction of K2.
 - 1984-1985, 1986, 1987 – post-operational studies (K2 PH began operating in 1983): adult surveys (gill nets), egg and larval surveys, juvenile surveys (boat electrofishing), water quality.
 - 1988 – new FERC-mandated flows for shad (800 cfs from 2200-0200 hours and 400 cfs from 0200 hours until peak generation started from May 15 – June 30). Per FERC order - releases could be made from either powerhouse.
 - 1989 – FERC-mandated flows for shad (400 cfs from K2 PH from 2200-start of next day's peak generation from May 15-June 30. From June 6-30, release increased to 800 cfs from 2200-0200 hours due to low ratio of live:dead American shad eggs captured. Minimum 400 cfs flow continued after 0200 hours). *Note: FERC gave the option of releasing 400 cfs from K2 PH, K1 PH, or Kerckhoff Dam.
 - 1990 – FERC mandated flows released from K2 PH (400 cfs from May 15-June 30 from 2200 to 0200 hours, and 400 cfs or peak generation flows from 0200 to 2200 hours). Non-peaking flows of 474-706 cfs provided from May 15-21. From May 22-June 30, target flows of 775 cfs and greater were provided around the clock. Fourth consecutive dry year. Millerton Lake at 540 ft msl.
 - 1991 – FERC mandated flows released from K2 PH (775 cfs when Millerton Lake at or below 545 ft msl; 1,200-2,000 cfs from 2200-0200 hours and 775 cfs or peak generation flows from 0200-2200 hours when Millerton Lake above 545 ft msl).
 - 1988, 1989, 1990, 1991 - egg and larval survey, juvenile survey, adults incidentally captured (gillnetting and electrofishing), water temperature and dissolved oxygen measured.
 - 1992 – full pool conditions existed, yet shad were able to spawn (juvenile and adult sampling conducted via gillnets in fall 1992). FERC mandated flows released from K2 PH (1,200 cfs from 2200 to 0200 hours and 775 cfs remaining hours when Millerton Lake is at or above 545 ft msl). Full pool study conducted. According to May 6, 1992 FERC Order, if sampling indicated shad successfully spawned during full pool velocity study and 1991 and 1992 year classes found, further sampling in 1993

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- and 1994 not needed, and studies per the 1981 Fishery Agreement between PG&E and CDFG were considered complete.
- 1993 February 17, 1993 letter from USFWS (attached to 1992 full pool study) indicated that their understanding was CDFG would conduct American shad status monitoring to verify if shad spawning flow releases adequate for remainder of license.
 - Would it be possible to take eDNA samples for Kern brook lamprey? Is there a primer?
 - Based on feedback from Genidaqs and USFWS biologists, there does not appear to be any primers available for Kern brook lamprey. It is suspected that Kern brook lamprey in the Project Bypass Reach are rare. There may not be enough material available to develop primers.

Follow-up question from February 14 site visit:

- Is J2 a PG&E gage or USGS gage?
 - USGS has oversight of the gages below. These gages are owned and maintained by PG&E. USGS checks the gages and verifies/publishes the flow data on their website, so the gages have USGS numbers.

STATION	STNAME	SHORTNAME	LATITUDE	LONGITUDE	USGS_Number	CDEC_ID
J1	Kerckhoff Reservoir 11-2466.50	Kerckhoff Reservoir	37.12811	-119.52553	11246650	KRH
J2	San Joaquin R Nr Auberry	San Joaquin R Nr Aub	37.13294	-119.53345	11246700	SJA
J3	KERCKHOFF POWERHOUSE #1	Kerckhoff	37.092556	-119.552799	11246950	
J6	Kerckhoff #2	Kerckhoff #2	37.07247	-119.55785	11247050	



United States Department of the Interior
BUREAU OF LAND MANAGEMENT

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MAR 16 2018

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

RE: Kerckhoff Hydroelectric Project No. 96-045

Dear Ms. Bose:

The Bureau of Land Management Bakersfield Field Office (BLM) offers the attached comments on Scoping Document 1 (SD1) and Pre-Application Document (PAD) of the Kerckhoff Hydroelectric Project No. 96-045 FERC Relicensing Project. Our comments focus on whether the proposed studies will provide the information that BLM will need in order to determine if there will be impacts from the Project to BLM's resources of concern. We appreciate the opportunity to comment.

In July of 2017, BLM Bakersfield requested that FERC share with us additional information on whether to request cooperating agency status for the relicensing process. Per FERC policy, an agency that has served as a cooperating agency in a proceeding may not thereafter intervene and become a party in proceeding. Because of this limitation, BLM Bakersfield has decided to not become a Cooperating Agency on this project.

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

The BLM appreciates the opportunity to comment on SD1 and PAD and to participate in the relicensing process. If you have any questions please contact Alison Lipscomb, Realty Specialist at (661) 391-6177 or alipscomb@blm.gov.

Sincerely,

John Hodge
Acting Assistant Field Manager, Resources

Enclosures:
Scoping Document 1 Comments
Pre-Application Document Comments
Appendices of Proposed New Studies
Map of Kerckhoff Facilities at K2
Map of San Joaquin River Gorge

CC:
Gabe Garcia, BLM, Field Manager

IAW P.L. 104-231 (EFOIA)
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exemptions apply [/]
Author/Program Lead signature
A. J. Garcia

SCOPING DOCUMENT 1 COMMENTS

1.0 INTRODUCTION

Note: BLM is required to issue a right-of-way for all PG&E features and facilities not included in the FERC Project boundary. The current right-of-way for transmission lines associated with the Project will expire on November 30, 2022. BLM will consider all features and facilities not included within the Project boundary or a BLM authorization to be in trespass.

3.2.1 PROPOSED PROJECT FACILITIES AND OPERATIONS

BLM requests the current GIS layers for the FERC Project Boundary and any updates/modifications to these layers throughout the process in order to analyze the resources within and adjacent to the Project and in anticipation of considering a PG&E right-of-way. This request has been made directly to PG&E and they have thus far been unable to provide this information critical to the analysis of the Project.

3.2.2 PROPOSED ENVIRONMENTAL MEASURES

BLM anticipates requesting changes to license conditions regarding Protection Mitigation and Enhancement (PM&E) measures, specifically noting licensee's responsibilities in regard to PG&E wildlife watering sites.

4.2.5 RECREATION RESOURCES

Effects of project operation and maintenance on recreational access and use in lands and waters adjacent to the project area should be addressed including the bypass reaches of the Project. Recreation resources within BLM's San Joaquin River Gorge (SJRG) should be included in the evaluation of impacts to recreation from project operation and maintenance. Information in regard to adequacy of access to recreational opportunities to meet current and future demand, and potential impacts to visitors recreating in the bypass reaches, including but not limited to fishing, swimming, whitewater boating, bouldering, and recreational gold panning, are of particular interest to BLM. BLM is also concerned with public safety affected by the Project.

4.2.6 CULTURAL RESOURCES

An evaluation of cultural resources characterized as a dispersed series of trash piles and encompassing pre-historic sites should be evaluated. This area of concern was reported to PG&E in 2009 and requires further analysis which may include a hazardous waste determination in coordination with BLM. These resources are historic trash related to Kerckhoff Powerhouse 1.

The area of potential effects should include all proposed use areas needed by FERC as well as

the areas used by PG&E and FERC historically. The area of potential effects should be surveyed at a Class III level. PG&E will obtain a Field Work Authorization from BLM prior to conducting survey.

The BLM should be included in the development of the Area of Potential Effects (APE) of the undertaking under National Historic Preservation Act (NHPA).

The BLM requests full copies of reports, record searches, and geospatial data.

An ethnographic study is needed and should include local tribal leadership from federal and non-federal groups.

PRE-APPLICATION DOCUMENT COMMENTS

PAD VOLUME 1: Table 4.5.1

The list of Project Facilities and Features does not include fencing (including gates and cattle guards) around access roads to K2 access tunnels, discharge area, or tailings/ spoils pile near access road 6. Please see attached map, *Kerckhoff Facilities at K2*.

Access road 6 should be defined as K1 headworks to K2 discharge area and includes Project specific and shared road sections.

PAD VOLUME 1: 4.5.6 - 4.5-4b

Smalley Road should be listed as a Shared Access Road. See comment under 4.5.6 – 4.5-4c for description.

PAD VOLUME 1: 4.5.6 - 4.5-4c

Smalley Road is listed as a Non-Project General Access Road and defined by PG&E: “Non-Project General Access Roads are not considered Project Roads because they are used as the primary travel corridors through the watershed and are open to unrestricted public use.”

The section of road referred to as Smalley Road, located within Bureau of Land Management (BLM)’s management area is not a County maintained road, and is not subject to unrestricted public use. The realignment of Smalley Road was completed by PG&E, upon completion jurisdiction was turned over to BLM. BLM has discretion on access.

BLM requests that STUDY LAND 1 be modified to include this section of road for analysis and should be included under the Table identified as Table LAND 1-2b.

Project Nexus: shared access roads are required for ingress and egress for Project related operations and maintenance.

Note: BLM is required to issue a right-of-way for all PG&E features and facilities not included in the FERC Project boundary. The current right-of-way for transmission lines associated with the Project will expire on November 30, 2022. BLM will consider all features and facilities not included within the Project boundary or a BLM authorization to be in trespass

PAD VOLUME 1: 5.2

BLM requests PG&E’s bedrock geology GIS layer and descriptions relative to the geology layer.

PAD VOLUME 1: 5.8.2.2

BLM disagrees with the following statement:

“Due to the rugged terrain and lack of access roads, the majority of the reach is not easily accessible by the public. The exception to this is the Yeh-Gu Weh-Tuh Trailhead, which provides trail access to and over the SJR (see Kerckhoff 1 Powerhouse Area).”

Additional access points include:

- **Ya-Gub-Weh-Tuh Trailhead** and campground connecting the BLM's San Joaquin River Trail, Bridge Trail, Pa'san Ridge and Wuh-ki-o trails.
- An unmarked trail **Access Point across from the Nuck-a-hee Learning Center** which follows the PG&E's project road to a small connecting trail above K1. This is a common access point by equestrian users that crosses the San Joaquin River.
- **San Joaquin River Trail accessed via Sky Harbor Road/South Fine Gold** area located on Millerton Lake State Recreation Area connected to the south of BLM's SJRG and provides access to the San Joaquin River.
- **Wellbarn Road** is another access point south of BLM's SJRG which connects to the San Joaquin River Trail (SJRT) that visitors use to access SJRG SRMA and the San Joaquin River. It should be noted that this road crosses private land and State Parks prior to terminating at the SJRG. This appears to be a popular access point for mountain bike users and runners.
- **River Access Day Use Area** (for description see comment under 5.8.2.2 Existing Facilities: Kerckhoff 2 Powerhouse Area).

PAD VOLUME 1: 5.8.2.2- Existing Facilities: Kerckhoff 2 Powerhouse Area

Minor correction: "Yeh-Gu Weh-Tuh" should read "Ya-Gub-Weh-Tuh"

While there are no PG&E maintained Project-specific recreation facilities, there are developed recreation facilities managed by BLM in the Project boundary. Developed Recreation Facilities in the Project area include:

River Access Day Use Area includes a parking area, picnic area, and accessible vault restroom. This is in the vicinity of K2 switchyard. Visitors have the option of a short river/fishing/recreational gold panning access trail to the river or connecting to the SJRT by walking a portion of the Project road to access one of two small connecting trails to the SJRT. This is a popular travel path to access the Millerton Caves and for river play. A portion of the Project area is understood by BLM to be used as a Helicopter Landing Zone but is also used by the public to for parking (a potentially conflicting use without coordination).

PAD Volume 1: 5.8.2.4

The bypass reach associated with this project contains two distinct segments of Wild & Scenic eligible sections of river. In addition to the segment described in the PAD, the second segment from K1 to Millerton Lake was found to be eligible for its outstanding recreation values.

The following interim protective management guidelines would apply to both segments:

- (a) Approve no actions altering the free-flowing nature of the suitable segment through impoundments, diversions, channeling, or riprapping;
- (b) Approve no actions that would measurably diminish the stream segment's identified outstandingly remarkable value(s); and
- (c) Approve no actions that would modify the setting or level of development of the suitable river segment to a degree that would change its identified classification.

PAD Volume 1: 5.9.2

BLM requests to be involved in all steps of the National Historic Preservation Act (NHPA) Section 106 process, including development of the Area of Potential Effect (APE), cultural inventory methodology, tribal consultation, and issuance of a BLM Cultural Resources Use Permit (CRUP) and Field Work Authorization (FWA) for all cultural review.

The area of potential effects should include all proposed use areas needed by FERC as well as the areas used by PGE and FERC historically. The area of potential effects should be surveyed at a class III level.

The BLM would like full copies of reports, record searches, and geospatial data.

PAD Volume 1: 5.9.3

An ethnographic study is needed and should include local tribal leadership from federal and non-federal groups.

PAD Volume 2: Appendix D: STUDY BOT 1

In regard to ground based surveys and mapping BLM requests surveys for invasive weed species to extend to two years. Depending on climate conditions, invasive species may be dormant from one year to the next. Thus it is recommended to search and map over multiple years. Two years is good. 5 years is best.

PAD Volume 2: Appendix D: STUDY WILD 1

Field transect surveys for sensitive wildlife and habitat should be extended to two years. Rare and secretive wildlife species can easily be missed with one year of study. Two years is better and cameras help greatly. BLM recommends the use of cameras to help determine the presence of rare wildlife species.

In addition to Bald Eagle nesting, roosting, and foraging habitat surveys, other raptor and owl surveys should be conducted. Species that should be surveyed for include golden eagles, prairie falcon, Coopers hawk, spotted owls, and California condors.

In regard to visual and acoustic surveys for Special Status Bat Species, BLM recommends the use of mist nets to identify sensitive bat species.

PAD VOLUME 2: Appendix D: STUDY LAND 1

The study includes references to Table LAND 1-1b. The table is labeled “**Table LAND 1-2b Gated shared roads with the BLM and USFS**”. Please correct.

Table LAND 1-2b Gated shared roads with the BLM and USFS.

The PAD incorrectly defines Smalley Road as a county/general access road. Smalley Road is a BLM road. BLM’s current Travel and Transportation plans lists this road as “Open.” Smalley Road is heavily used by PG&E for access to Project facilities, and as such Smalley Road should be included in the table and study. Access via Smalley Road may be restricted at BLM’s discretion.

Please clarify the use of the phrase “select” as mentioned in STUDY LAND 1: POTENTIAL INFORMATION GAPS. What Shared Access Roads will not be included in the proposed study?

PAD VOLUME 2: Appendix D: STUDY LAND 1

The BLM requests the consideration of the following be added to the study.

STUDY METHODS AND ANALYSIS: 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 Shared Access Roads identified on Table LAND 1-2b (including the portion of Smalley Road under the jurisdiction of BLM).

Identify the frequency and types of vehicles accessing the roads by PG&E and their affiliated companies (contractors and subcontractors).

- Include approximate weight of the vehicle can be determined by the model/type of vehicle and the load per axle for vehicles pulling trailers. The weight of a vehicle and number of axles would produce the most stress on the road surface and material.
- BLM requests monitoring of the average speeds of vehicles along roads.

Extent of Study Area: BLM request modification to the proposed study to include turnouts, turnarounds, or any area that is used for staging vehicles or equipment off of the road bed.

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.

Resource Assessment: In regard to - "location of areas along the roads and trails identified" please modify to include turnout areas and areas used for staging vehicles off road.

**PAD Volume 2: Appendix D: STUDY REC 2, STUDY REC 3, STUDY REC 4**

The BLM finds the Project analysis inadequate. BLM requests that the proposed studies also analyze Project related impacts to recreational resources at BLM’s San Joaquin River Gorge Special Recreation Management Area (SJRG). See attached map entitled *BLM SJRG_Rec_map*.

BLM would like to be included in the development of surveys in regard to recreation.

PROJECT NEXUS:

- The Project reservoir, shoreline, and Project Bypass Reach and its adjacent 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.
- Recreation at the SJRG has the potential to be highly concentrated in and in close proximity to the FERC Project boundary. Visitors access the trail system and cross the San Joaquin River at the SJRG Bridge in close proximity to PG&E's K1. They may also access the trail system at several other access points with the potential to be in close proximity to K1, K2 and other Project related features and facilities. The project has multiple direct and indirect effects on recreation opportunities and public safety on BLM managed public lands.
- Operation of the Project affects flows and potentially affects resources in the following river reaches:
 - The Project Bypass Reach, which includes the SJR from Kerckhoff Dam downstream to the K1 Powerhouse (8 mi.) and from the K1 Powerhouse to the K2 Powerhouse (1.8 mi.); and the 1-km (0.62-mi.) reach immediately below K2 Powerhouse to Millerton Lake, a BOR facility.

According to the *Bakersfield Field Office Record of Decision and Approved Resource Management Plan*, "The enormous increase in population in the Planning Area [inclusive of the SJRG] has intensified the demand for open space and recreation opportunities on public land. Not only has demand increased, but the kinds of recreation taking place on public lands have also increased..." (2014). It is BLM's objective to manage the recreational resources within the SJRG to address the growing demand for recreation and provide for adequate protection, mitigation, and enhancement of environmental resources, as well as public safety that may be affected as a result of the Project.

The proposed studies are intended to address the lack of information regarding potential impacts of Project related activities (facilities and features/operations and maintenance), direct or indirect, to recreation resources and opportunities on lands managed by the BLM within the SJRG.

These identified sections highlight changes to the current studies that could be adopted and potentially incorporated into PG&E's APPENDIX D - Proposed Draft Study Plans.

PAD VOLUME 2: Appendix D: STUDY REC 2

The BLM requests the consideration of the following be added to the study.

Potential Resource Issues

- Current geographic scope is inadequate. BLM requests the inclusion of lands and waters immediately adjacent to the Project be included in the study.

Project Nexus

- In regard to the Project Bypass Reach include the adjacent shoreline.

Potential Information Gaps

- Study how existing Project facility layout, design, condition and safety features affect recreation opportunities and public safety on immediately adjacent lands and waters.

Proposed Study or Information Gathering

Recreation Facility Inventory

- Project recreation facilities and those on adjacent lands and waters at each powerhouse will be inventoried and evaluated as to how they support recreation uses in the local area and how they could be modified to enhance such recreation uses and improve public safety.

PAD VOLUME 2: Appendix D: STUDY REC 3

The BLM requests the consideration of the following be added to the study.

Potential Resource Issues

- Locations of Project-related effects (operations, maintenance and locations of facilities and features) to recreational resources on public lands managed for recreation.

Potential Information Gaps

- Locations of Project-related effects (operations, maintenance and locations of facilities and features) to recreational resources on BLM public lands managed for recreation. This includes BLM's public lands at the SJRG that will be impacted by the Project.

Proposed Studies/Analysis to Address Identified Significant Information Gaps

PAD: "Project reservoir shoreline and water surface use assessment—Kerckhoff Reservoir will be assessed to report the level, timing, and type of reservoir boating use and shoreline recreation use."

- Current geographic scope is inadequate and will need to include Project Bypass Reach shoreline.

PAD: "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 nonpeak seasons."

- Current geographic scope is inadequate. Project study should include lands and waters adjacent to the Project where recreation takes place on public lands (specifically BLM's SJRG).

PAD: "Recreation use impact assessment—Project lands will be inventoried to report locations of recurrent dispersed recreation, describe the level, timing, and type of recreation use, and identify any visually evident effects on environmental resources at these locations."

- Current geographic scope is inadequate and needs to include lands adjacent to the Project.

Extent of Study Area

- Include Project Bypass Reach for water surface and shoreline study area.
- Include SJRG for developed recreation facility use assessment.
- Include public land managed by the BLM for the Recreation use impact assessment.

Study Methods and Analysis

Project Reservoir Shoreline and Water Surface Use Assessment

Include Bypass Reach.

BLM requests that sampling days taking place at the SJRG occur from January 1 to June 30.

Developed Recreation Facility Use Assessment

Include SJRG campgrounds and day use areas. Locations for spot survey should be developed with BLM for the SJRG.

Recreation Use Impact Assessment

Include Project Bypass Reach and land adjacent to FERC Project Boundary.

PAD VOLUME 2: Appendix D: STUDY REC 4

The BLM requests the consideration of the following be added to the study.

Potential Resource Issues

- Current geographic scope is inadequate. BLM requests the inclusion of lands and waters immediately adjacent to the Project be included in the study.

Project Nexus

- Include the Project Bypass Reach and its adjacent shoreline.
- Recreation at the SJRG is concentrated in close proximity to and in the FERC Project boundary.
- Operation of the Project affects flows and potentially affects resources in the following river reaches:
 - The Project Bypass Reach, which includes the SJR from Kerckhoff Dam downstream to the K1 Powerhouse (8 mi.) and from the K1 Powerhouse to the K2 Powerhouse (1.8 mi.); and the 1-km (0.62-mi.) reach immediately below K2 Powerhouse to Millerton Lake, a BOR facility.

Potential Information Gaps

- The Project has direct and indirect affects to recreation, including but not limited to, visitors losing gear due to unexpected fluctuations in water level and visitors being concerned with safety as it relates to recreational opportunities.

Proposed Studies/Analysis to Address Identified Significant Information Gaps

- Current geographic scope is inadequate. BLM requests the inclusion of lands and waters adjacent to the Project.

Extent of Study Area

- Include BLM public lands in the SJRG.

Visitor Survey

- BLM requests to consultation for development of study questions.
- BLM requests that sampling days taking place at the SJRG occur between January 1 to June 30 to achieve accurate results.

PAD VOLUME 2: Appendix D: STUDY GEO 1

The BLM requests the consideration of the following be added to the study.

Relevant Information/References

- Bateman, Paul C. and Alan J. Busacca, 1982, Geology of the Millerton Lake Quadrangle, West-Central Sierra Nevada, California, U.S. Geological Survey, Map GQ-1548.

Potential Information Gaps

- Gold content of sediments entering and leaving Kerckhoff Reservoir
- Volume of gold-bearing sediments in Kerckhoff Reservoir
- Gold content of sediments between Kerckhoff Dam and Millerton Lake
- Gold content of sediments from Kerckhoff Dam in Millerton Lake

Proposed Studies/Analysis to Address Identified Significant Information Gaps

- Analysis of gold quality, quantity and distribution in the project area, and in impacted reaches of San Joaquin River

Study Methods and Analysis

- Prepare a sampling plan for
 - 1) Sediments upstream of the Kerckhoff Reservoir
 - 2) Sediments in Kerckhoff Reservoir
 - 3) Sediments in the San Joaquin River between Kerckhoff Dam and Millerton Lake

Analyze samples for gold content, describe opportunities for recreational gold panning

Products

- Maps showing variations in gold concentration along the San Joaquin River
- Maps showing variations in gold concentration in Kerckhoff Reservoir

PAD VOLUME 2: Appendix D: STUDY GEO 2

The BLM requests inclusion of the attached *BLM proposed Gold Study* into Geo 2 Study.

Project Nexus

In the Bakersfield Resource Management Plan, inventory and management of the recreational gold panning resource of the SJRG was identified. Operation of the Kerckhoff Dam and reservoir restricts this resource because gold is retained in the Kerckhoff Reservoir and not allowed to move down the San Joaquin River where gold panners historically operated.

Potential Resources Issue(s)

- BLM requests an estimation of time in regard to sedimentation completely filling the Kerckhoff Reservoir and impacts to recreational gold panning, boating, and recreation.
- BLM requests an analysis of sedimentation impacts on recreational gold panning.

Relevant Information/References

- Bateman, Paul C. and Alan J. Busacca, 1982, Geology of the Millerton Lake Quadrangle, West-Central Sierra Nevada, California, U.S. Geological Survey, Map GQ-1548.

Potential Information Gaps

- The historical and current characteristics of gold particle size, abundance and character in sediments 1) upstream of Kerckhoff Reservoir, 2) in Kerckhoff Reservoir, and 3) Between Kerckhoff Dam and Millerton Lake

Proposed Studies/Analysis to Address Identified Significant Information Gaps

- Evaluate gold resource using procedures outlined in the BLM Handbook for Mineral Examiners, H-3890-1.
- Identify immediate sources of sediment and gold content thereof to Kerckhoff Reservoir and their characteristics including the area surrounding Kerckhoff Reservoir, Fish Creek, and the San Joaquin River as it enters Kerckhoff Reservoir, based on reconnaissance observations.

Extent of Study Areas

- Expand to include the San Joaquin River between Kerckhoff Reservoir and Millerton Lake.

Study Methods and Analysis

- BLM requests when sampling, to sample the entire sediment column, not just the surface. BLM also recommends the use of Vibroseise raft-mounted sampler.



Figure 1. Vibroseise sampler at the Buena Vista Mercury Mine pond.

Products

- BLM requests that sediment size and gold distributions and comparisons will be provided in tabular format.
- BLM requests sampling results be presented on respective maps.

PAD VOLUME 2: Appendix D: STUDY GEO 3

The BLM requests inclusion of the attached *BLM proposed Arsenic Study* into Geo 3 Study.

Proposed Studies/Analysis to Address Identified Significant Information Gaps

- BLM requests the installation of sediment monitoring stations at affected tributaries downstream of roads and requests the measurement of sediment discharges.
- BLM requests the total sediment contribution estimation to Kerckhoff Reservoir from road erosion for next 50 years.

Study Methods and Analysis

- BLM requests the installation of sediment monitoring stations to get quantitative data about sedimentation contributions from roadways.

PAD VOLUME 2: Appendix D: STUDY WQ 1

The BLM requests the consideration of the following be added to the study.

Proposed Studies/Analysis to Address Identified Significant Information Gaps

- BLM requests more information including, what depths the water will be sampled and for a detailed environmental condition of when water is sampled.

PAD VOLUME 2: Appendix D: STUDY WQ 2

The BLM requests the consideration of the following be added to the study.

Potential Information Gaps

- Water quality varies with precipitation; BLM requests the study identifies differences between typical and storm water sampling events.

Proposed Studies/Analysis to Address Identified Significant Information Gaps

- BLM requests the characterization of water quality be separated into three different water flow conditions: maximum, minimum, and average.

Study Methods and Analysis

- BLM requests tests be conducted to see what trace elements are bioavailable and bioaccessible because trace element concentrations by themselves give incomplete information about toxicity.

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

- BLM requests that arsenic (a common toxic element) be added to this table. BLM also requests that tests on metals be conducted in a manner that identifies if the element is bioavailable or bioaccessible.

PAD VOLUME 2: Appendix D - STUDY CUL 1 Cultural Resources**POTENTIAL RESOURCE ISSUE(S)**

- The BLM would like to add *unrecorded and unidentified* cultural resources to the list of potential resource issues.

PROJECT NEXUS

- The BLM would like to add regulatory compliance with Executive Order 13007 (sacred sites), the Native American Graves Protection and Repatriation Act (NAGPRA), and the Archaeological Resources Protection Act (ARPA).

RELEVANT INFORMATION

- 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 BLM, and may not be 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 BLM.
- The following excerpt references documentation that may not directly address the study area (i.e. Crane Valley) and the BLM requests that references be directly relevant to the Project area, including ethnography and contextual studies.
- The Nettles and Cimino (2013) document did not seek comment from the BLM regarding the APE prior to SHPO consultation. The BLM has noted that the 2013 document is inadequate as it leaves out a large number of unrecorded resources directly related to the Kerckhoff Project. The APE was a background review of existing documentation, only and did not include fieldwork to identify known and unrecorded resources. Existing and unrecorded resources need to be considered. The 1977 archaeological study is out of date and needs to be updated to meet current industry and agency requirements.
 - 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);
 - *Ethnographic, Ethnohistoric, and Traditional Cultural Property Study for the Crane Valley Hydroelectric Project* (McCarthy et al. 2011);
 - *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 BLM should be involved in the determination of the APE with FERC and SHPO.
- The BLM requests that NRHP documentation and evaluation of all cultural resources, includes the built environment, unrecorded sites created by the Kerckhoff project since its inception, regardless of the previously approved FERC boundary. FERC and PG&E have historically used and maintained areas beyond the boundary. Many of these resources are over 50 years in age. One example is the domestic encampment that was largely demolished in the 1960's including a large refuse dump that may contain hazardous materials.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- The BLM should be involved in the establishment of the APE in coordination with the FERC and SHPO. The APE should contain all areas proposed for inclusion in the FERC boundary, as

well as all areas used historically (including domestic use areas) by FERC and PG&E as part of operations and maintenance.

- The BLM requests completion of NRHP evaluations of all cultural resources that could potentially be affected by Project operation and maintenance activities. The use of historic and archaeological resources is not inclusive of the types of resources located within the Project and only covers NRHP evaluations for Criteria D. Criteria A, B, and C must also be considered in the identification process.
- Complete NRHP evaluations of all cultural resources that may have been affected by past Project operation and maintenance activities.
- Conduct impact assessments based upon the results of the planned studies. The BLM recommends the development of a NAGPRA plan of action for the duration of the Project.

EXTENT OF STUDY AREA

- The BLM requests that the study area include the area within 1.0 miles of the FERC Project Boundary and any Project facility that resides within 1.0 miles 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. It is critical to include the Squaw Leap geologic feature within the study area.
- Field surveys will require a BLM CRUP and FWA be obtained by a professional archaeologists prior to any scheduled field surveys as part of BLM compliance with FLPMA and ARPA. As noted in the development of the APE, the BLM requests to be involved in order to expedite the CRUP and FWA required for fieldwork. FERC's current description of the APE does not appear to meet the BLM's minimum standards for fieldwork.

STUDY METHODS AND ANALYSIS

- The BLM Bakersfield Field Office Cultural Resources Program requests to be added to the list of sources for which additional information may be available to supplement the information that was completed for the PAD.

Field Surveys

- The BLM requests a Class III inventory of the entire APE plus a 200 foot buffer for the identification of cultural and archaeological resources. Transect spacing shall be limited to a maximum of 15 meters with any exclusion areas clearly identified using GPS technology and mapped appropriately.
- The criteria listed in the PAD for moderate-high archaeological sensitivity is vague and does not adequately document cultural resources in such areas, once defined. The BLM requests a maximum of 15 meter transects be used instead of the following section from the PAD:
 - Conduct reconnaissance-level (pedestrian transects of no less than 30 meters [m] [98 ft.] in areas of moderate-high archaeological sensitivity) or focused (revisiting

previously recorded site locations only) surveys to re-examine previously surveyed areas within the APE.

- The BLM requests that all fieldwork be conducted under a BLM CRUP as defined by the Federal Land Policy and Management Act (FLPMA) and ARPA.

National Register of Historic Places Evaluations

- The BLM requests that all cultural resources located within the APE be evaluated.
- For the items listed in this section, a BLM CRUP and FWA are requested. In order for the BLM to respond efficiently, this process should be clarified with FERC well in advance of any field studies associated with NRHP evaluations.

CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE

- The BLM requests that the BLM California Protocol be added to the list of documents in this section.
 - The most current version of this document can be found online at: <https://www.blm.gov/sites/blm.gov/files/CA%20Protocol.pdf>

PRODUCTS

- The Draft CUL 1 TSR will be submitted to appropriate resource agencies and interested parties for a 90-day review and comment period.

POSSIBLE EARLY SCHEDULE

- The BLM requests to be included in and notified regarding the following scheduled events. A BLM CRUP and FWA may be required by the BLM.

Date	Activity
April–May 2018	Establish APE in consultation with FERC, BLM and SHPO
June 2018	Conduct detailed review of previous survey reports and records
December 2018–March 2019	Conduct field surveys, after obtaining BLM CRUP
January–May 2019	Develop NRHP Work Plan in consultation with tribes and resource agencies (as appropriate)
July–September 2019	Conduct NRHP eligibility studies, after obtaining BLM CRUP
October–November 2019	Prepare Draft CUL 1 TSR and distribute for review and comment by authorized participants
June 2020	Comments will be addressed and the final CUL 1 TSR will be distributed with Draft License Application to authorized participants

PAD VOLUME 2: Appendix D - STUDY CUL 2 Tribal Resources

POTENTIAL RESOURCE ISSUE(S)

- The BLM requests that Executive Order 13007 (sacred sites) be listed as a potential resource issue.

RELEVANT INFORMATION

- The BLM requests to be added FERC's list of databases and information available to determine tribal resources study needs. The BLM maintains a list of tribal contacts and has extensive contacts in this area.

POTENTIAL INFORMATION GAPS

- The BLM finds that there is inadequate identification of Native American community respondents.

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- The BLM requests that FERC address how they plan to address inadequate identification of Native American community respondents. The items listed here do not address the potential data gap item addressed in the previous section.

EXTENT OF STUDY AREA

- The BLM requests that the study area include the area within 1.0 miles of the FERC Project Boundary and any Project facility that resides within 1.0 miles 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. It is critical to include the Squaw Leap geologic feature within the study area.
- Fieldwork may require a BLM CRUP and FWA be obtained by a professional archaeologists prior to any scheduled fieldwork as part of BLM compliance with FLPMA and ARPA. As noted in the development of the APE, the BLM requests to be involved in order to expedite the CRUP and FWA required for fieldwork.

Archival Research

- The BLM requests to be added to the list in this section as the Bakersfield Field Office Cultural Resources Program may contain relevant information not curated elsewhere.

PRODUCTS

- The inventory and evaluation report will be submitted to appropriate resource agencies and stakeholders for a 90-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 December 2019.

SCHEDULE

- The BLM requests to be included in and notified regarding the following scheduled events. A BLM CRUP and FWA may be required by the BLM.

Date	Activity
April–June 2018	Conduct archival research
June–November 2018	Tribal consultation and site visits

Bureau of Land Management

Kerckhoff Project (FERC Project No. 96)

December 2018–January 2019	Identify potential Project impacts and determine need for NRHP eligibility studies in consultation with tribes and the BLM
February 2019–March 2019	Develop NRHP work plan in consultation with tribes and resource agencies
April–July 2019	Conduct NRHP eligibility studies
July–August 2019	Stakeholders review and provide comments on Draft CUL 2 TSR (90 days)
September–October 2019	Resolve comments and prepare Final CUL 2 TSR



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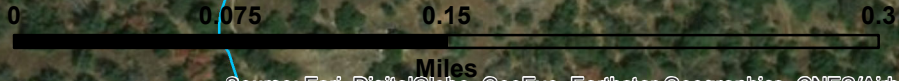
surge tank

Surge Reservoir 9182

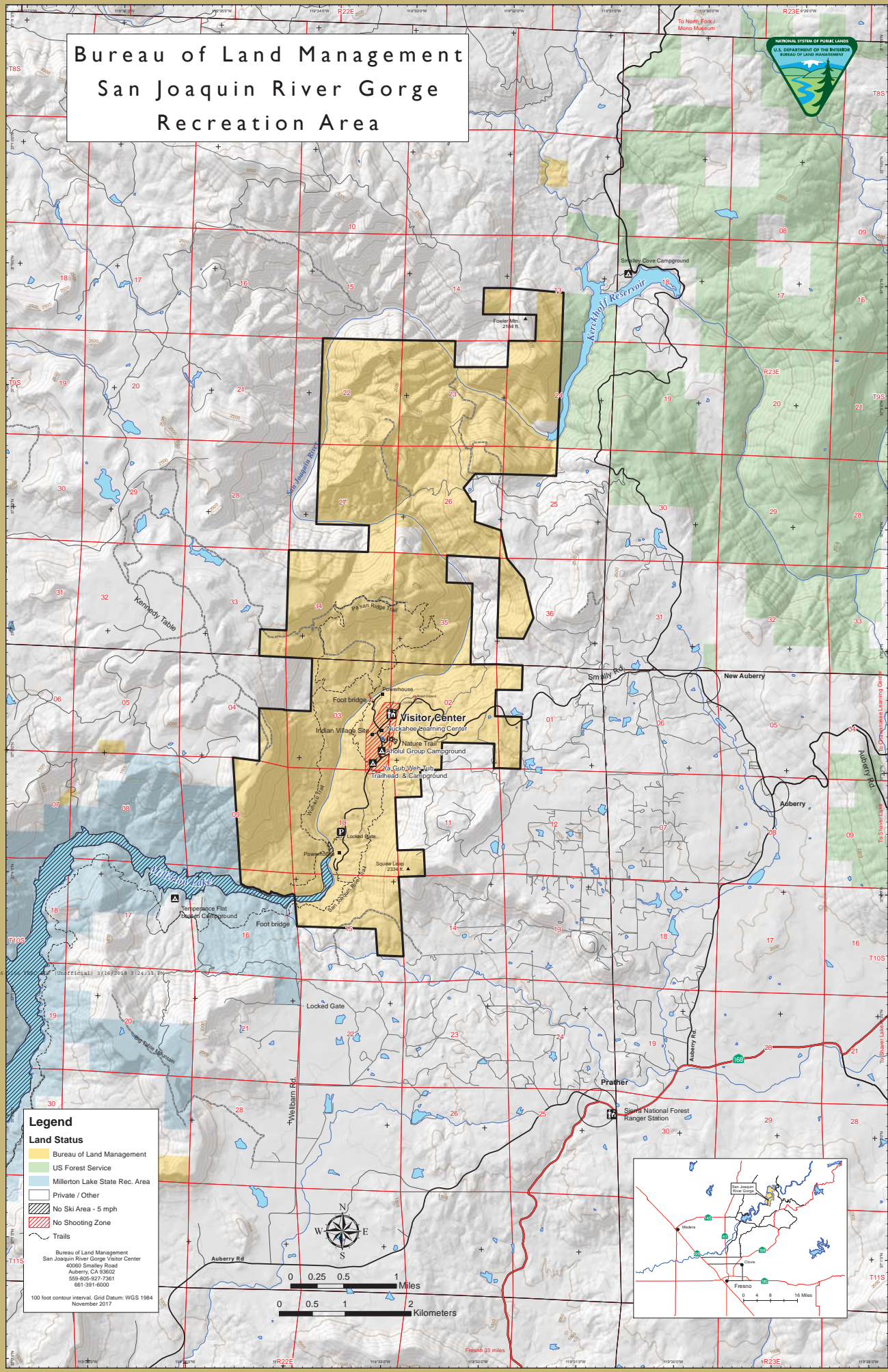
Pond Spring #1 9183

**Kerckhoff Relicensing:
Project Facilities and Features at
K2 Powerhouse area**

- Approximate Project Boundary
- Range Features
- Existing Fence
- Ditch route
- Trails



Bureau of Land Management San Joaquin River Gorge Recreation Area



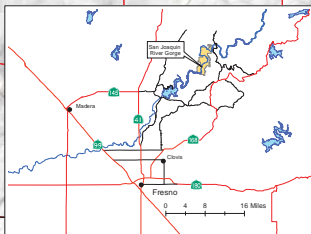
Legend

Land Status

- Bureau of Land Management
- US Forest Service
- Millerton Lake State Rec. Area
- Private / Other
- No Ski Area - 5 mph
- No Shooting Zone
- Trails

Bureau of Land Management
San Joaquin River Gorge Visitor Center
4000 S Smiley Road
Auberry, CA 95602
559-805-927-7361
561-391-6900

100 foot contour interval. Grid Datum: WGS 1984
November 2017



**APPENDIX A
STUDY PLAN CRITERIA
ARSENIC CONTAMINATION
18 CFR Section 5.9(b)**

Any information or study request must contain the following:

1. Describe the goals and objectives of each study proposal and the information to be obtained;

This study will inventory the character and volume of arsenic sediments and solutions in the project area. This inventory has long-term consequences for managing the arsenic in the project area. The objective is to identify the distribution of arsenic in sediments and waters of the project area and provide alternatives for how this resource could be managed to reduce human and environmental exposure to arsenic

2. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

In the Bakersfield Resource Management Plan, inventory and management of the arsenic and other toxic chemicals in the Bakersfield Field Office was identified. Operation of the Kerckhoff Dam and reservoir collects arsenic because arsenic is retained in the Kerckhoff Reservoir and not allowed to move down the San Joaquin River.

3. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

Requester is the Bureau of Land Management

4. Describe existing information concerning the subject of the study proposal, and the need for additional information;

There are no known arsenic studies in the area.

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

Sedimentation of the Kerckhoff Reservoir collects arsenic. Management of sediment is necessary for the long-term operation of the power plant. This management could be

designed to recovery unwanted arsenic in the project area. This study could be conducted in concert with the Gold study

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

The arsenic inventory would include stream sediment sampling in the San Joaquin River between the Kerckhoff Dam and Millerton Lake. The inventory would also include characterization of the arsenic quality and quantity in Kerckhoff Reservoir. This would be measured through a Vibroseis sampling plan. Samples would be assayed for arsenic content and also classify them according to bioavailability and bioaccessibility



Figure 1. Vibroseis sampler at the Buena Vista Mercury Mine pond.

7. Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.

No alternative studies are proposed. A sampling plan for the project area would be

1. Kerckhoff Reservoir: \$	15,000
2. San Joaquin River:	\$5,000
3. Arsenic assay and characterization	\$30,000
Total	\$50,000

**APPENDIX B
STUDY PLAN CRITERIA
RECREATIONAL GOLD PANNING
18 CFR Section 5.9(b)**

Any information or study request must contain the following:

8. Describe the goals and objectives of each study proposal and the information to be obtained;

This study will inventory the character and volume of gold-bearing sediments in the project area. This inventory has long-term consequences for managing the recreational gold panning resource. The objective is to identify the distribution of gold in sediments of the project area and provide alternatives for how this resource could be managed to improve gold panning opportunities.

9. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

In the Bakersfield Resource Management Plan, inventory and management of the recreational gold panning resource of the San Joaquin River Gorge Special Management Area was identified. Operation of the Kerckhoff Dam and reservoir restricts this resource because gold is retained in the Kerckhoff Reservoir and not allowed to move down the San Joaquin River where gold panners historically operated.

10. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

Requester is the Bureau of Land Management

11. Describe existing information concerning the subject of the study proposal, and the need for additional information;

Historic information about gold mining, including placer mining, in the project area are summarized on the U.S. Geological Survey abandoned mine database. See

<https://mrdata.usgs.gov/mrds/>

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

Sedimentation of the Kerckhoff Reservoir limits accessibility to gold for recreational gold panning. Management of sediment is necessary for the long-term operation of the power plant. This management could be designed to increase gold recovery in the project area by recreational gold panniers. This study could be done concurrently with the ARSENIC study.

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

The gold inventory would include stream sediment sampling in the San Joaquin River between the Kerckhoff Dam and Millerton Lake. The inventory would also include characterization of the gold quality and quantity in Kerckhoff Reservoir. This would be measured through a Vibroseis sampling plan



Figure 2. Vibroseise sampler at the Buena Vista Mercury Mine pond.

14. Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.

No alternative studies are proposed. A sampling plan for the project area would be

4. Kerckhoff Reservoir:	\$15,000
5. San Joaquin River:	\$5,000
6. Gold assays (gravity separation)	\$3,000
 Total	 \$23,000

Document Content(s)

Signed BLM Comments CL.PDF.....1-2

Comments on Scoping Document 1_BLM.PDF.....3-4

Comments on Pre-Application Document_BLM.PDF.....5-20

Attached Map 1_Kerckhoff Facilities at K2.PDF.....21-21

BLM SJRG_Rec_Map.PDF.....22-22

Study Requests_BLM.PDF.....23-28



United States
Department of
Agriculture

Forest
Service

Sierra National Forest

1600 Tollhouse Road
Clovis, CA 93611
559-297-0706
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Fax: 559-294-4809

File Code: 2770
Date: March 16, 2018

Debbie Powell
Senior Director, Power Generation-Operations
Pacific Gas and Electric Company
P.O. Box 770000, MCN11D-1138
San Francisco, CA 94177-0001

Subject: Forest Service comments on Pre-Application Document for Kerckhoff Hydroelectric Project, P-96-045

Dear Ms. Powell:

Pursuant to 18 CFR 5.9, the Forest Service is providing the following response to the Pre-Application Document (PAD) filed by Pacific Gas and Electric Company for the Kerckhoff Hydroelectric Project (P-96-045) on November 16, 2017. This response is being submitted by the USDA Forest Service, Sierra National Forest, hereafter referred to as "Forest Service."

This filing includes one attachment (Attachment 1), which includes our comments on Proposed Draft Study Plans, Appendix D of the PAD.

We look forward to working with Pacific Gas and Electric Company and other interested stakeholders on the relicensing of this project. If you have any questions regarding this filing, you may contact Jon George, Public Services Staff Officer, Sierra National Forest, at (559) 297-0706 extension 4923, or via email at jongorge@fs.fed.us.

Sincerely,

DEAN GOULD
Forest Supervisor

Enclosure

cc: FERC service list



ATTACHMENT 1

Kerckhoff Hydroelectric Project (P-96-045)

USDA Forest Service Comments on Pre-Application Document

March 1, 2018

The Forest Service provides the following comments on the Kerckhoff Hydroelectric Project (Project) Pre-Application Document (PAD) Appendix D, Proposed Draft Study Plans. The Forest has reviewed the Proposed Studies in the PAD, and agrees they are relevant, and will help inform operations and management, pertinent to relicensing. The studies should provide necessary information to help develop plans and management actions that will maintain, restore or enhance water quality and habitat for riparian and aquatic species, consistent with the Sierra National Forest Land and Resource Management Plan (LRMP). The Forest Service offers the following comments and recommendations to the studies proposed in the PAD:

STUDY HYD 1: Operations Simulation Model

No comments

STUDY HYD 2: Hydrology With and Without the Project

No comments

STUDY GEO 1: Channel Form and Fluvial Processes

No comments

STUDY GEO 2: Project-related Sediment Management Practices in Kerckhoff Reservoir

No comments

STUDY GEO 3: Project-related Erosion

No comments

STUDY WQ 1: Water Temperature in Kerckhoff Reservoir and San Joaquin River Bypass Reach

The Forest Service would like clarification on temperature monitoring in Kerckhoff reservoir. The bullet at the top of page WQ 1-2 says water temperature profiles will be measured from a boat, but the Study Methods and Analysis says that continuous water temperature data recorders will be used at three stations in Kerckhoff reservoir, with an additional site in the tailrace of the A.G. Wishon Powerhouse. It isn't clear whether the intent is to continuously record temperature at these locations and only take water profiles during three months at the dam, or if the intent is to only take three monthly water readings at all sites including the dam.

The Forest Service suggests using continuous water temperature arrays at 5 locations within Kerckhoff reservoir:

1. San Joaquin River upstream of the reservoir
2. In the tailrace or just downstream from the A.G. Wishon Powerhouse
3. Above Smalley Cove in reservoir
4. Downstream of Smalley Cove in reservoir
5. Just upstream of the dam

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

The timing of the sample collections should be specified.

STUDY AQ 1: Aquatic Habitat Mapping

Sample locations limited to safe access points mentioned here and in other studies will bias results. This should be kept in mind in the data analysis, interpretation. Some idea of how representative survey sites are relative to the other habitats in bypass reach should be articulated.

STUDY AQ 2: Fish Populations

During this study, AQ 3, and AQ 5 the Forest Service recommends recording aquatic invasive non-native species (e.g., bass, bullfrogs, mudsnails) encountered and including this information in the reports for these studies or in a separate report. This information will be used in the development of a collaborative interagency and Licensee control/prevention/removal plan (in cooperation with California Department of Fish and Wildlife (CDFW), Bureau of Land Management, Bureau of Reclamation, PG&E, and the Forest Service) in relation to Project facilities and Project operations and maintenance.

Project Nexus: there is no recent quantifiable data available on the presence and extent of invasive aquatic species in the project area. Conditions created by the project provide abundant suitable habitat for such undesired and harmful species to gain a foothold, to thrive and spread to other more natural areas, where they can prey on or outcompete native species of concern (i.e., hardhead minnows, western pond turtles, foothill yellow-legged frogs). Early detection and control of such invasive species will protect a variety of important resources and equipment most efficiently and effectively, and reduce stressors to rare and sensitive species, allowing for their recovery or restoration.

STUDY AQ 3: Mussels and Aquatic Mussels

The Forest Service recommends using environmental DNA (eDNA) to survey for sensitive mollusk species if they are not detected during surveys.

STUDY AQ 4: Entrainment

No comments

STUDY AQ 5: Western Pond Turtles

No comments

STUDY BOT 1: Plant Communities, Special Status Plants, Invasive Weeds

No comments

STUDY BOT 2: Riparian and Wetland Resources

No comments

STUDY WILD 1: Special-status Species

The Forest Service recommends including eDNA sampling for detection of foothill yellow-legged frog in suitable habitat within the project area. This is a relatively new (post-licensing) but inexpensive and reliable scientific method for finding hard-to-detect species.

Project Nexus: Timing of flows, water temperatures, and water level affect frog reproductive success, and thus operations can displace or destroy egg masses and/or tadpoles. Environmental DNA testing is a relatively new (post-licensing) but inexpensive and reliable scientific method for finding hard-to-detect species. Because foothill yellow-legged frog is rare on the forest, historically present, and currently under consideration for listing, it would be desirable to include this type of sampling. Other species of frogs and invasives can also be detected with this method.

STUDY LAND 1: Project Roads and Trails Assessment

No comments

STUDY REC 1: Whitewater Boating Flow Assessment

No comments

STUDY REC 2: Recreation Facility Assessment

The Forest Service recommends identifying any additional suitable locations and means for interpretation/outreach/education to provide public information specific to the area, regarding site-specific topics such as invasive plant and animal species, and highlight natural history, cultural history, aquatic resources, and recreation opportunities.

Project Nexus: Prevent/reduce new introductions of invasive species. Increase awareness and build understanding and appreciation for the area: educate on benefits of the system and maintaining natural areas that provide clean, high quality, functioning hydrologic resources for plants, fish, frogs, turtles, and people. (can include public safety messages and also reduces vandalism, trash, etc.)

STUDY REC 3: Recreation Visitor Use

No comments

STUDY REC 4: Recreation Visitor Use Surveys

No comments

STUDY CUL 1: Cultural Resources

No comments

STUDY CUL 2: Tribal Resources

No comments

Additional Comments

The following are Sierra National Forest Objectives for protection and maintenance of TES species and habitat relative to operations and maintenance of hydropower facilities, and the Kerckhoff relicensing project:

- Emphasize habitat improvements for sensitive, threatened, endangered and harvest species;
- Maintain in stream flow requirements and habitat conditions that maintain, enhance, or restore all life stages of native aquatic species, and that maintains or restores riparian resources, channel integrity, and fish passage.
- Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.
- Ensure that management activities do not adversely affect water temperatures or flows necessary for native local aquatic- and riparian-dependent species assemblages.
- Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.
- Identify and enhance low to moderate quality fish habitat that has potential to improve from structural or nonstructural improvement;
- Manage fish, wildlife and plant habitats to maintain viable populations of indigenous fish, wildlife and plant species. Maintain and restore habitat to support viable populations of native plant, invertebrate, and vertebrate riparian-dependent species.
- Work collaboratively with CDFW to identify, remove, and reduce invasive species, Prevent new introductions of invasive species. Maintain populations of non-native desired recreational fish species where not in conflict with objectives for native TES species maintenance or restoration.

Document Content(s)

USFScommentsKerckhoffPADatt1.DOCX.....1-4

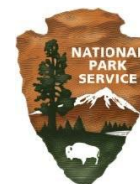
USFS_Comments_On_PreApplication_Document_For_Kerckhoff.PDF.....5-5



United States Department of the Interior

NATIONAL PARK SERVICE

Pacific West Region
333 Bush Street
San Francisco, CA



3/16/2018

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

Electronic Filing

Re: National Park Service's (NPS's) comments on the pre-application document (PAD) and study requests for the Kerckhoff Hydroelectric Project (P-96)

Dear Ms. Bose:

Thank you for the opportunity to provide comments on this project. The NPS Hydropower Assistance Program, Pacific West Region, offers the following comments and study request in response to the Federal Energy Regulatory Commission's (FERC's) Request for Comments on the PAD for the Kerckhoff Hydroelectric Project (P-96) filed on January 16, 2017.

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

The NPS commends the applicant's decision to conduct a whitewater boating study (Study REC 1: Whitewater Boating Assessment) following the guidelines laid out in *Flows and Recreation: A Guide to Studies for River Professionals* (Whittaker, Shelby, and Gangemi 2005), as noted in Appendix D of Volume 1, Part 2 of the PAD under Study Methods and Analysis on page REC-3. However, the NPS notes that the applicant's proposed whitewater boating study deviates from the methods outlined in Whittaker et. al. (2005), which are consistent with generally accepted practices in the scientific community, and have been used in whitewater boating studies for numerous FERC hydropower-licensing projects. The methods described in the Whittaker et. al. (2005) involve a phased approach where the results of a "Level 1" assessment are used to determine whether a "Level 2" assessment is warranted, while the results of a "Level 2" assessment determines if a "Level 3" assessment is warranted. In Study REC 1 of the PAD, the applicant also proposes a phased approach, although in a greatly modified form.

Level 1 of the phased approach in the Whittaker et. al. (2005) guide outline the “desk-top options,” which include 1) literature review, 2) hydrology assessment, 3) structured interviews, recreation focus group, and stakeholder meeting, and 4) documenting identified needs and explicit criteria for progressing to Level 2 studies. In the proposed whitewater boating study presented as REC 1 in the PAD, the applicant’s phased approach replaces “Levels” with “Phases,” which include Phase 1) Information Gathering, Phase 2) Hydrology Assessment, and Phase 3) Focus Group Sessions. Other than documenting the need to progressing to Level 2 studies, Level 1 of Whittaker et. al. (2005) method and the three phases of the applicant’s proposed study in the PAD are identical. However, that is where the similarities between the two study methods ends as the applicant did not consider the subsequent study levels identified in Whittaker et. al. (2005).

In Whittaker et. al. (2005), Level 2 involves the “limited reconnaissance options,” which includes site visits for boating feasibility assessments and expert judgement assessments. Level 2 also involves documenting identified needs and explicit criteria for progressing to Level 3 studies. Following this, Level 3 provides guidance for “intensive study options,” which include 1) multiple flow reconnaissance assessments, 2) flow comparison surveys of experienced users, 3) controlled flow studies, and 4) supply and demand/use assessments.

As identified above, the decision to conduct a Level 2 study would occur after careful scrutiny of the data gathered from the Level 1 study. Similarly, the decision to conduct a Level 3 study would occur after careful scrutiny of the data gathered from the Level 2 study. Making these decisions would generally include the involvement of agencies and other stakeholders who have an interest in the outcome.

The applicant does not provide any rationale for departing from the generally accepted study methods provided by Whittaker et. al. (2005). The NPS is thus submitting a study request that outlines a more comprehensive whitewater boating study that includes the options to conduct Level II and Level III assessments as outlined in Whittaker et. al. (2005). The NPS believes that a potential outcome of not following the generally accepted practices is a lack of sufficient data needed to make meaningful conclusions on existing and potential recreation whitewater boating.

Thank you again for this opportunity to comment on the PAD for the Kerckhoff Hydroelectric Project (P-96) and making a study request. If you have any further questions, please contact Steve Bowes at 415-623-2321 or Barbara Rice at 415-623-2320.

Sincerely,



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

NPS Study Request: Whitewater Boating Study

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

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

This purpose of this study is to evaluate the impacts of the Project on existing and potential recreation whitewater boating use. The focus of this study is the San Joaquin River downstream of Kerckhoff Dam and includes the following areas: Patterson Bend Run (Kerckhoff Dam to Powerhouse #1), Squaw Leap Run (Powerhouse #1 to Powerhouse #2), Millerton Lake Bottom Run (Powerhouse #2 to Millerton Lake), Smalley Cove put-in, the public put-in outside of Smalley Cove, and the Kerckhoff Reservoir.

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

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

The Project has the potential to affect 14.7 river miles of whitewater resources including; the Patterson Bend Run; the Squaw Leap Run; and the Millerton Lake Bottom Run. As part of the licensing effort, a comprehensive look at recreation needs should be conducted per FERC guidance to evaluate existing and potential future recreation needs (18 CFR 4.51).

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

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

The NPS is a resource agency. It is in the public's interest to fully document recreation opportunities and potential for improvements in this important window of relicensing. Whitewater boating on the San Joaquin is impacted by project operations and as part of the licensing effort recreation needs must be considered as per FERC guidance to evaluate existing and potential future recreation needs (18 C.F.R. 4.51).

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

The PAD utilizes existing information from *American Whitewater National River Database* and Holbeck and Stanley's *The Best Whitewater in California* but does not include information from Daniel Brasuell's websites, which area as follows:

- www.awetstate.com/SanJoaquinPB.html
- www.awetsate.com/SanJoaquinSL.html.

Information from the above websites should be included. Additional information is also needed on Project Area hydrology, whitewater boating opportunities, Project operations effects on those opportunities, and how recreationists access boatable reaches in the Project Area. The PAD also lacks a description of potential improvements that could be conducted to help enhance real time hydrology information on boatable flows or other options for enhancing the experience.

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

A clear nexus exists between Project operations and recreational opportunities on the San Joaquin River. Recreation boating opportunities occur directly below Kerckhoff Dam, a Project facility, and operation of that dam has direct impacts of flow levels. Recreational boating activities are dependent upon flow levels.

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

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

A **Level 1 Assessment** includes:

1. **Literature Review:** Review and summarize existing documents with information about recreation opportunities or the river's physical characteristics that make it attractive for recreation.
2. **Hydrology Assessment:** Summarize hydrology for the reach and the hydrologic relationship between river gauges and the river flows of this reach. Describe how the project operations work and affect the hourly, daily, and monthly flows and potential recreation opportunities. This summary of information may also include interviews with people knowledgeable about the river system and the gauges on the river.
3. **Interviews, Recreation Focus Group, and Stakeholder Meeting:** Interviews should be conducted with key resource experts and recreation users to gain additional information about recreational opportunities and the Project's hydrology. A stakeholder and focus

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

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

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

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

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

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

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

A site visit should be planned for the spring or early summer. This will offer a greater probability of observing higher than base flow levels. It also provides sufficient time to develop preliminary hydrology information about higher flows, become familiar with the

resource via interviews and existing literature, and set up logistics with local whitewater boaters who may help guide the site visit. The site visit should include evaluations of the three reaches for all recreation opportunities.

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

The Level 2 report should include explicit decisions about whether additional study is necessary. The applicants and their consultants would outline the issues in the report, but review by agencies and stakeholders (via working groups) can make those decisions more collaborative or identify disputes. The decision of whether to launch a more intensive Level 3 study is the critical study output, dependent on answers to the same questions discussed for the adequacy of Level 1 efforts.

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

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

The cost would be contingent on the billing rate arrangement with the applicants' consultant (rate is not known) and the number of study levels that are determined necessary as the study progresses, but would consistent with the cost of equivalent studies. With these factors in mind, a rough estimate of cost is between \$40,000 and \$70,000. The lower estimate is based on a Level 1 Assessment being sufficient to collect the needed information, while the higher estimate is based upon the need to conduct a Level II Assessment and possibly a Level III Assessment.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street
San Francisco, CA 94105-3901

March 16, 2018

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

Subject: Comments on Kerckhoff Hydroelectric Project Notice of Intent to File License Application for a New License and Commencing Pre-filing Process; Fresno and Madera Counties, CA

Dear Secretary Bose:

The U.S. Environmental Protection Agency (EPA) has reviewed the Federal Energy Regulatory Commission's (Commission) Notice of Intent to File License Application for a New License and Commencing Pre-filing Process for the Kerckhoff Hydroelectric Project hydropower relicensing. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

EPA recognizes the need for renewable, zero carbon emission power sources in California and welcomes the relicensing process as an opportunity to evaluate and minimize the impacts of existing hydroelectric projects on the regional environment. The Kerckhoff Hydroelectric Project (Project) license will expire in 2022; EPA is providing the attached comments to assist in the development of an environmental assessment (EA) or draft environmental impact statement (EIS) for the Project's relicensing.

EPA appreciates the opportunity to review this notice and is available to discuss our comments. When the draft EA or EIS prepared for this proposed action is released for public review, please send one hard copy and one CD to the address above (mail code: ENF-4-2). If you have any questions, please contact me at 415-947-4167 or prijatel.jean@epa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jean Prijatel".

Jean Prijatel
Environmental Review Section

Enclosure: EPA's Detailed Comments

EPA DETAILED COMMENTS ON THE NOTICE OF INTENT TO FILE LICENSE APPLICATION FOR A NEW LICENSE AND COMMENCING PRE-FILING PROCESS FOR THE KERCKHOFF HYDROELECTRIC PROJECT; FRESNO AND MADERA COUNTIES, CA – MARCH 16, 2018.

Purpose and Need

EPA recommends that the draft Environmental Assessment (EA) or draft Environmental Impact Statement (EIS) for the proposed project clearly identify the underlying purpose and need to which the Federal Energy Regulatory Commission (Commission) is responding in proposing the range of alternatives (40 CFR 1502.13). The *purpose* of the proposed action is typically the specific objectives of the activity, while the *need* for the proposed action may be to eliminate a broader underlying problem or take advantage of an opportunity.

The project purpose is essential for defining the range of alternatives to be considered for the project. The purpose and need should be a clear, objective statement of the rationale for the proposed project, as it provides the framework for identifying project alternatives. The draft EA or EIS should concisely identify why the project is being proposed, why it is being proposed now, and should focus on the specific desired outcomes of the project (e.g. hydropower generation) rather than prescribing a predetermined resolution.

Alternatives Analysis

In the draft document, evaluate in detail all reasonable alternatives that fulfill the project's purpose and need, including alternatives outside the legal jurisdiction of the Commission (40 CFR Section 1502.14(c)). Provide a clear discussion of the reasons for the elimination of alternatives that are not evaluated in detail.

A robust range of alternatives will include options for avoiding significant environmental impacts. The draft document should clearly describe the rationale used to determine whether impacts of an alternative are significant or not. Determine thresholds of significance by considering the context and intensity of an action and its effects (40 CFR 1508.27).

The environmental impacts of the proposed action and alternatives should be presented in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14). The potential environmental impacts of each alternative should be quantified to the greatest extent possible (e.g. acres of wetlands impacted; quantity of emissions).

To ensure a robust environmental analysis of a project license that may be issued, at least one alternative should include the mandatory conditions required by other state and federal agencies. These conditions may include provisions for fish passage, habitat connectivity and enhancements, sediment transport, and flow regimes.

Scope of Assessment

In determining the appropriate scope of the assessment to be conducted, please refer to the Council on Environmental Quality (CEQ) regulation at 40 CFR 1508.25, which defines the scope of an individual EIS as consisting of the range of actions, alternatives (see above), and impacts to be considered.

Indirect and Cumulative Impacts

Cumulative impact analyses describe the threat to resources as a whole, presented from the perspective of the resource instead of from the individual project. Cumulative impacts can result from individually

minor, but collectively significant, actions taking place over a period of time (40 CFR §1508.7). Discussions of cumulative impacts are usually more effective when included in the larger discussions of environmental impacts from the action (the environmental consequences chapter), as opposed to discussing cumulative impact analyses in a separate chapter.

The cumulative impacts analysis should identify how resources, ecosystems, and communities in the vicinity of the project have already been, or will be, affected by past, present, or future activities in the project area. These resources should be characterized in terms of their response to change and capacity to withstand stresses. Trends data should be used to establish a baseline for the affected resources, to evaluate the significance of historical degradation, and to predict the environmental effects of the project components.

For the cumulative impacts assessment, we recommend focusing on resources of concern or resources that are “at risk” and/or are significantly impacted by the proposed project, before mitigation. For this project, the Commission should conduct a thorough assessment of the cumulative impacts to aquatic and biological resources, especially in the context of the other projects operating and proposed in the watershed.

EPA recommends that the draft document identify which resources are analyzed, which ones are not, and why. For each resource analyzed, the draft document should:

- Identify the current condition of the resource as a measure of past impacts. For example, the percentage of species habitat lost to date.
- Identify the trend in the condition of the resource as a measure of present impacts. For example, the health of the resource is improving, declining, or in stasis.
- Identify all on-going, planned, and reasonably foreseeable projects in the study areas which may contribute to cumulative impacts.
- Identify the future condition of the resource based on an analysis of impacts from reasonably foreseeable projects or actions added to existing conditions and current trends.
- Assess the cumulative impacts contribution of the proposed alternatives to the long-term health of the resource, and provide a specific measure for the projected impact from the proposed alternatives.

The draft document should consider the cumulative impacts associated with other projects proposed in the area and the potential impacts on various resources including: water supply, endangered species, and habitat.

The draft EA or EIS should quantify cumulative impacts across resources areas, as well as describe and evaluate feasible mitigation measures to avoid and minimize the identified adverse cumulative impacts. Although these mitigation measures may be outside the jurisdiction of the Commission or project proponents, describing them in the draft document would serve to alert other agencies or officials who can implement these extra measures (CEQ 40 Questions No. 19(b)).

The Bureau of Reclamation published a Draft Environmental Impact Statement for the Upper San Joaquin River Basin Storage Investigation (USJRBSI) in 2014, proposing a new dam and reservoir between Millerton Lake and Kerckhoff Dam. In addition to evaluating the cumulative environmental impacts associated with this project, in the draft EA or EIS discuss the status of the USJRBSI and how its implementation would impact the license for Kerckhoff Project. In particular, discuss if the license

would be reopened or amended to address flow regimes, sediment sluicing, and the operation or decommissioning of the project's powerhouses should the USJRBSI reservoir be implemented.

Biological Resources, Habitat, and Wildlife

The draft document should identify all petitioned and listed threatened and endangered species and critical habitat that might occur within the project area. The document should identify and quantify which species or critical habitat might be directly, indirectly, or cumulatively affected by each alternative and mitigate impacts to these species; emphasis should be placed on the protection and recovery of species due to their status or potential status under the federal or state Endangered Species Act.

Water Quality

The purpose of the Clean Water Act (CWA) is to restore and maintain the chemical, physical and biological integrity of waters of the United States. The CWA requires states to develop a list of impaired waters that do not meet water quality standards, and to establish priority rankings and develop action plans, called Total Maximum Daily Loads (TMDLs), to improve water quality. EPA recommends that the Commission provide, in the draft EA or EIS, information on CWA Section 303(d) impaired waters in the project area and how the project would impact these impairments.

In the Affected Environment section of the Water Quality chapter, discuss anticipated changes to the watershed in terms of quantity and timing of snowpack, runoff, and precipitation. Discuss how these changes may impact the hydrology in the project area and the operations of the project. This discussion should include impacts to water temperature, flow, sediment transport, and beneficial uses.

Consultation with Tribal Governments

Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments" (November 6, 2000) was issued in order to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, and to strengthen the United States government-to-government relationships with Indian Tribes.

EPA recommends that the draft EA or EIS describe the process and outcome of government-to-government consultation between the Commission and each of the tribal governments within the plan area, issues that were raised (if any), and how those issues were addressed in the selection of the preferred alternative. As a general resource, we recommend the document *Tribal Consultation: Best Practices in Historic Preservation*,¹ published by the National Association of Tribal Historic Preservation Officers.

National Historic Preservation Act and Executive Order 13007

Consultation for tribal cultural resources is required under Section 103 of the National Historic Preservation Act (NHPA). Historic properties under the NHPA are properties that are included in the National Register of Historic Places (NRHP) or that meet the criteria for the National Register. Section 106 of the NHPA requires a federal agency, upon determining that activities under its control could affect historic properties, to consult with the appropriate State Historic Preservation Office/Tribal Historic Preservation Office (SHPO/THPO). Under NEPA, any impacts to tribal, cultural, or other treaty resources must be disclosed in the EIS. Section 106 of the NHPA requires that Federal agencies consider the effects of their actions on cultural resources, following the regulation at 36 CFR 800.

¹ http://www.nathpo.org/PDF/Tribal_Consultation.pdf

Executive Order 13007 “Indian Sacred Sites” (May 24, 1996) requires federal land managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners, and to avoid adversely affecting the physical integrity, accessibility, or use of sacred sites. It is important to note that a sacred site may not meet the National Register criteria for a historic property and that, conversely, a historic property may not meet the criteria for a sacred site. It is also important to note that sacred sites may not be identified solely in consulting with tribes located within geographic proximity of the project. Tribes located outside of the plan area may also have religiously significant ties to lands within the plan area and should, therefore, be included in the consultation process.

EPA recommends that the draft EA or EIS address the existence of Indian sacred sites in the project areas. Explain how the proposed action would address Executive Order 13007, distinguish it from Section 106 of the NHPA, and discuss how the Commission would ensure that the proposed action would avoid adversely affecting the physical integrity, accessibility, or use of sacred sites. Provide a summary of all coordination with Tribes and with the SHPO/THPO, including identification of NRHP eligible sites and development of a Cultural Resource Management Plan.

**UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION**

Pacific Gas and Electric Company Kerckhoff Hydroelectric Project	FERC Project #96
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AMERICAN WHITEWATER'S COMMENTS AND STUDY REQUEST FOR PACIFIC GAS
AND ELECTRIC COMPANY PRELIMINARY APPLICATION DOCUMENT, PROPOSED
TECHNICAL STUDY PLANS FOR THE KERCKHOFF PROJECT
(FERC PROJECT NUMBER 96)

(Submitted March 16, 2018)

I. Introduction

American Whitewater offers the following study request for Pacific Gas and Electric Company (PG&E) Preliminary Application Document. Overall, we are pleased PG&E included an assessment of whitewater boating in the PAD's REC1 – Whitewater Boating Assessment. However, the methodology of the study is incomplete in scope and does not insure all relevant information will be gathered, American Whitewater is requesting a full whitewater boating study including an analysis of Spill Cessation and Coordinated Operations with Southern California Edison's Big Creek 4 Project 2017.

II. Interest of American Whitewater

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

III. Comments

6.2 Draft Proposed Studies

American Whitewater provides comment on proposed studies below. An actual study request will follow.

6.2.1.1 HYD1 Operation Simulation Model

An economic analysis included in the HYD 1 Operations Simulation Model study would augment and inform recreational resource studies.

Though PG&E proposed an Operations Simulation Model study, the American Whitewater recommends an operations model that would be able to compute power generation at the Kerckhoff Powerhouse #1 and #2 resulting from Project operations. The model should include the capability of reflecting operations to shape power generation to meet energy demands. If needed, post-processing of daily model output could be developed to simulate hourly operations of the powerhouses to simulate inter-day variations in releases from each powerhouse. This post-processor needs to be able to produce outputs in revenue as well as generation. Revenue projections should be based on the most current pricing data available. The outputs need to include standard generation, as well as any ancillary services provided by the project.

Note that the water balance/operations model runs on a daily time step and cannot directly simulate shorter time period power operations. So, to simulate the range, rate of change and occurrence of flows within a day, post-processing of the water balance/operations model output can be accomplished using Excel spreadsheets to apply hourly or 15 minute patterns to the daily flows for a representative period of interest.

Overall, PG&E should collaborate with Relicensing Participants on the more variable, discretionary elements of project operations, model output and additional post-processing needs for refined analysis and information.

6.2.7.1 REC 1 – Whitewater Boating Assessment

A Hydrographic Analysis of Spills should be included to help identify recreational flow opportunities within a natural hydrograph that are mutually beneficial to Species of Concern and Native Aquatic Species.

Since the management of naturally occurring spills within a natural hydrograph regime could provide opportunity for whitewater recreational flows and benefit species of concern as well as native aquatic species, American Whitewater recommends a Hydrographic Analysis of Spills that incorporates the following components:

- Historic 15-minute or hourly gauge information from PG&E loading the data to DSSVue for visualization and analysis using the US Army Corps of Engineers DSSVue software.
- Corresponding daily flow data for USGS records in DSSVue format.
- Characterize historic spill characteristics for spills more than 1000 cfs from 15-minute or hourly hydrological data including plots, identification of magnitude, timing, duration, recession rate, and possible multiple peak flows by year and water year-type
- Characterize Kerckhoff lake levels, inflows into Kerckhoff Lake, the Kerckhoff Diversion Intakes and both Powerhouses #1 and #2.
- Summarize PG&E's contractual agreements for flows

- Summarize existing infrastructure capabilities for controlling spills.
- Prepare a report that includes methods and findings with annual plot illustrating showing multiple spills by water year; tabulations and plots of spill recessions, as well as inflows to and outflows from Kerckhoff Lake during spills. The memo should identify the constraints to operation, capacity and the ability to control spills.

Overall, spill cessation has been or is currently being addressed on other FERC hydroelectric projects including the Upper Drum-Spaulling Project 2310, the Yuba-Bear Project 2266 and the Big Creek 4 Project 2017. This analysis can be addressed within a proposed Whitewater Boating Study.

An analysis of upstream flows coming out of the Southern California Edison Big Creek 4 Project 2017 should be included to help identify recreational flow opportunities available from coordinated operations.

It should be noted that upstream on the Southern California Edison Big Creek 4 Project 2017 that Long Term Operating Rules are currently being formulated to provide license required recreational flows. These recreational flows and potential pulse flows would be available to play through the downstream reaches within the Kerckhoff Project.

Specifically, an analysis of the whitewater flow releases generated in 2013 on the Big Creek 4 Project could shed light on recreational flow opportunities for whitewater resources within the Kerckhoff Project.

IV. Study Request: Whitewater Recreation Study

Whitewater Boating Study

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

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

The purpose of this study is to evaluate the impacts of the hydropower project on existing and potential recreational whitewater boating use in major streams within the Project, including; the Smalley Cove Put-in on Kerckhoff Reservoir; the Patterson Bend Run from below Kerckhoff Dam to Kerckhoff Powerhouse #1; Squaw Leap Run from Kerckhoff Powerhouse #1 to Kerckhoff Powerhouse #2; and Millerton Lake Bottom Run from Kerckhoff Powerhouse #2 to Millerton Reservoir.

Generally, the components of the study should include: (1) an analysis of the hydrology including Spill Cessation Analysis, Big Creek 4 Project 2017 Coordinated Flow Analysis and a description of project operations and their impact on flows in the San Joaquin Watershed; (2) conducting recreation user and stakeholder focus groups; (3) conducting a site visit; (4) the potential for conducting a controlled flow study to determine minimum and optimal flows for

boating, if warranted by findings of the hydrologic analysis; and (5) a report on the outcome of these components, describing existing and potential recreation opportunities and improvements to access.

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

The Project has the potential to affect 14.7 river miles of whitewater resources including; the Patterson Bend Run; the Squaw Leap Run; and the Millerton Lake Bottom Run.

The NPS has authority to consult with the FERC and applicants concerning a proposed project's effects on outdoor recreation resources under the Federal Power Act (18 CFR §§ 4.38(a), 5.41(f)(4)-(6), and 16.8(a)); the Outdoor Recreation Act (PL 88-29) and the NPS Organic Act (16 USC et seq.). This is especially important for National Wild & Scenic eligible watersheds, such as the San Joaquin River Gorge. It is thus the policy of the NPS to represent the national interest regarding recreation and to assure that hydroelectric projects subject to licensing recognize the full potential for meeting present and future public outdoor recreation demands, while maintaining and enhancing a quality environmental setting for those projects. FERC guidelines and the Federal Power Act, also provide direction to give equal consideration to other non-hydropower resources.

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

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

Whitewater recreation takes place on the San Joaquin when flows allow, which are impacted by project operations. As part of the licensing effort, a comprehensive look at recreation needs should be conducted per FERC guidance to evaluate existing and potential future recreation needs (18 C.F.R. 4.51).

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

The PAD utilizes existing information from *American Whitewater National River Database* and Holbeck and Stanley's *The Best Whitewater in California* but does not include information from Daniel Brasuell's website www.awetstate.com/SanJoaquinPB.html and www.awetsate.com/SanJoaquinSL.html

The PAD lacks information that would characterize Spill Cessation.

The PAD lacks information that would help identify opportunities available from coordinated operations with the upstream Southern California Edison Big Creek 4 Project 2017 license required recreational flows.

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

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

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

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

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

A Level 1 Assessment includes:

Hydrology Assessment. Summarize the hydrology of the Project area and the hydrologic relationship between river gages and the river flows of the relevant reaches. Characterize historic Spill Cessation. Characterize potential flow opportunities from coordinated operations with the upstream Big Creek 4 Project 2017. Information can be used from the Big Creek 4 Project experimental whitewater flow releases done in 2013. (SCE 2014) Describe how the project operations work and affect the hourly, daily, and monthly flows and potential recreation opportunities. This summary of information may also include interviews with people knowledgeable about the river system and the gages on the river.

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

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

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

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

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

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

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

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

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

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

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

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

The cost will depend on what information is readily available and what requires additional work, and is estimated to be \$65,000, based upon whether or not on the water flow studies are conducted.

V. Conclusion

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

Respectfully submitted,



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

**UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION**

Pacific Gas and Electric Company Kerckhoff Hydroelectric Project	FERC Project #96
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CERTIFICATE OF SERVICE

Pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure, I hereby certify that I have this day caused the foregoing **American Whitewater's Comments Regarding Pacific Gas and Electric Company Preliminary Application Document and Proposed Study Plan for the Kerckhoff Hydroelectric Project (P-96)** to be served upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated this 16th day of March 16.



Theresa L. Simsiman
American Whitewater

From: Anita Lodge [mailto:avadlesh@gmail.com]
Sent: Tuesday, March 27, 2018 8:35 AM
To: Whitman, Lisa
Subject: Kerckhoff Relicensing

Kerckhoff Relicensing

I would like to commit about the camping area at Smalley Cove and the problems of the parking along Power House Rd. Smalley Cove is a beautiful camping and allows access to Kerckhoff Lake. However it is very under used with boater preferring to park along the road rather than use the camp ground. I would like PG&E to concede a second camping area in the San Joaquin Gorge Recreation Area. This area is already being managed by BLM. The engineered plans for RV camping area have been drawn up. I feel a partnership with BLM, PG&E and Friends of the San Joaquin River Gorge could create a manageable area for trailer camping in the already developed San Joaquin River Gorge Management Area. PG&E crews now camp out in this area without the benefit of a RV camp site. An RV camping area would be a great addition to the Gorge Area recreation.

Southern California Edison has their campground at Shaver Lake, Camp Edison, it would only make sense that PG&E could help to create something a similar project along the San Joaquin River Gorge.

Anita Lodge
Friends of the San Joaquin River Gorge

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
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ATTACHMENT E

Consultation Record

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Pacific Gas and Electric Company (PG&E)
Kerckhoff Hydroelectric Project
Early Proposed Study Plan Meeting
Piccadilly Airport Inn - 5115 E McKinley Avenue, Fresno
Wednesday, March 28, 2018, 9:00 am – 4:45 pm

Attendees

Participant	Affiliation
Theresa Simsiman	American Whitewater (AW)
Christina Castellon	Bureau of Land Management (BLM)
Karen Doran	Bureau of Land Management (BLM)
Amy Girado*	Bureau of Land Management (BLM)
Somer Shaw	Bureau of Land Management (BLM)
Gregg Wilkerson*	Bureau of Land Management (BLM)
Abimael Leon	CA Department of Fish and Wildlife (CDFW)
Eric Guzman	CA Department of Fish and Wildlife (CDFW)
Wayne Lifton	Cardno
Katie Ross-Smith	Cardno
Cate Bush	Kearns & West (Note Taker)
Julie Leimbach	Kearns & West (Facilitator)
Stephen Bowes	National Parks Service (NPS)
Christina McDonald	North Fork Rancheria of Mono Indians
Matthew Armstrong	Pacific Gas & Electric (PG&E)
Ed Cheslak	Pacific Gas & Electric (PG&E)
Daniel Clark	Pacific Gas & Electric (PG&E)
Gina Morimoto	Pacific Gas & Electric (PG&E)
Lisa Whitman	Pacific Gas & Electric (PG&E)
Philip Choy	State Water Resources Control Board (SWRCB)
Dawn Alvarez	United States Forest Service (USFS)
Jon George	United States Forest Service (USFS)

*Arrived later in the meeting

Action Items and Next Steps

The meeting resulted in the following action items and next steps.

Study	Proposed Study Revisions	For Further Discussion in Follow Up Meetings	Follow Up meeting	
			Date	Participants
Aquatic Studies				
WQ 1 Water Temperature in Kerckhoff Reservoir and Project Bypass Reach	<ol style="list-style-type: none"> 1. Include study element to use bathymetry to inform water temperature profiles (verify timing of bathymetric survey to ensure this is feasible). 2. Add profiles at the 3 continuous water temperature monitoring locations in Kerckhoff Reservoir. 3. Consider adding a water temperature recorder in reach below PH 1 tailrace in the summer. 4. Measure other water quality parameters along with water temperature at the profile sites. 5. Add contingency clause committing to water temperature model based on study results. 6. More detailed monitoring stations map – zoomed in for study plan. 	<ul style="list-style-type: none"> • Discuss the proposed revisions to meet interests, as Gregg was not at the meeting for the discussion of this study. 	3/29	Ed and Gregg
WQ 2 Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir	<ol style="list-style-type: none"> 1. Specify conditions and range of months for WQ sampling. 2. Specify schedule for e. coli sampling 	<ul style="list-style-type: none"> • Discuss the proposed revisions to meet interests, as Gregg was not at the meeting for the discussion of this study. • PG&E to have internal discussion regarding E. coli request between K1 and K2 powerhouses. 	3/29	Ed and Gregg

Study	Proposed Study Revisions	For Further Discussion in Follow Up Meetings	Follow Up meeting	
			Date	Participants
AQ 1 Aquatic Habitat Mapping	<ol style="list-style-type: none"> 1. Add contingency clause for phase II studies for passage and thermal suitability of pools that may become isolated, if found, based on field results. 2. Identify target fish species. 3. Add relationship to other studies including water temperature study. 	<ul style="list-style-type: none"> • Discuss passage criteria and request for proposed additional language in study plan to address passage and potential discontinuity of pools (thermal suitability). 	4/5 2:00 – 4:00 pm	Gina, Wayne, Eric, Philip
AQ 2 Fish Populations	<ol style="list-style-type: none"> 1. Include language re: incidental observation of non-native invasive species. 2. Language to increase options for sampling based on conditions to minimize mortalities. Include alternative methodologies that would result in a shorter time in net to minimize take of hardhead. 3. Notify Eric, CDFW re: fish sampling field schedule so he can participate. 	<ul style="list-style-type: none"> • Discuss permitting (Scientific Collecting Permit) • Discuss potential American Shad study element • PG&E and CDFW internal discussions re: Shad and Bass – what studies would inform evaluation of Shad spawning success? • Potential splash counts. 	4/5 2:00 – 4:00 pm	Gina, Wayne, Eric, Philip
AQ 3 Mussels and Aquatic Molluscs		<ul style="list-style-type: none"> • Dawn (FS) Send Gina list of sensitive molluscs to include in eDNA sampling after checking with specialist 		
AQ 4 Entrainment	<ol style="list-style-type: none"> 1. Review literature on dam passage mortality during spill. 			
AQ 5 Western Pond Turtles	<ol style="list-style-type: none"> 1. No comments. 			
HYD 1 Operations Simulation Model	<ol style="list-style-type: none"> 1. Add language to “RELATIONSHIP TO OTHER STUDIES” to look at scenarios for WWB opportunities based on inflow to the project. 			

Study	Proposed Study Revisions	For Further Discussion in Follow Up Meetings	Follow Up meeting	
			Date	Participants
HYD 2 Hydrology with and without the Project	1. No comments.			
BOT 2 Riparian and Wetland Resources	1. Include specific (woody) vegetation requirements for flows (comment from SWRCB from AQ1).	<ul style="list-style-type: none"> None. This is already included in the proposed BOT 2 study. 		
GEO 1 Channel Form and Fluvial Processes		<ul style="list-style-type: none"> Clarification and discussion of requested study elements 	3/29	Ed, Scott, and Gregg
GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir		<ul style="list-style-type: none"> Clarification and discussion of requested study elements 	3/29	Ed, Scott, and Gregg
New Aquatic Study Requests				
Rare Aquatic Species		<ul style="list-style-type: none"> Gina to research and get back to Phillip re: Kern brook lamprey eDNA Follow up FYLF eDNA discussion re: sampling methods 	4/5 2:00 – 4:00 pm	Gina, Wayne, Eric, Philip (FYLF – Philip, Ann, Dawn, Eric, Andie)
Benthic Macroinvertebrate		<ul style="list-style-type: none"> Continue to discuss BMI study options. 	4/5 2:00 – 4:00 pm Schedule BMI and Bioaccumulation last for Gina and Phillip	Gina, Wayne, Eric, Philip

Study	Proposed Study Revisions	For Further Discussion in Follow Up Meetings	Follow Up meeting	
			Date	Participants
Bioaccumulation		<ul style="list-style-type: none"> Discuss suggested phased approach with contingencies based on first phase of study results 1) metals 2) organics. Prioritization. 	4/5 2:00 – 4:00 pm Schedule BMI and Bioaccumulation call for Gina and Phillip	Gina, Wayne, Eric, Philip, Ed
Botanical, Wildlife, and Land Studies				
BOT 1 Plant Communities, Special Status Plant, Invasive Weeds		<ul style="list-style-type: none"> Discussion between specialists 	TBD	Gina, Tim Keldson (BLM), Kelly
WILD 1 Special Status Wildlife Species		<ul style="list-style-type: none"> Discussion between specialists 	TBD	Laura, Tim, Gina
LAND 1 Project Roads and Trails Assessment	<ol style="list-style-type: none"> Address type of use, roads, staging areas, heavy equipment. Specify the criteria of PG&E locked gate for identifying PG&E project roads. Consider map of identified roads and locked gates as identified by Somer and Dan in the meeting. Dan will draft new language and send to Somer. No comment on transmission lines, which are outside of relicensing. 			

Study	Proposed Study Revisions	For Further Discussion in Follow Up Meetings	Follow Up meeting	
			Date	Participants
Recreation and Cultural Studies				
REC 1 Whitewater Boating Assessment		<ul style="list-style-type: none"> Theresa get info from Dave S. re: addressing safety and access to boating reach through PG&E facilities. Group discussion to be scheduled. 	4/4 1:00 – 3:30 pm	Lisa, Theresa, Steve, Somer, Dan, Dave M, Carol, Katie, Wayne
REC 2 Recreation Facility Assessment	<ol style="list-style-type: none"> Add assessment of opportunities for outreach to the public at project access and facilities. Outreach could include: project description, invasive species, natural history, recreational opportunities, stewardship, flow changes, and real-time flow information Assess effects of PG&E facilities and operations on recreational opportunities on BLM managed areas in and adjacent to SJ River, including fishing, mining, swimming, safety and equipment loss due to change in flows at K1 and K2, takeouts near PHs, and below PH outflows. Consider adding assessment of the recreation opportunities in the stream reach to REC 3 or stand-alone study. 	<ul style="list-style-type: none"> BLM comments on REC 2, 3, 4 - Explore options for assessing effect of project operations on recreational uses below dam. PG&E to consider options and discuss with group at follow-up meeting. 	4/4 1:00 – 3:30 pm	Lisa, Somer, Dan, Karen, Eric, Dave M, Carol, Katie, Wayne
REC 3 Recreation Visitor Use	<ol style="list-style-type: none"> Assess fishing access below K2 – see SWRCB comments on study plans (last comment p.1). 	<ul style="list-style-type: none"> “same as above” 	4/4 1:00 – 3:30 pm	Lisa, Somer, Dan, Karen, Eric, , Dave M, Carol, Katie, Wayne

Study	Proposed Study Revisions	For Further Discussion in Follow Up Meetings	Follow Up meeting	
			Date	Participants
REC 4 Recreation Visitor Use Surveys		<ul style="list-style-type: none"> “same as above” 	4/4 1:00 – 3:30 pm	Lisa, Somer, Dan, Karen, Eric, , Dave M, Carol, Katie, Wayne
CUL 1 Cultural Resources	<ol style="list-style-type: none"> Add BLM as repository of information. Cultural study covers realistic past and future footprint of the project. Ex: dumpsite. Identify areas that will be addressed outside of Project Boundary. Specify contractor will be covered by state permit. Provide ABC standard practice specifications. Develop way to account for impact on underwater cultural resources. 	<ul style="list-style-type: none"> Matt – send Historical Properties Management Plan from other projects to Amy Discuss testing 		Matt and Amy
CUL 2 Tribal Resources	<ol style="list-style-type: none"> Address Executive Order 13007. 	<ul style="list-style-type: none"> Matt – send Christina McDonald documents on underwater cultural resources. Meet to discuss landforms related to project ethnographic study. Discuss SHPO consultation. 		Matt, Amy, Christina, Somer

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Meeting Objective

Lisa Whitman (PG&E) initiated the meeting, discussed the meeting objectives, reviewed the Kerckhoff ILP study plan process schedule, and summarized the requirements for study plan requests under the ILP.

The objectives of the meeting were to: 1) discuss and work toward agreement on the proposed study plans in advance of the April 30th filing with FERC; 2) share information; and, 3) discuss requests for new studies.

The primary upcoming milestones for the ILP study plan process include:

- PG&E file Proposed Study Plan with FERC – April 30th
- FERC Study Plan Meeting – by May 30th
- Stakeholders file comments on Proposed Study Plans – Jul 29th
- PG&E files Revised Study Plan – August 28th
- Stakeholders file comments on the Revised Study Plan – September 12th
- FERC Issues Study Plan Determination – September 27th
- Study Plan Dispute Process – October through December

Lisa Whitman (PG&E) provided an overview of seven requirements for study plan requests under the ILP process pursuant to 18 CFR §5.9(b). She expressed particular interest in gaining understanding of the study plan requests from the stakeholders on the requirement that study plans “explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements, or protection, mitigation and enhancement (PM&E) measures.” 18 CFR §5.9(b)(5).

The existing proposed study plans reviewed at the meeting included the following:

- WQ 1 Water Temperature in Kerckhoff Reservoir and the San Joaquin River Bypass Reach
- WQ 2 Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir
- AQ 1 Aquatic Habitat Mapping
- AQ 2 Fish Populations
- AQ 3 Mussels and Aquatic Molluscs
- AQ 4 Entrainment
- AQ 5 Western Pond Turtles
- HYD 1 Operations Simulation Model

- HYD 2 Hydrology with and without the Project
- BOT 2 Riparian and Wetland Resources
- GEO 1 Channel Form and Fluvial Processes
- GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir
- BOT 1 Plant Communities, Special-Status Plant, Invasive Weeds
- WILD 1 Special Status Wildlife Species
- LAND 1 Project Roads and Trails Assessment
- REC 1 Whitewater Boating
- REC 2 Recreation Facility Assessment
- REC 3 Recreation Visitor Use
- REC 4 Recreation Visitor Use Surveys
- CUL 1 Cultural Resources
- CUL 2 Tribal Resources

The new study plans requested by stakeholders reviewed at the meeting included the following:

- Arsenic Contamination
- Recreational Gold Panning
- Rare Aquatic Species
- Benthic Macroinvertebrate
- Bioaccumulation

Comments, Questions, and Discussion on Draft Proposed Study Plans

For each proposed study plan, the commenting stakeholders presented an overview of their comments on the plan. This was followed by comments, questions, and discussion with the meeting participants. Participant input is summarized below based on the order the topics were discussed.

Aquatic Study Plans

WQ 1 Water Temperature in Kerckhoff Reservoir and the San Joaquin River Bypass Reach

Dawn Alvarez (USFS) asked for clarification on temperature monitoring in Kerckhoff Reservoir, specifically if PG&E intends to measure water temperature profiles from a boat or if continuous water temperature data recorders will be used. Also, the USFS suggests using continuous water temperature arrays at additional locations. Ed Cheslak (PG&E) clarified that the WQ1 study plan in the PAD includes continuous temperature measurements at three depths that will be taken at three locations within the reservoir. PG&E proposes taking these measurements near the dam, mid-reservoir, and toward the top of the reservoir. At the top of the reservoir, there may only be two samples if the reservoir is too shallow. Those are fixed locations at fixed elevations. This information will be supplemented by a full temperature profile near the dam. PG&E has not proposed other profiles in the reservoir because PG&E does not expect there to be considerable change throughout the reservoir. Due to its small storage capacity and significant turn over, it is unlikely to stratify.

Eric Guzman (CDFW) asked about the depth of the reservoir. Ed Cheslak (PG&E) responded that near the dam, he thinks the depth is around 60 feet. The depth varies further from the dam, and some areas are fairly shallow. PG&E has partial bathymetry for the reservoir, which PG&E will use to identify suitable locations for gathering data.

Ed added that PG&E could revise the study to clarify the type and location of the sampling. Gina Morimoto (PG&E) added that PG&E needs to look at the timing of the bathymetry study and coordinate it with the water temperature study. Ed Cheslak (PG&E) responded that he hears a desire within the group for additional water temperature profiles in other locations within the reservoir as well.

Dawn Alvarez (USFS) responded that if there are fewer continuous arrays, then additional information is needed. Dawn also asked for clarification in the study plan on what would be collected from the boat versus the continuous sampling.

Somer Shaw (BLM) added that BLM's specialist, Gregg Wilkerson, is not present, but BLM's concern is to gather detailed information on water depth and the timing of water samples.

Ed Cheslak (PG&E) responded that PG&E can use the bathymetry to identify the water depths at the approximate locations an array is proposed. PG&E will add profiles at all three locations of continuous monitoring and PG&E will clarify the locations of the arrays with Gregg Wilkerson (BLM).

Philip Choy (SWRCB) expressed interest in implementing monitoring sites in the bypass reach, particularly below Kerckhoff 1 Powerhouse (K1), but also above Kerckhoff 2 Powerhouse (K2), in order to measure the effects of K1. Specifically, he is concerned about stranding of aquatic species in pools if the pools in the bypass reach get disconnected, especially during the summer when water temperatures rise.

Gina Morimoto (PG&E) explained that PG&E has had difficulty with high flows washing out equipment, as well as issues of accessibility upstream of the K1 Powerhouse. PG&E has discussed possibly relocating the gage that is currently at K1 to a more accessible location.

Ed Cheslak (PG&E) commented that PG&E anticipates minimal change in water temperature in the 1.8 miles between K1 and K2 powerhouses. PG&E is not opposed to implementing an additional monitoring site; however, there are practical issues of deployment and maintaining the locations despite high flows. The station above K1 is used as a compliance point, and PG&E has not been able to access the probe because there is no longer a safe helicopter landing area. PG&E is trying to find a new location, and has been discussing this issue with CDFW over the past several years, including with Julie Means (CDFW) and Linda Connolly (CDFW). If temperatures rise above 27 degrees Celsius, PG&E is required to increase flow for the protection of smallmouth bass. Because PG&E is not able to access the water temperature recorders at the compliance point, PG&E typically increases flow when temperatures rise and there have not been issues with adverse responses from fish. However, PG&E hears SWRCB's concern and will consider adding an additional station, possibly qualified by data collection only during summer months.

Philip Choy (SWRCB) recommended a water temperature model study, as SWRCB has requested in previous hydropower licensing processes. Gina Morimoto (PG&E) indicated that PG&E could consider adding some contingency language stating that if water temperature data indicate that a water temperature model is warranted, a water temperature model study will be conducted.

Eric Guzman (CDFW) voiced concern that the requirement for PG&E to increase flow when temperatures rise above 27 degrees Celsius is geared toward non-native fish [smallmouth bass]. However, a future shift toward native fish may change the temperature requirement.

Ed Cheslak (PG&E) commented that PG&E tried to move the compliance point above K1 up to the gage right below the dam. Two years of temperature measurements were collected at that location and at the compliance point. During the first year, cold water was released from the dam with resulting normal warming and a tight correlation between the gage and compliance point. In that case, a model is unnecessary because temperature prediction can be utilized. The next year, warm water was coming in, but cooling occurred downstream. In those types of situations, water temperature is largely determined by upstream activities.

Dawn Alvarez (USFS) asked for clarification regarding WQ 1's focus. Wayne Lifton (Cardno) clarified that WQ 1 studies water temperature, WQ 2 studies water quality. Both WQ 1 and WQ 2 include the bypass reach.

Eric Guzman (CDFW) asked for additional information on the dynamics between Southern California Edison's (SCE) Big Creek system upstream and Kerckhoff Reservoir. Also, Eric requested information on the bathymetry, location, and timing of monitoring, including detailed maps on monitoring areas.

Ed Cheslak (PG&E) explained that PG&E will evaluate how Kerckhoff Reservoir reacts to different inflows in order to identify future effects. Further, he clarified that some recent water temperature data from the temperature probe upstream of K1 Powerhouse were not included in the

PAD because the helicopter retrieval of data collection equipment was constrained by access and safety compliance issues; however, the data were not lost.

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

Somer Shaw (BLM) explained that BLM requests the following: identification of differences between typical and stormwater sampling events; the characterization of water quality be separated into water flow conditions; tests be conducted to determine what trace elements are bioavailable and bioaccessible; arsenic be added to the Table WQ 2; and, for tests conducted on metals to identify elements that are bioavailable or bioaccessible. BLM needs to follow up on this discussion with Gregg Wilkerson (BLM).

Ed Cheslak (PG&E) explained that safety is the primary challenge with sampling during storm events. Additionally, the Project has little to no control over the water during storm events. Generally, PG&E proposed the water quality and water temperature monitoring at the same time to be able to match up temperature and flow conditions to fully characterize the water quality conditions. PG&E proposed to focus the monitoring in the summer (primarily in May through September) when water temperatures and water quality are expected to be limiting during the low flow period.

Somer Shaw (BLM) commented that BLM's specialist, Gregg Wilkerson, is concerned with high flows eroding and transporting material, including arsenic that may need to be monitored. There is a concern that the dam structures may cause accumulation of certain materials.

Ed Cheslak (PG&E) explained that arsenic is one of the California Administrative Manual (CAM 17) constituents included in the water quality data collection, which will be conducted once during the runoff period and once during the dry period. PG&E believes that this is adequate sampling to provide data on the CAM 17 metals. Previous sediment sampling showed very low levels of arsenic.

Dawn Alvarez (USFS) asked for clarification on the timing of the sampling. She suggested that instead of a specific date, the study could specify a condition and a range of months. Wayne Lifton (Cardno) explained that the flow determines the timing of the sample collection. It is pretty typical for licenses to require sampling twice annually, including once during the runoff period and once during the dry period.

Philip Choy (SWRCB) requested clarification on the timing of sampling collections and suggested that additional sampling would be helpful. The more information that PG&E provides to agencies, the more confidence agencies will have in the water quality data, and the less agencies will feel the need to check in after license implementation. Philip suggested using E. coli as an additional bacteria parameter. He cited a recent Environmental Protection Agency recommendation to use E. coli as an indicator of health risk. Additionally, Philip mentioned that using E. coli is less costly and can be sampled simultaneously with coliform. Philip advised to sample around key recreational dates like the Fourth of July. Philip also requested consideration of additional sampling sites, including the following: Smalley Cove, the undeveloped recreation site above Smalley Cove, and recreation areas located between K1 and K2, and below K2. Wayne Lifton (Cardno) clarified that below the powerhouses are where the greatest amount of flow takes place,

so the water is not still in these areas. He suggested that the flow created by the Project dilutes bacteria in the water.

Daniel Clark (PG&E) asked for an explanation of the nexus to the Project. He commented that he understands that the flows are influenced by the Project, but the recreation would be there regardless of flows. He asked if the Project has any control or effect on recreation.

Theresa Simsiman (AW) commented that water is released from K1 and K2. Somer Shaw (BLM) added that there is a project nexus because the flows and the water are influenced by the Project, and impact safety conditions.

Matthew Armstrong (PG&E) asked what amount of recreation occurs in the area. Somer Shaw (BLM) responded that the Project affects recreation. Also, there is a significant amount of recreation that occurs in the area. In particular, there is a lot of fishing below K2, along with swimming and other recreation taking place around K1.

Ed Cheslak (PG&E) asked what action PG&E can take if E. coli is above the standards and how could PG&E protect the public. Dawn Alvarez (USFS) offered the North Fork Feather Project as an example where USFS requested additional restrooms and trash collection to address issues with E. coli. Philip Choy (SWRCB) suggested requiring additional signage.

Lisa Whitman (PG&E) expressed understanding that, in the context of this conversation, E. coli may be present in the bypass reach because of recreational activities. There is a suggestion that those recreational activities are happening because of the Project's operations.

Somer Shaw (BLM) commented that recreation, both at the reservoir and downstream, has evolved because of this Project. Eric Guzman (CDFW) added that this issue is difficult and complex because there is an attempt to determine which parties are at fault or responsible for activities and effects within the Project area. There is a tendency to continually point upstream. Theresa Simsiman (AW) commented that this issue speaks to stewardship of the river which is everyone's responsibility. An example is to examine the stewardship work occurring on the Mokelumne River.

Lisa Whitman (PG&E) acknowledged that stewardship of the river and social responsibility are also priorities for PG&E. And, there is a need to determine what portion of the burden belongs to PG&E based on PG&E's effect on the area, which is a challenging assessment.

Theresa Simsiman (AW) added that she understands PG&E's concerns. The studies are intended to inform negotiations and further understand the issues. Philip Choy (SWRCB) reiterated that there is nexus with the Project. People are drawn to recreate in areas because of flow created by the Project, mainly between K1 and K2, and below K2. Daniel Clark (PG&E) responded that the flow might be a part of the attraction to those areas; however, there are broader recreational impacts than those affected by the Project. He added that the studies aim to gain additional information and understanding of the river.

AQ 1 Aquatic Habitat Mapping

Dawn Alvarez (USFS) commented that USFS suggests that sample locations are currently limited to safe access points, which may bias results. There is a need to consider this bias during data interpretation and analysis. Gina Morimoto (PG&E) clarified that PG&E's intent is to map the entire bypass reach for AQ 1.

Philip Choy (SWRCB) explained that SWRCB requests additional information on species of riparian vegetation in the area, particularly related to recession rates for flow. Katie Ross-Smith (Cardno) asked Philip Choy (SWRCB) if he was referring to woody riparian species such as willows and cottonwood, not herbaceous species and grasses. She commented that PG&E will gather general riparian species present during the helicopter surveys proposed in BOT 2 Riparian and Wetland Resources, and that the study plan also requires summarizing information regarding recession rates for woody riparian vegetation. Katie asked for clarification that SWRCB aims to address recession requirements of dominant species, which is included in BOT 2. Philip Choy (SWRCB) confirmed the above explanation from Katie Ross-Smith (Cardno).

Philip expanded on a second comment in which SWRCB requests that PG&E examine the potential for fish to be isolated in pools during the summer due to discontinuity in the bypass reach. If AQ 1 shows discontinuity, then PG&E may want to look into additional modeling. Eric Guzman (CDFW) added that passage of trout is an issue, along with connectivity. Gina Morimoto (PG&E) responded that she believes AQ 1 will map the area, look for discontinuity in the bypass reach, and evaluate the data in regards to the passability of trout. Wayne Lifton (Cardno) added that there are different upstream barriers, such as cascades, that do not cause downstream obstacles. He continued that coordination needs to occur between AQ 1 and WQ 1 studies. PG&E can examine and consider existing data.

Philip Choy (SWRCB) requested specific language creating a contingency clause if data indicate the need for additional studies. Gina Morimoto (PG&E) and Philip Choy (SWRCB) drafted the following language: "If any issues with fish passage are identified, then we will discuss with the agencies (and stakeholders) possible additional habitat studies to collect information on the isolated pools and thermal suitability of summer habitat."

Philip Choy (SWRCB) responded with a request for additional water quality sites.

Wayne Lifton (Cardno) suggested adding language in the Relationship to Other Studies section.

Eric Guzman (CDFW) suggested including information on native fish species. Philip Choy (SWRCB) asked about the ability to use fish that are similar to trout when identifying passage issues. Wayne Lifton (Cardno) responded that trout are used because there are available data on trout, but PG&E can look into using additional fish species. Philip requested not classifying barriers solely on the height for rainbow trout, but to also include some category lower that might be better for cyprinids.

AQ 2 Fish Populations

Philip Choy (SWRCB) provided an overview of SWRCB's request for more information on American shad and striped bass as both species spawn in areas affected by the Project. Existing data on these species are potentially outdated. The most recent American shad survey documented in the PAD occurred in 2011 and the most recent referenced fish surveys that observed striped bass in the bypass reach occurred in 1982. The information that exists looks primarily at spawning and does not include estimates of population.

Eric Guzman (CDFW) agreed that the information included in the PAD is outdated. He added that it would be beneficial to have more information on the dynamic between native and non-native fish, as well as information to determine maintenance of the fisheries.

Gina Morimoto (PG&E) commented that there are extensive studies showing the velocity necessary to enable successful spawning of American shad. Another year of information is unlikely to provide new or beneficial information.

Philip Choy (SWRCB) explained that SWRCB requests a study focused on the number of adults in order to get an estimate of the American shad population. He mentioned that a splash count would suffice for gathering these data. Philip commented that he understands that PG&E implemented appropriate flows for spawning. However, he is concerned with the lack of information on life stages after spawning. In particular, he is interested in knowing if the population remains stable over time, which is relevant to the Project.

Ed Cheslak (PG&E) asked for an explanation of the nexus between the population of American shad and the Project. Millerton Lake has most of the ability to affect the area's American shad population. PG&E provides appropriate flows for spawning. However, apart from the spawning stage, what other action can PG&E take? Additionally, it takes considerable effort to gather data on the American shad population. What are the implications if a study does show a change in the American shad population, particularly when there are many factors downstream? Why should PG&E bear the burden?

Eric Guzman (CDFW) commented that the spawning component is significant. Millerton Lake has an impact as well, but the Project affects the population too. Without data, there is no way to evaluate the Project's effects, especially when relying on outdated studies. The concern is potential changes to the population. Philip Choy (SWRCB) added that the discussion of additional action depends on whether the population is changing. Currently, this information is unavailable.

Gina Morimoto (PG&E) asked if the objective is to maintain the American shad fishery. Eric Guzman (CDFW) responded that the objective is to maintain the American shad fishery and explained that the recreational component exists because American shad are a rare occurrence as a self-sustaining population. More information is needed to learn how to properly maintain American shad populations.

Wayne Lifton (Cardno) expressed confusion because PG&E is providing the conditions for spawning, which is the only life stage that the Project can affect. Additionally, he suggested considering restricting fishing opportunities in certain areas in order to protect fish populations. He

suggested that another issue arises with a need to gain meaningful information rather than just non-conclusive or inconsequential data. Further, studies on American shad require considerable effort.

Eric Guzman (CDFW) expressed uncertainty about taking fishing opportunities away from anglers and suggested that additional consideration is needed. He requested information on the frequency of sampling, including gill netting.

Additionally, Eric expressed concern about the harm to fish during the gill netting process, particularly hardhead. He suggested shorter checks and additional discussion on improving sampling methods to minimize effects. Eric also requested to be involved or notified when sampling occurs. Wayne Lifton (Cardno) responded that PG&E would consider sampling methods to minimize effects, particularly to hardhead. Gill netting would be used in some portions of Kerckhoff Lake. The expectation is that bass will be a major part of the catch, which do pretty well with short sets. Gina Morimoto (PG&E) asked if gill netting would be approved in a Scientific Collecting Permit. Eric and Gina will have a follow-up discussion to discuss sampling methods in relation to the Scientific Collecting Permit.

AQ 3 Mussels and Aquatic Molluscs

Dawn Alvarez (USFS) explained that USFS recommends using environmental DNA (eDNA) for sensitive mollusk species.

Gina Morimoto (PG&E) asked if USFS had specific species in mind. Species that have existing markers could use eDNA. However, it would be challenging and costly to use eDNA for species without markers.

Dawn Alvarez (USFS) responded that she will check with USFS's specialist and possibly provide a list of specific species.

Eric Guzman (CDFW) asked if there is any documentation on mollusks in the area. Gina Morimoto (PG&E) responded that there is documentation on molluscs in the area and PG&E hopes to consult with the tribes.

AQ 4 Entrainment

Philip Choy (SWRCB) explained SWRCB's suggestion that, in addition to calculating potential loss of biota through the intakes, PG&E also assess the potential for fish survival over Kerckhoff Dam.

Wayne Lifton (Cardno) responded that most literature is on salmon and trout with very little literature available on other species. PG&E will include a literature search on mortality going over dams that are similar in size to Kerckhoff Dam.

AQ 5 Western Pond Turtles

No comments.

HYD 1 Operations Simulation Model

Ed Cheslak (PG&E) gave an overview of the comments. SWRCB's comment expressed interest in coordinating the Project's operations with upstream hydroelectric projects. Ed responded that Kerckhoff is a stand-alone project that generates based off available water. There is no coordination with upstream hydroelectric projects. Such coordination would create a large and possibly unmanageable number of alternatives to evaluate.

Eric Guzman (CDFW) asked if PG&E can change the Project's operations in response to known operations of upstream hydroelectric projects.

Theresa Simsiman (AW) commented that PG&E has been involved in AW's long-term processes at Big Creek, which specifically assesses opportunities for white water flows. AW is interested in having more information on the flows.

Ed Cheslak (PG&E) expressed that PG&E's current operations model will provide an assessment of opportunities by identifying when spill will occur. Flows from upstream operations are included as a constraint within that model, as the condition of spill is related to inflow and capacity. PG&E is not able to determine inflow although there are seasonal expectations. Once a history of hydrology without the Kerckhoff project is developed, there will be increased information on the frequency and magnitude of spills to assist in operational decisions. Knowledge of Big Creek and other upstream operations is not necessary to make determinations about the Project's operations.

Wayne Lifton (Cardno) commented that one reason to assess using a model is to consider alternative scenarios regarding generation and whitewater. This can be related to AW's request. As long as inflow information is available, the model is capable of assessing various scenarios. The issue here is with the term "coordination" when the discussion is actually around opportunity. PG&E can add language to look at scenarios for opportunities for whitewater based on inflow.

Theresa Simsiman (AW) asked for clarification on the operational effects and potential missed opportunities that may arise for PG&E when AW requests the Project to provide a certain flow. Ed Cheslak (PG&E) confirmed that the operations model is capable of providing an opportunity assessment, as requested by AW. Somer Shaw (BLM) commented that BLM supports this analysis, and the addition of a bullet point regarding assessment of scenarios will meet BLM's need.

Ed Cheslak (PG&E) added that the model can contribute to a revenue analysis as a consequence of alternative scenarios. PG&E does not disclose financial information around this issue, but the information exists to inform a conversation. However, we may not be able to model the 15-minute analyses requested by AW. PG&E needs additional information to determine AW's needs and possibly use a supporting analysis addressing variability to provide the requested data.

Theresa Simsiman (AW) explained that AW's needs derive from the fact that whitewater occurs in real time, not on a daily average, so understanding variability is important. This conversation may continue later with additional specialists. (**See discussion of REC 1 for resolution of this concern.*)

HYD 2 Hydrology with and without the Project

No comments.

BOT 2 Riparian and Wetland Resources

Gina Morimoto (PG&E) explained that no comments were received, except for the discussion in AQ 1 regarding the request from Philip Choy (SWRCB) for additional information on species of riparian vegetation in the area in relation to recession rates for flow.

GEO 1 Channel Form and Fluvial Processes

Christina Castellon (BLM) explained BLM's comments. BLM requests additional information on the following: gold content of sediments entering and leaving Kerckhoff Reservoir, volume of gold-bearing sediments in Kerckhoff Reservoir, gold content of sediments between Kerckhoff Dam and Millerton Lake, and gold content of sediments from Kerckhoff Dam in Millerton Lake. BLM requests an analysis of gold quality, quantity and distribution in the project area and impacted reaches of the San Joaquin River. Additionally, BLM requests a sampling plan be prepared to analyze sediment for gold content and describe opportunities for gold panning.

Gina Morimoto (PG&E) asked for clarification on whether the gold comments are related to recreation or separate from recreation. Gina explained that GEO 1 focuses on the channel, not sediments.

Somer Shaw (BLM) responded that the gold comments in GEO 1 are separate from recreation, and are specific to gold as proposed by Gregg Wilkerson (BLM). He viewed GEO 1 as an opportunity to examine sediment within the study in order to save on resources.

Gina Morimoto (PG&E) and Wayne Lifton (Cardno) suggested that BLM's requests may be more appropriate in another study or a new study. There is a need for further discussion including specialists to determine whether to address the comments through a separate study or incorporate into an existing study.

Ed Cheslak (PG&E) asked for clarification on the project nexus. In the relicensing, PG&E proposes to maintain operations as they currently exist, and sediment is treated as an existing condition. Accordingly, a sediment assessment is generally not necessary. Somer Shaw (BLM) explained that previous licenses did not address this issue. BLM wants to address past missed opportunities and gain necessary information on current conditions.

GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir

BLM's specialist, Gregg Wilkerson, is needed for this discussion. Accordingly, a subsequent conversation will take place with Gregg Wilkerson (BLM) and Ed Cheslak (PG&E).

New Aquatic Study Requests

Rare Aquatic Species

Philip Choy (SWRCB) explained SWRCB's comments. The goal of the Rare Aquatic species study is to determine the presence of species in the Project affected area. SWRCB requests collection and analysis of eDNA samples at sites in Kerckhoff Reservoir and the bypass reach, with sample collection focused on determining the presence of foothill yellow-legged frogs and Kern brook lamprey, as well as identifying the need for additional monitoring and studies toward the protection of rare aquatic species. Philip explained that if Kern brook lamprey are captured during surveys, then eDNA would not need to be done. It would only be done if the species were not found.

Gina Morimoto (PG&E) commented that she has a contact currently working on a new marker for Kern brook lamprey. She will follow up on this possibility with Philip Choy (SWRCB). Dawn Alvarez (USFS) also requested eDNA on the foothill yellow legged-frog.

Benthic Macroinvertebrate (BMI)

Philip Choy (SWRCB) explained SWRCB's comments requesting a BMI Study to characterize BMI metrics and BMI taxonomical and density assemblages within Project-affected reaches downstream of Kerckhoff Dam. Philip commented that SWRCB generally makes this request during relicensing, but is open to a different protocol in the bypass reach.

Gina Morimoto (PG&E) responded that PG&E struggles with BMI studies because they do not inform specific license conditions.

Philip Choy (SWRCB) clarified that BMI studies indicate general conditions that can be used in comparison with other reaches to determine if additional action is needed. There is a precedent for requesting and conducting BMI studies for other projects.

Wayne Lifton (Cardno) commented that BMI studies take a considerable effort, but generally, decisions are not based on the results of BMI studies. It should be necessary to conduct a BMI study only if data indicate concerns about water quality, food quality, fish growth, or other factors. PG&E agrees that BMI studies are a valuable tool, but only when the data are needed for impact analyses or PM&E measures. It is difficult to justify a BMI study in this Project even if BMI studies are routine in other projects. Wayne asked if there is a particular area of concern for SWRCB.

Philip Choy (SWRCB) affirmed that SWRCB is still interested in conducting a BMI study because it offers an overview of conditions in the reach. If the BMI study is reach-wide, Philip suggests that the focus be on the area below the Kerckhoff Dam in the Kerckhoff Dam to K1 reach. However, this particular preference is Philip's opinion and has not been vetted by others at SWRCB.

Gina Morimoto (PG&E) asked Philip Choy (SWRCB) if SWRCB would be open to making the BMI study a contingency study. If data indicate a concern with water quality or some other trigger, then PG&E will conduct a BMI study. Philip Choy (SWRCB) commented that SWRCB wants a

BMI study in the reach that is not on contingency because a BMI study will provide an indication of conditions.

Bioaccumulation

Philip Choy (SWRCB) explained that the goals of the Bioaccumulation Study are to: (1) collect information to develop fish consumption advisories for Kerckhoff Reservoir and (2) promote public safety. SWRCB is interested in the concentration of methyl mercury, arsenic, and other contaminants in resident, edible-sized sport fish in Kerckhoff Reservoir.

Ed Cheslak (PG&E) explained that data from a previous sediment analysis do not indicate any concerning contaminant levels. The sediment in Kerckhoff Reservoir is primarily composed of medium to fine sand, some silt and clay, and very few organics. Accordingly, organics that could support methylation of mercury are limited in Kerckhoff Reservoir. Considering that the area surrounding Kerckhoff Reservoir is forested with very little agriculture, PG&E does not find it necessary to test for all of the constituents SWRCB requested. While arsenic is present in Kerckhoff Reservoir, it occurs only at a very low level. Accordingly, PG&E proposes conducting a bioaccumulation study in a phased approach. First, PG&E will conduct a water quality study, which examines CAM 17 metals, including mercury and PCB. The water quality study would be utilized to identify constituents of concern. Subsequently, identified constituents of concern would be analyzed using a fish tissue analysis.

Philip Choy (SWRCB) suggested that PG&E conduct a bioaccumulation study on metals regardless, and conduct a bioaccumulation study on organics if a need is indicated by the water quality study or other data. He explained that fish can live in the reach for long periods of time and a water quality study will not provide enough information to understand long-term or historic patterns.

Ed Cheslak (PG&E) explained that the water quality assessment now contains all CAM 17 metals, but no organics. This is due to the fact that Kerckhoff Reservoir is a higher elevation catchment and organics are associated with agricultural production, which is largely absent in the Project area. Organic tests are costly and complicated. Further, there is not a project nexus without a precursor to implicate concern.

Gregg Wilkerson (BLM) asked for clarification on PG&E's methodology. He explained that different readings can be measured depending on flow regime of the water sample. Regarding mercury and arsenic, would PG&E test throughout the food chain?

Ed Cheslak (PG&E) explained that PG&E is considering doing a fish tissue analysis. Philip Choy (SWRCB) wanted these data primarily for the Office of Environmental Health Hazard Analysis (OEHHA) for publishing information and guidance on fish consumption. Accordingly, there is not an intent or need to examine the food chain.

Wayne Lifton (Cardno) clarified that the bioaccumulation study is a new proposed study. PG&E suggests a phased approach based on concerns indicated in the water quality samples and sediment samples, and considering that there is very little concentrated agriculture occurring in the area.

Gregg Wilkerson (BLM) expressed concern regarding fish advisories when considering that Kerckhoff Reservoir is not deep and might be stocked.

Wayne Lifton (Cardno) explained that Kerckhoff Reservoir is no longer stocked except for fish that come from upstream. He commented that examining metals through spectrophotometry is not especially challenging; however, organics can be considerably more expensive to analyze. Wayne suggested first examining water quality and sediment. If specific concerns arise, then PG&E can examine organics.

Ed Cheslak (PG&E) suggested that PG&E examine the water column to determine if stratification patterns occur. More information will be available to inform decisions after conducting WQ 2.

Eric Guzman (CDFW) expressed concern that water quality studies alone provide an inadequate amount of data. Specifically, large fish species that live for several years may endure recurring exposure to constituents even though those constituents are not detected by a water quality study.

Wayne Lifton (Cardno) commented that, assuming human health is the primary concern, muscle tissue of fish should be the focus of analysis rather than organs or the whole fish.

Ed Cheslak (PG&E) asked for clarification on the Project nexus, specifically, how Project operations accelerate or cause bioaccumulation. Philip Choy (SWRCB) commented that bioaccumulation is significant not only for informing the public on consumption concerns, but also for informing the public that fish quality is good. Accordingly, SWRCB's requests are focused on game species. Additionally, the Kerckhoff Reservoir is a focal point for recreation and the Project's operations may create conditions for the accumulation of constituents, including mercury. Further, SWRCB's requests for bioaccumulation are focused on game species.

Botanical, Wildlife, and Land Study Plans

BOT 1 Plant Communities, Special-Status Plant, Invasive Weeds

Christina Castellon (BLM) provided an overview of BLM's comments. Regarding ground based surveys and mapping, BLM requests surveys for invasive weed species to extend to two years. BLM's concern is that invasive species may be dormant for periods of time depending on climate conditions. Accordingly, BLM recommends to search and map over multiple years.

Gina Morimoto (PG&E) responded that PG&E's specialist advises that the BOT 1 study's duration of one year is adequate. She explained that most of the species in this watershed are perennial or widespread so observation will not be difficult. Typically, multiple year studies are implemented for compliance, but not for gathering application information. Somer Shaw (BLM) requested that PG&E reach out to BLM's specialist, Tim Keldsen.

Lisa Whitman (PG&E) commented that the hope and intent is for this discussion to occur prior to submission of the proposed study plans.

WILD 1 Special Status Wildlife Species

Dawn Alvarez (USFS) explained that USFS requests eDNA sampling for the foothill yellow-legged frog, which was covered previously during the discussion on the Rare Aquatic Species new study.

Christina Castellon (BLM) provided an overview of BLM's comments, which include a recommendation to extend the survey to two years as rare and secretive wildlife species can easily be missed with one year of study. Additionally, BLM recommends the use of cameras to help determine the presence of rare wildlife species, including surveys to detect Bald Eagles, among other raptor and owl species. Further, BLM recommends using mist nets to identify sensitive bat species.

Gina Morimoto (PG&E) explained PG&E's concerns considering the feedback received from PG&E's wildlife biologist. The focus on the special status component is to determine the location of suitable habitat for special wildlife species. Primarily, this analysis is used to determine the location for pre-construction activities. Accordingly, one year of study will be adequate to determine the presence of special status wildlife species in the area with consideration of California Wildlife Habitat Relationships and initial results. PG&E will document any observations of special status wildlife species during all fieldwork and conduct a habitat analysis. Additionally, cameras can be labor intensive, generate an overwhelming number of images, and cameras are not particularly helpful without a target species. In particular, cameras are not very useful for observing birds or bats. Mist nets can be fairly intrusive and can cause injury to bats. In addition, most bat species can be detected visually or acoustically. In areas where acoustic or visual surveys detect unknown species, then mist nets may be used to collect additional information. Species that have habitats in the area will be included in the survey with a focus on determining suitable habitat for future construction and maintenance projects.

Somer Shaw (BLM) requested a follow up discussion including BLM's specialist, Tim Keldsen.

LAND 1 Project Roads and Trails Assessment

Daniel Clark (PG&E) explained that PG&E understands that the main access road near Smalley Cove is not a public road. It is a BLM road and BLM controls the use of that road. Daniel asked if BLM could elaborate and discuss FERC project roads and features.

Somer Shaw (BLM) commented that she is satisfied with PG&E's exclusive access from the gated points out. BLM does want PG&E to identify vehicles and affiliate companies. BLM needs to understand and regulate the use of the road, and it is challenging to distinguish between PG&E transmission vehicles and PG&E hydropower vehicles. She explained that even though there is a separate action related to the existing right of way, the FERC license informs the rest of the operation. These two issues are separate, but dependent.

Daniel Clark (PG&E) responded that PG&E will conduct an assessment of Smalley Road and on PG&E specific use roads. He does not think that the public road will be considered a FERC Project road. Usually, PG&E has necessary documentation.

Somer Shaw (BLM) commented that documentation on previous licenses was not complete.

Daniel Clark (PG&E) clarified that the request for documentation of use was for all roads, and specifically the hydropower project roads.

Somer Shaw (BLM) asked how PG&E is defining shared roads and differentiating management of project roads. Daniel Clark (PG&E) explained that if there is a locked gate and exclusive use, apart from the private owner, then the road is not shared. The project roads will be managed proportionate to use. Staging areas will also be included.

Somer Shaw (BLM) asked for information on the types of vehicles using the roads, particularly heavy equipment, as the vehicles can have an impact on the roads. Daniel Clark (PG&E) agreed that PG&E will identify the type of road, use of road, staging areas, and use of heavy equipment. This information will be included in the revised study plan. At this time, there is no comment on the transmission lines, but there is increased understanding between BLM and PG&E.

Recreation and Cultural Study Plans

REC 1 Whitewater Boating

Stephen Bowes (NPS) commented that NPS requests a fuller study because the current, phased study seems inadequate. He suggested that a full study proposal likely will not cost more than the current proposal. Additionally, Stephen noted concern with the language “if needed”, which is used throughout the study. He wants to ensure that PG&E convenes an actual focus group to identify whitewater boating flows for the study.

Theresa Simsiman (AW) expressed concern because AW’s level one study typically includes phase one, phase two, and phase three of REC 1. Additionally, AW conducts a subsequent level two and level three study. AW requests additional information on opportunistic flows, as well as clarification on the capabilities of the model. Ed Cheslak (PG&E) explained that the model provides information on flow in the reach given current operations. The model can consider unimpaired flow to predict when flow is greater under the existing operational needs, considers storage, and determines spill.

Theresa Simsiman (AW) asked for clarification on characterizing historic spill. Ed Cheslak (PG&E) explained that there is a historical time series, and a second time series that may exist if the project has changed. The model does not detect a change in facilities, but uses the operational rule to look at a baseline. The resulting information allows identification of spill to evaluate opportunities and examine alternatives. This record can be used to produce a time series for offline analysis.

Theresa Simsiman (AW) asked how to coordinate the study proposed by Stephen Bowes (NPS) and the whitewater boating study. Wayne Lifton (Cardno) clarified that phase two examines existing hydrology and targets regions of the flow record to determine alternatives for additional assessment under the model. This information is included in Appendix D on page 17 under HYD 1 Evaluating Alternative Operations. Katie Ross-Smith (Cardno) added that the PG&E will coordinate between HYD 1 and REC 1.

Lisa Whitman (PG&E) commented that the proposed study plan does not include all of the phases and deviates from standard methodology due to safety and security issues, particularly around access and flows.

Theresa Simsiman (AW) explained that whitewater exists in the area of many PG&E facilities and whitewater boaters assume a risk and are very safety conscious. AW's level one assessment includes all three phases that PG&E proposed, including a focus group and hydrology assessment. AW's level two assessment involves a site visit and evaluation of issues. At least including level one and level two is important to AW.

Somer Shaw (BLM) asked whether PG&E is concerned with hazards associated with whitewater boating or if the concern is around access near PG&E facilities. Lisa Whitman (PG&E) responded that both are concerns for PG&E.

Theresa Simsiman (AW) explained that before construction of K2, there were opportunistic flows. If a flow gage is installed, whitewater boaters can predict flows and mitigate risk. Theresa added that she will check in with AW's specialist, Dave Steindorf, for additional insight, particularly around safety concerns associated with access to PG&E facilities.

Somer Shaw (BLM) expressed that BLM is also concerned with flow and the release of water considering recreational use of the area.

Lisa Whitman (PG&E) commented that PG&E is not averse to including additional standard phases. However, there is a need to address safety concerns, and assistance from stakeholders could be helpful. For instance, understanding how whitewater boaters as a recreational community prepare and address safety concerns would be helpful.

Theresa Simsiman (AW) suggested the addition of site visits. Also, whitewater boaters prepare by assessing real time information about flow, which is why it is important to have flow information.

Lisa Whitman (PG&E) added that there are unique considerations associated with this Project regarding safety. Some are liability concerns and others are related to public safety, employee safety, and operational safety.

REC 2 Recreation Facility Assessment

Dan Clark (PG&E) started the conversation by reviewing the comments by USFS recommending identification of additional suitable locations and means for outreach and education to provide public information specific to the area.

Dawn Alvarez (USFS) and Jon George (USFS) confirmed that USFS aims to provide outreach and education to the public, particularly on the issue of invasive species. This outreach could include posting information on the existing bulletin board at Smalley Cove or on an additional panel at Smalley Cove, and maybe in the gorge.

Somer Shaw (BLM) agreed that additional information and education posted in the area would be helpful. She added that a description of the project would benefit public education and relations.

Theresa Simsiman (AW) commented that recreational boating is also relevant. A sign could be posted about not bringing invasive species on the bottom of boats. Eric Guzman (USFS) offered to bring existing fliers to share. He added that increased information to the public will prevent assumptions.

Dawn Alvarez (USFS) clarified that USFS requests that the study identify potential areas for outreach and education. For example, Smalley Cove and the small slice of USFS land nearby. Daniel Clark (PG&E) confirmed that PG&E's assessment will identify locations and means of outreach and assess coordination of informational opportunities.

Somer Shaw (BLM) commented that BLM requests that the proposed studies also analyze Project related impacts to recreational resources. In particular, BLM is interested in assessing geographic scope, improving the bypass reach and shoreline, as these areas are affected by flows. Additionally, BLM requests an assessment of opportunities to increase accessibility and address public safety concerns. Somer mentioned that she has heard directly of people losing equipment because of flows during fall, summer, and spring.

Dan Clark (PG&E) asked for clarification on the location of recreational activity.

Theresa Simsiman (AW) added that the powerhouses are used as take-outs for whitewater boating.

Somer Shaw (BLM) explained that recreational gold panning takes place around K2. There are several access points nearby. Signs are posted regarding the flows. She commented that BLM has received some feedback complaining about restricted access due to the gate by K2, which was possibly put in after September 11, 2001.

Dan Clark (PG&E) clarified that assessments will be put in context with the Project's effects.

Somer Shaw (BLM) explained that BLM is particularly interested in the areas where recreation occurs, specifically the area between K1 and K2 powerhouses as well as the area below K2 powerhouse. The Project discharges water, which changes the water levels and impacts flow. Accordingly, Project operations affect recreational activity, especially impacting issues of access and safety. BLM hopes to have additional discussions with PG&E around these issues.

Lisa Whitman (PG&E) commented that BLM's comments focused on the bypass reach, while PG&E's proposed studies focused on Kerckhoff Reservoir. The issue of assessment location needs further internal PG&E discussion.

Theresa Simsiman (AW) suggested that some of the discussion on the bypass reach regards recreational visitor use, not facilities.

Dan Clark (PG&E) emphasized the need to identify the Project nexus.

Lisa Whitman (PG&E) commented that BLM and PG&E may need to coordinate regarding safety issues near the powerhouses. However, an assessment that examines broader issues of recreational visitor use, such as disability access, is not related to the Project's operations.

Somer Shaw (BLM) clarified that BLM requests an assessment of PG&E facilities and structures that affect recreation on BLM land, particularly related to flows, access, and safety. BLM is not requesting a full assessment of all facilities in BLM's management areas.

Lisa Whitman (PG&E) suggested putting these assessments under REC 3. She expressed understanding that there are Project effects concerning flow that impact recreational use of BLM facilities.

Somer Shaw (BLM) commented that she considered proposing a new study.

Karen Doran (BLM) added that BLM's requested study is also an assessment of existing conditions to identify issues.

Dan Clark (PG&E) asked for clarification if BLM is requesting an assessment of PG&E's effects on BLM facilities.

Somer Shaw (BLM) responded that BLM requests assessment of PG&E's effects on the use of BLM facilities.

Dan Clark (PG&E) and Karen Doran (BLM) expressed a need for clarification on what is considered a recreational facility and a facility structure.

REC 3 Recreation Visitor Use

Dan Clark (PG&E) read the BLM comments on REC 3. He asked for clarification on BLM's specific concerns.

Somer Shaw (BLM) explained that BLM is concerned about visitor needs. In particular, BLM requests an assessment of the Project's effects on recreation, including issues around restricted access and safety. The same issues arise throughout the recreation studies. Somer requested a follow up discussion on REC 3.

Daniel Clark (PG&E) explained that the REC 3 study involves an assessment of PG&E facilities and recreation.

Philip Choy (SWRCB) commented that SWRCB made a comment in the PAD requesting an assessment on American shad because the included data are outdated. He had a comment regarding fishing access for shad at K1 and K2 powerhouses. He asked if PG&E had this information; and if not, there may need to be an angler survey to determine if PG&E restricts access to fishing shad at these locations.

Lisa Whitman (PG&E) commented that the SWRCB's requested assessment supports the whole fishery rather than just providing necessary flows to support American shad spawning.

Theresa Simsiman (AW) explained that there is a connection with the Project because people that are fishing access the river near the powerhouse.

Gina Morimoto (PG&E) asked for clarification on whether SWRCB is thinking about a creel survey. Philip Choy (SWRCB) responded that he was not suggesting a creel survey. He is interested in information that could inform the estimated frequency that people access below K1 and K2 to fish for American shad and whether PG&E restricts access with a gate.

Somer Shaw (BLM) explained that the issue relates to restricted access for recreation.

Eric Guzman (CDFW) added that people fish for American shad at Millerton Lake too.

Theresa Simsiman (AW) asked how PG&E is capturing or characterizing the recreational use that happens near the powerhouses. Lisa Whitman (PG&E) commented that PG&E does not encourage recreational use around its powerhouses. Somer Shaw (BLM) explained that regardless of whether PG&E encourages such use, recreation takes place around its powerhouses.

Dan Clark (PG&E) commented that PG&E's effect on recreation in the reach is related to flow, PG&E's effect on recreation near the powerhouse is related to its facilities.

Theresa Simsiman (AW) commented that it appears as though PG&E needs to characterize recreation that is affected by flow and recreation that is affected by the powerhouses.

Somer Shaw (BLM) asked how PG&E will analyze visitation within the areas of concern near the powerhouses, including fishing as well as other recreation. Wayne Lifton (Cardno) commented that the fish are in these areas because PG&E provides the necessary flows for shad. An alternative option to address issues with fishing near the powerhouses is not to release the flows to attract shad and fishermen.

Somer Shaw (BLM) suggested increasing public education about the flows. Currently the only information provided is through signs stating that the flows are subject to changes. PG&E will need to target various groups for education.

Wayne Lifton (Cardno) commented that if PG&E needs to address safety concerns, then resources may be better used to mitigate those concerns rather than for a study.

Theresa Simsiman (AW) responded that studies are necessary to determine the safety concerns that need mitigation.

Eric Guzman (CDFW) added that studies are needed to determine whether the flows provided by PG&E are working to support American shad.

Somer Shaw (BLM) commented that another consideration is which languages are used on signage.

Theresa Simsiman (AW) added that PG&E needs to consider who is using the area and what activities occur.

Lisa Whitman (PG&E) asked if there is a clear way to separate recreation created by the powerhouses from recreation stemming from BLM facilities.

Somer Shaw (BLM) commented that such separation is challenging. The historical use of the area is largely based on PG&E access points so it is difficult to separate safety issues from recreational value. However, it would be helpful to gain a baseline of information on effects within areas of concern and assessing means to provide safety and opportunity. Existing data on recreational visitation fluctuate. There has been one drowning as well as lost equipment and other safety concerns.

Julie Leimbach (Kearns & West) summarized that there is an issue of facilities use and a separate issue of recreational use in the reach.

Lisa Whitman (PG&E) commented that she is hearing an issue of evaluating and addressing recreational uses caused by PG&E's facilities. Her concern is how to separate that issue from the fact that BLM has recreational areas below Kerckhoff Dam and BLM supports recreation in the San Joaquin River Gorge. There is a need to either separate these issues and goals, or perhaps coordinate with BLM.

Theresa Simsiman (AW) added that there is an additional concern regarding the effects that the powerhouses may have on recreation.

REC 4 Recreation Visitor Use Surveys

The group discussed encountering a similar issue of organization as mentioned in REC 3.

Eric Guzman (CDFW) explained that these issues are complex and interconnected. In particular, it is challenging to determine which party is obligated to take on certain responsibilities. It seems like it is PG&E's responsibility to gather data on the American shad population because PG&E's facility affects the habitat there.

Julie Leimbach (Kearns & West) suggested that all of the agencies and stakeholders present could consider the question of responsibility and reflect on the relationships among parties.

CUL 1 Cultural Resources

Matthew Armstrong (PG&E) provided an overview of comments from SWRCB and BLM. SWRCB's comments mention an informal recreation area. Matthew is interested in learning about the activity occurring in this area because activity may implicate cultural resource issues or possible site alteration. Requests for changes to recreational areas must be weighed against cultural resource issues.

Philip Choy (SWRCB) explained that SWRCB included this discussion in its comments because erosion in the area may affect water quality.

Matthew Armstrong (PG&E) responded to comments from BLM by agreeing that BLM should be added as a repository of information. Additionally, PG&E wants to work with Native American

stakeholders. Matthew asked about the reason for BLM's request to extend the study area out to one mile.

Amy Girado (BLM) expressed interest in coordinating with PG&E to prevent future issues with Native American stakeholders. Additionally, the current study area is small and BLM wants additional data for meaningful results. There are not a lot of data and the wider area is expected to capture more information about resources that may be present. It is not a heavy burden to extend the length of study area.

Matthew Armstrong (PG&E) responded that BLM's request is fair. He noted that all resources should be evaluated with a main concern for preventing damage.

Amy Girado (BLM) explained that Criteria D needs evaluation, but Criteria A, B, and C do not need to be evaluated. BLM's main concern is having data initially so that it will be available if additional work is needed in the future.

Matthew Armstrong (PG&E) offered to send an example of a FERC document, the Historic Property Management Plan, to BLM.

Amy Girado (BLM) expressed concern that existing data are outdated so evaluation may be requested for resources that are no longer present in the area.

Matthew Armstrong (PG&E) mentioned that this issue is related to the discussion on transmission lines. Additionally, BLM's comments request an evaluation of past impact areas, which PG&E find potentially unnecessary. Also, Matthew asked for clarification on what is meant by areas outside the FERC boundary.

Amy Girado (BLM) explained that her concern is to make sure that the cultural study covers the realistic footprint, and includes nuisances for analysis as well. In particular, BLM is concerned with including the large dump site and areas like this that are carved out of FERC's boundary, and subsequently inadequately assessed.

Somer Shaw (BLM) asked if the dumpsite is addressed in the boundary.

Amy Girado (BLM) responded that BLM does not have a good idea of the cultural boundary used with PG&E at this time. Additionally, Amy anticipates that the footprint will expand outside of the Project boundaries.

Matthew Armstrong (PG&E) expressed that BLM's concerns make sense. He explained that it might not make sense to include some areas in the licensing process, but it is beneficial to start the conversation now and generate ways to deal with the issues. Additionally, BLM requested tighter specifications, which are standard good practice.

Christina McDonald (North Fork Rancheria of Mono Indians) expressed that PG&E needs to document the underwater resources at Kerckhoff Reservoir. Matthew commented that PG&E does not yet know how to address the underwater resources at Kerckhoff Lake, but PG&E is considering conducting an assessment of possible impacts due to recreational use of the lake.

Dawn Alvarez (USFS) suggested that PG&E discuss the underwater resources with Jon George (USFS) if they are located on USFS land.

CUL 2 - Tribal Resources

Matthew Armstrong (PG&E) asked for clarification on BLM's request to case a wider net.

Amy Girado (BLM) explained that the existing data are outdated. Additionally, certain features and landforms that relate to the ethnography were not previously captured. It is important to include impacted stakeholders to share their perspectives, values, and concerns.

Matthew Armstrong (PG&E) commented that BLM's request seems fair and can be further discussed. Additionally, PG&E will add regulatory compliance with Executive Order 13007. Regarding the ethnographic study, an assessment will be made considering impacted stakeholders.

New Sediment-Related Study Requests

Arsenic Contamination

Gregg Wilkerson (BLM) provided an overview of BLM's comments. His concern is that the existing proposed studies do not provide an adequate assessment of arsenic. The new arsenic standard is five parts per billion. In some areas (not associated with the Project), arsenic levels are exceeding safe levels and water must be treated. Accordingly, BLM requests more information on conditions regarding arsenic in the Project-affected area. In particular, BLM is concerned because the Project potentially provides an opportunity for arsenic to accumulate and breakdown in the Kerckhoff Reservoir.

Ed Cheslak (PG&E) explained that PG&E addresses arsenic in WQ 2, which assesses arsenic, along with the other CAM 17 metals. In WQ 2, PG&E can examine arsenic as an element of concern and identify potential issues. Traditionally, PG&E does not conduct sediment examinations because the Project does not involve dredging or any changes to the sediment condition. Currently, the sediment is in equilibrium and any contaminants coming into the Kerckhoff Reservoir are transported downstream. The existing sediment analysis does not indicate a high level of arsenic. Is the WQ 2 study satisfactory or what additional study is needed?

Gregg Wilkerson (BLM) responded that he would like to see a map showing sampling locations and arsenic concentrations. Additionally, he requests that water samples be taken periodically throughout the water column to observe any changes in arsenic concentrations. Gregg explained that the Kerckhoff Reservoir acts as a trap that may hold onto arsenic and prevent it from traveling downstream.

Ed Cheslak (PG&E) responded that the profile is currently conducted at the dam, but different kinds of profiling will be instituted at the three locations. Also, PG&E will conduct an assessment of minerals, nutrients, hydrocarbon, and CAM 17 metals at the dam during the runoff season and at the end of summer in order to bracket conditions. PG&E is not targeting storm events due to safety concerns.

Gregg Wilkerson (BLM) explained that he is concerned by the absence of data from storm events because the incomplete data may skew results. Also, storm events potentially introduce contaminants. There are techniques for safely sampling during storm events. Ed Cheslak (PG&E) explained that storm events are not included because the Project does not have control over the storm event. Accordingly, there is not an issue that is specific to the Project, such as runoff in which rain events act as mechanisms to introduce arsenic into the water column. Storm events are viewed as natural events that are out of PG&E's control. Thus, there is not a nexus with the Project.

Somer Shaw (BLM) commented that she is concerned that the dam is trapping sediment, in which case, the structure is providing a condition and the storm event is moving a condition created by the Project.

Gregg Wilkerson (BLM) added that when materials come into the dam, it becomes PG&E's responsibility. As material accumulates, it breaks down. Accordingly, chemical changes are occurring as a consequence of the presence of the dam. It would be better to measure this material and confirm that it remains at a safe level. Ed Cheslak (PG&E) expressed disagreement. He explained that arsenic may settle in the sediment and be trapped. However, currently the sediment load is at equilibrium. To PG&E's knowledge, there is no further accumulation of sediment in Kerckhoff Reservoir. The material that comes in is transported downstream and there is no generation of arsenic. Somer Shaw (BLM) stated that PG&E is creating a condition for arsenic to accumulate.

Gregg Wilkerson (BLM) added that further discussion is necessary on this topic.

Eric Guzman (CDFW) commented that relicensing is an opportunity to gather updated information. As the previous data are outdated, it seems as though it should be PG&E's responsibility to update information for evaluation and establish a new baseline for impacts.

Ed Cheslak (PG&E) asked how arsenic would affect management, if a sediment analysis detected it.

Eric Guzman (CDFW) responded that he would assess where the arsenic was coming from. Ed Cheslak (PG&E) clarified that any detected arsenic would have washed in from the watershed above Kerckhoff Reservoir. Eric Guzman (CDFW) expressed that PG&E continues to respond to concerns with an explanation that it is a flow-through operation and, therefore, not the responsibility of PG&E. This results in a lack of information to evaluate the Project and potential impacts.

Ed Cheslak (PG&E) explained that PG&E has not been asked to do a contaminant analysis of the sediment in any other licensing projects, unless during a decommissioning. The sediments at Kerckhoff Reservoir are stable, except for a possible bioaccumulation issue that will be further examined. Previously, PG&E has not been required to assess sediments behind the reservoir. FERC has recognized an absence of project nexus where arsenic is coming in and passing through.

Eric Guzman (CDFW) asked if there is a way to understand and ensure the Project's efficiency regarding project facilities. Gina Morimoto (PG&E) responded that the Project undergoes

inspections from FERC, the Division of Safety and Dams, as well as environmental and public use inspections, among others.

Eric Guzman (CDFW) clarified that his interest is in the utilization of new available technology.

Lisa Whitman (PG&E) explained that she would consider the Project's efficiency regarding project facilities to be a business decision in terms of asset management.

Wayne Lifton (Cardno) added that an efficiency analysis usually derives from a proposal by a licensee to change facilities, like when K2 was proposed in 1979. However, when a project remains the same, the existing condition is the proposed project to be analyzed.

Recreational Gold Panning

Lisa Whitman (PG&E) expressed that recreational gold panning is a new issue for consideration that has not come up in other relicensings. PG&E is interested to gain information in terms of level of activity, frequency, etc.

Somer Shaw (BLM) explained that people generally use the fishing access point then the extension trail at K2 to access the areas slightly above and below K2. People use scuba suits and other equipment. There has been equipment lost in the area.

Gregg Wilkerson (BLM) added that most of the gold panning occurs below the cutoff and most of the gold originates on USFS land then comes into Kerckhoff Reservoir. Some of the gold makes its way downstream, particularly when sediment is flushed out of the tunnels. Ed Cheslak (PG&E) explained that during spill, PG&E opens the low-level outlets and flushes some sediment.

Gregg Wilkerson (BLM) responded that gold panning is a recreational activity affected by the Project's operations and it was absent from the PAD. If PG&E did not release sediment through its powerhouses, there would probably not be gold panning in the area. It is a recreational activity that PG&E should consider. Potentially, PG&E could notify the public on the timing of release.

Somer Shaw (BLM) added that illegal operations have occurred in the stretch between the dam and K1.

Theresa Simsiman (AW) added that PG&E needs to address safety concerns regarding fluctuations in flow and consider providing mitigating information, such as real time flow information.

Gregg Wilkerson (BLM) clarified that he is requesting a study that documents and assesses recreational gold panning with quantitative data.

Lisa Whitman (PG&E) asked if the gold panning community is attracted to powerhouse areas typically. What is the value in this area? Gregg Wilkerson (BLM) explained that recreational gold panning occurs in many California rivers, particularly near mining areas. One reason that people are attracted to the Project area is accessibility.

Lisa Whitman (PG&E) asked about the reasons for the study. Gregg Wilkerson (BLM) explained that a study could provide information to affect the quality of the recreational activity. For

Attachment E – Consultation Record

instance, releasing the sediment at one time would increase the amount of available gold. Wayne Lifton (Cardno) responded that releasing the sediment at once would have a considerable adverse effect on downstream aquatic resources.

Theresa Simsiman (AW) added that the purpose of studies is to identify uses and impacts. This interest needs consideration.

Gina Morimoto (PG&E) clarified that low-level outlets are not operated to flush sediment. Dredging would be considered if the objective were to move sediment downstream.

APPENDIX A
Agenda

Attachment E – Consultation Record

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**PG&E Kerckhoff Hydroelectric Project
Early Proposed Study Plan Meeting Agenda**

**Piccadilly Airport Inn, 5115 E McKinley Avenue, Fresno
March 28, 2018
9:00 am – 4:45 pm**

9:00 – 9:15 Introductions, Safety, Ground Rules

9:15 – 9:30 ILP Study Plan Schedule

9:30 – 11:30 Water-related Study Plans

- *WQ 1 Water Temperature in Kerckhoff Reservoir and the San Joaquin River Bypass Reach*
- *WQ 2 Water Quality Sampling in Project Bypass Reach and Kerckhoff Reservoir*
- *AQ 1 Aquatic Habitat Mapping*
- *AQ 2 Fish Populations*
- *AQ 3 Mussels and Aquatic Molluscs*
- *AQ 4 Entrainment*
- *AQ 5 Western Pond Turtles*
- *HYD 1 Operations Simulation Model*
- *HYD 2 Hydrology with and without the Project*
- *BOT 2 Riparian and Wetland Resources*
- *GEO 1 Channel Form and Fluvial Processes*
- *GEO 2 Project-related Sediment Management Practices in Kerckhoff Reservoir*

11:30 – 12:00 New Aquatic Study Requests

- *Rare Aquatic Species*
- *Benthic Macroinvertebrate*
- *Bioaccumulation*

12:00 – 1:00 LUNCH (on own)

1:00 – 2:00 Botanical, Wildlife, and Land Study Plans

- *BOT 1 Plant Communities, Special-Status Plant, Invasive Weeds*
- *WILD 1 Special Status Wildlife Species*
- *LAND 1 Project Roads and Trails Assessment*

2:00 – 2:15 BREAK

2:15 – 4:00 Recreation and Cultural Study Plans

- *REC 1 Whitewater Boating*
- *REC 2 Recreation Facility Assessment*
- *REC 3 Recreation Visitor Use*
- *REC 4 Recreation Visitor Use Surveys*
- *CUL 1 – Cultural Resources*
- *CUL 2 - Tribal Resources*

4:00 – 4:30 New Sediment-related Study Requests

- *Arsenic Contamination*
- *Recreational Gold Panning*

4:30 – 4:45 Meeting Close-out

- *Action Items and Next Steps*

Table E-1. Proposed Study Plan Stakeholder Additional Consultation Records

Date	Correspondence Type		Participants																								Summary											
	Email	Tele-conference	Stakeholders															PG&E							PG&E Consultants													
			Theresa Simsiman (American)	Somer Shaw (BLM)	Gregg Wilkerson (BLM)	Tim Keldsen (BLM)	Karen Doran (BLM)	Amy Girado (BLM)	Christina Castellon (BLM)	Denis Kearns (BLM)	Rebecca Brooke (BLM)	Larry Vrendenburgh (BLM)	Fariba Hamedani (BLM)	Eric Guzman (CDFW)	Steve Bowes (NPS)	Philip Choy (State Water Board)	Dawn Alvarez (USFS)	Ann Roberts (USFS)	Joanna Clines (USFS)	Lisa Whitman	Gina Morimoto	Ed Cheslak	Dan Clark	Laura Burkholder	Catherine Ferguson	Shannon Johnson		Kelly Kephart	Andie Herman	Scott Steinberg	Matt Armstrong	Mike Taggart	Wayne Lifton (Cardno)	Katie Ross-Smith (Cardno)	Dave Martinez (Cardno)	Mitch Katzel (Cardno)	Carol Efird (Louis Berger)	
12/19/17		•		•			•	•	•	•	•	•								•	•		•	•														Studies included in the PAD <ul style="list-style-type: none"> Discussed draft study plans included in the PAD Discussed the timing of the studies and study areas
12/21/17		•																		•	•										•						Studies included in the PAD <ul style="list-style-type: none"> Discussed American shad and striped bass available information and studies performed by PG&E Discussed required flows for American shad spawning Discussed eDNA sampling for Kern Brook Lamprey. Discussed potential BMI study Discussed reservoir sediment conditions 	
1/25/18		•	•										•							•	•																REC 1 Study <ul style="list-style-type: none"> Discuss draft DSP approach, safety issues, AW and NPS requested study plan to follow Flows and Recreation: A Guide to Studies for River Professionals (Whittaker et al. 2005) 	
3/6/18	•																			•	•																Studies included in the PAD <ul style="list-style-type: none"> PG&E provided 12/21/17 meeting notes and follow-up information requested by State Water Board during the call on 12/21/17 and FERC's Scoping Meeting on 2/13/18 	
3/6/18		•																																			Studies included in the PAD <ul style="list-style-type: none"> PG&E and State Water Board discussed the follow-up information provided in the 3/6/18 email, as well as additional detail in several DSPs. 	

Attachment E – Consultation Record

Date	Correspondence Type		Participants																					Summary												
	Email	Tele-conference	Stakeholders														PG&E								PG&E Consultants											
			Theresa Simsiman (American	Somer Shaw (BLM)	Gregg Wilkerson (BLM)	Tim Keldsen (BLM)	Karen Doran (BLM)	Amy Girado (BLM)	Christina Castellana (BLM)	Denis Kearns (BLM)	Rebecca Brooke (BLM)	Larry Vrendenburgh (BLM)	Fariba Hamedani (BLM)	Eric Guzman (CDFW)	Steve Bowes (NPS)	Philip Choy (State Water Board)	Dawn Alvarez (USFS)	Ann Roberts (USFS)	Joanna Clines (USFS)	Lisa Whitman	Gina Morimoto	Ed Cheslak	Dan Clark		Laura Burkholder	Catherine Ferguson	Shannon Johnson	Kelly Kephart	Andie Herman	Scott Steinberg	Matt Armstrong	Mike Taggart	Wayne Lifton (Cardno)	Katie Ross-Smith (Cardno)	Dave Martinez (Cardno)	Mitch Katzel (Cardno)
3/30/18		•																																		<p>AQ 2 Study and License Article 45 water temperature compliance</p> <ul style="list-style-type: none"> Discussed existing water temperature compliance. To reduce the potential for fish mortality during sampling at Kerckhoff Reservoir, discussed gill net sampling with shorter sets during the day and longer sets at night Discussed hook and line sampling as a possible method to verify presence and collect information on spawning American shad, and review CDFW guide logs, if available from CDFW
4/2/18																																				<p>CUL 1 and CUL 2 Studies</p> <ul style="list-style-type: none"> Discussed BLM comments on the studies and the PAD
4/4/18		•																																		<p>BOT 1 and WILD 1 Studies</p> <ul style="list-style-type: none"> Discussed BLM's comments on invasive weed survey frequency and wildlife survey frequency and methods. BLM agreed with the methodology of one year of surveys for invasive weeds understanding that future license conditions would likely require PG&E to update noxious weed baseline surveys to capture population change over time BLM agreed with frequency for one year of habitat surveys for special status wildlife; focused surveys only for bald eagle; habitat-based approach survey for other special-status wildlife with the potential to occur; wildlife cameras are not needed for the wildlife surveys; and mist nets only would be used in specific locations where bat species could not be identified by visual or acoustic surveys

Date	Correspondence Type		Participants																								Summary												
	Email	Tele-conference	Stakeholders														PG&E							PG&E Consultants															
			Theresa Simsiman (American)	Somer Shaw (BLM)	Gregg Wilkerson (BLM)	Tim Keldsen (BLM)	Karen Doran (BLM)	Amy Girado (BLM)	Christina Castellani (BLM)	Denis Kearns (BLM)	Rebecca Brooke (BLM)	Larry Vrendenburgh (BLM)	Fariba Hamedani (BLM)	Eric Guzman (CDFW)	Steve Bowes (NPS)	Philip Choy (State Water Board)	Dawn Alvarez (USFS)	Ann Roberts (USFS)	Joanna Clines (USFS)	Lisa Whitman	Gina Morimoto	Ed Cheslak	Dan Clark	Laura Burkholder	Catherine Ferguson	Shannon Johnson		Kelly Kephart	Andie Herman	Scott Steinberg	Matt Armstrong	Mike Taggart	Wayne Liffon (Cardno)	Katie Ross-Smith (Cardno)	Dave Martinez (Cardno)	Mitch Katzel (Cardno)	Carol Efird (Louis Berger)		
4/4/18		•	•	•								•						•			•																		<p>REC 1, REC 2, REC 3, and REC 4 Studies</p> <ul style="list-style-type: none"> For REC 1, discussed the three phases for whitewater assessment guidelines laid out in <i>Flows and Recreation: A Guide to Studies for River Professionals</i> (Whittaker, Shelby, and Gangemi 2005). PG&E agreed to review materials provided during the meeting and to consider addressing these phases in the REC 1 study For REC 2, 3, and 4, discussed access, safety, and recreation opportunities in the San Joaquin River near the K1 and K2 powerhouses. PG&E and BLM agreed to a site visit to look at recreation access and safety near the powerhouses
4/5/18		•																•		•	•	•																<p>AQ 1, AQ 2, WQ1, and WQ 2 Studies, and Benthic Macroinvertebrates and Bioaccumulation Study Requests</p> <ul style="list-style-type: none"> For AQ 1, PG&E agreed to include a specification for the criteria for fish passage in the study plan and to clarify that the discontinuity of pools will be documented as part of this study For AQ 2, State Water Board agreed hook-and-line and review of CDFW logs, if available, could be used to verify presence and collect information, including scale analysis, on spawning American shad. State Water Board agreed to the gill netting approach for two 4-hr sets during the day and one 8-hr set at night to reduce potential mortality. PG&E agreed to measure fish and collect scales for analysis of striped bass incidentally caught during hook and line surveys. PG&E agreed that the last hook and line survey would target documenting spawned out shad Discussed water temperature monitoring locations in the Project Bypass Reach 	

Attachment E – Consultation Record

Date	Correspondence Type		Participants																								Summary										
	Email	Tele-conference	Stakeholders															PG&E								PG&E Consultants											
			Theresa Simsiman (American)	Somer Shaw (BLM)	Gregg Wilkerson (BLM)	Tim Keldsen (BLM)	Karen Doran (BLM)	Amy Girado (BLM)	Christina Castellani (BLM)	Denis Kearns (BLM)	Rebecca Brooke (BLM)	Larry Vrendenburgh (BLM)	Fariba Hamedani (BLM)	Eric Guzman (CDFW)	Steve Bowes (NPS)	Philip Choy (State Water Board)	Dawn Alvarez (USFS)	Ann Roberts (USFS)	Joanna Clines (USFS)	Lisa Whitman	Gina Morimoto	Ed Cheslak	Dan Clark	Laura Burkholder	Catherine Ferguson	Shannon Johnson		Kelly Kephart	Andie Herman	Scott Steinberg	Matt Armstrong	Mike Taggart	Wayne Lifton (Cardno)	Katie Ross-Smith (Cardno)	Dave Martinez (Cardno)	Mitch Katzel (Cardno)	Carol Efrid (Louis Berger)
																																					<ul style="list-style-type: none"> For WQ 2, discussed fecal coliform sampling locations in the reservoir and in near the K1 and K2 powerhouse For the BMI study request, discussed elements of a potential BMI study Discussed State Water Board’s list of constituents to be analyzed for a Bioaccumulation study and potential Project nexus
4/9/18		•																																		<p>eDNA Study Request</p> <ul style="list-style-type: none"> Discussed potential eDNA sampling design for foothill yellow-legged frog (FYLF) and Kern brook lamprey USFS agreed to withdraw the request for eDNA sampling for special-status molluscs as no special-status or USFS sensitive species are known to occur in the SJR below Kerckhoff Dam PG&E agreed to document observations of bullfrogs encountered during field surveys 	
4/10/18		•																																			<p>Bioaccumulation Study Request follow-up call to discuss constituents and methodology</p>
4/10/18	•																																				<p>Bioaccumulation Study Request follow-up email</p> <ul style="list-style-type: none"> State Water Board spoke with OEHHA about constituents. With additional research into each contaminant and potential Project nexus, State Water Board recommended a modified list of constituents to analyze in fish tissue compared to initial suite of requested constituents
4/11/18		•																																			<p>WQ 1 and WQ 2 Studies</p> <ul style="list-style-type: none"> Discussed sediment sampling, potential for concentration of contaminants Discussed water temperature monitoring Discussed coliform and <i>E. coli</i> in relation to sampling sites and methodology

Date	Correspondence Type		Participants																						Summary											
	Email	Tele-conference	Stakeholders														PG&E						PG&E Consultants													
			Theresa Simsiman (American	Somer Shaw (BLM)	Gregg Wilkerson (BLM)	Tim Keldsen (BLM)	Karen Doran (BLM)	Amy Girado (BLM)	Christina Castellani (BLM)	Denis Kearns (BLM)	Rebecca Brooke (BLM)	Larry Vrendenburgh (BLM)	Fariba Hamedani (BLM)	Eric Guzman (CDFW)	Steve Bowes (NPS)	Philip Choy (State Water Board)	Dawn Alvarez (USFS)	Ann Roberts (USFS)	Joanna Clines (USFS)	Lisa Whitman	Gina Morimoto	Ed Cheslak	Dan Clark	Laura Burkholder		Catherine Ferguson	Shannon Johnson	Kelly Kephart	Andie Herman	Scott Steinberg	Matt Armstrong	Mike Taggart	Wayne Lifton (Cardno)	Katie Ross-Smith (Cardno)	Dave Martinez (Cardno)	Mitch Katzel (Cardno)
4/11/18		•		•	•									•						•	•	•														<p>GEO 1, GEO 2, and GEO 3 Studies</p> <ul style="list-style-type: none"> Discussed that BLM is mostly interested in measures to provide public notification regarding flow releases that may affect the gold distribution, and also possibly providing interpretive signage related to gold panning Discussed the purposes of GEO 3 and PG&E will add clarification of the study's purpose to the study plan Discussed bio-available arsenic testing as part of WQ 2
4/11/18	•													•						•	•														<p>WQ 2 Study</p> <ul style="list-style-type: none"> State Water Board provided references to thresholds for recreation-related <i>E. coli</i> and coliform parameters 	

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ATTACHMENT F

Proposed Study Plans

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STUDY HYD 1 Operations Simulation Model

April 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 of the Pre-Application Document (PG&E 2017c), *Project Location, Facilities, and Operations*, 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):

- 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.

Proposed Study Plan

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 stakeholders 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

Proposed Study Plan

be held with resource agencies and stakeholders to present the model and the results of calibration and simulation to the stakeholders, 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 resources agencies and 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 participants
July 2020	Distribute Final HYD 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	\$	17,828
Fieldwork	\$	0
Data Analysis	\$	41,916
Products	\$	20,516
Total	\$	80,260

HYD 1-5

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REFERENCES

- California Data Exchange Center. 2017. Friant Dam (Millerton Lake) (Station:Mil). Available at: <http://cdec.water.ca.gov/cgi-progs/queryDaily?MIL>.
- 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, CA
- 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.
- 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>.
- USACE (U.S. Army Corps of Engineers). 2017. Hydrologic Engineering Center ResSim Software. Available at: <http://www.hec.usace.army.mil/software/hec-ressim/>.

STUDY HYD 2 Hydrology With and Without the Project

April 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 of the Pre-Application Document [PG&E 2017b], *Project Location, Facilities, and Operations* and Section 5.1, *Water Use and Hydrology*);
- 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 have been identified as potential information gaps:

- 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.

Proposed Study Plan

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 km]).

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*.

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 the participants
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

Proposed Study Plan

REFERENCES

- PG&E (Pacific Gas and Electric Company). 2017a. Mean, minimum, and maximum monthly average flows into Kerckhoff Reservoir and below Kerckhoff Dam.
- _____. 2017b. Pacific Gas and Electric Company Kerckhoff Hydroelectric Project FERC Project No. 96 Pre-Application Document (PAD), November 2017. PG&E San Francisco, California.
- Richter, B.D., J. Baumgartner, J. Powell, and D. Braun. 1996. A method for assessing hydrologic alteration within ecosystems. *Conservation Biology* 10(4):1163–1174.
- SCE (Southern California Edison). 2017. 2016 data collection report. Native Aquatic Species Management Plan (NASMP). Big Creek, California.
- The Nature Conservancy. 2009. Indicators of hydrologic alteration (IHA) software Version 7.1 with rPurview LLC - Ted Rybicki, Totten Software Design Smythe Scientific Software.
- USGS (U.S. Geological Survey). 2017. Geographic Names Information System (GNIS). Available at: www.nhd.usgs.gov/gnis

STUDY GEO 1 Channel Form and Fluvial Processes

April 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) *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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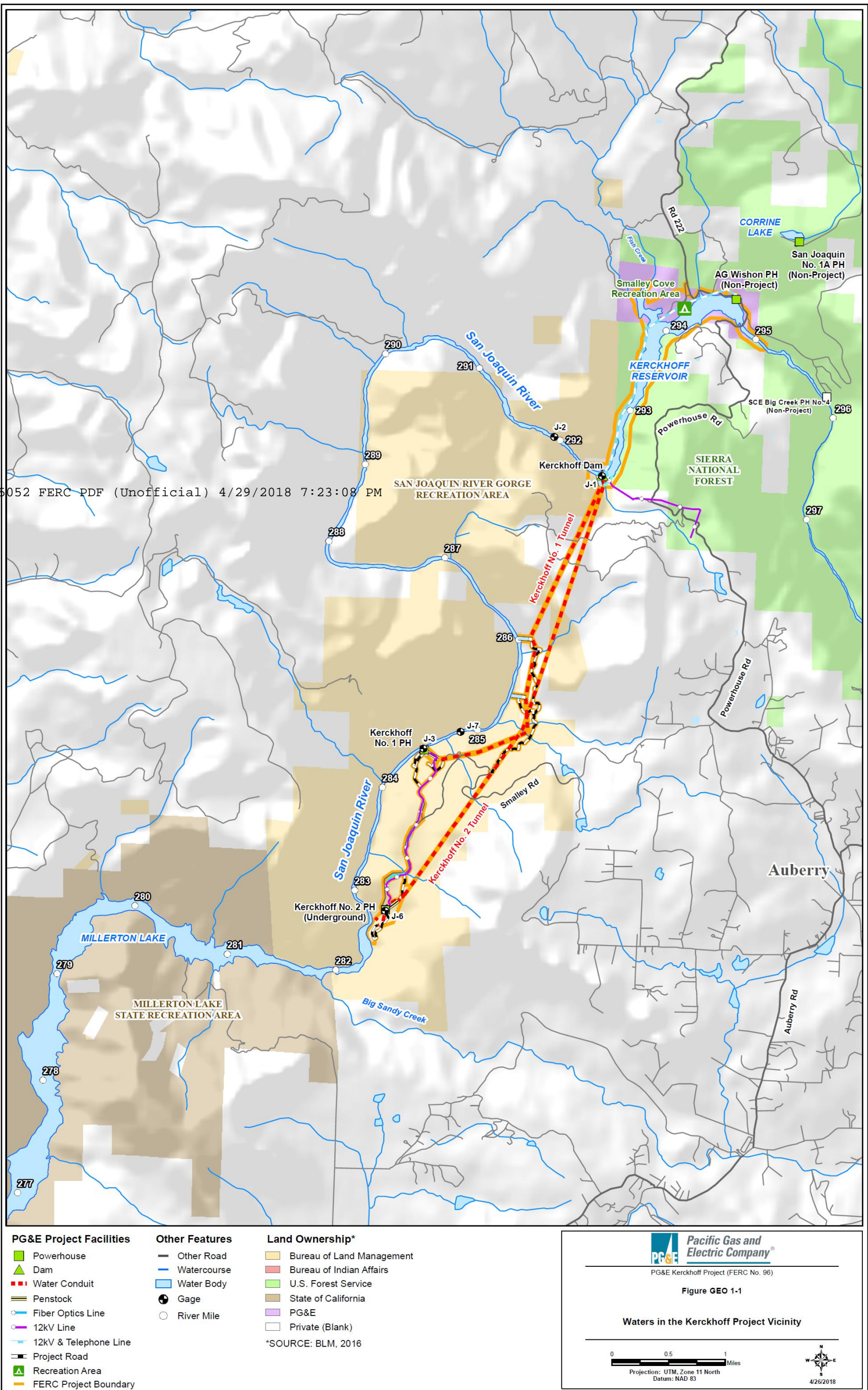


Figure GEO 1-1. Waters in the Project Vicinity.

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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 resources agencies and 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 resources agencies and interested parties.
- A Supplemental GEO 1 TSR will be distributed to resources agencies and 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 ILP regulations require. PG&E is considering accelerating the schedule so it would to 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 stakeholders
February–March 2019	-	Stakeholders 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 under with and without Project flow conditions (results of <i>Study HYD 2, Hydrology with and without the Project</i>)
December 2019	December 2019	Distribute Supplemental GEO 1 TSR
January–March 2020	January–March 2020	Stakeholders review and provide comments on draft supplemental TSR
April and May 2020	April and May 2020	Resolve comments and prepare final 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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Proposed Study Plan

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STUDY GEO 2

Project-related Sediment Management Practices in Kerckhoff Reservoir

April 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.

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) *Geologic Map of the Millerton Lake Quadrangle* (Bateman and Busacca 1982);
- U.S. Bureau of Reclamation's (BoR) *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).

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

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

Proposed Study Plan

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 the methods, timing, and frequency.
- 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 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.
 - The current sediment characterization data will be compared with the 2012 sediment characteristics to assess the potential sources of sediment and support sediment management and resource planning, if needed.
- Identify immediate sources of sediment to Kerckhoff Reservoir and their characteristics including the area surrounding Kerckhoff Reservoir, Fish Creek, and the San Joaquin River 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).

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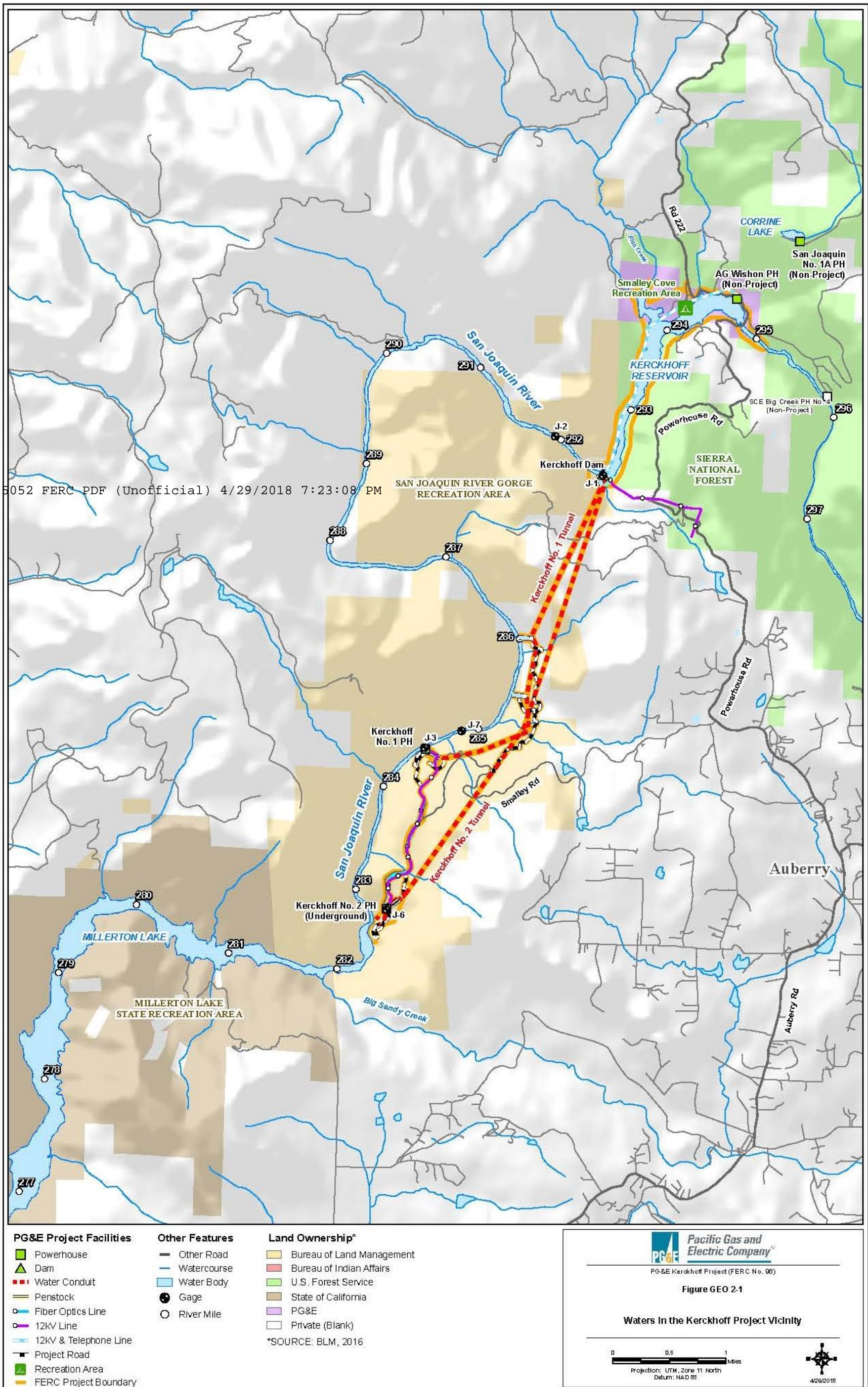


Figure GEO 2-1. Waters in the Project Vicinity.

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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 bathymetry, to create a seamless contour map of reservoir bottom topography. 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. Bathymetry 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. Bathymetric data and multispectral LiDAR data will be tied to a common set of benchmarks to allow for seamless integration of the datasets. Data will be combined via geographic information system (GIS) to facilitate preparation of reservoir contour maps, calculation of available storage, and comparison to previous bathymetric surveys. The emphasis of the bathymetric survey comparison will be with the 2012 bathymetric survey for the common areas included in both surveys to estimate the volume of sediment present in the reservoir. 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. A total of 15 samples will be collected during the bathymetric survey. Seven of the sediment characterization samples will be collected as close as possible to the seven sites sampled in 2012 within the reservoir, 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.

Proposed Study Plan

- 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 *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 bathymetric and multispectral LiDAR surveys are standard practice for assessing reservoir storage and 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.

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 resources agencies and interested parties for comment.
- 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*.
- *Study WQ 1 Water Temperatures in Kerckhoff Reservoir and San Joaquin River 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.

GEO 2-6

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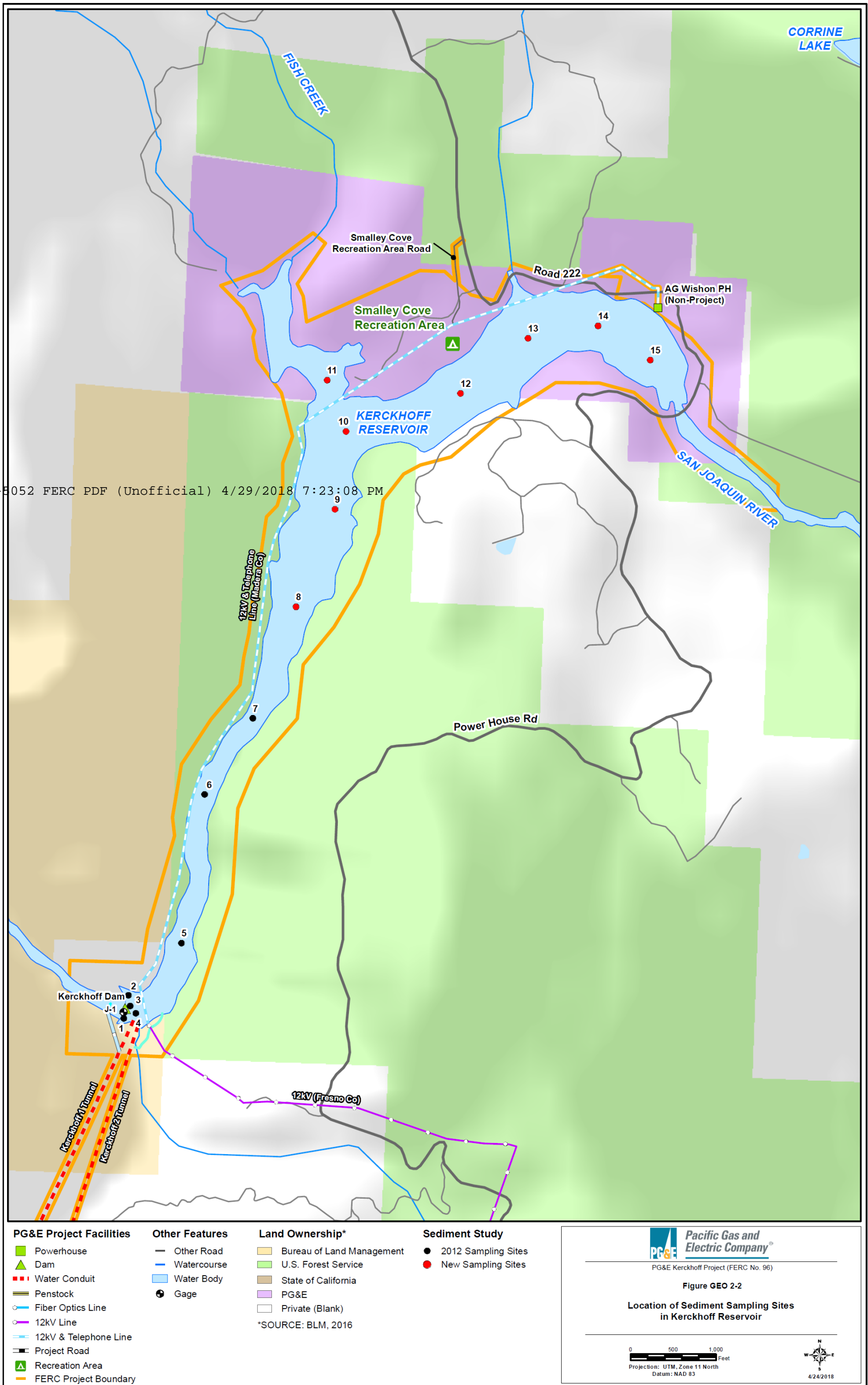


Figure GEO 2-2. Approximate Sediment Sampling Locations in Kerckhoff Reservoir.

GEO 2-7

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POSSIBLE EARLY SCHEDULE

PG&E is evaluating the potential to implement this study in September 2018, which is earlier than 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 bathymetric field surveys and sediment sampling (concurrent with bathymetric survey)
Winter 2018/2019	Fall 2019-Winter 2020	Analyze LiDAR and bathymetric data, sediment sampling data, and sediment sources to reservoir, and prepare Draft GEO 2 TSR
Spring 2019	Spring 2020	Distribute Draft GEO 2 TSR to stakeholders
Summer 2019	Spring 2020	Stakeholders review and provide comments on draft report
Fall 2019	July 2020	Distribute Final GEO 2 TSR to the stakeholders

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

Proposed Study Plan

REFERENCES

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STUDY GEO 3 Project Road-Related Erosion

April 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) *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).

Proposed Study Plan

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 micro-zonation 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) 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 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 1)	5,572
Access Road 3 to Kerckhoff 1 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 K2 Surge Tank)	1,304
Access Road 9 (to K2 Penstock Construction Access Tunnel)	334

Table GEO 3-1b. Shared Access Roads.

Shared Road with Gated Access (Shared Entities) ^a	Length (ft.)
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.

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.
- If authorization is obtained, PG&E will complete surveys as described in this study plan.

Proposed 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, 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 Gas Transmission Integrity Management Program (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, etc.) 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.
 - 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.

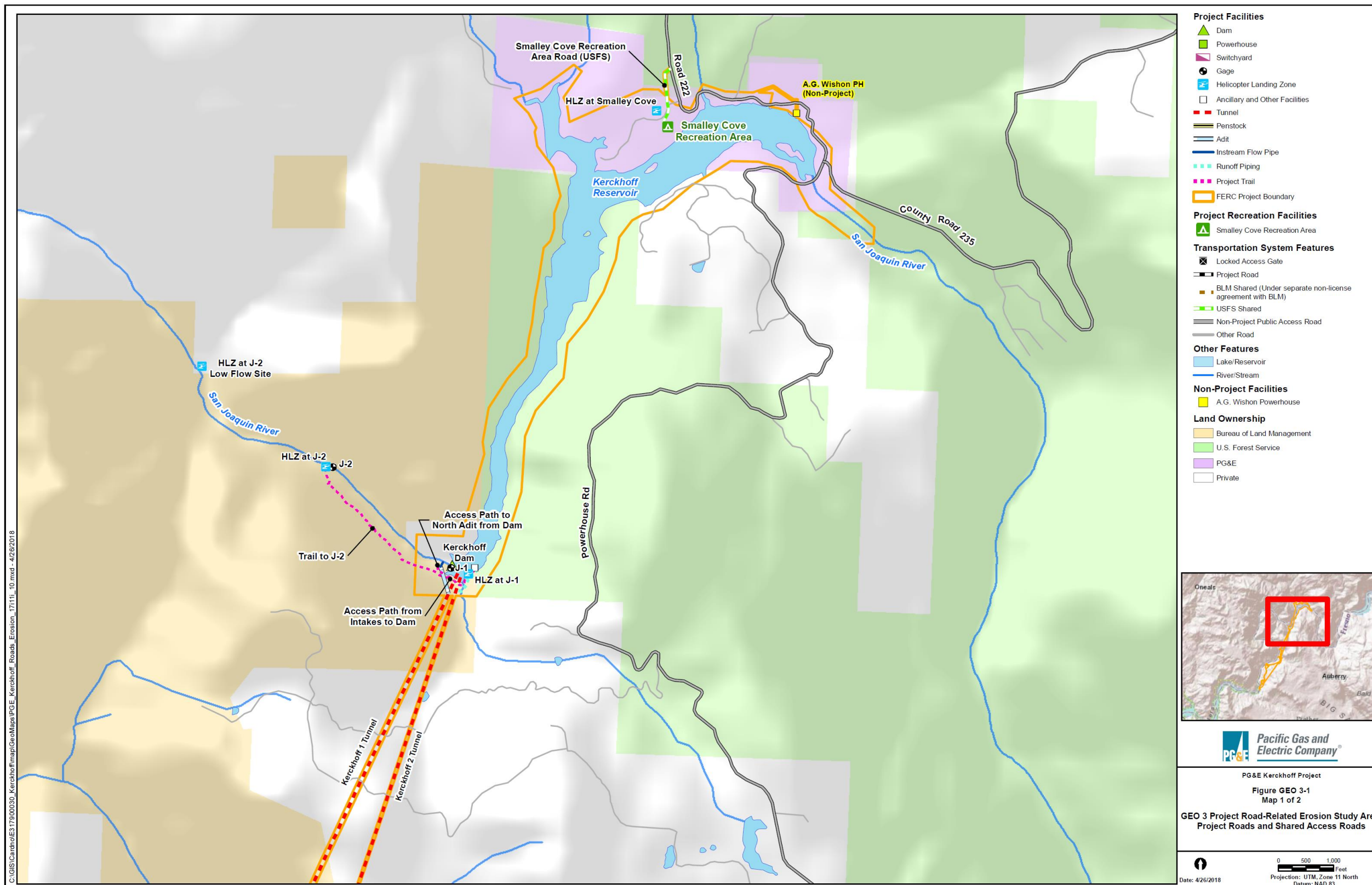


Figure GEO 3-1a. Project Road-related Erosion Study Area: Project and Shared Access Roads.

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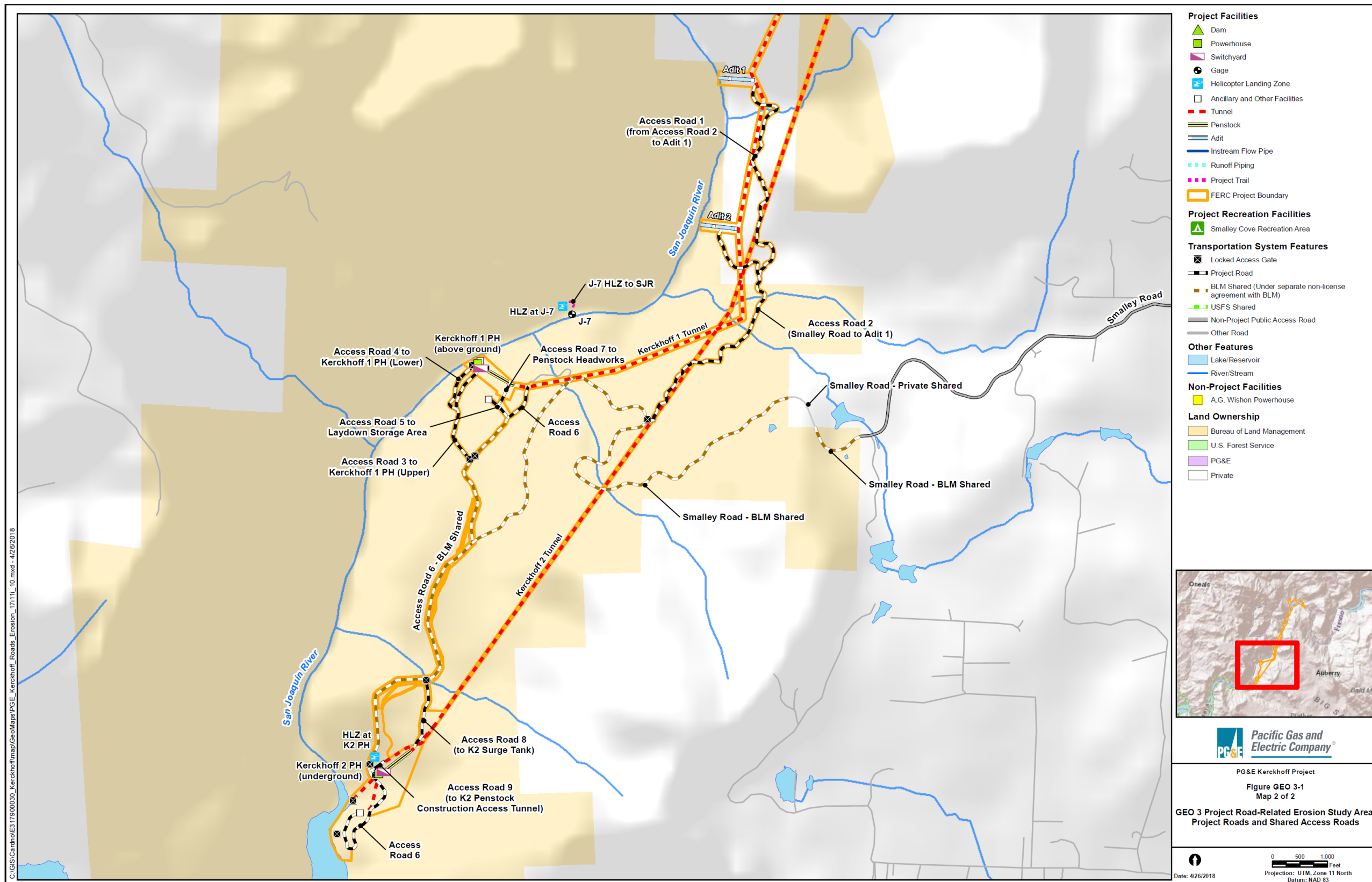


Figure GEO 3-1b. Project Road-related Erosion Study Area: Project and Shared Access Roads.

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- 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 documentation. 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 road erosion 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 resources agencies and 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 (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 GEO 3 (see Tables GEO 3-1a and 3-1b) will be updated to include any additional roads that may be later identified under *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, 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 stakeholders
January–March 2020	Stakeholders 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	\$	80,400

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
- BLM (U.S. Bureau of Land Management). 2015. National Inventory and Condition Assessment Guidance & Instructions Handbook H-9113-2, Release Number 9-406. May 2015. Available at: https://www.blm.gov/sites/blm.gov/files/uploads/Media%20Center/BLM%20Policy_H-9113-2.pdf Accessed April 2018.
- BoR (U.S. Bureau of Reclamation). 2008. Upper San Joaquin River basin storage investigation. October 2008.
- . 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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STUDY WQ 1
Water Temperatures in Kerckhoff Reservoir and Project Bypass Reach
April 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.

Proposed Study Plan

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 Powerhouse (<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 San Joaquin River (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*.

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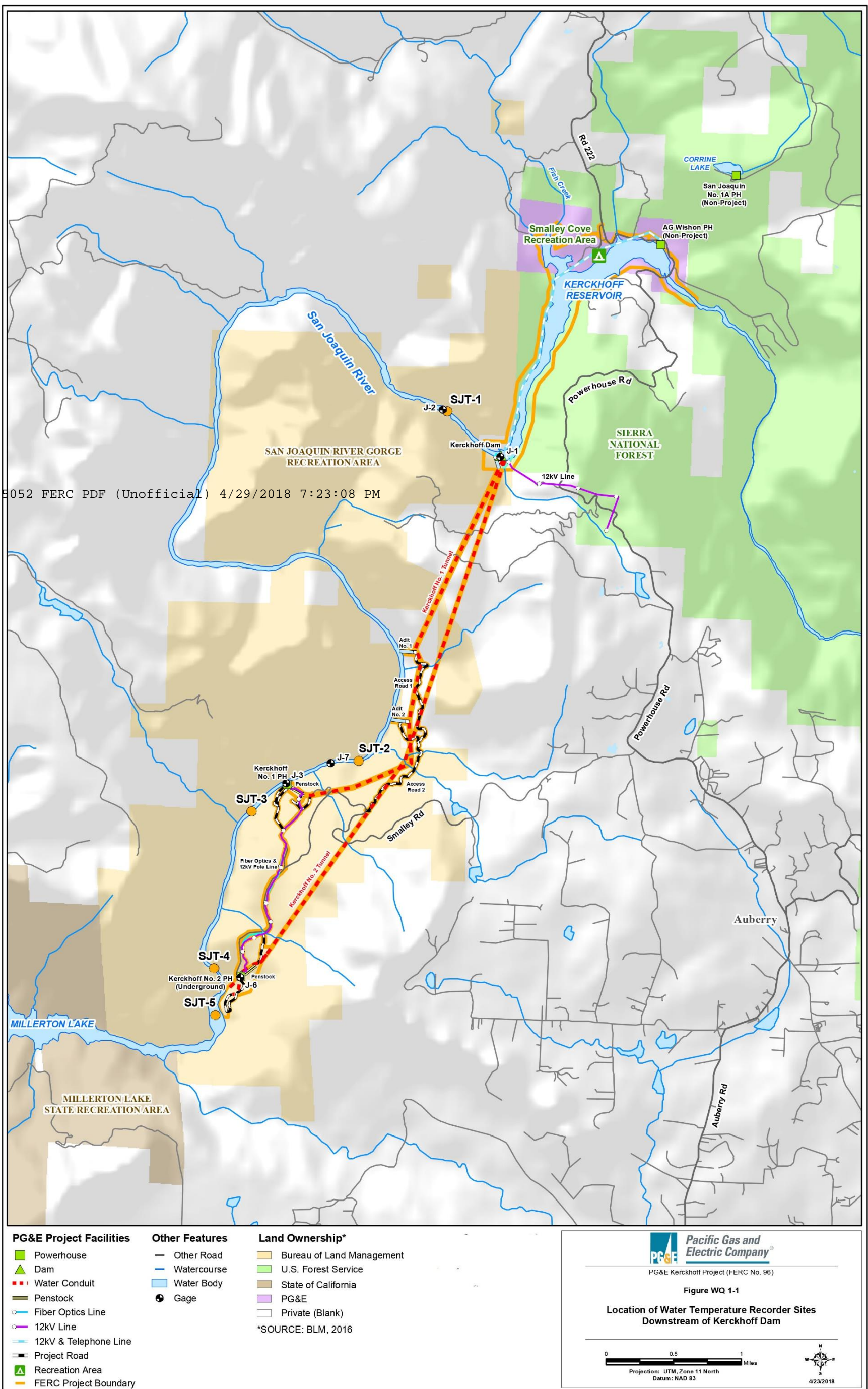


Figure WQ 1-1. Water Temperature Recorder Sites (approximate locations) downstream of Kerckhoff Dam.

WQ 1-3

Kerckhoff Hydroelectric Project, FERC Project No. 96
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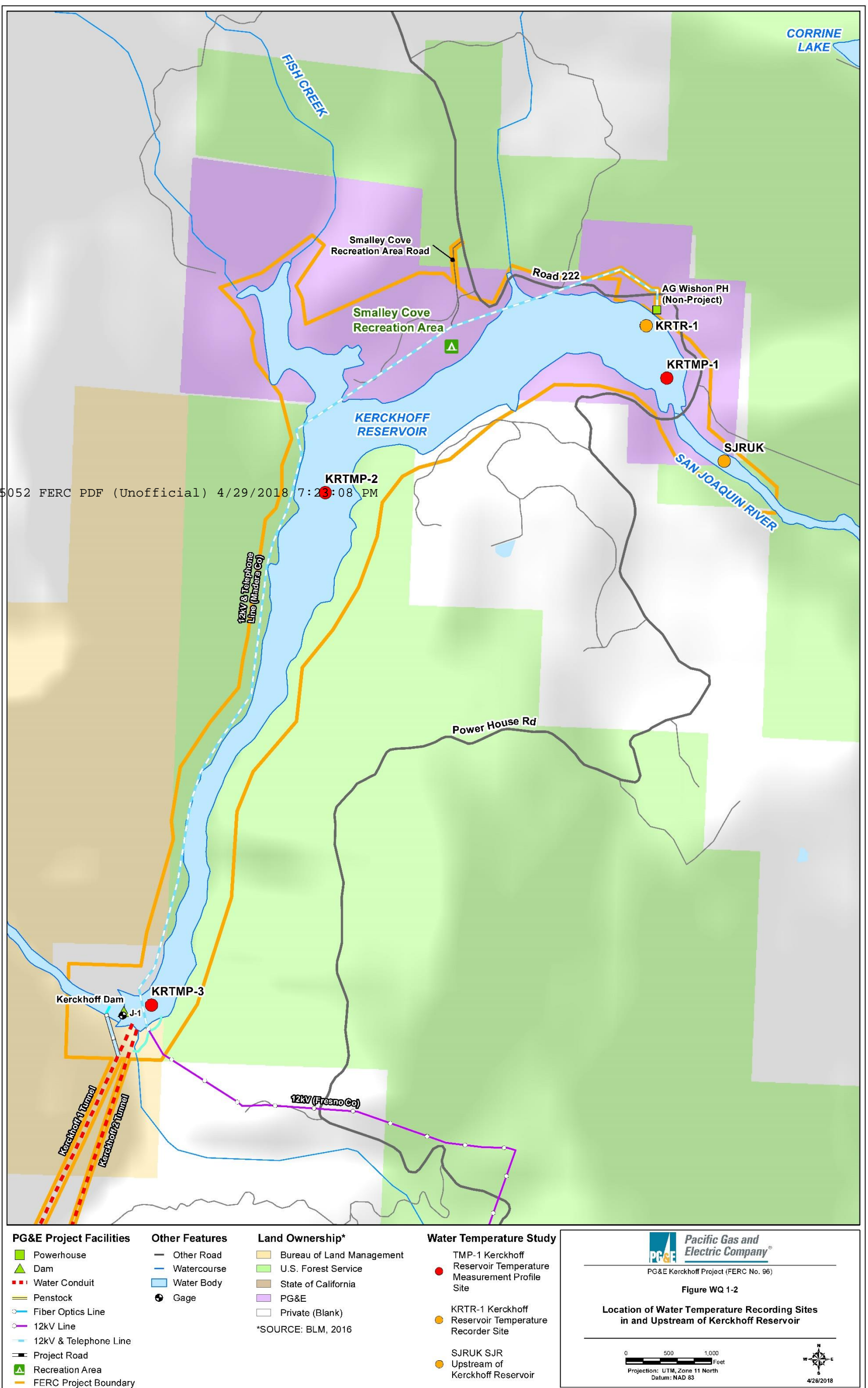


Figure WQ 1-2. Water Temperature Recording Sites (approximate locations) in Kerckhoff Reservoir.

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Recorders will be operated between May 1 and October 31. Three monthly water temperature profiles will be measured in the reservoir near each of the profile station (June, August, and September). Reservoir water temperature profiles will be collected with a field meter such as an 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 along 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 of J-7 location). The site will be located as access and safety allow. A third site (Station SJT-3) will be located downstream of the Kerckhoff 1 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 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 early November). The GPS coordinates of each location will be recorded. Water temperatures will be reported at an hourly interval 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).

Proposed Study Plan

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, the technical team will meet with interested stakeholders 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*.
- 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 in affecting life history events and activities.

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 stakeholders to discuss 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>

REFERENCES

- 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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Proposed Study Plan

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

April 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);
- 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.

Proposed Study Plan

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) Gorge between Kerckhoff Dam and immediately downstream of the 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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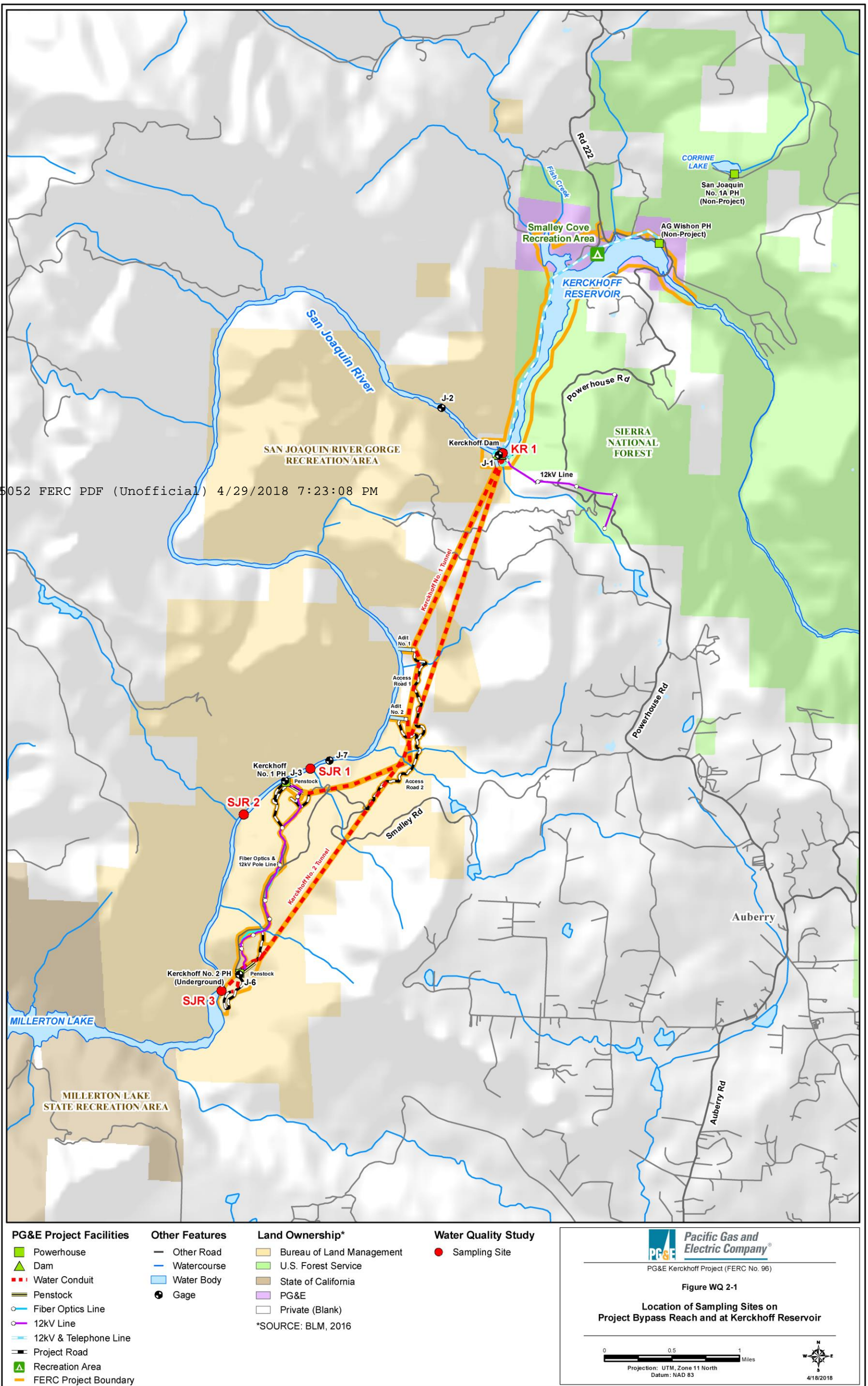


Figure WQ 2-1. Approximate Locations of Sampling Sites in the Project Bypass Reach

WQ 2-3

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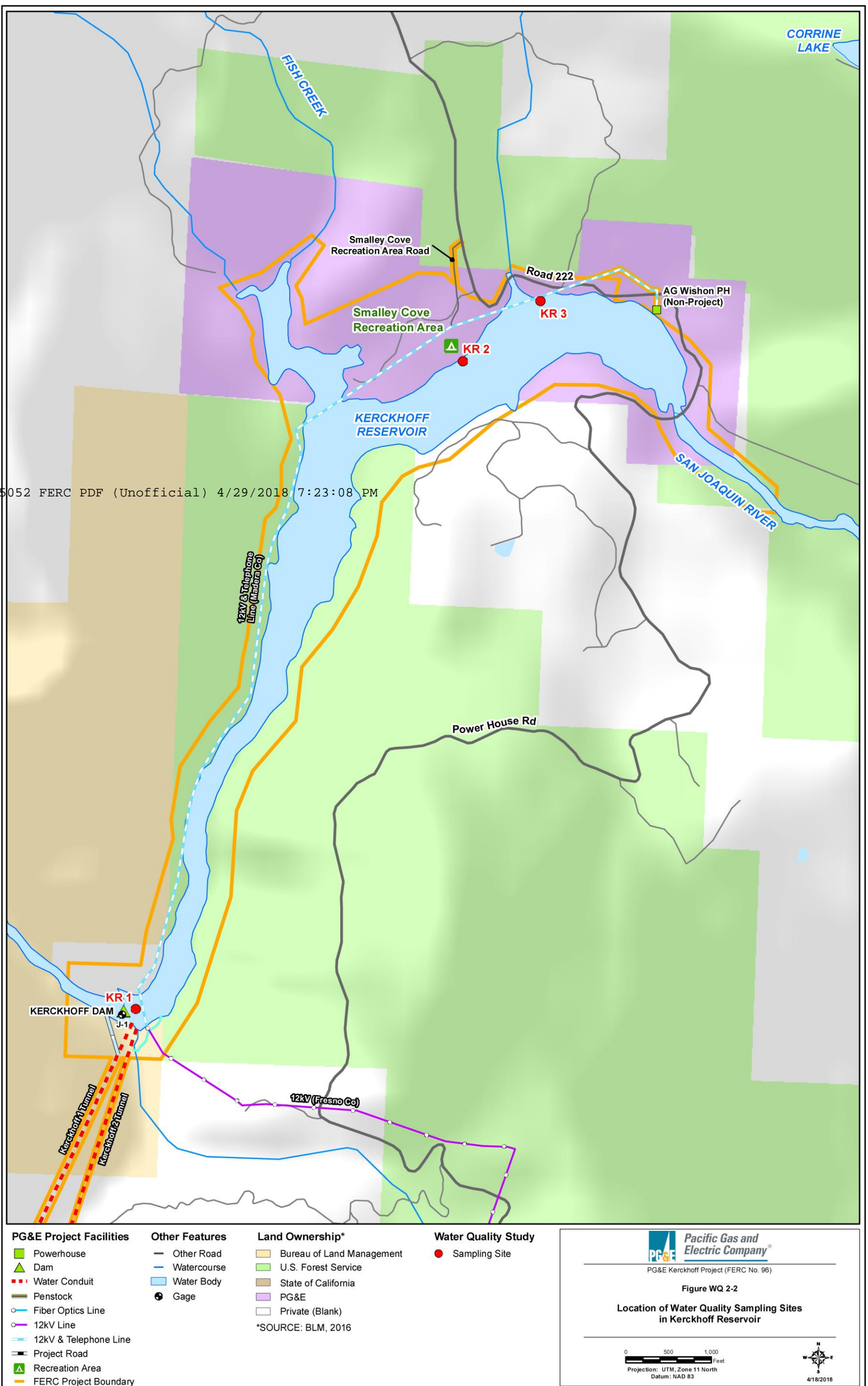


Figure WQ 2-2. Approximate Locations of Sampling Sites in Kerckhoff Reservoir

WQ 2-5

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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		
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
E. coli	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, TI, 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. *E. coli* sampling included only if proposed bacteria provision has been approved for the Basin Plan by the California Regional Water Quality Control Board Central Valley Region at time of sampling.

Proposed Study Plan

Project Bypass Reach

- SJRBR 1—San Joaquin River just above K1 Powerhouse.
- SJRBR 2—San Joaquin River between K1 and K2 Powerhouse (when K1 is operating).
- SJRBR 3—San Joaquin River approximately 100 meters (m) downstream of 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 K2 powerhouse).

Seasonal sampling schedule—samples will be collected at the sites listed above in early summer/late spring (May/June) and late summer (August/September).

Bacteriological sampling—will be conducted in Kerckhoff Reservoir around the Memorial Day and Labor Day weekends to capture high recreational use periods. Recreation-related bacteriological sampling will be used to determine if fecal coliform concentrations meet Basin Plan objectives for the protection of water contact recreation (REC-1). The protocol will involve collecting five (5) samples within a 30-day period. Bacteriological sampling at SJRBR 3 will be conducted only if Millerton Lake is at or above 545 ft. MSL (i.e., backwater conditions near K2 powerhouse and would consist of a six week rolling average or five samples within a month).

The *E. coli* objective is currently provisional, awaiting State Water Board approval. Consequently, *E. coli* sampling will only be carried out if the proposed Bacteria Provision is approved by the time of the scheduled sampling (currently summer 2019).

Methods

In situ water temperature, DO, DO percent saturation, specific conductance, turbidity, and pH water quality measurements will be collected using an 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 recoverable and compared with National Recommended Water Quality Criteria for Freshwater Aquatic Life Protection. If the total recoverable exceeds these criteria, then the sample will be further analyzed to determine the bioavailable fraction.
- 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.
- 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.

Proposed Study Plan

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 water quality 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 collected during *Study AQ 2, Fish Populations* and *Study AQ 5, Western Pond Turtle*; 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 participants
January-February 2020	Stakeholder review and comments on the Draft 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	\$	38,000
Data Analysis	\$	12,603
Products	\$	12,000
Total	\$	71,603

WQ 2-10

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.
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Proposed Study Plan

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STUDY AQ 1 Aquatic Habitat Mapping

April 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*):

- 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 SJR 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

PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Characterize mesohabitat² types between Kerckhoff Dam and the 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 fish 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 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 vegetation⁵, 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 PG&E will discuss these with the agencies (and stakeholders) including possible additional habitat studies to collect information on the 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.

⁵ Characterization of riparian vegetation will be performed in coordinated with GEO 1 and 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.

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 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 resources agencies and 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 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 ILP regulations require. PG&E is considering accelerating the schedule so it would to 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 participants
June 2019	March 2020	Distribute Final AQ 1 TSR to participants

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

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- Hawkins, C.P., J.L. Kershner, P.A. Bisson, M.D. Bryant, L.M. Decker, S.V. Gregory, D.A. McCullough, C.K. Overton, G.H. Reeves, R.J. Steedman, and M.K. Young. 1993. A hierarchical approach to classifying habitats in small streams. Fisheries 18(6):3-12.
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STUDY AQ 2 Fish Populations

April 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);*
- *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 stakeholders 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 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.
- American shad spawning adults will be captured 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).

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

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.

Proposed Study Plan

snorkeled habitat units will be divided into four or more⁴ 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 0900 and 1600 hours (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.

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.”

⁴ If the wetted channel is sufficiently wide to accommodate four lanes.

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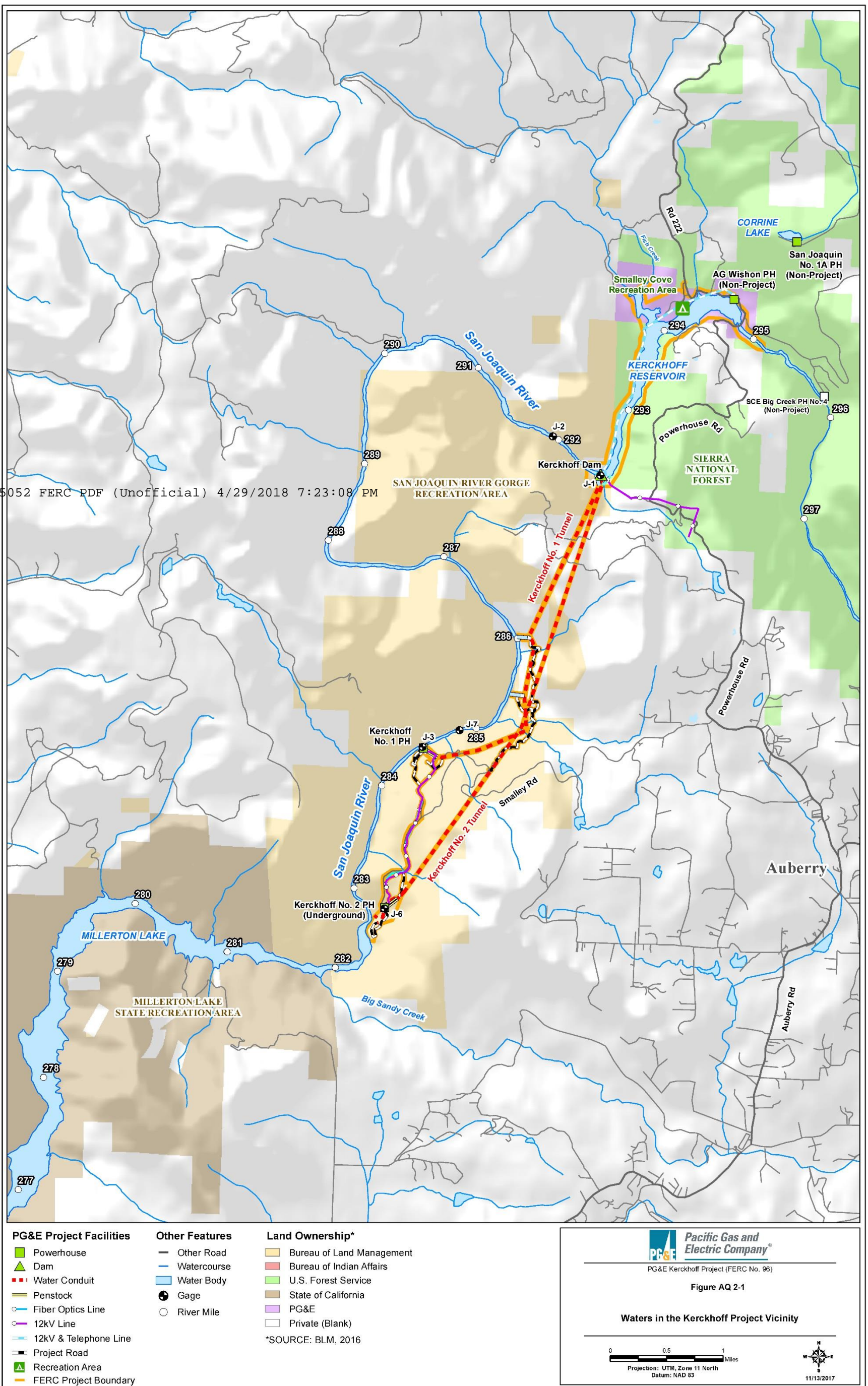


Figure AQ 2-1. Waters in the Project Vicinity.

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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.⁵ 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. 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 4 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. The last sampling will take place at the end of the last week (after June 30) of shad flows 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.

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 Wildlife⁶ (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 sport fish species will be provided to *Study WQ 3, Bioaccumulation* for analysis (a total of 27 fish will be collected). Non-native species encountered during sampling will be recorded.

⁵ 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.

⁶ To be provided by CDFW, if available.

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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.

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.⁷ Variable-mesh gill nets will be 100 to 125 ft.

⁷ 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.

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.

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 and 2017).

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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 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 resources agencies and 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 2⁸ *Study AQ 4, Entrainment*, if needed, in terms of vulnerable fish species and age life stages.
- Nine individual fish from each of three sport fish species will be provided to *Study WQ 3, Bioaccumulation* 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*.
- *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.

⁸ If a clearance can be obtained to safely sample in the vicinity of the K1 and K2 intakes.

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 participants
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	\$	195,000
Data Analysis	\$	33,000
Products	\$	27,512
Total	\$	262,012

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- BoR (U.S. Bureau of Reclamation). 2008. Biological resource technical reports: draft aquatic biological resources technical report. Upper San Joaquin River Basin Storage Investigation. October 2008.
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STUDY AQ 3 Mussels and Aquatic Molluscs

April 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.

Proposed Study Plan

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 Native Americans 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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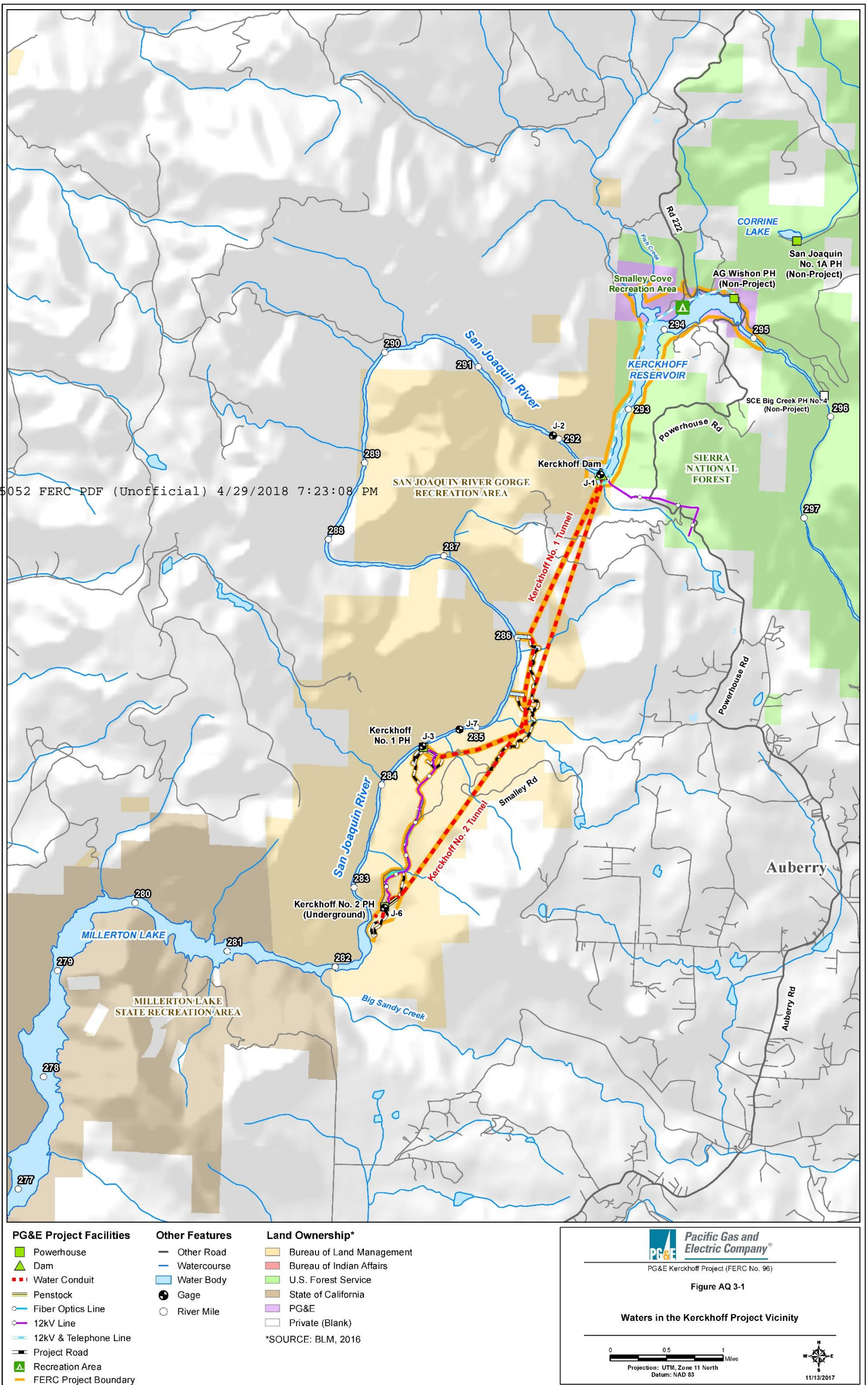


Figure AQ 3-1. Waters in the Project Vicinity.

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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.

Proposed 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 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 resources agencies and 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 Native Americans 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 participants
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

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Proposed Study Plan

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STUDY AQ 4**Entrainment***April 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.

Proposed Study Plan

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 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); 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 regulatory agencies and other stakeholders. The recommendation will be discussed with resource agencies and 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 on Kerckhoff Reservoir*; and
- Conduct monitoring of entrainment at the intakes using hydroacoustic sampling on a seasonal basis (fall 2019 and summer 2020).

Proposed Study Plan

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 in during the late summer - 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, with two 4-hour sets during the day and one 8-10 hour 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 night³. 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 hours 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 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 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 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 participants
Early summer 2019	Meet with participants 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 AQ 4 TSR.
Fall 2019-summer 2020	If Phase 2 is conducted, Phase 2 fieldwork
Fall 2020	Analyze data and prepare Draft Phase 2 AQ 4 TSR
Late fall-Winter 2020	Distribute Draft Phase 2 AQ 4 TSR to participants
Late winter 2020	Address comments and prepare Final AQ 4 TSR, and distribute to participants, if Phase 2 is conducted.

Proposed Study Plan

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.

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STUDY AQ 5 Western Pond Turtles

April 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] 2017), 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 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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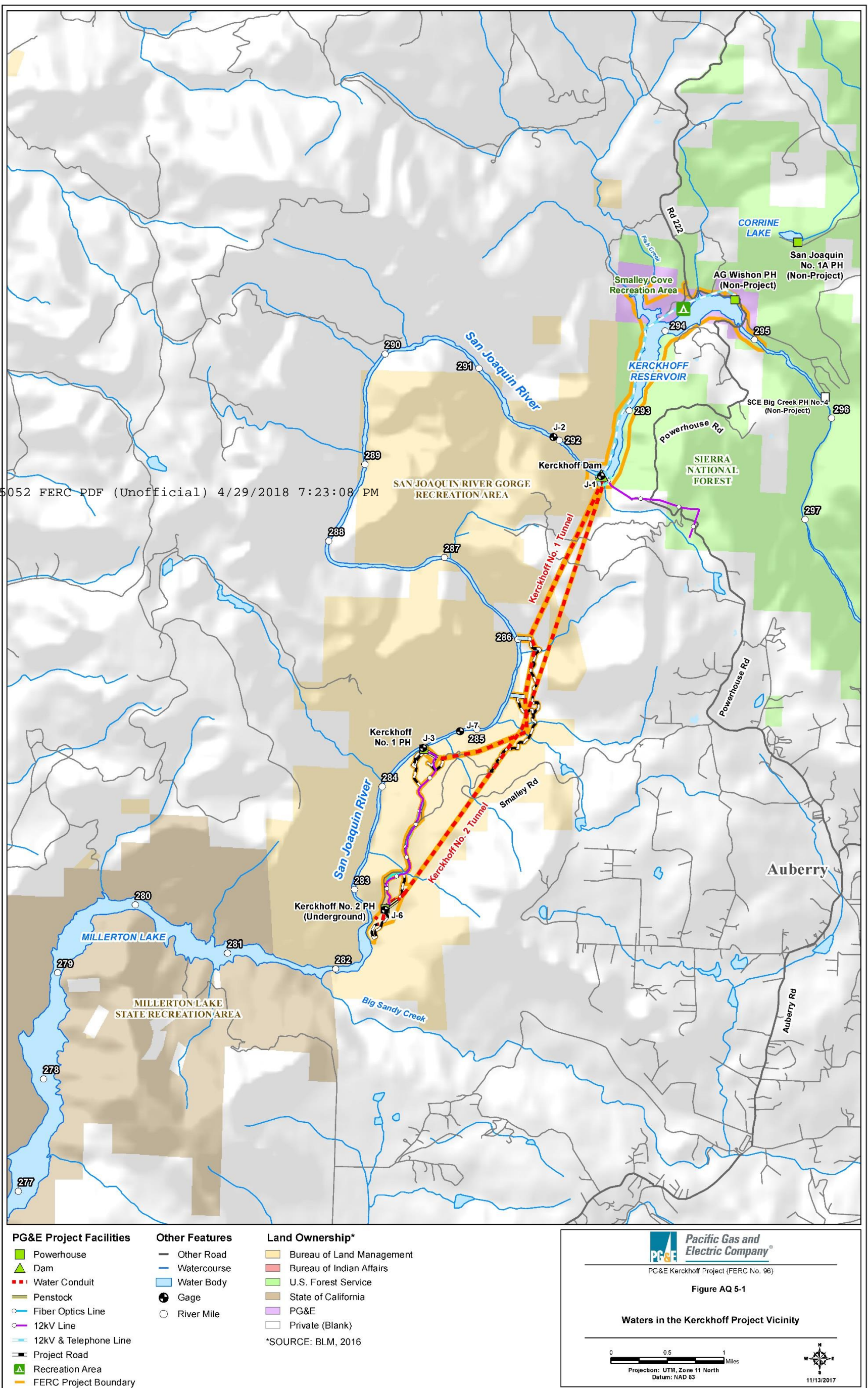


Figure AQ 5-1. Waters in the Project vicinity.

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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 visual encounter observations recorded during *Study AQ 1, Aquatic Habitat Mapping* and *Study AQ 2, Fish Populations* data collection in the field as well as a visual encounter survey of Kerckhoff Reservoir by kayak.
- 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 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).

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

Proposed Study Plan

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 and 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.
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 to participants.
February 2020	Stakeholder comments on TSR due.
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 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

Proposed Study Plan

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

April 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.

Proposed 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 1)	5,572
Access Road 3 to Kerckhoff 1 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 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).

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 K2 Powerhouse to Millerton Lake (0.62 mi.), a BoR facility.

Proposed Study Plan

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; PG&E 2016; Stebbins 2013a, 2013b, 2015).

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 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 Native American Tribes to be incorporated in the cultural resource 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-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 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.

Proposed Study Plan

- 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 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 (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 listed as high and moderate ranking 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 in 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).

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.

- 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 Native American Tribes to be incorporated in the cultural resource report.
- 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 capable 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* (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.

Proposed Study Plan

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.
- 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 agency personnel and other Project stakeholders 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 resources agencies and 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*). 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 stakeholders
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 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	\$	158,400

Proposed Study Plan

REFERENCES

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Proposed Study Plan

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STUDY BOT 2 Riparian and Wetland Resources

April 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.

Proposed Study Plan

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 K2 Powerhouse in Millerton Lake, a BoR facility; and
- The shoreline around Kerckhoff Reservoir within the FERC Project Boundary (10.3 km [6.4 mi.]).

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.

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.

- 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.

Proposed Study Plan

- Evaluate existing flows in the 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 (*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 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 (*HYD 2, Hydrology with and without the Project*).
- The Draft BOT 2 TSR will be distributed to resource agency personnel 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 resources agencies and 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 the *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 ILP regulations require. PG&E is considering accelerating the schedule so it would to 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.

Proposed Study Plan

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	Stakeholders 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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Proposed Study Plan

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BOT 2-8

STUDY WILD 1 Special-Status Wildlife Species

April 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 eagle 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 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 includes 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 K1 Powerhouse to the Kerckhoff 2 [K2] Powerhouse [1.8 mi.]) and the short reach immediately below K2 Powerhouse to Millerton Lake (0.62 mi.), a Bureau of Reclamation (BoR) facility.

Proposed Study Plan

- 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 PG&E surveys in support of construction projects at Project facilities (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 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 (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.

Proposed Study Plan

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 K2 Powerhouse to Millerton Lake, a BoR facility (0.62 mi.), including a 0.25-mile 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 is 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).

Proposed Study Plan

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 AM, 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.

Proposed 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 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 and 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 stakeholders
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 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

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Proposed Study Plan

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STUDY LAND 1 Project Roads and Trails Assessment

April 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

Proposed 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 1)	5,572
Access Road 3 to Kerckhoff 1 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 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 (2) 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;

Proposed Study Plan

- 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 geographical 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.

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.

Proposed 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 the resource agencies and 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* studies 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.

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 participants
January–March 2020	Stakeholder 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>.
- . 2015. MS 9113 – Roads (Public). Release 9-405. May 4, 2015. Available at: https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicy_manual9113.pdf.
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- SNF (Sierra National Forest). 1991. Environmental impact statement (EIS) and Sierra National Forest (SNF) land and resource management plan (LRMP). Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5373730.pdf.
- 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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Proposed Study Plan

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
April 2018

POTENTIAL RESOURCE ISSUE(S)

- Whitewater boating opportunities in the Project Bypass Reach.¹
- Public access to the San Joaquin River (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.²

RELEVANT INFORMATION

The following available information was reviewed to determine whitewater boating flow study needs (refer to Section 5.7 of the Pre-Application Document [PAD, PG&E 2017] *Recreation Resources* 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 (Holbreck and Stanley 1998);
- Review of American Whitewater (AW) website and whitewater boating run descriptions for the Patterson Bend and Squaw Leap whitewater runs on the SJR (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 The Project Bypass Reach includes the SJR from Kerckhoff Dam downstream to the Kerckhoff 1 (K1) Powerhouse (8 mi.) and from K1 Powerhouse to the Kerckhoff 2 (K2) Powerhouse (1.8 mi.).

² Section 10(a)(1) of the Federal Power Act.

Proposed Study Plan

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Comprehensive resource descriptions for Project Bypass Reach whitewater boating runs from whitewater boating NGO representatives.
- Boatable streamflow ranges for Project Bypass Reach whitewater boating runs.
- The number of existing whitewater boating-day opportunities for each run within the Project Bypass Reach by water year type.
- The seasonal distribution of existing whitewater boating-day opportunities for runs within the Project Bypass Reach.
- Assessment of safety and Project security related to whitewater boating access to Project facilities and the Project Bypass Reach.
- 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. A component of Phase 2 (site visit) and Phase 3 are contingent on the need to develop and/or refine resource information developed in Phase 1 and 2 of the study. The following phases are proposed to supplement existing information:

- **Phase 1 – Initial Information Gathering and Evaluation and Hydrology Assessment:** PG&E will develop additional information on whitewater resources and opportunities on the Project Bypass Reach 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 Project Bypass Reach.
- **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 groups session. One of the outcomes of the focus group will be a determination of the need for a whitewater single-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 Single-Flow Study (contingent):** If an outcome of Phase 2 is that a whitewater boating single-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 single-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 two whitewater boating runs located on the SJR between Kerckhoff Dam and Kerckhoff 2 Powerhouse (K2):

- SJR from below Kerckhoff Reservoir to Kerckhoff 1 Powerhouse (K1) – Patterson Bend Run (8 mi.³)
- SJR from the K1 Powerhouse to K2 Powerhouse – Squaw Leap Run (1.8 mi.)

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). This phased approach will be used to develop data needed to address 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

- Develop information about whitewater boating resources on the Project Bypass Reach 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 Project Bypass Reach 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 points used for whitewater boating activities.
- Identify egress points and routes from the SJR in the Project Bypass Reach.
- Identify Project facility safety concerns associated with access routes and/or access 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

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

Proposed 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 one-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 water year type.

Phase 2 – Focus Group Sessions and Site Visit

- Conduct a focus group discussion with stakeholders to refine and/or develop additional details about the 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 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.

- Based on the focus group discussion, determine if a whitewater single-flow study is necessary to develop additional information needed to refine the boatable flow range.
 - A single-flow study will be conducted only if there is a need to substantially refine the boatable flow range or identify specific flow-related points of concern within the Project Bypass Reach 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 Single-Flow Study (contingent)

- Identify and address PG&E safety and liability concerns prior to conducting on-water study activities.
- 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.
- The flow study will be a single flow study. The target flow will be identified through consultation with whitewater boating stakeholders.
 - Flow will be provided preferentially by making use of natural flows (spill from Kerckhoff Reservoir, if available), depending on the target flow range, runoff conditions, identified safety considerations, and PG&E’s operational constraints.
- Identify and assemble the on-water boating study team.
 - 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 the whitewater boating single-flow study to refine the boatable flow range for whitewater boater skill levels as identified in Phases 1 and 2.
- Conduct a post-flow study meeting with the boating study team members to complete the boating surveys and collect additional information that may have resulted from the flow study.
- Utilize the information developed during the flow study to refine the whitewater boating flow range.
- Utilize the refined whitewater boating flow range and hydrologic information to estimate the number of boatable days under existing Project operations.

Proposed Study Plan

- Address other whitewater boating considerations (including safety) in the Project Bypass Reach and Kerckhoff Reservoir.

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 and 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 DLA (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.

SCHEDULE

Date	Activity
January–February 2019	Phase 1 - Conduct initial information gathering and evaluation
February–March 2019	Phase 1 - Hydrology assessment
April 2019	Analyze data and prepare Preliminary Draft REC 1 TSR
March –May 2019	Phase 2 - Conduct interviews and focus group session
May–July 2019	Phase 3 - If needed and agreed to and flows are available, conduct a single flow study ¹
July–October 2019	Analyze data and prepare Revised Draft REC 1 TSR
December 2019	Distribute Revised Draft REC 1 TSR for review and comment
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 1 TSR in the Draft License Application

¹ Flows will be provided preferentially by making use of natural flows (spill from Kerckhoff Reservoir), or a controlled flow release. Timing will be dependent on the target flow range, runoff conditions, and PG&E's operational constraints. If the flows are not available in 2019, then the study maybe postponed until Spring 2020.

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 and Research	\$	120,000
Data Analysis	\$	20,000
Products	\$	25,000
Total	\$	\$175,000

REFERENCES

AW (American Whitewater). 2017. American whitewater. Available at: www.americanwhitewater.org.

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, CA

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>.

Proposed Study Plan

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REC 1-8

STUDY REC 2
Recreation Facility Assessment

April 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.

Proposed 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 resources agencies and interested parties 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	Stakeholder 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

Proposed Study Plan

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.
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- 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.
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- . 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.
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- . 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

April 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 and lands in the vicinity of Kerckhoff 1 and 2 powerhouses 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 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).

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.
- 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.
- Recreation-related effects on environmental resources.

Proposed Study Plan

PROPOSED STUDIES/ANALYSES TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

- Shoreline, land, and water surface use assessment—Land in the vicinity of Kerckhoff 1 and 2 powerhouses, as well as Kerckhoff Reservoir, will be assessed to report the level, timing, and type of reservoir boating and recreation use occurring in these areas.
- 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.

EXTENT OF STUDY AREA

The Study Area includes:

Study Element	Study Area
Shoreline, land, and water surface use assessment	Water surface and shoreline of PG&E-owned and National Forest System Lands (NFSL) of Kerckhoff Reservoir. 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).
Developed recreation facility use assessment	Smalley Cove Recreation Area
Recreation use impact assessment	Area within the FERC Project Boundary extending 100 ft. from the: (1) boundary of Smalley Cove Recreation Area and (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). 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.

REC 3-2



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).

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 immediate vicinity of Kerckhoff 1 and 2 powerhouses, PG&E will conduct observation surveys in the Study Area. The observation surveys will be conducted by a roving surveyor in a vehicle and boat. Recreation use will be observed and documented during the primary recreation season from May 1 through September 30, when Project recreation facilities are generally open for public use, as well as in April to capture visitor use during the spring. 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 and in the Study Area near Kerckhoff 1 and 2 powerhouses. 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.

Proposed Study Plan**Table REC 3-1. Number of sampling days for reservoir shoreline and water surface observations.**

	Peak Recreation Season May 1 to September 30	Non-Peak Recreation Season April 1 to April 30
Holiday weekends (Memorial Day, 4th of July, Labor Day)	1 day on Labor Day weekend and 1 day on either Memorial Day weekend or 4 th of July weekend. Estimate 2 sampling days.	None
Non-holiday weekends	2 days per month in May, June, July, August, and September. Estimate 10 sampling days.	1 day per month. Estimate 1 sampling day.
Weekdays	2 days per month in May, June, July, August, and September. Estimate 10 sampling days.	1 day per month. Estimate 1 sampling day.
Total estimated sampling days	22 days	2 days

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 April 1 through September 30 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 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.

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 resources agencies and 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

- None.

Proposed Study Plan**SCHEDULE**

Date	Activity
April –September 2019	Conduct fieldwork for assessments
October 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	\$	9,000
Fieldwork and Research	\$	90,000
Data Analysis	\$	21,300
Products	\$	20,500
Total	\$	140,800

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.

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.

Proposed Study Plan

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REC 3-8

STUDY REC 4 Recreation Visitor Use Surveys

April 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, and lands in the vicinity of Kerckhoff 1 and 2 powerhouses, 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 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 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 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).

Proposed 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.
- 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, and (4) characterize Project visitors (e.g., places of residence, gender, age, frequency of visits) to project future recreation visitation to the Project.

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).



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) from April 1 through September 30 using the sampling scheme presented in Table REC 4-1.

Table REC 4-1. Number of Sampling Days to Conduct Visitor Surveys

	Peak Recreation Season May 1 to September 30	Non-Peak Recreation Season April 1 to April 30
Holiday weekends (Memorial Day, 4th of July, Labor Day)	1 day on Labor Day weekend and 1 day on either Memorial Day weekend or 4 th of July weekend. Estimate 2 sampling days.	None
Non-holiday weekends	2 days per month in May, June, July, August, and September. Estimate 10 sampling days.	1 day per month. Estimate 1 sampling day.
Weekdays	2 days per month in May, June, July, August, and September. Estimate 10 sampling days.	1 day per month. Estimate 1 sampling day.
Total estimated sampling days	22 days	2 days

Proposed Study Plan

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.). 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.

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 4 Technical Study Report (TSR) and will include summary tables, drawings, and maps, as appropriate.
- The Draft REC 4 TSR will be distributed to resource agencies and 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

- None.

SCHEDULE

Date	Activity
April–September 2019	Conduct visitor surveys
October 2019	Analyze data and prepare Draft REC 4 TSR
December 2019	Distribute Draft REC 4 TSR to participants
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	\$	9,000
Fieldwork and Research	\$	88,500
Data Analysis	\$	28,000
Products	\$	27,000
Total	\$	152,500

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.

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.

Proposed Study Plan

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REC 4-6

STUDY CUL 1 Cultural Resources

April 2018

POTENTIAL RESOURCE ISSUE(S)

- Effects of the Project on both known and previously 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 Project Vicinity 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 Project Vicinity are available through the GLO.

Proposed Study Plan

- 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, and Native American Tribes.
- 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, the Map Room at the Henry Madden Library, California State University – Fresno, and the records of local historical societies.
- 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 operation and maintenance 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 criteria (A, B, C, and D). NRHP evaluations will be conducted in accordance with an NRHP Work Plan that is developed in consultation with Native American Tribes and agency stakeholders.

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. For buried facilities (i.e., tunnels) that are in the FERC Project Boundary, but will not or cannot be accessed 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 feet 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.

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:
 - USGS Historical Topographic Map Collection
 - BLM GLO plat maps and survey notes
 - BLM GLO land patent and grant records
 - The Bakersfield BLM cultural resource files
 - The Sierra National Forest High Sierra Ranger District cultural resources files and, if appropriate, the Bass Lake Ranger District cultural resources files.
 - Madera County Museum

Proposed Study Plan

- Eastern Fresno County Historical Society
- PG&E's company archives
- Map Room at the Henry Madden Library, California State University, Fresno
- Fresno County Public Library Heritage Center
- Study Plan 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.
- Any subsurface archaeological testing performed on federal lands during the life of the license or in preparation for the license is subject to the Archaeological Resources Protection Act (ARPA) and non-invasive studies (i.e. archaeological survey) are subject to the Organic Act.
- 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.
- 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 would be treated in accordance with the Native American Grave Protection and Repatriation Act (NAGPRA).

Field Surveys

- 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 between 15 and 30 meters apart, depending upon variations in the terrain, archaeological sensitivity of the area, and the requirements of the landholding 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.
 - 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). If the artifacts are in an area easily accessible to the public and likely to be stolen, then they may be hidden or collected, pursuant to land-holding agency permission and direction. If an object is hidden, a site record update will describe the hiding place, with the hiding place appropriately marked using a GPS with sub-meter accuracy.

- 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 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), or linear features that stretch well beyond the APE (e.g., historic roads, canals, etc.). 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.
- 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.
- Develop an NRHP Evaluation 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.

Proposed Study Plan

- The Work Plan will be developed in consultation with Native American Tribes and agency stakeholders, as appropriate.
- The Work Plan will incorporate a NAGPRA Plan of Action in the event that excavation is necessary.
- The work plan will consider all NRHP criteria and not be limited to those criteria under which certain resource types are normally evaluated.
- 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 field work in support of studies will be conducted under appropriate landholding agency-issued permits.
- Consult with the Sierra National Forest, the BLM, appropriate Native American Tribes, 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 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*

CUL 1-6

Agreement Among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (BLM Agreement) (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).

PRODUCTS

The cultural resources study methods and results will be documented in three cultural resources inventory and evaluation reports (herein referred to as the CUL 1a, CUL 1b and CUL 1c Technical Study Reports [TSR]), 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, FERC, and PG&E 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
 - Regulatory setting
 - Prehistoric context for the Study Area
 - Study methods
 - Study results
 - 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.
 - 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 the CRHR evaluation efforts of 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
 - 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 evaluated cultural resource.

Proposed Study Plan

- 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
 - NRHP evaluation findings
 - 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 built environment cultural resource.
- The Draft CUL 1 TSRs will be submitted to appropriate resource agencies and interested parties for a 45-day review and comment period.
- As needed, and allowed by FERC's process and federal regulations, cultural resources GIS data and record search information will be shared with land holding 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.

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 holding agencies, 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 Native American Tribes 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

REFERENCES

California OHP (Office of Historic Preservation). 1990. Archaeological resource management reports (ARMR): recommended contents and format. California Office of Historic Preservation, Sacramento, California.

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Proposed Study Plan

McCarthy, H., C. Blount, and S. D'Oro. 2011. Ethnographic, ethnohistoric, and Traditional Cultural Property study for the Crane Valley Hydroelectric Project – Madera County, California. Report prepared for Pacific Gas and Electric Company, Fresno, California.

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.

NPS (National Park Service). 1995. How to apply the National Register criteria for evaluation. National Register Bulletin 15. U.S. Department of the Interior, National Park Service. Washington, D.C.

Varner, D.M. and K.G. McCormick. 1977. Archaeological investigations for the Kerckhoff Hydroelectric Project, Fresno County. California State University, Fresno. Submitted to Pacific Gas and Electric Company, San Francisco, California.

STUDY CUL 2 Tribal Resources

April 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

- 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.
- Operation and maintenance 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.

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
- 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 this PAD.

Proposed Study Plan

POTENTIAL INFORMATION GAPS

The following have been identified as potential information gaps:

- Location and nature of tribal resources that could be affected by Project operation and/or maintenance activities.
- 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 both federally recognized and unrecognized Native American Tribes and Native American individuals, and agency personnel (both U.S. Bureau of Land Management [BLM] and U.S. Forest Service) to identify Native American groups and individuals to be consulted not already listed among the stakeholders.
- Consult with federally recognized and unrecognized Native American Tribes and other cultural groups 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 operation and/or maintenance activities.
- 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 in conjunction with 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 area around the APE. This will provide background information that may inform CUL 2 as well as CUL 1.

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, 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.

CUL 2-2

Archival Research

Complete archival research to identify previous studies and ethnographic information that can be used to establish the context by 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.
- The cultural resources files and in-house personnel of the Sierra National Forest.

Tribal Consultation and Resource Identification

- Continue identification of tribal groups and individuals who may have Project Area affiliation and knowledge.
- Consult with 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 tribal elders and other tribal representatives 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) will contact the appropriate Native American Tribe(s) to arrange one-on-one interviews with tribal elders or other representatives who may have knowledge of special

Proposed Study Plan

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 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.
- If participating 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.

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 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 operation and maintenance of the Project.
- If deemed necessary, develop a Tribal Resources NRHP Eligibility Evaluation Work Plan in consultation with the 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 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).
- 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 (herein 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's (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 presently documented tribal and ethnographic resources
- Study methodology
- Study findings, resource evaluations, and management recommendations
- Relevant Project and tribal resource mapping as appropriate

The inventory and evaluation report will be submitted to appropriate resource agencies and stakeholders 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.

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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 the Native American Tribes or mapped by botanists 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	Native American Tribal consultation and site visits
September-October 2019	Identify potential Project impacts and determine need for NRHP eligibility studies in consultation with tribes
November –December 2019	Develop NRHP work plan in consultation with tribes and resource agencies
January-February 2020	Conduct NRHP eligibility studies
March-April 2020	Stakeholders 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

REFERENCES

- 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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Proposed Study Plan

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STUDY AQ 6 Rare Aquatic Species

April 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, or 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] 2008b). 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 CNDDDB record from the 1960s exists for North Fork Willow Creek,

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).

Proposed Study Plan

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 km (15 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 the Fish Population Section 5.4.3 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 (2008b) 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 2008b);
- CDFW's California Natural Diversity Database (CNDDDB) (CDFW 2017a);
- California Wildlife Habitat Relationship (CWHR) System database, version 9.0 (CDFW 2017b);
- Museum records 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);
- 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 2008b);
- Fishes of the Sacramento-San Joaquin estuary and adjacent waters, California: A guide to the early life histories. Interagency Ecological Program Technical Report No. 9. U.S. Department of the Interior Bureau of Reclamation Mid-Pacific Region, Byron, California. (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 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 FYLFs 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 site 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 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 USDA Forest Service, Rocky Mountain Research Station National Genomics Center (NGC) for Wildlife and Fish Conservation.

FYLF and Kern Book 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 species, two locations in Kerckhoff Reservoir and one location in Fish Creek. Sampling will occur

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

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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 K1 powerhouse, near (downstream) tributary downstream of K1, and near (downstream) tributary upstream of K2 (Figure AQ 6-1). Site locations in and near Kerckhoff Reservoir include: at the inlet of 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 *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 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 L samples will be filtered, collected, and preserved using the most appropriate field protocols for remote locations. 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 to 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.

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).

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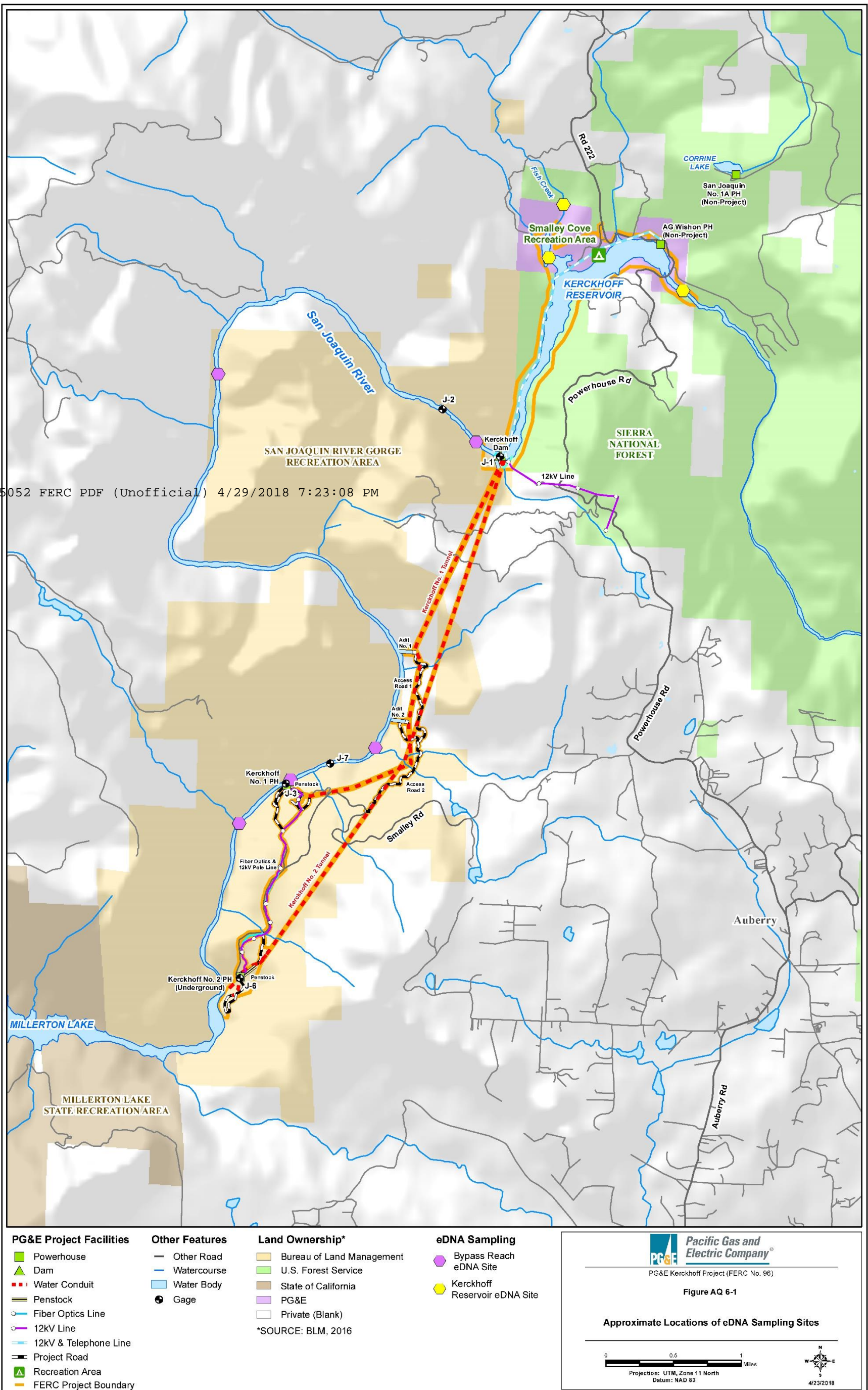


Figure AQ 6-1. Approximate locations of eDNA sampling sites.

AQ 6-5

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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 6 Technical Study Report (TSR). The TSR will include summary tables and maps, as appropriate.
- The Draft AQ 6 TSR will be distributed to resources agencies and interested parties for review and comment.
- 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 may be related to *AQ 2 Fish Populations as part of the report for that study*. Sampling access will be determined from information collected during *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.
July 2020	The Final AQ 6 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	\$	2,931
Fieldwork	\$	22,000
Data Analysis	\$	5,649
Products	\$	8,006
Total	\$	38,586

Proposed Study Plan

REFERENCES

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- 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 WQ 3 Bioaccumulation in Kerckhoff Reservoir

April 2018

POTENTIAL RESOURCE ISSUE(S)

- The bioavailability of contaminants is potentially affected by Kerckhoff Reservoir, which, through bioaccumulation, may affect fish tissue concentrations of sport fish 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 sport fish.

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 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) 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);
- Pacific Gas and Electric Company's (PG&E's) amended application for new license for the Project (PG&E 1977).

POTENTIAL INFORMATION GAPS

The following has been identified as a potential information gap:

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

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PROPOSED STUDIES/ANALYSIS TO ADDRESS IDENTIFIED SIGNIFICANT INFORMATION GAPS

The following study is proposed to supplement existing information:

- Characterize sport fish muscle tissue concentrations of total mercury, arsenic, and polychlorinated biphenyls (PCBs) in resident, legal-size sport fish 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 for tissues analysis will be collected during the fish population sampling study (*Study AQ 2*) using OEHHAs collection and sample size protocols (OEHHA 2005). Reservoir sampling 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.
- Fish tissue fillet samples will be collected from 9 (nine) individual muscle tissue legal-size sport fish from three commonly consumed target species (e.g., various species of bass, sunfish, and trout¹) selected in consultation with the stakeholders for a total of 27 samples (3 species times 9 samples). Each sample will be analyzed for total mercury and arsenic.
- Nine composite samples, containing combined filets of 3-5 fish from the same species (e.g., bass) will be analyzed for PCBs.
- 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 1996a). Total mercury will be measured using USEPA 1631e, modified (USEPA 2002). Whole fish will be collected in the field (during *Study AQ 2*) and shipped, on ice, to MPSL who will conduct the extraction of 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.

¹ If insufficient sport fish are collected, Sacramento pikeminnow will be sampled.

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 bioaccumulation Technical Summary 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, DO, 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.

SCHEDULE

Date	Activity
Summer-Fall 2019	Collect field samples, 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 participants
February 2020	Stakeholder review and comments on the Draft TSR due
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	\$	9,000
Data Analysis	\$	32,500
Products	\$	9,620
Total	\$	53,511

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WQ 3-6

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