

Office of
Energy
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June 2019

FERC/EIS-0295D

**DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR HYDROPOWER LICENSE**

**Bucks Creek Hydropower Project
Docket No. P-619-164 – California**



**Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, DC 20426**

FERC/EIS-0295D

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California

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Washington, D.C. 20426

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FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

To the Agency or Individual Addressed:

Reference: Draft Environmental Impact Statement

Attached is the draft environmental impact statement (draft EIS) for the Bucks Creek Hydroelectric Project (FERC Project No. 619-164), located on Bucks, Grizzly, and Milk Ranch Creeks in Plumas County, California, in the Sierra Nevada Mountains. The project consists of Bucks Creek Powerhouse; Grizzly Powerhouse, and the Grizzly Tap Transmission Line; water storage, diversion, and conveyance facilities associated with the two powerhouses, including Bucks Lake, Lower Bucks Lake, Three Lakes, Grizzly Forebay; and other associated facilities.

This draft EIS documents the view of governmental agencies, non-governmental organizations, affected Indian tribes, the public, the license applicant, and Federal Energy Regulatory Commission (Commission) staff. It contains staff evaluations of the applicants' proposal and the alternatives for relicensing the Bucks Creek Hydroelectric Project.

Before the Commission makes a licensing decision, it will take into account all concerns relevant to the public interest. The draft EIS will be part of the record from which the Commission will make its decision. The draft EIS was sent to the U.S. Environmental Protection Agency and made available to the public on or about June 14, 2019.

Copies of the draft EIS are available for review in the Commission's Public Reference Branch, Room 2A, located at 888 First Street, N.E., Washington D.C. 20426. The draft EIS also may be viewed on the Internet at www.ferc.gov/docs-filing/elibrary.asp. Please call (202) 502-8222 for assistance.

Attachment: Draft EIS

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COVER SHEET

- a. Title: Environmental Impact Statement for Hydropower License, Bucks Creek Hydroelectric Project— FERC Project No. 619-164
- b. Subject: Draft Environmental Impact Statement
- c. Lead Agency: Federal Energy Regulatory Commission
- d. Abstract: The Bucks Creek Hydroelectric Project is located on Bucks, Grizzly, and Milk Ranch Creeks, in the Sierra Nevada Mountains in Plumas County, California. The 84.8-megawatt project consists of Bucks Creek and Grizzly Powerhouses owned by Pacific Gas & Electric Company and the City of Santa Clara, including a 4.2-mile-long, 115-kilovolt Grizzly Tap Transmission Line; water storage, diversion and conveyance facilities associated with the two powerhouses, including Bucks Lake, Lower Bucks Lake, Three Lakes, and Grizzly Forebay; and other associated facilities. The project affects approximately 1,539.5 acres in the Plumas National Forest administered by the U.S. Department of Agriculture, Forest Service.
- The staff's recommendation is to relicense the project as proposed, with certain modifications and additional measures recommended by the agencies.
- e. Contact: Alan Mitchnick
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Office of Energy Projects
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(202) 502-6074 (AM); (202) 502-8462 (EW)
- f. Transmittal: This draft environmental impact statement to relicense the Bucks Creek Hydroelectric Project is being made available for public comment on or about June 14, 2019, as required by the National Environmental Policy Act of 1969¹ and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR, Part 380).
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¹ National Environmental Policy Act of 1969, amended (Pub. L. 91-190, 42 U.S.C. 4321–4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, §4(b), September 13, 1982).

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FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)² and the U.S. Department of Energy Organization Act³ is authorized to issue licenses for up to 50 years for the construction and operation of non-federal hydroelectric developments subject to its jurisdiction, on the necessary conditions:

“That the project adopted...shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e)...”⁴

The Commission may require other conditions consistent with the FPA and as may be found necessary to provide for the various public interests to be served by the project.⁵ Compliance with such conditions during the licensing period is required. The Commission’s Rules of Practice and Procedure allow any person objecting to a licensee’s compliance or noncompliance with such conditions to file a complaint noting the basis for such objection for the Commission’s consideration.⁶

² 16 U.S.C. §791(a)-825r, as amended by the Electric Consumers Protection Act of 1986, Pub. L. 99-495 (1986), the Energy Policy Act of 1992, Pub. L. 102-486 (1992), and the Energy Policy Act of 2005, Pub. L. 109-58 (2005).

³ Pub. L. 95-91, 91 Stat. 556 (1977).

⁴ 16 U.S.C. § 803(a).

⁵ 16 U.S.C. § 803(g).

⁶ 18 C.F.R. §385.206 (2018).

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ACRONYMS AND ABBREVIATIONS

AIS	aquatic invasive species
APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
BCC	bird of conservation concern
BGEPA	Bald and Golden Eagle Protection Act
BMI	benthic macroinvertebrates
BMP	Best Management Practice
BO	Biological Opinion
BP	before present
°C	degrees Celsius
CA-IPC	California Invasive Plant Council
California DFW	California Department of Fish and Wildlife
CDFA	California Department of Food and Agriculture
California DWR	California Department of Water Resources
certification	water quality certification
CESA	California Endangered Species Act
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
COLD	cold freshwater habitat
Corps	U.S. Army Corps of Engineers
CRLF	California red-legged frog
CRWG	Cultural Resources Workgroup
CSCI	California stream condition index
CSR	Cresta spill recession
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibels
DO	dissolved oxygen
ECG	Ecological Consultation Group
EFH	essential fish habitat
EIS	Environmental Impact Statement
EPAct	Energy Policy Act of 2005
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FLA	final license application
Forest Service	U.S. Department of Agriculture, Forest Service
FPA	Federal Power Act

fps	foot per second
FPC	Federal Power Commission, predecessor to the FERC
FSS	Forest Service sensitive species
FWS	U.S. Department of the Interior, Fish and Wildlife Service
FYLF	foothill yellow-legged frog
GWh	gigawatt hours
HMBP	Hazardous Materials Business Plan
hp	horsepower
HPMP	Historic Properties Management Plan
IHA	indicators of hydrologic alteration
Interior	U.S. Department of the Interior
kV	kilovolt
kW	kilowatt
LOP	limited operating period
LRMP	Land and Resource Management Plan
LWM	large woody material
mg/L	milligrams per liter
mi ²	square miles
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mS/cm	millisiemens/centimeter
MSC	Maidu Summit Consortium
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places
NERC	North American Electric Reliability Corporation
NFFR	North Fork Feather River
NFS	National Forest System
NHPA	National Historic Preservation Act of 1966
NMFS	National Marine Fisheries Service
NMZ	nest management zone
NNIP	non-native invasive plant
NTU	nephelometric turbidity unit
NWPP	Northwest Power Pool
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard and Assessment
OHV	off-highway vehicle
PA	Programmatic Agreement
Park Service	U.S. Department of the Interior, National Park Service
PCT	Pacific Crest Trail

PG&E	Pacific Gas and Electric Company
PHABSIM	Physical Habitat Simulation
PNF	Plumas National Forest
PURPA	Public Utility Regulatory Policies Act
REA	ready for environmental analysis
Reclamation	U.S. Bureau of Reclamation
RM	river mile
RMA	Road Management Plan
ROS	Recreation Opportunity Spectrum
SD	Scoping Document
SHPO	State Historic Preservation Officer
SIBI	Sierra Index of Biotic Integrity
SMP	Shoreline Management Plan
SNFPA	Sierra Nevada Forest Plan Amendment
SNYLF	Sierra Nevada yellow-legged frog
SPCCP	Spill Prevention, Control and Countermeasure Plan
SPWN	spawning, reproductive, and/or early development habitat
SSC	Species of Special Concern (in California)
TAF	thousand acre-feet
TCP	traditional cultural property
TDG	total dissolved gas
TM	technical memorandum
TMDL	total maximum daily load
UFI	unimpaired flow
ug/L	micrograms/liter
USGS	U.S. Geological Survey
VES	visual encounter surveys
VQO	Visual Quality Objective
Water Board	State Water Resources Control Board
WECC	Western Electricity Coordinating Council
WUA	weighted useable area
WY	water year
YOY	young-of-year

EXECUTIVE SUMMARY

Proposed Action

On December 12, 2016, Pacific Gas and Electric Company (PG&E) and the City of Santa Clara (City) (collectively, licensees) filed an application for a new license with the Federal Energy Regulatory Commission (Commission or FERC) to continue to operate and maintain the Bucks Creek Hydroelectric Project (FERC No. 619). The licensees filed a supplemental application on May 22, 2018.

The project has an existing capacity of 84.8 megawatts (MW) and includes two developments located on Bucks, Grizzly, and Milk Ranch Creeks, which are tributaries to the North Fork Feather River (NFFR) in Plumas County, California. The project currently occupies 1,539.5 acres of federal land in the Plumas National Forest (PNF), which is administered by the U.S. Department of Agriculture, Forest Service (Forest Service). The project is located entirely within Plumas County, California in the Sierra Nevada Mountains, approximately 17 miles southwest of the community of Quincy.

The licensees are not proposing to add capacity or make any major modifications to the project or its operations under the new license.

Project Description

The project consists of two existing developments, the Bucks Creek Development and the Grizzly Development. The project is located within the Plumas National Forest (PNF) with the exception of one project recreation facility (Haskins Valley boat launch and campground) that is located on an inholding within the PNF that is owned by PG&E, and a project access road that crosses an inholding parcel of another private owner.

Bucks Creek Development

The Bucks Creek Development includes Bucks Lake Dam and Reservoir, Three Lakes Dam and Reservoir, Milk Ranch Conduit, Lower Bucks Lake Dam and Reservoir, Bucks Creek Powerhouse, Grizzly Forebay Dam and Reservoir, and Grizzly Forebay Tunnel.

Bucks Lake Dam is a rock-filled, concrete-faced structure with a height of 123 feet and a length of 1,320 feet. The dam impounds Bucks Lake, a 1,827-acre reservoir that extends approximately 5 miles upstream from the dam. From Bucks Lake, water is released immediately downstream into a short reach of Bucks Creek before draining into Lower Bucks Lake. The licensees operate three project recreation sites at Bucks Lake: Haskins Valley Campground and Boat Launch, Indian Rock Day Use Area, and West End Cove Day Use Area.

Three Lakes Dam is a rock-filled structure with a height of 30 feet and a length of 584 feet. The dam impounds the flow of Milk Ranch Creek, raising the level of Lower Lake and Middle Lake, which combined with Upper Lake are collectively known as Three Lakes Reservoir. Milk Ranch Conduit conveys flow from Three Lakes Reservoir

and nine small intermittent tributary drainages (Milk Ranch Creek, North Fork Grouse Hollow Creek, South Fork Grouse Hollow Creek, Bear Trap Creek, Slide Ravine, Bear Ravine, and three unnamed drainages) to Lower Bucks Lake. The licensees operate one day use recreation site, Three Lakes Trailhead, adjacent to the Three Lakes Dam.

Lower Bucks Lake Dam is a concrete arch with a height of 99 feet and a length of 500 feet and impounds Lower Bucks Lake, which extends approximately 1.1 miles upstream of the dam. Water is conveyed from Lower Bucks Lake to the Grizzly Powerhouse by the Grizzly Powerhouse Tunnel, both of which are part of the Grizzly Development, described below.

The Grizzly Forebay Dam is a concrete arch with a height of 98 feet and a length of 520 feet and impounds the Grizzly Forebay Reservoir, which extends approximately 0.8 mile upstream of the dam. The licensees operate five recreation sites at Grizzly Forebay: Grizzly Forebay Campground, Grizzly Forebay Trail, Grizzly Forebay Gaging Station Trail, Grizzly Forebay Recreation Area, and Grizzly Forebay Fishing Access. From Grizzly Forebay, the flow is conveyed through the 9,575-foot-long, horseshoe-shaped Grizzly Forebay Tunnel to Bucks Creek Powerhouse. The maximum flow capacity is 400 cubic feet per second (cfs).

The normal maximum gross head of Bucks Creek Powerhouse is 2,558 feet, generating an average annual 234.8 gigawatt hours (GWh) with an average capacity factor of 41.2 percent. There are no project transmission lines at the Bucks Creek Powerhouse; it connects directly to the non-project substation adjacent to the Bucks Creek Powerhouse and switchyard that is part of the interconnected transmission system. Bucks Creek Powerhouse releases all flow to the NFFR 1 mile upstream of Rock Creek Powerhouse, which is part of PG&E's Rock Creek-Cresta Hydroelectric Project (FERC Project No. 1962).

Grizzly Development

The Grizzly Development includes the Grizzly Powerhouse Tunnel and the Grizzly Powerhouse, and is located between Lower Bucks Lake and the Grizzly Forebay.⁷

The 12,320-foot-long Grizzly Powerhouse Tunnel conveys the flow from Lower Bucks Lake to Grizzly Powerhouse. The capacity of the tunnel is 400 cfs. The normal maximum gross head of Grizzly Powerhouse is 719 feet. The powerhouse generates an

⁷ Prior to the construction of the Grizzly Development, water from Lower Bucks Lake was conveyed into Grizzly Forebay via the now operationally abandoned Lower Bucks Lake Tunnel located along Grizzly Creek. The Lower Bucks Lake Tunnel remains as a project facility under the current FERC license.

average annual of 48.9 GWh, with an average capacity factor of 28.2 percent. Grizzly Powerhouse discharges directly into the Grizzly Forebay.

A 4.2-mile-long, 115-kilovolt (kV) transmission line transmits power from Grizzly Powerhouse to PG&E's 115-kV Caribou-Sycamore Transmission Line, part of the interconnected system.

Project Operation

The project is operated in a peaking mode and is normally controlled remotely from a switching center located in PG&E's Rock Creek Powerhouse. The project is operated to optimize the use of water in coordination with the operation of PG&E's other FERC-licensed hydropower projects in the NFFR watershed.⁸

The project reservoirs are operated consistent with a Memorandum of Understanding (MOU) between the PNF and the licensees (PG&E, 1998), which specifies minimum elevations for Lower Bucks Lake, Lower and Middle Lakes, Bucks Lake, and Grizzly Forebay, and restricts the timing of drawdown of Bucks Lake.

The release valve at Three Lakes Dam is closed in the late spring to allow it to fill throughout the summer. Beginning in late summer, the licensees typically release between 4 and 12 cfs from Three Lakes Dam, depending on the water year, until the Lower Lake is drawn down to minimum pool. There are no power generation facilities associated with Three Lakes; instead, the stored water is diverted from Milk Ranch Creek into Milk Ranch Conduit and conveyed to Lower Bucks Lake for generation at the Grizzly and Bucks Creek Powerhouses. The conduit also collects water from intermittent tributary streams within the Milk Ranch Creek and the Bucks Creek watersheds.

The licensees provide minimum instream flows in Bucks Creek and Grizzly Creek in accordance with the Amended License (FERC, 2006a). Since 2006, annual channel maintenance spills at both Lower Bucks Lake Dam and Grizzly Forebay Dam are required in Wet and Above Normal water years⁹ in accordance with License Article 13 (FERC, 2006b).

⁸ These projects are, from upstream to downstream, the Upper North Fork Feather River Project (FERC Project No. 2015), the Rock Creek-Cresta Project (FERC Project No. 1962), and the Poe Project (FERC Project No. 2107). Bucks Creek Powerhouse releases flow into the NFFR between the two developments of the Rock Creek-Cresta Project.

⁹ Defined based on the predicted unimpaired inflow to Oroville and spring snowmelt runoff forecasts provided by the licensees and California DWR each month from March through May.

Proposed Facility Modifications

The licensees propose the following modifications to existing facilities:

- Install a Howell-Bunger valve at the end of the existing low-level outlet of Bucks Lake Dam to release the minimum instream flows into Bucks Creek.
- Enhance existing recreation facilities, including campgrounds, picnic areas, boat launches, day use areas, and trails, and construct a Bucks Lake Shoreline Trail and new facilities at the Bucks Lake Boat-In Campground.

Proposed Project Boundary

The licensees propose changes to the existing project boundary that would: (1) include existing facilities and roads that are necessary for current and future operation and maintenance (O&M) activities, and recreation development; (2) remove land and roads currently within the boundary that are not required for project purposes; and (3) reduce the shoreline buffer along project impoundments where project infrastructure and recreation facilities are in proximity to the shoreline.

The proposed boundary modifications would remove 331.3 acres from the project boundary. Federal land within the project boundary would be reduced by 223.5 acres, resulting in a total of 1,316 acres of federal land managed by the Forest Service remaining in the project boundary. PG&E land within the project boundary would be reduced by 108.5 acres, resulting in 1,492.7 acres of PG&E land remaining within the project boundary. Other private land within the project boundary would be increased by 0.7 acre, resulting in 8.2 acres of private land within the project boundary.

Proposed Operations

The project would continue to be operated in the same manner as it has since the construction of the Grizzly Development, except for the changes associated with the licensees' proposed environmental measures, which are listed below.

Proposed Environmental Measures

The licensees propose the following measures to protect or enhance environmental resources at the project:

General Measures

- Provide annual employee training related to special-status species, non-native invasive plants, cultural resources, and reporting procedures.
- Consult annually with the Forest Service and other interested agencies regarding license implementation, resource monitoring results, non-routine maintenance, and overall coordination of activities occurring on National Forest System (NFS) land.

- Establish an Ecological Consultation Group to annually consult on the implementation of resource management plans and other applicable license conditions.

Geology and Soils

- Implement the Erosion Management Plan (filed as appendix E-2 of the license application) to minimize future erosion and sedimentation as a result of ground-disturbing activities from routine O&M, emergency actions, and planned projects within the project boundary.

Aquatic Resources

- Allow large woody material to naturally pass over Grizzly Forebay Dam and Lower Bucks Lake Dam during spill events to improve aquatic habitat downstream. Wood at Bucks Lake Spillway would be manually relocated to the Lower Bucks Lake Spillway to protect a road crossing over the spillway.
- Implement the Gravel Augmentation Plan (filed as appendix E-2 of the license application) to improve trout spawning habitat and populations downstream of Lower Bucks Dam and Grizzly Forebay Dam.
- Provide higher minimum instream flows, by water year type and month, to Bucks Creek below Lower Bucks Lake Dam (ranging from 4 to 15 cfs), and Grizzly Creek below Grizzly Forebay (ranging from 4 to 13 cfs). Provide minimum instream flows where none are required under the existing license, by water year type and month, in the following reaches: Bucks Creek below Bucks Lake Dam (3 cfs in all months regardless of water year type), Milk Ranch Creek downstream of Three Lakes (ranging from 0.25 cfs to the unimpaired outflow of the reservoir), Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1 (ranging from 0.25 cfs or the natural inflow, whichever is less, to 2 cfs), and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 (0.5 cfs or natural inflow, whichever is less).
- Initiate drawdown of Three Lakes annually between August 15 and September 15 to protect aquatic habitat.
- Provide channel maintenance flows of increased duration and magnitude to Bucks Creek below Lower Bucks Lake Dam and Grizzly Creek below Grizzly Forebay Dam to protect and enhance riparian and instream habitat.
- Manage reservoir operations to maintain the following existing minimum pool elevations to protect and enhance aquatic habitat and recreation resources: 4,966 feet at Lower Bucks Lake; 6,050 feet at Lower Lake; 6,057 feet at Middle Lake; 4,303 at Grizzly Forebay; in a Dry or Critically Dry water year type, 5,080 feet at Bucks Lake; and in a Wet or Normal water year type, 5,100

feet at Bucks Lake, and not exceed 15 feet below the water surface elevation as of June 1 between June 1 and September 1.

- Gradually decrease powerhouse load changes during managed spills, and schedule no outages longer than 2 weeks at Bucks and Grizzly Powerhouses during April through July to reduce potential effects of flow fluctuations on fisheries and breeding and rearing foothill yellow-legged frogs (FYLF).
- Determine water-year type annually, to be used for the implementation of instream flows, channel maintenance flows, project reservoir operations, and Milk Ranch Conduit bypass flows in Wet water years, based on the California Department of Water Resources forecast to be consistent with other NFFR watershed hydroelectric projects and simplify compliance and operational consistency for instream flows.
- Leave six inoperable diversions along Milk Ranch Conduit in place to maintain current channel and riparian conditions.
- Allow unimpaired flow at two Milk Ranch Conduit diversions, Milk Ranch Creek (Diversion No. 1) and North Fork Grouse Hollow Creek (Diversion No. 2), during Wet water years rather than seasonally diverting flows into the conduit to enhance seasonal aquatic habitat and year-round riparian resources.
- Implement the Streamflow and Reservoir Level Gaging Plan (filed as appendix E-2 of the license application) to document compliance with streamflow and reservoir level requirements.
- Implement the Hazardous Materials Management Plan (filed as appendix E-2 of the license application), which includes standard practices regarding the storage, use, transport, and disposal of hazardous materials to protect water quality.
- Fund fish stocking by California Department of Fish and Wildlife (California DFW) in Bucks Lake, Grizzly Forebay, and Middle and Lower Lakes in each year stocking occurs to improve the recreational fishery.
- Implement the Aquatic Resources Monitoring Plan (filed as appendix E-2 of the license application) that includes measures to monitor stream fish populations in Milk Ranch, Bucks, and Grizzly Creeks downstream of Project dams; brook trout in Three Lakes; benthic macroinvertebrates and FYLF in project-affected reaches of Bucks, Grizzly, and Milk Ranch Creeks; water temperature in lower portions of Milk Ranch Creek, Bucks Creek, and Grizzly Creek, upstream of the NFFR; water quality in recreational areas of Bucks Lake, Lower Bucks Lake, Grizzly Forebay, and Three Lakes and Bucks Creek downstream of Lower Bucks Lake; and stream channel morphology, large woody material and riparian vegetation in Bucks and Grizzly Creeks below

- Lower Bucks Lake Dam and Grizzly Dam, respectively, to document any long-term changes in resource conditions in order to facilitate resource management.
- Develop an aquatic invasive species management plan to prevent the introduction and spread of aquatic invasive species on project land.

Terrestrial Resources

- Implement the Integrated Vegetation Management Plan (filed as appendix E-2 of the license application) that includes measures to protect special-status plant populations and natural communities on project land.
- Implement the Bald Eagle Management Plan (filed as appendix E-2 of the license application) to protect eagles on project land from disturbance.
- Implement a limited operating period during the osprey breeding season (March 15 to August 31). During this period, protective buffers would be established around active osprey nests when conducting potentially disruptive project maintenance activities to protect nesting birds from disturbance.
- Implement limited operating periods during the California spotted owl and northern goshawk breeding seasons (March 1 through August 31 and February 15 through August 31, respectively). During this period, 0.25-mile protective buffers would be established around active nests when conducting potentially disruptive project maintenance activities to protect nesting birds from disturbance.
- Evaluate, and upgrade if necessary, the project transmission line for consistency with Avian Powerline Interaction Committee (APLIC) standards and implement other raptor protection measures. Throughout the term of the new license, ensure all newly installed powerlines, poles, conductors, and other transmission infrastructure conform to current guidelines to minimize or avoid electrocution and collision hazards.
- Conduct nesting surveys on project land for California spotted owls and northern goshawks the first year following license issuance, then every 7 years thereafter, and establish buffers in which no work would occur around active nests to protect nesting birds from disturbance.
- Limit O&M activities on project land during willow flycatcher breeding season within buffer zones around suitable habitat to protect nesting birds from disturbance.
- Consult with a bat biologist prior to significant project facility modifications and project-related vegetation management activities to protect maternity colonies composed of approximately 50 bats or more and colonies of any size if composed of special-status bats.

- Inspect project tunnels for bats prior to conducting O&M activities in the winter and implement appropriate protective measures or a limited operating period to protect hibernacula supporting special-status bat species or approximately 50 or more non-special-status bats.
- Consult with a bat biologist prior to any loud/vibration O&M activities along Three Lakes Road or Three Lakes Dam to protect special-status bat species during the maternity season.

Threatened and Endangered Species

- Provide unimpaired flows to Bear Ravine at Milk Ranch Conduit Diversion No. 8 to protect the federally endangered Sierra Nevada yellow-legged frog (SNYLF) and its critical habitat.
- Implement the SNYLF Management Plan (filed as appendix E-2 of the license application) that includes measures to protect SNYLF and their suitable habitat during project-related O&M activities in areas above 4,500 feet.

Recreation Resources

- Revise the Recreation Management Plan (filed as appendix E-2 of the license application) to reflect the agreement between the licensees and the Forest Service (filed May 14, 2019) that includes measures to address existing and future recreation resource needs within the project boundary.

Land Use and Aesthetics

- Implement the Transportation Management Plan (filed as appendix E-2 of the license application) that provides guidance for the rehabilitation and maintenance of project roads.
- Implement the Fire Prevention and Response Plan (filed as appendix E-2 of the license application) that includes procedures for fire prevention, reporting, and safe fire practices for project facilities.
- Implement a revised Shoreline Management Plan (SMP) (to be filed with the Commission by July 31, 2019) that would address all shorelines within the project boundary, and guide the use, occupancy, and management of shoreline resources.
- Consult with the Forest Service prior to painting the exterior of project facilities on NFS land, to select a suitable paint color that minimizes the contrast between facilities and their surrounding landscape.

Cultural Resources

- Implement a Historic Properties Management Plan (HPMP) (to be filed in 2019) to protect and preserve historic properties identified in the project area, as well as ongoing inventory and evaluation of cultural resources in the project area.

Public Involvement

Before filing its license application, the licensees conducted pre-filing consultation under the Integrated Licensing Process. The intent of the Commission's pre-filing process is to initiate public involvement early in the project planning process and to encourage citizens, governmental entities, tribes, and other interested parties to identify and resolve issues prior to an application being formally filed with the Commission. As part of the pre-filing process, staff conducted scoping to identify issues and alternatives. Staff distributed a scoping document to stakeholders and other interested entities on January 14, 2014 and held scoping meetings in Chico, California, on February 11, 2014. Staff distributed a revised scoping document on May 29, 2014 that reflects public input. On December 12, 2016, PG&E and the City filed their final license application. They subsequently filed a supplement to the final license application on May 22, 2018. On August 6, 2018, the Commission issued a public notice accepting the application and soliciting motions to intervene and protests, stating that the application is ready for environmental analysis, and requesting comments, terms and conditions, recommendations, and prescriptions.

Alternatives Considered

This draft environmental impact statement (draft EIS) analyzes the effects of continued project operation and recommends conditions for any license that may be issued for the project. In addition to the licensees' proposal, we consider three alternatives: (1) the licensees' proposal with staff modifications (staff alternative); (2) staff alternative with mandatory agency conditions; and (3) no action, meaning that the licensees would continue to operate the project with no changes.

Staff Alternative

Under the staff alternative, the project would include most of the licensees' proposed measures, with the exception of the proposed annual employee training, annual review of federally listed and special-status species lists, and annual ecological group meeting.

We do not recommend a license condition requiring annual employee training because the licensees are expected to train their employees to the extent needed to maintain compliance with a license. Therefore, we do not recommend incorporating this measure as part of any license issued for the project.

We do not recommend annual consultation with the Forest Service and other agencies to review monitoring status, proposed modifications to facilities, management and maintenance because consultation and reporting is a requirement of each resource-specific compliance plan. Similarly, we do not recommend organizing an ecological consultation group because the licensees are already required to consult with agencies during the preparation of reports that are components of Commission-approved management plans.

In addition, the staff alternative also includes the following recommended modifications of the licensees' proposal and additional measures.

- Develop a drought management plan that defines drought conditions based on available data specific to the project, rather than regional or state-wide proclamations, to ensure modifications to operations during extended low-water periods are only implemented as necessary and in a manner that protects aquatic resources.
- Modify the proposed annual determination of water-year type to also provide the results to the U.S. Fish and Wildlife Service, Water Board, and California DFW, in addition to Forest Service and FERC.
- Modify the proposal to fund fish stocking by the California DFW to a requirement that the licensees implement a fish stocking plan for Bucks Lake, Grizzly Forebay, and Middle and Lower Lakes to improve the recreational fishery.
- Modify the proposed Aquatic Resources Monitoring Plan to only include monitoring gravel in Bucks Creek downstream of Lower Bucks Lake Dam spillway and in Grizzly Creek downstream of the Grizzly Creek gaging weir to document maintenance of 37 cubic yards of 0.25- to 2.5-inch diameter gravel at those locations. Only the proposed gravel monitoring would have a project-related benefit.
- Develop an avian protection plan that outlines the design of any proposed modifications to the project transmission line to protect birds from electrocution or collisions that may result from the licensees' review of existing facilities.
- Revise the project boundary to include the area from the proposed location of the Bucks Lake Shoreline Trail to the shoreline of Bucks Lake because the proposed trail would be part of the licensees' recreation facilities that support public access to the project.

Staff Alternative with Mandatory Conditions

The staff alternative with mandatory conditions includes the staff-recommended measures noted above along with the mandatory conditions that we did not include in the

staff alternative: (1) annual consultation with the Forest Service (preliminary 4(e) condition 1); (2) organizing an Ecological Consultation Group and hosting meetings (preliminary 4(e) condition 2, preliminary 401 condition 9); (3) annual employee training (preliminary 4(e) condition 27); (4) preparation of biological evaluations for any new project features on NFS land (preliminary 4(e) condition 28); (5) annual review of special-status species lists and assessment of new species (preliminary 4(e) condition 29); and (6) aquatic resources monitoring (preliminary 4(e) condition 43, preliminary 401 condition 11).

No-Action Alternative

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented.

Environmental Effects of the Staff Alternative

The primary issues associated with licensing the Bucks Creek Project are the effects of continued project operation on geology and soils, water quality, fishery resources, terrestrial resources, threatened and endangered species, recreation and land use, and cultural resources. Below, we briefly discuss the anticipated environmental effects of issuing a new license for the project under the staff alternative.

Geology and Soils

Project operations and maintenance activities, construction and renovation of recreation facilities, and stormwater runoff from exposed surfaces such as unpaved roads and trails have the potential to cause minor erosion. The licensees' proposed Transportation Management Plan outlines both annual and long-term maintenance activities to address on-going erosion issues associated with plugged culverts and lack of adequate road drainage resulting in surface erosion and gullyng. The licensees' proposed Erosion Management Plan include best management practices to minimize erosion associated with project operations and limit the adverse effects of erosion on terrestrial and aquatic habitats.

Aquatic Resources

Project operations, including reservoir storage, diversion of flows, and manipulation of flow releases for power production, affect aquatic resources both in the project area and downstream of the project by modifying aquatic habitat availability and quality. Under existing conditions, project operations reduce peak flows and the amount of sediment and large woody material delivered to Bucks and Grizzly Creeks downstream of the dams. As a result, the amount of spawning-sized gravel below the dams generally increases in a downstream direction, and there is relatively little large woody material in these reaches. The proposed channel maintenance flows, a measure to pass large woody

material at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay dams, and the Gravel Augmentation Plan for Bucks and Grizzly Creeks would mitigate these project effects.

The proposed minimum instream flows would increase releases into project-affected stream reaches (Bucks Creek below Lower Bucks Lake Dam and Grizzly Creek below Grizzly Forebay) during all water year types, except for portions of Critically Dry years when flows would be the same or slightly less than existing minimum instream flow requirements. Under existing conditions, there are no minimum instream flow releases from Bucks Lake into Bucks Creek or into Milk Ranch Creek or its tributaries. As noted above, the proposed channel maintenance flows would increase the magnitude and duration of high flows. Such flows are instrumental in recruiting and redistributing spawning gravels and large woody material and creating periodic scouring and vegetation recruitment events to maintain aquatic habitat and a diverse riparian zone.

The proposed minimum reservoir elevations are sufficient to provide rearing habitat for resident fish. The proposed measure to gradually decrease flows from managed spills at Lower Bucks Lake and Grizzly Forebay Dams would help protect aquatic resources, including fish populations in the stream reaches below the dams and FYLF populations in the NFFR 1.5 miles downstream of the Grizzly Creek confluence, by preventing stranding or dewatering of habitat during critical life stages.

Resident fish species in Bucks Lake, Lower Bucks Lake, Three Lakes, and Grizzly Forebay may be entrained and pass through project turbines and be subjected to stress, injury, and mortality. Due to the low number of fish occurring at depth in project reservoirs, it is likely that the number of fish subject to entrainment mortality is relatively low. However, some minor levels of mortality would still be likely to occur.

The proposed Hazardous Material Management Plan would minimize the likelihood of accidental spills and address any potential discharges of hazardous substances to project land and waters.

Terrestrial Resources

Project operations and maintenance activities and recreational use have the potential to remove or damage vegetation in the project area and introduce or spread non-native invasive plants. The proposed construction of new recreational facilities would result in the disturbance and loss of some vegetation. The proposed Integrated Vegetation Management Plan would protect vegetation resources in the project area and prevent adverse effects to habitat for wildlife species. The plan also includes measures for periodic surveys for special-status plants and non-native invasive plants, revegetation activities, and treatment of non-native invasive plants on all project land. The proposed minimum reservoir elevations should be sufficient to support special-status plant habitats.

Project activities may also affect wildlife resources in the project area. Vegetation clearing along roads and transmission lines, road grading, modification of existing facilities, construction of new project facilities, recreation, and noise associated with these activities (i.e., helicopter use, blasting, and heavy machinery use) have the potential

to affect sensitive life stages. The proposed protection measures for special-status birds, including nest buffers and limited operating periods for bald eagle, osprey, northern goshawk, California spotted owl and willow flycatcher, would limit disturbance during the nesting season.

Operations and maintenance activities conducted at project structures (e.g., powerhouses, storage buildings, valve houses, and dams), recreational facilities, tunnels, or other structures have the potential to adversely affect bats and their roosting habitat, especially those facilities that support maternity colonies or winter hibernation roosts. The proposed bat management measures are expected to identify locations of maternity colonies and winter roosts in project structures and mitigate effects of project operations and maintenance activities.

Fluctuations in spill rates at Grizzly Forebay and Lower Bucks Lake into Grizzly and Bucks Creek, respectively, may affect breeding FYLF by stranding egg masses in the NFFR. The closest population of FYLF to the project area is on the NFFR 1.5 miles downstream of the confluence with Grizzly Creek. The licensees' proposed measures are expected to protect FYLF in the NFFR downstream of Grizzly Creek.

Threatened and Endangered Species

Project operations and maintenance activities, recreational use, and management of reservoirs and diversions have the potential to affect the SNYLF and its habitat. The proposed SNYLF Management Plan contains specific protection measures intended to avoid or minimize potential adverse effects, including buffers and limited operating periods near suitable habitat, decontamination protocols to minimize the spread of chytrid¹⁰ within the project area, restrictions on the use and application of herbicides and pesticides, and limitations on instream work.

The licensees propose a new measure to cease diversion of flows from Bear Ravine, which is occupied critical habitat, into Milk Ranch Conduit, that would increase year-round instream flows in Bear Ravine. This measure would enhance habitat for SNYLF in Bear Ravine by increasing connectivity between ponds and other microhabitats preferred by the frog and increasing availability of inundated areas during drier months, and would eliminate entrainment of frogs into the Milk Ranch Conduit. In addition, the licensees propose similar measures to maintain or increase instream flows to protect and potentially enhance suitable habitat in other stream corridors in the project area.

¹⁰ Chytrid, a type of fungus, is a major contributing factor in the dramatic decline in amphibian populations worldwide and has significantly reduced or extirpated many populations of SNYLF in California (Briggs et al., 2005). The control and remediation of Chytrid disease is a crucial factor in the potential recovery of the SNYLF.

The proposed measures to increase instream flows in Bear Ravine and other stream corridors in the project area, eliminate potential entrainment of frogs into the Milk Ranch Conduit, and eliminate potential effects of project O&M on SNYLF in Bear Ravine would likely benefit the frog and its critical habitat. Therefore, we conclude that continued project operation, as proposed with staff-recommended measures, may affect, but is not likely to adversely affect, SNYLF and its critical habitat.

Continued project operation, as proposed with staff-recommended measures, would have “no effect” on the California red-legged frog because surveys indicate this species is not present in the project area and no suitable habitat is available.

Recreation, Land Use, and Aesthetics

Numerous recreation opportunities exist at the project, including developed sites managed by either the licensees or the Forest Service, and those outside of developed recreation sites along project reservoir shorelines. Many of the developed project recreation facilities require maintenance to meet existing visitor needs, have reached the end of their serviceable life, or do not meet current accessibility guidelines. Moreover, existing facility capacities are not expected to be able to meet anticipated increases in recreation demand during the next license period. Implementing the proposed Recreation Management Plan would expand recreation opportunities and capacity by adding new facilities and improving existing facilities.

Many recreational activities take place outside of developed recreation sites along project reservoir shorelines. To address these user-created shoreline recreation sites, the licensees propose to update the SMP to address all project shorelines and shoreline uses, and provide guidance for managing shoreline resources within the project boundary.

Implementing the proposed Transportation Management Plan would ensure that project roads are maintained to current standards, allowing continued and improved public access to and through the project. The proposed Fire Management Plan would improve public safety by ensuring that project O&M activities are conducted in a manner that would prevent the ignition and spread of wildland fires, and by guiding the response should fires occur.

To improve the overall visual quality of the project, the licensees propose to consult with the Forest Service prior to painting the exterior of project facilities to identify natural colors that would better blend the facilities with the surrounding environment.

Cultural Resources

Project operations and maintenance activities, construction of new recreation facilities, and recreation activities have the potential to adversely affect cultural resources. The proposed HPMP outlines protection measures, management and consultation protocols, and education and outreach methods to avoid, reduce or mitigate such effects (PG&E, 2018).

Proposed construction activities, including recreation enhancements have the potential for adverse effects on cultural resources, particularly in areas that have not yet been surveyed. Implementation of the HPMP, with staff-recommended modifications, would ensure that historic properties are protected over the license term. To meet section 106 of the National Historic Preservation Act requirements, the Commission intends to execute a programmatic agreement (PA) with the California State Historic Preservation Officer for the project for the protection of historic properties that would be affected by project construction, operation, and maintenance activities. The terms of the PA would require the licensees to implement the revised HPMP.

No-action Alternative

Under the no-action alternative, the project would continue to operate as it has in the past. None of the licensees' proposed measures or the resource agencies' recommendations and mandatory conditions would be required. None of the staff-recommended measures would be implemented, including measures to enhance environmental conditions for fish and wildlife, including the endangered SNYLF, within the project area, measures to improve flow conditions downstream of the project for FYLF, and measures to expand and improve recreation opportunities.

Draft License Articles

Staff recommendations for license articles for any new license for the project are based on the analysis presented in this draft EIS. Draft license articles are attached in appendix A.

Conclusions

Based on our analysis, we recommend licensing the project as proposed by the licensees with some staff modifications and additional measures.

In section 4.2 of the EIS, we estimate the likely cost of alternative power for each of the three alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost \$23,531,163, or 54.90 mills/kilowatt-hour (kWh) more than the likely alternative cost of power. Under the proposed action alternative, project power would cost \$28,655,409, or 78.18 mills/kWh more than the likely alternative cost of power. Under the staff alternative, project power would cost \$28,560,835, or 77.82 mills/kWh more than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the project would provide a dependable source of electrical energy for the region (260,243 MWh annually); (2) the 260,243 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution, including greenhouse gases; and (3) the recommended environmental measures proposed by the licensees, as modified by staff, would adequately protect and enhance environmental resources affected by the project.

The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, D.C.

Bucks Creek Hydroelectric Project FERC Project No. 619—California

1.0 INTRODUCTION

1.1 APPLICATION

On December 12, 2016, Pacific Gas and Electric Company (PG&E) and the City of Santa Clara, California (City) (collectively, applicants or licensees) filed an application for a new license with the Federal Energy Regulatory Commission (Commission or FERC) to continue to operate and maintain the Bucks Creek Hydroelectric Project (Bucks Creek Project or project). On May 22, 2018, the licensees filed a supplement to the license application (errata filed July 27, 2018). The existing 84.8-megawatt (MW) project is located on Bucks, Grizzly, and Milk Ranch Creeks, tributaries to the North Fork Feather River (NFFR) in Plumas County, California (figure 1-1). The total area within the existing project boundary is 3,148.2 acres. This includes 1,539.5 acres of federal land within the Plumas National Forest (PNF), administered by U.S. Department of Agriculture, Forest Service (Forest Service), 1,601.2 acres of PG&E-owned land, and 7.5 acres held by other private landowners. The project generates an average of about 271,000 megawatt-hours (MWh) of energy annually.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Bucks Creek Project is to continue to provide a source of hydroelectric power. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a license to the licensees for the Bucks Creek Project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be the best adapted comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the

protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

Issuing a new license for the Bucks Creek Project would allow the licensees to generate electricity at the project for the term of a new license, making electrical power from a renewable resource available to its customers.

This draft environmental impact statement (draft EIS) assesses the effects associated with operation of the project and alternatives to the proposed project. It also includes recommendations to the Commission on whether to issue a new license, and if so, the terms and conditions recommended to become a part of any license issued.

In this draft EIS, we assess the environmental and economic effects of continuing to operate the project: (1) as proposed by the licensees, (2) with our recommended measures; and (3) with any mandatory conditions prescribed by state and federal agencies. We also consider the effects of the no-action alternative. Important issues that are addressed include the effects of continued project operation on instream flows, shoreline erosion and sediment transport, water quality, fishery resources, terrestrial resources, threatened and endangered species, recreation and land use, and cultural resources.

1.2.2 Need for Power

To assess the need for project power, the Federal Energy Regulatory Commission (Commission or FERC) staff reviewed the licensees' anticipated future use of project power. The Bucks Creek Project would generate an average of 271,000 megawatt-hours (MWh) annually.

According to the Western Electricity Coordinating Council's (WECC) 2015 Power Supply Assessment, reserve margins in the California/Mexico subregion will decline during the next 10 years if new plants are not built in addition to those currently undergoing regulatory review or already under construction (WECC, 2015). The WECC study shows that by 2025 there will still be sufficient generating resources to maintain the California Public Utility Commission-mandated 15 percent reserve margin in Northern California provided all major generation sources including Diablo Canyon Power Plant remain in service during California's summer peak electricity demand.

Actual reserve margins will depend on weather, economic conditions, and resource development. For example, tightening credit markets could delay construction of plants that are planned or currently under regulatory review, resulting in lower reserve margins. On the other hand, tightening credit markets could also reduce demand growth. Environmental constraints, such as air quality requirements, could limit new generation options, or once-through cooling restrictions could cause existing plants to retire more quickly than currently anticipated. Hotter than average peak weather would also worsen conditions.

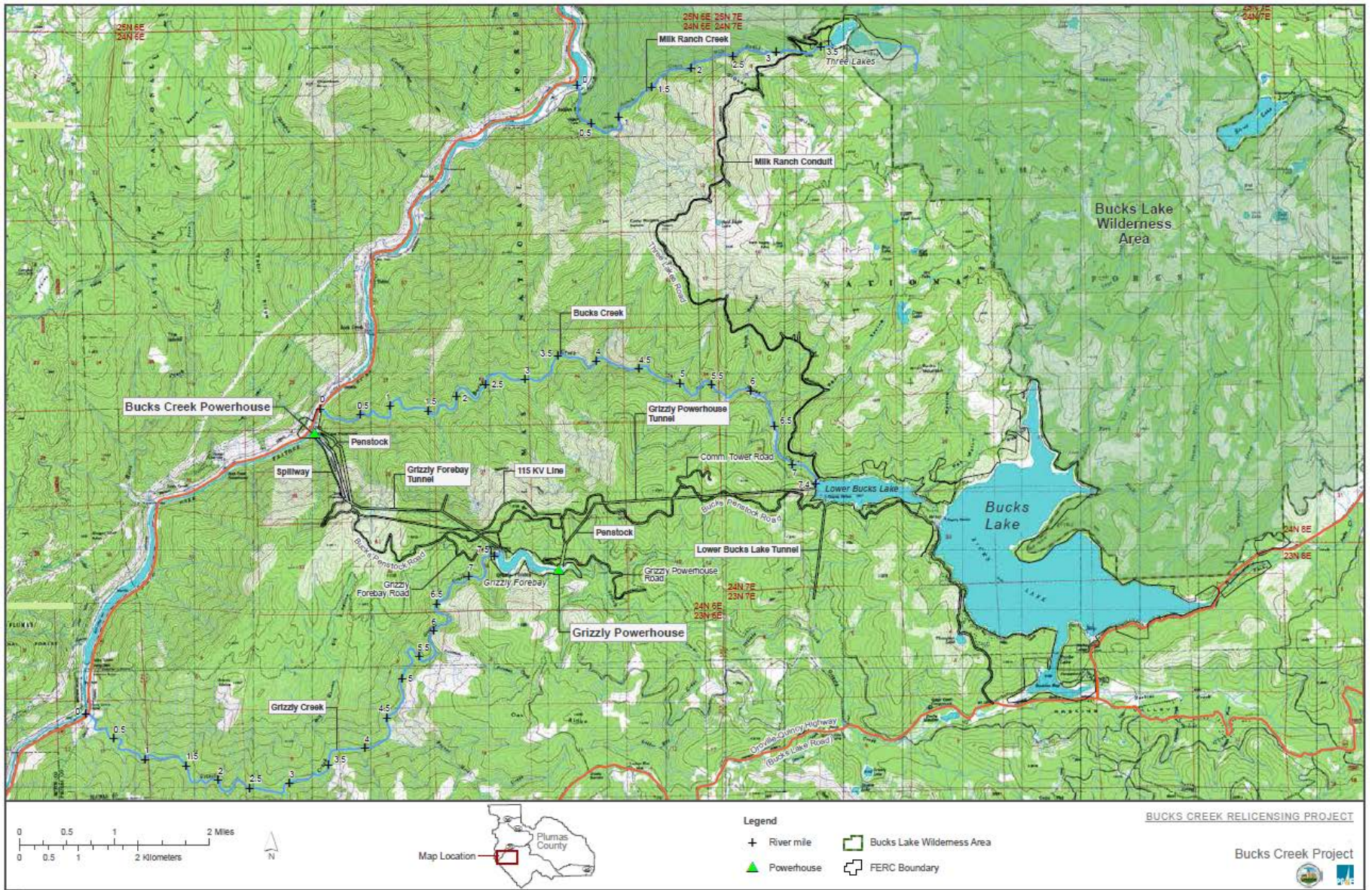


Figure 1-1. Location of Bucks Creek Hydroelectric Project (Source: FERC, 2014a).

By producing hydroelectricity, the Bucks Creek Project would displace the need for non-renewable resources, thereby creating an environmental benefit. The future use of power from the Bucks Creek Project, its displacement of non-renewable fossil-fueled generation, and contribution to a diversified generation mix support a finding that the power from the project would help meet both the short- and long-term need for power for the California/Mexico subregion.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

Any new license for the Bucks Creek Project would be subject to requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or the U.S. Department of the Interior (Interior). The U.S. Department of the Interior's U.S. Fish and Wildlife Service (FWS), by letter filed on October 3, 2018, requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

1.3.1.2 Section 4(e) Conditions

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation will be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. The Forest Service filed preliminary conditions by letter dated October 1, 2018 (filed October 3, 2018) pursuant to section 4(e) of the FPA. These conditions are described under section 2.2.5, *Modifications to Applicants' Proposal—Mandatory Conditions* and included in Appendix B.

The Energy Policy Act of 2005 provides parties to this licensing proceeding the opportunity to request trial-type hearings regarding issues of material fact that support the preliminary conditions developed under FPA section 4(e) and to propose alternatives to preliminary conditions. On November 2, 2018, the Commission received a copy of the licensees' filing to the Forest Service proposing alternative 4(e) conditions in response to the Forest Service's revised 4(e) conditions and seeking a trial-type hearing to resolve disputed issues of material fact. The disputed conditions are portions of Forest Service preliminary 4(e) condition 55, the Recreation Management Plan. On December 19, 2018, the Commission received a notice that the licensees and the Forest Service reached an agreement to stay the hearing process in order to allow time to reach a settlement before referral to an administrative judge, no later than April 5, 2019. On March 28, 2019, the Commission received notice that the licensees and Forest Service agree that the 120-day

period for settlement discussions was suspended during the 35-day lapse in federal appropriations, during which the parties were prevented from engaging in settlement discussion. On May 14, 2019, the Forest Service filed one revised preliminary condition. On May 17, 2019, the Commission received notification that the licensees and Forest Service resolved their differences, and with the submittal of the Forest Service's revised preliminary condition, the licensees' withdrew the November 2, 2018 request for trial-type hearing and submittal of alternative conditions. The Forest Service's preliminary conditions, the revised preliminary condition, and the licensees' revised proposal are analyzed within the corresponding resource areas in section 3, *Environmental Analysis*, and section 5.2, *Comprehensive Development and Recommended Alternative*.

1.3.1.3 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

On October 3, 2018, Interior and the California Department of Fish and Wildlife (California DFW) filed timely recommendations under section 10(j). These recommendations are summarized in table 5-1. In section 5.3.1, *Fish and Wildlife Agency Recommendations*, we address how the agency recommendations comply with section 10(j).

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act, the Commission may not issue a license for a hydroelectric project unless a license applicant obtains certification from the appropriate state pollution control agency verifying compliance with the act, or the state agency waives certification by failing to act on the request within a reasonable time, not to exceed one year. On August 14, 2018, the licensees applied to the California State Water Resources Control Board (Water Board) for section 401 water quality certification (certification) for the Bucks Creek Hydroelectric Project. The Water Board received this request on August 14, 2018. On October 5, 2018, the Water Board filed preliminary certification conditions. These conditions are described in section 2.2.5, *Modifications to Applicants' Proposal – Mandatory Conditions* and included in Appendix C.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or

threatened species or result in the destruction or adverse modification of the critical habitat of such species. Our analyses of project effects on threatened and endangered species are presented in section 3.3.3, *Terrestrial Resources*, and section 3.3.4, *Threatened and Endangered Species*, and our recommendations are provided in section 5.1, *Comprehensive Development and Recommended Alternative*.

Two federally listed species could be potentially be found in the project area (letter from FWS, Sacramento Fish and Wildlife Office, filed March 29, 2019).¹¹ The endangered Sierra Nevada yellow-legged frog (SNYLF) (*Rana sierrae*) is known to occur in the Bucks Creek project vicinity as documented in supplemental relicensing surveys conducted in 2017 (PG&E and City, 2018c). There is also designated critical habitat for the SNYLF within the FERC project boundary. We conclude that relicensing the Bucks Creek Hydroelectric Project, as proposed with staff-recommended measures and mandatory agency conditions (the proposed action), “may affect, but is not likely to adversely affect,” this species or its critical habitat. We will request FWS concurrence with this finding.

In addition, the threatened California red-legged frog (CRLF) (*Rana draytonii*) may also occur in the project area. During focused surveys conducted by the licensees, however, no habitat for this species was found to be present in the project area, and no individuals were observed. We conclude the project would have “no effect” on the CRLF and no further action under the ESA is required.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(3)(A), the Commission cannot issue a license for a project within or affecting a state’s coastal zone unless the state CZMA agency concurs with the license applicant’s certification of consistency with the state’s CZMA program, or the agency’s concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification request.

The project is not located within the state-designated Coastal Management Zone, which extends no more than 5 miles inland from the sea.¹² In a letter filed May 22, 2018, as an appendix to the final license application, the California Coastal Commission declined to assert federal consistency jurisdiction because: (1) this project is located far outside both the Coastal Commission’s and the San Francisco Bay Conservation and

¹¹ FWS also identified the threatened delta smelt (*Hypomesus transpacificus*) as potentially occurring in the project area. The project, however, is outside the known range of this species and is not considered further.

¹² See <https://www.coastal.ca.gov/maps/czb/> for a map of California’s Coastal Management Zone.

Development Commission’s jurisdiction; and (2) the project would not affect any coastal zone uses or resources.

1.3.5 National Historic Preservation Act

In its NOI (January 14, 2014), the Commission designated the licensees as the non-federal representative for carrying out informal consultation pursuant to section 106 of the National Historic Preservation Act (NHPA). Section 106 requires that every federal agency “take into account” how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) for the protection of historic properties from the effects of the operation of the Bucks Creek Project. The terms of the PA would ensure that the licensees address and treat all historic properties identified within the project’s area of potential effects (APE) through the implementation of a Historic Properties Management Plan (HPMP). The licensees filed a draft HPMP with the Commission as part of the supplemental FLA (PG&E and City, 2018a; PG&E, 2018).

1.3.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on all actions that may adversely affect Essential Fish Habitat (EFH). EFH consultation is not required because no EFH is present within the Bucks Creek Project area.

1.3.7 Wilderness Act

Under section 4(c) of the Wilderness Act, 16 U.S.C. § 1133(c) states that “there shall be no commercial enterprise and no permanent road within any wilderness area designated by the act and no structure or installation within any such area.” The Bucks Lake Wilderness Area, created by the California Wilderness Act of 1984, is located in the vicinity of the Bucks Creek Project. The Upper Bucks Creek Basin and portions of Milk Ranch Creek Basin are within the Bucks Lake Wilderness Area. The eastern shoreline of Bucks Lake abuts the Wilderness Area. The wilderness boundary divides the Lower Lake and Middle Lake portions of Three Lakes; Middle and Upper Lake and a portion of the Three Lakes Trail are within the Bucks Lake Wilderness Area. However, the Bucks Creek Project was licensed prior to the creation of the Bucks Lake Wilderness Area, no

new construction is proposed within the Wilderness Area, and no additional lands would be inundated; therefore, there is no inconsistency with the Wilderness Act.¹³

Our analyses of project effects on resources in the Wilderness Area are presented in section 3.3.6, *Land Use and Aesthetics*, and our recommendations are provided in section 5.1, *Comprehensive Development and Recommended Alternative*.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 CFR, sections 5.1–5.16) require that licensees consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the ESA, the National Historic Preservation Act, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

1.4.1 Scoping

Before preparing this EIS, we conducted scoping to determine what issues and alternatives should be addressed. Scoping document (SD) 1 was distributed to interested agencies and others on January 14, 2014 (FERC, 2014b). It was noticed in the Federal Register (FR) on January 21, 2014. Based on verbal comments that were received during two scoping meetings held on February 11, 2014, in Chico, California,¹⁴ as well as written comments we received throughout the scoping process, SD2 was prepared and distributed to interested parties on May 29, 2014 (FERC, 2014a) and noticed in the Federal Register on May 29, 2014. In addition to comments provided at the scoping meetings, the following entities provided written comments:

<u>Commenting Entity</u>	<u>Date Filed</u>
Dustin Doyle	February 10, 2014
Cheryl Armstrong	February 24, 2014
Barry O'Sullivan	February 27, 2014
Dustin Doyle	March 18, 2014
Kevin Owens	March 25, 2014
American Whitewater	April 10, 2014
Bucks Lake Homeowners Association	April 11, 2014

¹³ *PPL Montana*, 121 FERC ¶62,198 (2007).

¹⁴ Transcripts of the public meetings are part of the Commission's public record for the project (Accession Nos. 20140211-4003 and -4004).

<u>Commenting Entity</u>	<u>Date Filed</u>
Rick Frey	April 11, 2014
PNF	April 11, 2014
Licensees	April 14, 2014
California DFW	April 14, 2014
Water Board	April 14, 2014
Lori Simpson, Plumas County Supervisor	April 14, 2014
Dustin Doyle	April 16, 2014
Dewitt Henderson	April 21, 2014

1.4.2 Interventions

On August 6, 2018, the Commission issued a notice that the licensees had filed an application to relicense the Bucks Creek Project. This notice set October 5, 2018, as the deadline for filing protests and motions to intervene. The following entities filed motions to intervene.

<u>Intervenor</u>	<u>Date Filed</u>
USDA Forest Service	September 4, 2018
Interior	September 27, 2018
Water Board	September 27, 2018
American Whitewater and California Sportfishing Protection Alliance	October 4, 2018
Andrew Everett, on behalf of the Bucks Lake Homeowners Association	October 4, 2018
California DFW	October 4, 2018

1.4.3 Comments on the Application

The August 6, 2018, notice also stated that the application was ready for environmental analysis and solicited comments, recommendations, preliminary terms and conditions, and preliminary fishway prescriptions. The following entities commented:

<u>Commenting Agency and Other Entity</u>	<u>Date Filed</u>
National Park Service	September 21, 2018
USDA Forest Service	October 3, 2018
Interior, Office of the Secretary, on behalf of FWS	October 3, 2018
Andrew Everett, on behalf of the Bucks Lake Homeowners Association	October 3, 2018
California DFW	October 4, 2018
Water Board	October 5, 2018
Environmental Protection Agency (EPA)	October 12, 2018

The licensees filed reply comments on November 19, 2018.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Bucks Creek Project would continue to operate as required by the current project license (i.e., there would be no change to the existing environment). No new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives.

2.1.1 Existing Project Facilities

The project is located entirely within Plumas County, California in the Sierra Nevada Mountains, approximately 17 miles southwest of the community of Quincy. It consists of two developments that contain four dams, four reservoirs, two powerhouses, several recreation sites, and associated facilities.

2.1.1.1 Bucks Creek Development

The Bucks Creek Development was completed in 1928. It includes Bucks Lake Dam and Reservoir, Three Lakes Dam and Reservoir, Milk Ranch Conduit, Lower Bucks Lake Dam and Reservoir, Bucks Creek Powerhouse, Grizzly Forebay Dam and Reservoir, and Grizzly Forebay Tunnel.

Bucks Lake Dam and Reservoir

Bucks Lake Dam is a rock-filled, concrete-faced structure with a height of 123 feet and a length of 1,320 feet. The dam impounds Bucks Lake, which extends approximately 5 miles upstream from the dam. Total storage in the 1,827-acre reservoir is approximately 105,605 acre-feet at the normal maximum water surface elevation of approximately 5,157 feet. From Bucks Lake, water is released immediately downstream into a short reach of Bucks Creek before draining into Lower Bucks Lake.

There are seven project recreation sites located on project lands at Bucks Lake. Four of the sites are on NFS land and managed by the Forest Service: Mill Creek Campground (11 campsites and restrooms), Hutchins Group Campground (3 group campsites), Sandy Point Day Use Area (30 picnic sites, parking, boat launch, and restrooms), and Sundew Campground (23 campsites and restrooms). The remaining three sites are operated by the licensees: Haskins Valley Campground (65 campsites, concrete boat ramp, and restrooms), Indian Rock Day Use Area (two picnic units, parking, and restrooms), and West End Cove Day Use Area (three picnic units, parking, and restrooms).

Three Lakes Dam and Reservoir, and Milk Ranch Conduit

Three Lakes Dam is a rock-filled structure with a height of 30 feet and a length of 584 feet. The dam impounds the flow of Milk Ranch Creek, raising the level of Lower

Lake and Middle Lake, which combined with Upper Lake are collectively known as Three Lakes Reservoir.¹⁵ These water bodies are hydraulically linked and are approximately 0.75 mile from the dam. Total storage in the 40-acre reservoir is approximately 513 acre-feet at the normal maximum water surface elevation of approximately 6,074 feet.

Milk Ranch Conduit conveys flow from Three Lakes Reservoir and feeder diversions to Lower Bucks Lake. Feeder diversions contribute additional flow from several unnamed tributaries. The maximum capacity of the approximately 8-mile-long conduit is about 70 cubic feet per second (cfs).

There is one day use site at Three Lakes Dam within the project boundary and operated by the licensees. The day use area provides parking for approximately nine vehicles, access to approximately 1 mile of shoreline trail maintained by the licensees, and a Forest Service trail that provides access to the Pacific Crest Trail (PCT).

Lower Bucks Lake Dam and Reservoir

Lower Bucks Lake Dam is a concrete arch with a height of 99 feet and a length of 500 feet. The dam impounds Lower Bucks Lake, which extends approximately 1.1 miles from the dam. Total storage in the 136-acre reservoir is approximately 5,843 acre-feet at the normal maximum water surface elevation of approximately 5,022 feet. Water is conveyed from Lower Bucks Lake to the Grizzly Powerhouse by the Grizzly Powerhouse Tunnel, both of which are part of the Grizzly Development, described below.

There is one project recreation site within the project boundary at Lower Bucks Lake. The Forest Service operates and maintains the campground (seven campsites) and day use area (with restroom) adjacent to the shoreline. The day use area provides an unsurfaced access area for hand launching boats.

Grizzly Forebay Dam and Reservoir

The Grizzly Forebay Dam is a concrete arch 98 feet high and 520 feet long that impounds the Grizzly Forebay Reservoir that extends approximately 0.8 mile from the dam. Total storage in the 38-acre reservoir is approximately 1,112 acre-feet at the normal maximum water surface elevation of approximately 4,316 feet.

The licensees operate five project recreation sites at Grizzly Forebay. These sites are within the project boundary, on NFS land, and are operated and managed by PG&E. The sites include: Grizzly Forebay Campground (seven campsites and restrooms) and shoreline trail (0.77 mile), Grizzly Forebay Access (car-top boat launch, 12 parking spaces, and restrooms), Grizzly Forebay Trail (1.25 miles), Grizzly Forebay Gaging

¹⁵ Upper Lake is not influenced by Three Lakes Dam or project operation.

Station Trail (0.3 mile), and Grizzly Powerhouse Fishing Access (approximately 10 parking spaces).

Grizzly Forebay Tunnel

Flow is conveyed through the horseshoe-shaped Grizzly Forebay Tunnel to Bucks Creek Powerhouse. The tunnel is 9,575 feet long with two 4,786-foot-long penstocks leading to Bucks Creek Powerhouse. The maximum flow capacity is 400 cfs.

Bucks Creek Powerhouse

The Bucks Creek Powerhouse is a 47-foot-long by 132-foot-wide, steel-frame and reinforced concrete building. The powerhouse contains two double-overhung impulse turbines that each have a rated output of 40,000 horsepower (hp). In addition, the powerhouse includes two revolving field generators that have a total maximum capacity of 65 MW. The normal maximum gross head of Bucks Creek Powerhouse is 2,558 feet, generating an average annual 234.8 gigawatt hours (GWh) with an average capacity factor of 41.2 percent.

There are no project transmission lines at the Bucks Creek Powerhouse because it connects directly to an adjacent non-project switchyard that is part of the interconnected transmission system.

Bucks Creek powerhouse releases all flow to the NFFR, 1 mile upstream of Rock Creek Powerhouse, which is part of PG&E's Rock Creek-Cresta Hydroelectric Project (FERC Project No. 1962).

2.1.1.2 Grizzly Development

The Grizzly Development is located downstream of Lower Bucks Lake and upstream of the Bucks Creek Powerhouse. Completed in 1993, the Grizzly Development is composed of the Grizzly Powerhouse Tunnel and the Grizzly Powerhouse.¹⁶

Grizzly Powerhouse Tunnel

The 12,320-foot-long, 11- to 14-foot-diameter Grizzly Powerhouse Tunnel (including a 4,900-foot-long, 4.5- to 8-foot-diameter buried penstock leading to Grizzly Powerhouse) conveys the flow from Lower Bucks Lake to Grizzly Powerhouse. The maximum flow capacity is 400 cfs.

¹⁶ Prior to the construction of the Grizzly Powerhouse, the now operationally abandoned Lower Bucks Lake Tunnel conveyed water from Lower Bucks Lake into Grizzly Forebay along Grizzly Creek.

Grizzly Powerhouse

The Grizzly Powerhouse is a 65-foot-long by 55-foot-wide, steel-frame and concrete building that contains one vertical Francis turbine with a rated output of 19.7 MW and one synchronous generator with a maximum capacity of 19.8 MW. The normal maximum gross head of Grizzly Powerhouse is 719 feet with an average annual generation production of 48.9 GWh, for an average capacity factor of 28.2 percent. Grizzly Powerhouse discharges directly into the Grizzly Forebay.

A 4.2-mile-long, 115-kilovolt (kV) transmission line transmits power from Grizzly Powerhouse to PG&E's 115-kV Caribou-Sycamore Transmission Line, part of the interconnected system.

2.1.2 Project Safety

The project has been operating since 1990 under the existing license. During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the project has been inspected and evaluated every 5 years by an independent consultant, and consultant's safety reports have been submitted for Commission review. As part of the relicensing process, Commission staff evaluated the continued adequacy of the proposed project facilities should a new license be issued. Special articles may be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to assure adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance (O&M), and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The project is a peaking system normally operated remotely from PG&E's Rock Creek Powerhouse switching center. Powerhouse operations, minimum instream flows, and reservoir levels are monitored and controlled 24 hours a day, 7 days a week from the switching center. Roving operators inspect Bucks Creek and Grizzly Powerhouses regularly. If an alarm at a powerhouse or other project facility is received at the switching center, a roving operator is dispatched to investigate the cause of the alarm and to correct any problems that may exist. The licensees typically schedule planned maintenance of dams, powerhouses, and penstocks during low electric power demand periods.

Operation of the Bucks Lake and Grizzly developments, described above, are coordinated to optimize the use of water. Project operations are coordinated with the operations of PG&E's other three FERC-licensed hydropower projects in the NFFR watershed, two upstream and one downstream of the Bucks Creek Project. The most upstream project is the Upper North Fork Feather River Project (FERC Project No. 2015). The next project downstream is the Rock Creek-Cresta Project (FERC Project

No. 1962); and the most downstream project is the Poe Project (FERC Project No. 2107). These facilities modify the timing and magnitude of natural flows in the NFFR, upstream and downstream from the Bucks Creek Project and include five dams/reservoirs and seven powerhouses. Figure 2-1 is a schematic overview diagram of all four projects. The flow of water through the four projects is shown in figure 2-2.

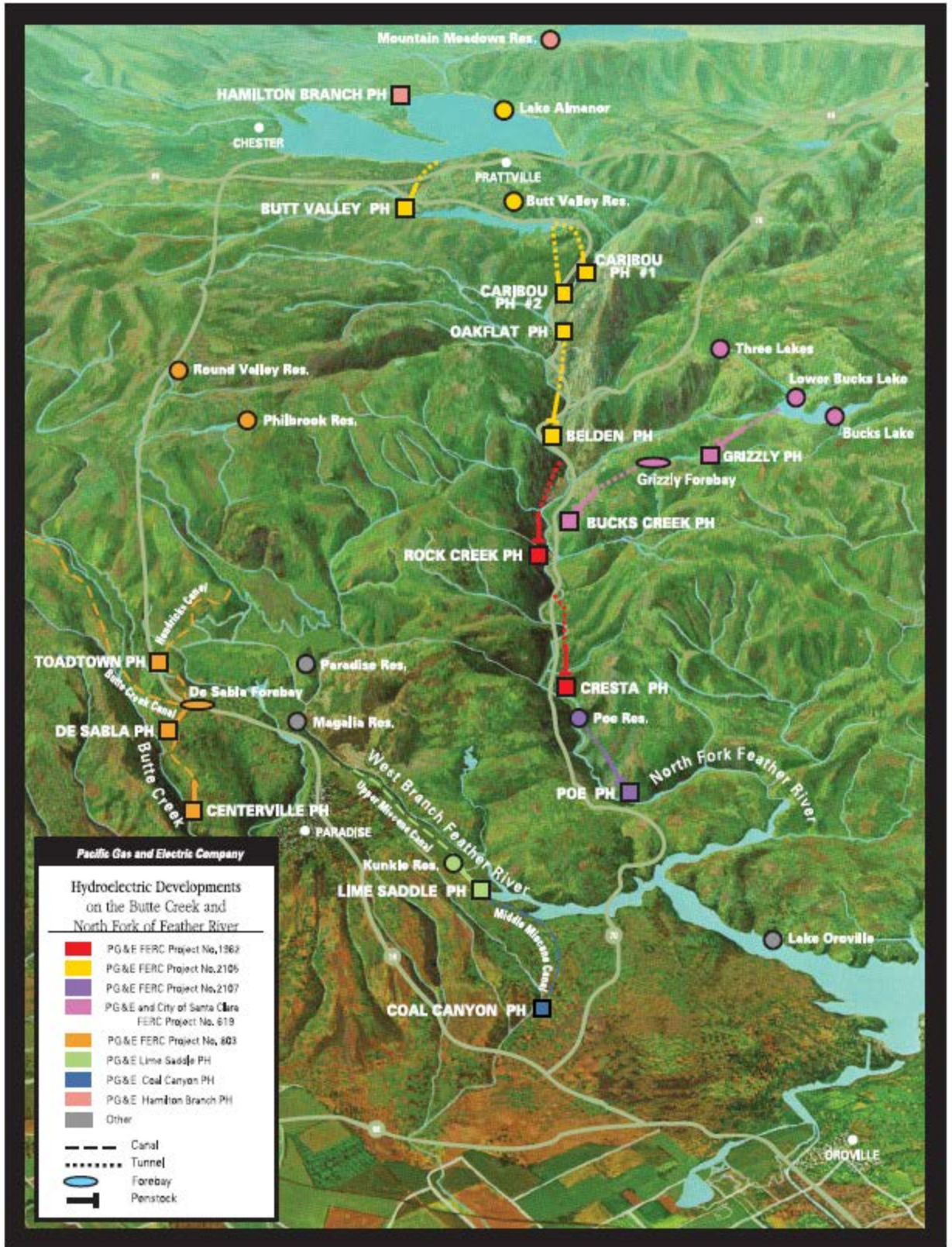


Figure 2-1. Schematic overview of Butte Creek and North Fork Feather River hydroelectric developments (Source: PG&E and City, 2013).

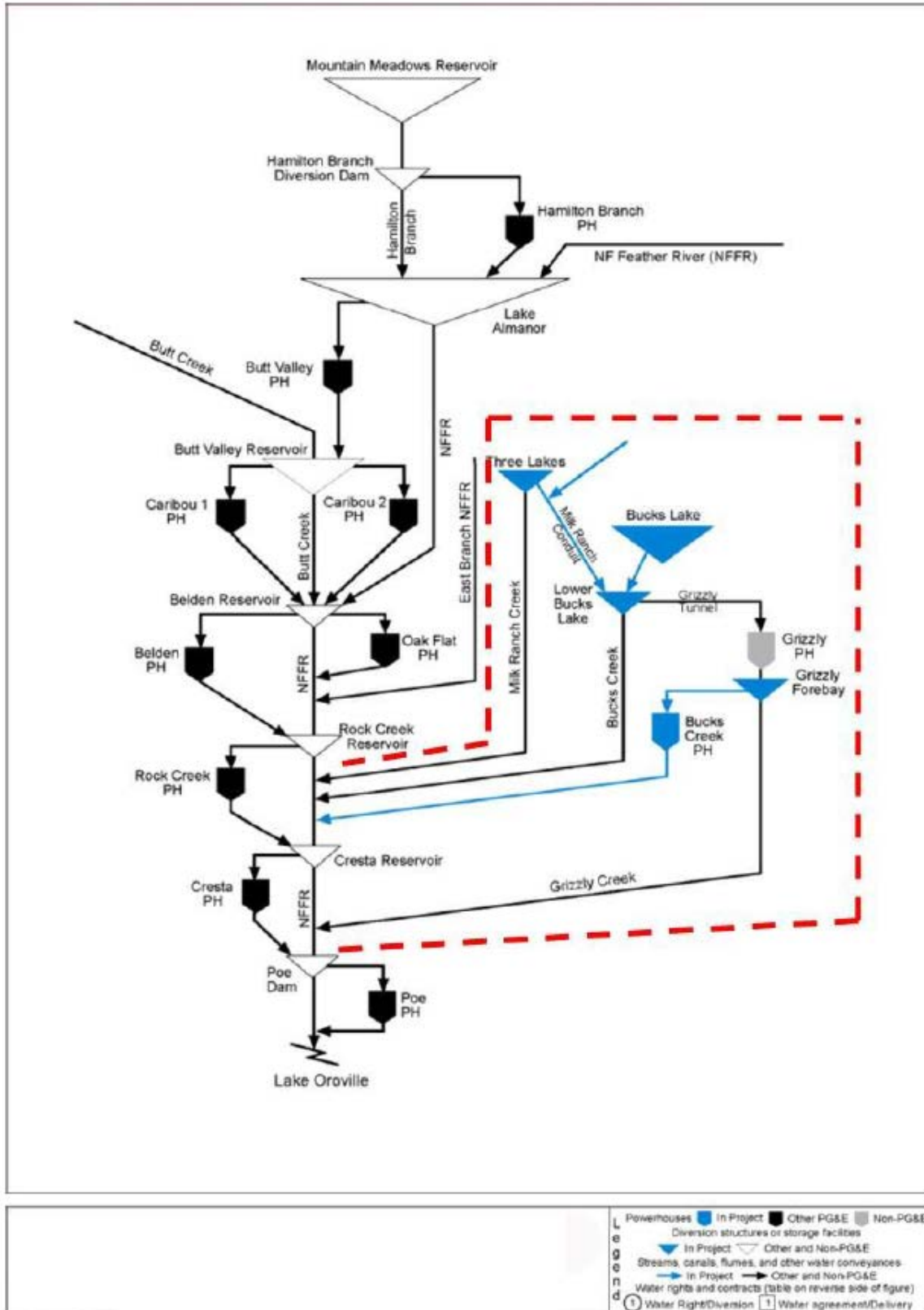


Figure 2-2. Schematic diagram of the flow of water with rights and contracts in the Bucks Creek Project (Source: FERC, 2014a).

The project reservoirs are also operated consistent with a Memorandum of Understanding (MOU) between the PNF and the licensees (PG&E, 1998). The MOU requires the following:

- A. Lower Bucks Lake shall not be drawn down below elevation 4,966 feet¹⁷.
- B. The lake levels of Lower and Middle Three Lakes shall be maintained as in the 10-year period of 1957 through 1967. Lower Three Lakes shall not be drawn down below elevation 6,050 feet and Middle Three Lakes shall not be drawn down below elevation 6,057 feet.
- C.1 Drawdown on Bucks Lake for a year other than a dry year during June 1 through September 1 shall not exceed 15 feet below the water surface elevation of June 1, and at no time shall the water surface elevation go below elevation 5,100 feet.
- C.2. Drawdown on Bucks Lake for a dry year shall not go below water surface elevation 5,080 feet and this level shall not be reached prior to September 1.
- D. Grizzly Forebay shall not be drawn down below elevation 4,303 feet.

Under the MOU, a dry year is defined as “any 12-month period beginning May 1 in which the natural runoff of the Feather River at Oroville for the April 1 to July 31 period, as forecast on April 1 by the California Department of Water Resources (DWR) and as may be adjusted by the State on May 1, will be 50 percent or less of the average for such period as computed by the State for the 50-year period in use at that time.” Departure from these reservoir operation criteria is permissible only when it is necessary to do maintenance on the respective dams or outlet works, when in the interest of public safety, or as may be otherwise authorized by FERC. All elevations are on Feather River Power Company datum. For example, Elevation 5,155.0 feet Feather River Power Company = 5,158.5 feet U.S. Geological Survey [USGS].

The licensees operate the Bucks Creek Powerhouse in a manner that reduces daily average water temperatures both in the lower Rock Creek Reach (between Bucks Creek and Rock Creek Powerhouses) and the Cresta Reach. Bucks Creek Powerhouse discharges to the NFFR approximately 1 mile upstream of Rock Creek Powerhouse and has significantly cooler water. This benefits the lower Rock Creek reach, which comprises about 12 percent of the total Rock Creek reach, as well as the Cresta Reach.

¹⁷ All elevations are on Feather River Power Company datum. For example, Elevation 5,155.0 feet Feather River Power Company = 5,158.5 feet U.S. Geological Survey [USGS]. Elevations in “PG&E (formerly, Feather River Power Company) Datum” are 3.5 feet lower than those expressed as “U.S. Geological Survey Datum.”

Bucks Creek Powerhouse has a normal maximum gross head of 2,558 feet, the highest hydraulic head in PG&E's hydropower system. Bucks Creek Powerhouse is equipped with automatic generation control capability so that the California Independent System Operator can control generation. The 65-MW Bucks Creek Powerhouse produces an average annual 234.8 GWh, with an average capacity factor of 41.2 percent.

The Grizzly Powerhouse head is 719 feet. Its 19.8-MW unit has an average annual production of 48.9 GWh, for an average capacity factor of 28.2 percent.

Under current practices, the valve at Three Lakes is closed in the late spring to allow it to fill throughout the summer. Beginning in late summer, the licensees typically release between 4 and 12 cfs from Three Lakes Dam, depending on the water year, until the lower lake is drawn down to minimum pool. There are no power generation facilities associated with Three Lakes; instead, the stored water is diverted from Milk Ranch Creek into Milk Ranch Conduit and conveyed to Lower Bucks Lake for generation at the Grizzly and Bucks Creek Powerhouses. The conduit also collects water from intermittent tributary streams within the Milk Ranch Creek and the Bucks Creek watersheds.

2.1.4 Existing Environmental Measures

The licensees operate the Bucks Creek project in accordance with environmental measures in the current license as discussed below.

Under Article 13, the licensees provide minimum instream flows in Bucks Creek and Grizzly Creek in accordance with the Amended License (FERC, 2006a) (table 2-1). Milk Ranch Creek and Bucks Creek below Bucks Lake have no minimum instream flow requirements.

In accordance with Article 13, annual channel maintenance spills at both Lower Bucks Lake Dam and Grizzly Forebay Dam are required in Wet and Above Normal water years¹⁸ (FERC, 2006b). Both annual spill (50 to 70 cfs for a minimum of 12 hours) and periodic (every 5 years) high spill (150 to 245 cfs for a minimum of 12 hours) events are required, should natural spill events of this magnitude not occur. At Grizzly Forebay Dam, annual spill requirements of 50 to 70 cfs for a minimum of 12 hours are required in Wet and Normal water years by License Article 13, should natural spill events of this magnitude not occur in the previous 18 months (FERC, 2006b). In addition, the licensees

¹⁸ Licensees shall determine water-year type for channel maintenance flow releases based on the predicted unimpaired inflow to Oroville and spring snowmelt runoff forecasts provided by licensees and California DWR each month from March through May. The water-year types are defined as follows: Wet: greater than or equal to 5,679 thousand acre-feet (TAF) inflow to Oroville; Normal: less than 5,679 TAF but greater than or equal to 3,228 TAF inflow to Oroville; Dry: less than 3,228 TAF but greater than or equal to 2,505 TAF inflow to Oroville; Critically Dry: less than 2,505 TAF inflow to Oroville.

conduct large wood management at project reservoirs. At Lower Bucks Lake Dam, spills occur infrequently and most of the flow immediately below the dam comes from minimum flows released through the dam’s low-level outlet. Due to the irregularity of spills at the dam, large wood that builds up on the spillway approach apron is mechanically removed and placed in the channel downstream of the dam. At Grizzly Forebay, the downstream end of the reservoir’s log boom remains attached to the right side of the spillway year-round. This allows large wood to freely pass over the spillway during spill events.

The licensees implement the Bald Eagle Management Plan (Article 103 in FERC’s Order Amending License for the Grizzly Powerhouse Development) to protect bald eagles from human disturbance and provide suitable habitat for future nesting opportunities in the vicinity of the project. The plan establishes nest management zones (NMZ) to protect nesting sites in the project area, which provide up to a one-half mile buffers around existing nests. Currently, there are two NMZs in the project vicinity, located at Bucks Lake and Grizzly Forebay. The plan requires the licensees to conduct annual productivity surveys of these nests. The plan also includes measures to avoid, protect, and minimize effects to bald eagles from project activities throughout the year. Within the NMZs, project activities are restricted during the limited operating period (LOP); for example, non-emergency maintenance activities must occur outside the LOP (PG&E, 2006c).

Table 2-1. Existing minimum instream flow requirements for Grizzly Creek and Bucks Creek as amended in 2006 (Source: PG&E and City, 2018a, as modified by staff).

Location¹	Period	Minimum Release
Bucks Creek below Lower Bucks Lake	Nov 1 – April 30	4 cfs
	May 1 – June 30 ²	8 cfs
	July 1 – Oct 31	6 cfs
Grizzly Creek below Grizzly Forebay Dam	Nov 1 – April 30	4 cfs
	May 1 – June 30 ²	8 cfs
	July 1 – Oct 31	6 cfs

¹ Milk Ranch Creek below Three Lakes and Bucks Creek below Bucks Lake Dam have no minimum instream flow requirement.

² Streamflow is subject to weather dependent access conditions (i.e., snow), as adjustments may need to be performed manually.

The licensees also implement protection measures for the willow flycatcher. The measures include developing a plan to protect willow flycatcher habitat within the FERC project boundary and monitor grazing effects to willow flycatcher habitat in Haskins

Valley (PG&E, 2002a and 2006a). Project land within Haskins Valley are routinely monitored for changes in grazing effects and related issues, such as noxious weed infestations.

The licensees implement a Quagga/Zebra Mussel Infestation Prevention Program in compliance with requirements of the California Fish and Game Code (AB2065) at all of its reservoirs and waterways to protect its assets and the ecological integrity of its reservoirs and waterways (PG&E, 2009). The program includes a vulnerability assessment of the lakes and reservoirs to determine the potential for infestation; a public education program to inform reservoir users of any infestation and measures to prevent it from spreading; monitoring for early detection of these mussels; and management of recreation, boating, and fishing activities, as needed.

PG&E employees are required to attend annual training that includes prevention of nonnative invasive plant (NNIP) transport (via vehicles), cleaning procedures for rental equipment, cleaning procedures when moving between watersheds, protection of special-status species occurrences, minimizing erosion, and controlling sediment best management practices (BMPs).

The licensees implement a Shoreline Management Plan (SMP), which addresses uses and occupancies on the Bucks Lake shoreline within the FERC project boundary and provides guidance for managing the shorelines on other project reservoirs (PG&E, 2007, reviewed 2014). The SMP requires a 25-foot horizontal setback from the ordinary high water mark for buildings and development, except docks and buoys. The plan also requires all private uses of the Bucks Lake shoreline (e.g., residences and their maintenance activities, private docks/buoys) to be permitted by the licensees and appropriate agencies and to follow guidelines specified in the plan. A revised SMP will be filed with the Commission by July 31, 2019, that will address all shorelines within the project boundary, and guide the use, occupancy, and management of shoreline resources.

National Forest System (NFS) roads that the licensees use to access the project are managed under the terms of a Road Maintenance Agreement (RMA) (Forest Service, 1988). For each RMA segment, the agreement identifies the road maintenance level, the licensees' and Forest Service road maintenance cost-sharing responsibilities, and which organization will perform road maintenance.

The licensees prepared a Visual Resources Plan (Revision 2) (PG&E, 1991a) for the Grizzly Development in consultation with and approved by the Forest Service. The plan included mitigation measures to minimize aesthetic effects of the Grizzly Development and specific existing project features intended to meet the Forest Service's Visual Quality Objectives (VQOs) to the extent practicable. The licensees implemented the measures for the Grizzly Development.

2.2 APPLICANTS' PROPOSAL

The licensees do not propose any activities that would involve major construction or changes in power generation facilities. The licensees propose modifications to the

Bucks Lake Dam flow release structure, recreation facilities, and the project boundary. Changes are listed below.

2.2.1 Proposed Facility Modifications

- At Bucks Lake Dam, install a Howell-Bunger valve at the end of the existing low-level outlet at the base of the dam to release the minimum flows into Bucks Creek.
- Implement the Recreation Management Plan, which includes the following facility modifications and new recreation facilities:
 - Bucks Lake Inlet Parking: Replace existing signage and add signage directing users how to park to maximize the capacity of the existing space.
 - Grizzly Forebay Campground: Replace site amenities and reduce vegetation fuel loading.
 - Grizzly Forebay Recreation Area and Gaging Station Trail: Construct one to two accessible parking spaces, install signage, and replace restroom in the recreation area. Maintain and improve trail for users.
 - Haskins Valley Boat Launch: Reconstruct boat ramp to comply with current California Department of Boating and Waterway standards for a single lane ramp.
 - Haskins Valley Campground: Reconstruct campground, including the water system, convert five existing campsites to an amphitheater for interpretive and educational programs, construct five additional single-family campsites and vault restroom, and provide one electrical hookup at each of about 20 campsites.
 - Hutchins Group Campground: Reconstruct group campground including the water system and amphitheater. Expand areas for parking, increase overnight capacity where conditions allow. Perform trail maintenance and install signage on the trail between Hutchins Campground and Lower Bucks Lake.
 - Indian Rock Day Use Area: Reconstruct day use area (replace picnic tables and restroom) and formalize trails.
 - Lower Bucks Lake Campground: Relocate the existing campsites above the road and away from the shoreline. Construct 15 family campsites, and one host site. Provide site markers, tables, tent pads, fire rings, and wildlife-resistant food storage, potable water supply, and restrooms. Install electrical hookup at three to four sites. Treat vegetation to reduce fuel loading within and immediately adjacent to the campground. Eliminate overnight use at existing campsite numbers 1 and 2 and restore sites. Convert existing campsite numbers 3 and 4 to two or three family

campsites. Convert existing campsite numbers 5 and 6 to a day use area (with seven picnic sites, parking for seven vehicles, and shoreline access for hand launching watercraft). Convert existing campsite number 7 to a multi-family campsite. Install three vault restrooms along Forest Road 24N24 to serve the day use area and the two multi-family campsites.

- Lower Bucks Lake Day Use Area: Replace the vault toilet. Construct a paved parking area with barriers to prevent vehicle access to the shoreline. Construct seven picnic sites with tables and fire grills. Construct a surfaced boat launch for launching car top and small trailered watercraft. Install site signage and information boards.
- Mill Creek Campground: Reconfigure existing campground layout and provide additional overnight capacity. Reconstruct the water system and replace site amenities. Perform trail maintenance and install signage on the trail between the campground and the non-project Mill Creek Trail.
- Sandy Point Day Use Area and Boat Launch: Replace site amenities and reconstruct the water system. Construct a double-lane boat launch with courtesy dock. Install signage in conjunction with the construction of the new Bucks Lake Shoreline Trail.
- Sundew Campground: Reconfigure the existing campground layout and provide up to two additional multi-family campsites. Replace site amenities and reconstruct the water system. Install signage in conjunction with construction of the new Bucks Lake Shoreline Trail.
- West End Cove Day Use Area: Replace amenities, construct a shoreline access trail and fishing pier, and construct six additional paved parking spaces.
- Bucks Lake Boat-In Campground: Construct up to five family campsites with site markers, tables, tent pads, fire rings, wildlife-resistant food storage, and one vault toilet within the existing footprint of site number 1. Formalize and harden access to routes connecting the shoreline, campsites, and other campground amenities. Install entrance sign and information boards. Concurrent with campground development, remove all amenities from existing site numbers 2 and 3 and restore the sites to discourage overnight use. The Forest Service will retain management of existing sites 4 and 5.
- Bucks Lake Shoreline Trail: Construct a new trail between Sundew and Mill Creek Campgrounds to accommodate pedestrian and bicycle use. Include a parking area near the entrance to Sundew Campground.

2.2.2 Proposed Project Boundary Changes

The licensees propose to modify the FERC project boundary in select areas to include existing facilities and roads necessary for project operations and maintenance, and to exclude excess land and roads currently within the FERC project boundary that are not required for project purposes.

The proposed project boundary modifications would reduce the amount of federal land by 223.5 acres, resulting in a total of 1,316 acres of federal land within the project boundary. The proposed modifications are shown in Exhibit G of the Final License Application (PG&E and City, 2016a), and are described in table 2-2.

Table 2-2. Licensees' proposed additions and removals from the project boundary (Source: staff).

Additions to the Project Boundary	Removals from the Project Boundary
Three Lakes Area	
<ul style="list-style-type: none"> • Include the Three Lakes Trail, near the Upper Lake of Three Lakes, with a 12.5-foot buffer on each side of the centerline of the trail. • Include the entire helipad use area at the Milk Ranch Conduit Road helipad, including the maintenance buffer and access road. 	<ul style="list-style-type: none"> • Remove the Upper Lake from the project boundary at Three Lakes. • Remove land on the north side of the Three Lakes Trail beyond the 12.5-foot buffer from the centerline of the trail at Lower and Middle Lakes at Three Lakes.
Grizzly Forebay Area	
<ul style="list-style-type: none"> • Include the staging area at the intersection of Bucks Penstock Road and Grizzly Big Creek Road • Include the entire helipad use area, maintenance buffer, and access at the Bucks Communication Tower helipad. • Include the Grizzly Forebay Gaging Station Trail with a 12.5-foot buffer on each side of the centerline of the trail. • Include all campground facilities at Grizzly Forebay Campground. 	<ul style="list-style-type: none"> • Remove land along the south shoreline of Grizzly Forebay beyond a 25-foot horizontal buffer from the maximum water surface elevation.

Additions to the Project Boundary**Removals from the Project Boundary**

Lower Bucks Lake Area

- Include land along the south shoreline of Lower Bucks Lake to create a 25-foot horizontal buffer from the maximum water surface elevation where the existing project boundary is less than a 25-foot horizontal buffer from the maximum water surface elevation.
- Remove land along the south shoreline of Lower Bucks Lake beyond a 25-foot horizontal buffer from the maximum water surface elevation.
- Remove land along the north shoreline of Lower Bucks Lake beyond a 40-foot buffer north of the Three Lakes Road, with the exception of the area for the future relocation of the Lower Bucks Lake Campground.

Buck Lakes Area

- Include the existing water system infrastructure at Mill Creek Campground.
 - Include the Mill Creek Tie Trail at Mill Creek Campground with a 12.5-foot buffer on each side of the centerline of the trail.
 - Include the Hutchins Group Campground Trail with a 12.5-foot buffer on each side of the centerline of the trail.
 - Include access roads at all project recreation facilities (Mill Creek Campground, Hutchins Group Campground, Sandy Point Day Use Area, Haskins Valley Campground, Sundew Campground, Indian Rock Day Use Area, West End Cove Day Use Area, Lower Bucks Campground, Three Lakes Trailhead Parking Lot, and the Grizzly Forebay Recreation Area parking lot).
 - Include all campground facilities along the east edge of the Haskins
 - Remove land west of Bucklin Road along the west shore of Bucks Lake between Indian Rock Day Use Area and the Dam Spillway Access Road.
 - Remove Bucklin Road from the project boundary on the west side of Bucks Lake.
 - Remove land along the shoreline at Bucks Lake for areas outside of the existing project facilities and recreation areas beyond a 25-foot horizontal buffer from the maximum water surface elevation.
 - Remove the Whitehorse Campground expansion area and the eastern Bucks Inlet expansion area from the project boundary.
 - Remove land around the Bucks Lake Dam Water Supply Line and Diversion on the west side of Bucks Lake.
-

Additions to the Project Boundary	Removals from the Project Boundary
<p>Valley Campground, extending the project boundary eastward to the edge of Bucklin Road.</p> <ul style="list-style-type: none"> • Include land along the shoreline at Bucks Lake for areas outside of the existing project facilities and recreation areas to create a 25-foot horizontal buffer from the maximum water surface elevation where the existing project boundary is less than a 25-foot horizontal buffer from the maximum water surface elevation. • Include land at Bucks Creek Inlet for roadside parking for shoreline access. 	

2.2.3 Proposed Project Operation

The project would continue to be operated in the same manner as it has since the construction of the Grizzly Powerhouse project facilities, except for the changes associated with the licensees' proposed environmental measures listed below. Each includes a reference to a more detailed description of the measure (e.g., GEN-1) that can be found in the licensees' supplement to the final license application (PG&E and City, 2018a).

- Provide higher minimum instream flows, by water year type and month, to Bucks Creek below Lower Bucks Lake Dam and Grizzly Creek below Grizzly Forebay. Provide minimum instream flows where none are required under the existing license, by water year type and month, in the following reaches: Bucks Creek below Bucks Lake Dam, Milk Ranch Creek downstream of Three Lakes, Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1, and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 (WR-1) (table 2-3).
- Cease diverting flows from Bear Ravine into Milk Ranch Conduit at Milk Ranch Conduit Diversion No. 8, thereby allowing the unimpaired flow in Bear Ravine to continue downstream of the diversion (WR-2).
- Adjust the timing of the annual drawdown of Three Lakes to begin around August 15 or later, depending upon the elevation of Lower Three Lakes, with the objective of reaching minimum pool at Lower Three Lakes by September 15 at a release of 9 cfs (WR-3).

- Continue to provide channel maintenance flows in Bucks Creek below Lower Bucks Lake and in Grizzly Creek below Grizzly Forebay. In Normal and Wet water years, if a High Spill (200-300 cfs magnitude flow for at least 18 hours) has not occurred during the previous 5 years in Bucks Creek below Lower Bucks Lake Dam, the licensees would make a good faith effort to schedule a High Spill event of 200-300 cfs. If, prior to March 31 of each year, a spill of at least 50 cfs for at least 18 hours duration has not occurred in the last 18 months in Grizzly Creek below Grizzly Forebay Dam, the licensees would provide minimum streamflows of 50 to 70 cfs for at least 18 hours prior to April 15 of that year (WR-4).
- Continue to maintain minimum reservoir elevations as described in measure WR-5. Lower Bucks Lake would not be drawn down below elevation 4,966 feet, Lower and Middle Three Lakes would not be drawn down below elevation 6,050 feet, Bucks Lake would not be drawn down below elevation 5,080 feet (depending on water year type)¹⁹, and Grizzly Forebay would not be drawn down below elevation 4,303 feet.
- Gradually ramp down the spill by changing unit loads at Bucks Creek Powerhouse and/or Grizzly Powerhouse when managed spill occurs at Grizzly Forebay Dam or Lower Bucks Lake Dam (WR-6).
- Classify four water-year types: Wet, Normal, Dry, and Critically Dry for alignment with the Rock Creek-Cresta (FERC No. 1962) and Poe (FERC No. 2107) projects (WR-7), as needed to guide operational activities.
- Leave the six inoperable diversions along Milk Ranch Conduit (FERC Diversion Nos. 1, 4, 5, 6, 7, and 8) and their ancillary features in an inoperable condition (i.e., no longer able to divert flows). Leave any remaining diversion structures in place and manage them for safety and aesthetics in consultation with the Forest Service and other interested relicensing participants within 6 months of license issuance (WR-8).
- Temporarily close (i.e., bypass) Milk Ranch Conduit Diversion Nos. 1 and 2 (FERC Diversion No. Milk Ranch Creek and 15) during Wet water years, from April 1, or as soon as reasonably accessible, through August 15, or when the licensees initiate the annual Three Lakes drawdown (WR-9).

¹⁹ Drawdown in other than a Dry or Critically Dry water year during June 1 through September 1 would not exceed 15 feet below the water surface elevation of June 1, and at no time would the water surface elevation go below elevation 5,100 feet. Drawdown for a Dry or Critically Dry water year would not go below water surface elevation 5,080 feet and this level would not be reached prior to September 1.

- Continue to divert seasonal flow at eight diversions located along Milk Ranch Conduit (renumbered consecutively in the downstream direction beginning with the intake at Milk Ranch Creek²⁰) (WR-8). Refer to table 2-4 and figure 2-3 for a summary and location of the diversions.

²⁰ Unless specifically identified by a FERC Diversion Number, all references to diversion numbers refer to the licensees' proposed renumbering identified in table 2-4.

Table 2-3. Proposed Bucks Creek Project instream flows (cfs), by water year (WY) type (Source: PG&E and City, 2018a, as modified by staff).

WY Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Bucks Creek Below Bucks Lake (manual measurement)												
Project ID (Bucks2)												
All Water	3	3	3	3	3	3	3	3	3	3	3	3
Year Types												
Bucks Creek below Lower Bucks Lake (continuous measurement)												
Project ID (NF82)/USGS No. (11403530)												
Critically Dry	6	4	4	4	6	7	7	7	6	6	6	6
Dry	6	5	5	5	6	8	8	8	8	6	6	6
Normal	6	6	6	6	8	12	12	12	9	8	8	7
Wet	8	8	8	8	10	15	15	15	11	10	8	8
Grizzly Creek below Grizzly Forebay (continuous measurement)												
Project ID (NF222)/USGS No. (11404300)												
Critically Dry	6	4	4	4	4	6	6	6	6	6	6	6
Dry	6	6	6	6	6	8	8	8	8	8	8	6
Normal	8	8	8	8	8	10	10	10	9	9	9	8
Wet	9	9	9	9	10	13	13	13	11	10	10	9
Milk Ranch Creek below Three Lakes (manual measurement)												
Project ID (MR2)												
Critically Dry	0.25	WS	WS	WS	WS	WS	0.25 ¹	0.25	0.25	0.25	0.25	0.25
Dry	0.5	WS	WS	WS	WS	WS	0.5 ¹	0.5	0.5	0.5	0.5	0.5

WY Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Normal	1	WS	WS	WS	WS	WS	1 ¹	1	1	1	1	1
Wet	2	WS	WS	WS	WS	WS	2 ¹	2	2	2	2	2

Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1 (manual measurement)

Project ID (MRC1)

Critically Dry	0.25	0.25 ²	0.25 ²	0.25 ²	0.25 ²	0.25 ²	0.25 ¹	0.25	0.25	0.25	0.25	0.25
Dry	0.5	0.25 ²	0.25 ²	0.25 ²	0.25 ²	0.25 ²	0.5 ¹	0.5	0.5	0.5	0.5	0.5
Normal	1	0.25 ²	0.25 ²	0.25 ²	0.25 ²	0.25 ²	1 ¹	1	1	1	1	1
Wet	2	0.25 ²	0.25 ²	0.25 ²	0.25 ²	0.25 ²	2 ^{1,3}	2 ¹	2 ¹	2 ¹	2 ¹	2

South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 (manual measurement)

Project ID (MRC2)

All Water	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴	0.5 ⁴
Year Types												

WS: “Winter Setting” where the low-level outlet valve is fully open and the natural inflow equals the outflow of the reservoir. The licensees may open the outlet to the WS prior to November 1 if weather is predicted that may restrict safe access to the valve house.

- ¹ The licensees would adjust the valve within two business days, or as soon thereafter as accessible, following the publication of California DWR water year forecast of unimpaired runoff in the Feather River at Oroville as set forth in California DWR’s Bulletin 120.
- ² 0.25 cfs or natural inflow, whichever is less. Licensees may set the outlet to 0.25 cfs prior to November if weather is predicted that may restrict safe access to the diversions.
- ³ Bypass flows from within two days of the April publication of California DWR’s Bulletin 120 forecast through August 15, if conditions are met, in accordance with the Wet Water Year Milk Ranch Conduit Diversion Nos. 1 and 2 Bypass Flow PM&E Measure (WR-9).
- ⁴ 0.5 cfs or natural inflow, whichever is less.

Table 2-4. Summary of Milk Ranch Conduit diversions and proposed actions (Source: PG&E and City, 2018a, as modified by staff).

FERC Diversion No.	Proposed Diversion No.	Drainage Name	Proposed Action
Milk Ranch Creek	1/Intake	Milk Ranch Creek	Active Diversion ¹
15	2	North Fork Grouse Hollow Creek	Active Diversion
14	3	South Fork Grouse Hollow Creek	Active Diversion
13; 12	4	Unnamed Drainage	Active Diversion
11	5	Unnamed Drainage	Active Diversion
10	6	Bear Trap Creek	Active Diversion
9	7	Slide Ravine	Active Diversion
8	-	Unnamed Drainage	Not Operated ²
7	-	Unnamed Drainage	Not Operated
6	-	Unnamed Drainage	Not Operated
5	-	Unnamed Drainage	Not Operated
4	-	Unnamed Drainage	Not Operated
3	8	Bear Ravine	Actively Maintained, but Not Operated ³
2	9	Unnamed Drainage	Active Diversion
1	-	Unnamed Drainage	Not Operated

¹ Diversion would continue to be operated and maintained.

² Diversion no longer would be operated or maintained.

³ Although actively maintained as part of the FERC project, the licensees would stop diverting flows from Bear Ravine into Milk Ranch Conduit at Milk Ranch Conduit Diversion No. 8, per the requirements of measure WR-2, Full Natural Flow in Bear Ravine at Milk Ranch Conduit Diversion No. 8.

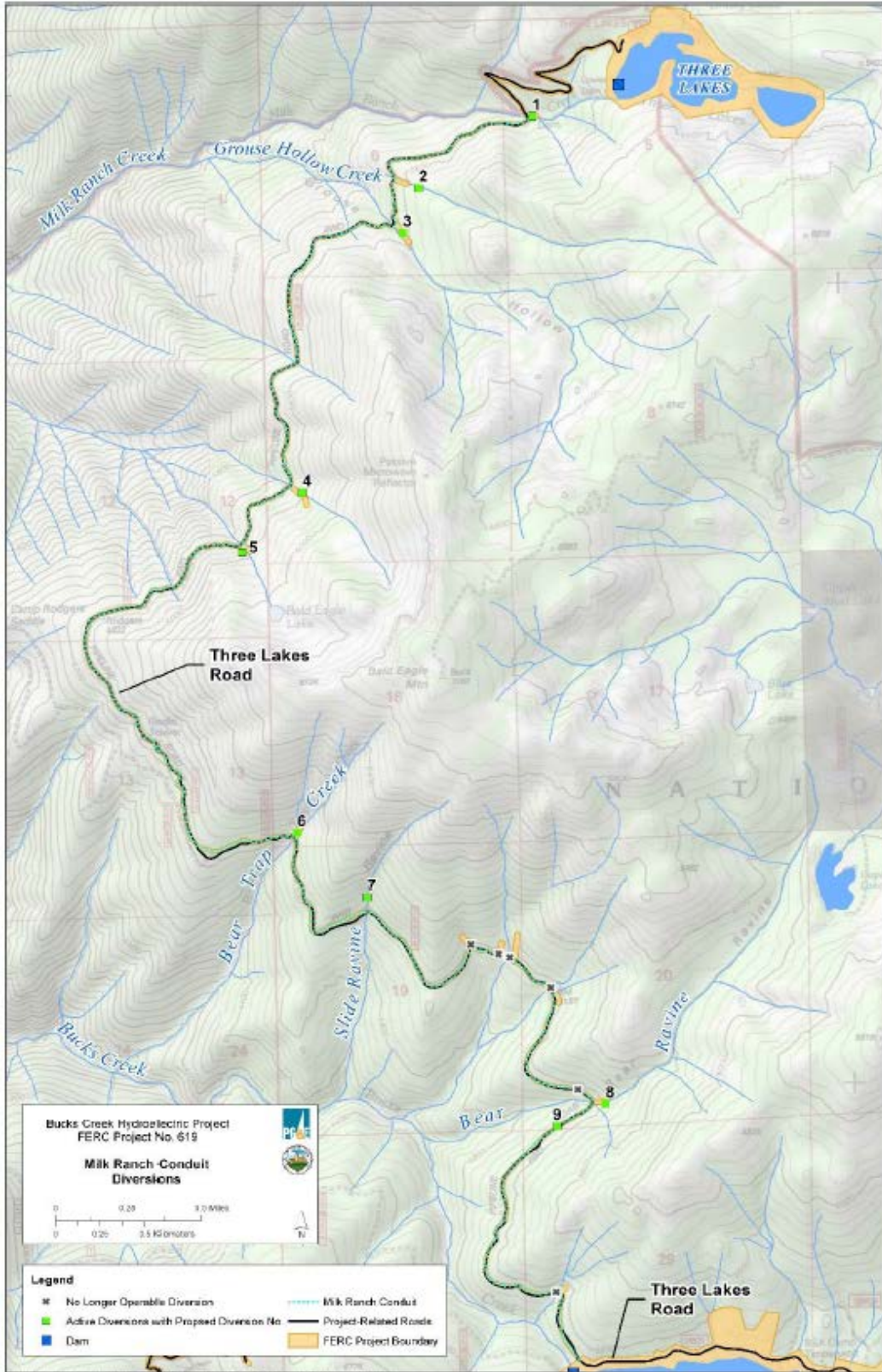


Figure 2-3. Proposed Milk Ranch Conduit diversions (Source: PG&E and City, 2018a).

2.2.4 Proposed Environmental Measures

The licensees propose the following environmental measures:

General Measures

- Provide annual employee training related to special-status species, non-native invasive plants (NNIPs), cultural resources, and reporting procedures (GEN-1).
- Consult annually with the Forest Service and other interested agencies regarding license implementation, resource monitoring results, non-routine maintenance, and overall coordination of activities occurring on NFS land (GEN-2).
- Establish an Ecological Consultation Group to annually consult on the implementation of resource management plans and other applicable license conditions (GEN-3).

Geology and Soils

- Implement the Erosion Management Plan (LU-6) (filed as appendix E-2 of the license application) to minimize future erosion and sedimentation as a result of ground-disturbing activities from routine O&M, any emergency actions, and planned projects within the project boundary.

Aquatic Resources

- Allow large woody material to naturally pass over Grizzly Forebay Dam and Lower Bucks Lake Dam during spill events to improve aquatic habitat downstream. Wood at Bucks Lake Spillway would be manually relocated to the Lower Bucks Lake Spillway to protect a road crossing over the spillway (GS-1).
- Implement the Gravel Augmentation Plan (GS-2) (filed as appendix E-2 of the license application) to improve trout spawning habitat and populations downstream of Lower Bucks Dam and Grizzly Forebay Dam.
- Provide higher minimum instream flows, by water year type and month, to Bucks Creek below Lower Bucks Lake Dam (ranging from 4 to 15 cfs), and Grizzly Creek below Grizzly Forebay (ranging from 4 to 13 cfs). Provide minimum instream flows where none are required under the existing license, by water year type and month, in the following reaches: Bucks Creek below Bucks Lake Dam (3 cfs in all months regardless of water year type), Milk Ranch Creek downstream of Three Lakes (ranging from 0.25 cfs to the unimpaired outflow of the reservoir), Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1 (ranging from 0.25 cfs or the natural inflow, whichever is less, to 2 cfs), and South Fork Grouse Hollow Creek at Milk

Ranch Conduit Diversion No. 3 (0.5 cfs or natural inflow, whichever is less) (WR-1).

- Initiate draw down of Three Lakes annually by between August 15 and September 15 to protect aquatic habitat (WR-3).
- Provide channel maintenance flows of increased duration and magnitude to Bucks Creek below Lower Bucks Lake Dam and Grizzly Creek below Grizzly Forebay Dam to protect and enhance riparian and instream habitat (WR-4).
- Manage reservoir operations to maintain the following existing minimum pool elevations to protect and enhance aquatic habitat and recreation resources: 4,966 feet at Lower Bucks Lake; 6,050 feet at Lower Lake; 6,057 feet at Middle Lake; 4,303 at Grizzly Forebay; in a Dry or Critically Dry water year type, 5,080 feet at Bucks Lake; and in a Wet or Normal water year type, 5,100 feet at Bucks Lake, and not exceed 15 feet below the water surface elevation of June 1 between June 1 and September 1 (WR-5).
- Gradually decrease powerhouse load changes during managed spills and schedule no outages longer than 2 weeks at Bucks and Grizzly Powerhouses during April through July to reduce potential effects of flow fluctuations on fisheries and breeding and rearing foothill yellow-legged frogs (FYLF) (WR-6).
- Determine water-year type annually, to be used for the implementation of instream flows (WR-1), channel maintenance flows (WR-4), project reservoir operations (WR-5), and Milk Ranch Conduit bypass flows in Wet water years (WR-9), based on the California DWR forecast to be consistent with other NFFR watershed hydroelectric projects and simplify compliance and operational consistency for instream flows (WR-7).
- Leave six inoperable diversions along Milk Ranch Conduit in place to maintain current channel and riparian conditions (WR-8).
- Allow unimpaired flow at two Milk Ranch Conduit diversions, Milk Ranch Creek (Diversion No. 1) and North Fork Grouse Hollow Creek (Diversion No. 2), during Wet water years rather than seasonally diverting flows into the conduit to enhance seasonal aquatic habitat and year-round riparian resources (WR-9).
- Implement the Streamflow and Reservoir Level Gaging Plan (WR-10) (filed as appendix E-2 of the license application) to document compliance with streamflow and reservoir level requirements.
- Implement the Hazardous Materials Management Plan (LU-5) (filed as appendix E-2 of the final license application), which includes standard practices regarding the storage, use, transport, and disposal of hazardous materials to protect water quality.

- Fund fish stocking by California DFW in Bucks Lake, Grizzly Forebay, and Middle and Lower Lakes in each year stocking occurs (AR-1) to improve the recreational fishery.
- Implement the Aquatic Resources Monitoring Plan (AR-2) (filed as appendix E-2 of the license application) that includes measures to monitor stream fish populations in Milk Ranch, Bucks, and Grizzly Creeks downstream of Project dams; brook trout in Three Lakes; benthic macroinvertebrates and FYLF in project-affected reaches of Bucks, Grizzly, and Milk Ranch Creeks; water temperature in lower portions of Milk Ranch Creek, Bucks Creek, and Grizzly Creek, upstream of the NFFR; water quality in recreational areas of Bucks Lake, Lower Bucks Lake, Grizzly Forebay, and Three Lakes and Bucks Creek downstream of Lower Bucks Lake; and stream channel morphology, large woody material and riparian vegetation in Bucks and Grizzly Creeks below Lower Bucks Lake Dam and Grizzly Dam, respectively, to document any long-term changes in resource conditions in order to facilitate resource management.
- Develop an aquatic invasive species (AIS) management plan to prevent the introduction and spread of AIS on project land (AR-4).

Terrestrial Resources

- Implement the Integrated Vegetation Management Plan (TR-1) (as filed as appendix E-2 of the final license application) that includes measures to protect special-status plant populations and natural communities on project land.
- Implement the Bald Eagle Management Plan (TR-2) (as filed as appendix E-2 of the final license application) to protect eagles from disturbance.
- Implement a limited operating period during the osprey breeding season (March 15 to August 31). During this period, protective buffers would be established around active osprey nests when conducting potentially disruptive project maintenance activities on project land to protect nesting birds from disturbance (TR-3).
- Implement limited operating periods during California spotted owl and northern goshawk breeding seasons (March 1 through August 31 and February 15 through August 31, respectively). During this period, 0.25-mile protective buffers would be established around active nests when conducting potentially disruptive project maintenance activities to protect nesting birds from disturbance (TR-4).
- Evaluate, and upgrade if necessary, the project transmission line for consistency with Avian Powerline Interaction Committee (APLIC) standards and implement other raptor protection measures. Throughout the term of a new license, ensure all newly installed power lines, poles, conductors and other

transmission infrastructure conform to current guidelines to minimize or avoid electrocution and collision hazards (TR-5).

- Conduct nesting surveys on project land for California spotted owls and northern goshawks during the first year following license issuance, then every 7 years thereafter, and establish buffers in which no work would occur around active nests to protect nesting birds from disturbance (TR-6).
- Limit O&M activities on project land during willow flycatcher breeding season within buffer zone around suitable habitat to protect nesting birds from disturbance (TR-7).
- Consult with a bat biologist prior to significant project facility modifications and project-related vegetation management activities to protect maternity colonies composed of approximately 50 bats or more and colonies of any size if composed of special-status bats (TR-8).
- Inspect project tunnels for bats prior to conducting O&M activities in the winter and implement appropriate protective measures or a limited operating period to protect hibernacula supporting special-status bat species or approximately 50 or more non-special-status bats (TR-9).
- Consult with a bat biologist prior to any loud/vibration activities along Three Lakes Road or Three Lakes Dam to protect special-status bat species during the maternity season (TR-10).

Threatened and Endangered Species

- Provide unimpaired flows to Bear Ravine at Milk Ranch Conduit Diversion No. 8 to protect the federally endangered SNYLF and its critical habitat (WR-2).
- Implement the SNYLF Management Plan (AR-3) (filed as appendix E-2 of the final license application) that includes measures to protect SNYLF and their suitable habitat during project-related O&M activities in areas above 4,500 feet.

Recreation Resources

- Revise the Recreation Management Plan (filed as appendix E-2 of the license application [RR-1]) to reflect the agreement between the licensees and the Forest Service (filed May 14, 2019) that includes measures to address existing and future recreation resource needs within the project boundary.

Land Use and Aesthetics

- Implement the Transportation Management Plan (LU-1) (filed as appendix E-2 of the license application) that provides guidance for the rehabilitation and maintenance of project roads.
- Implement the Fire Prevention and Response Plan (LU-2) (filed as appendix E-2 of the license application) that includes procedures for fire prevention, reporting, and safe fire practices for project facilities.
- Implement a revised SMP (LU-3) (to be filed with the Commission by July 31, 2019) that would address all shorelines within the project boundary, and guide the use, occupancy, and management of shoreline resources.
- Consult with the Forest Service prior to painting the exterior of a project facilities on NFS land to select a suitable paint color that minimizes the contrast between facilities and their surrounding landscape (LU-4).

Cultural Resources

- Implement an HPMP (CU-1) (to be filed in 2019) to protect and preserve historic properties identified in the project area, as well as ongoing inventory and evaluation of cultural resources in the project area.

2.2.5 Modifications to Applicants' Proposal—Mandatory Conditions

The following mandatory conditions have been provided and are evaluated as part of the licensees' proposal.

Section 4(e) Land Management Conditions

The Forest Service filed 61 preliminary terms and conditions under section 4(e). We consider preliminary conditions 1, 3 through 20, and 22 through 26 to be administrative; therefore, they are not analyzed in this EIS. The remaining 37 conditions are resource-specific and are analyzed in this EIS (appendix B).

- Condition 2: Establish an Ecological Consultation Group and host annual meetings to discuss the licensees' compliance with license conditions and implemented measures that have implications for ecological resources.
- Condition 21: Implement the Hazardous Materials Management Plan for locations on, or directly affecting, NFS land.
- Condition 27: Provide annual employee environmental awareness training for hydropower O&M staff.
- Condition 28: Prepare a biological evaluation prior to taking any action to construct new project features on NFS land that may affect Forest Service special-status species or their critical habitat.

- Condition 29: Annually review special-status species lists and assess, in consultation with the Forest Service, potential for project-related effects on newly listed species or special-status species detected during project construction, operation, or maintenance.
- Condition 30: Determine the water type year for minimum streamflow compliance based on the California DWR (Bulletin 120) Forecast of Total Unimpaired Runoff in the Feather River at Oroville for the water year.
- Condition 31: Meet the minimum streamflows in specified reaches by month and water year type, as shown in table 2-3.
- Condition 32: Cease diverting flows from Bear Ravine into Milk Ranch Conduit at Milk Ranch Conduit Diversion No. 8, thus allowing for the unimpaired flow in Bear Ravine.
- Condition 33: Temporarily close two of the Milk Ranch Conduit Diversions if the year is a Wet water year (as defined in condition 30, Annual Determination of Water Year Type).
- Condition 34: Implement channel maintenance flows in Wet and Normal water years (as defined in condition 30) at Bucks Creek below Lower Bucks Lake and Grizzly Creek below Grizzly Forebay.
- Condition 35: Manage spill at Grizzly Forebay and Lower Bucks Lake, coordinate managed spills with the Rock Creek-Cresta Project, and manage spill to protect the FYLF population in the Cresta Reach.
- Condition 36: Operate the project reservoirs so that Lower Bucks Lake is not drawn down below 4,966 feet, Lower Three Lakes is not drawn down below 6,050 feet, Middle Three Lakes is not drawn down below 6,057 feet, Grizzly Forebay is not drawn down below 4,303 feet, and Bucks Lake is operated based on a month and water year type.
- Condition 37: Draw down the elevation of Lower Three Lakes to reach minimum pool by September 15 at a release of 9 cfs if the water surface elevation is at or below 6,072 feet; if above this level, initiate drawdown on or about August 15, and set the low-level outlet valve to release 9 cfs.
- Condition 38: Manage diversions along Milk Ranch Conduit for safety and aesthetics. Six diversion structures would be left inoperable (i.e., no longer diverting flows) and would be managed for safety and aesthetics by the licensees.
- Condition 39: Implement the Streamflow and Reservoir Gaging Plan for locations on, or directly affecting, NFS land.
- Condition 40: Pass woody material at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay dams during spill events and channel maintenance flows. If

these events are not sufficient to pass woody material, the licensees may periodically mechanically remove woody material from the reservoirs.

- Condition 41: Implement the Gravel Augmentation Plan for locations on, or directly affecting, NFS land.
- Condition 42: Implement the SNYLF Management Plan for locations on, or directly affecting, NFS land.
- Condition 43: Implement the Aquatic Resources Monitoring Plan for locations on, or directly affecting, NFS land.
- Condition 44: Develop a plan to manage AIS in waters within the project boundary within 1 year of license issuance. The Plan shall include BMPs to prevent the introduction of AIS, early detection monitoring, and monitoring and management of existing populations of AIS.
- Condition 45: Implement the Integrated Vegetation Management Plan for locations on, or directly affecting, NFS land.
- Condition 46: Evaluate, and upgrade if necessary, the transmission line for consistency with APLIC and implement other raptor protection measures within 2 years of license issuance.
- Condition 47: Implement the Bald Eagle Management Plan for locations on, or directly affecting, NFS land.
- Condition 48: Limit the operating period for potentially disruptive project O&M activities to protect breeding osprey, including a protective buffer around active nests during the breeding season.
- Condition 49: Conduct periodic northern goshawk and California spotted owl nesting surveys to determine changes to nesting locations within existing territories and/or establishment of new territories.
- Condition 50: Limit project-related activities during the California spotted owl and northern goshawk breeding seasons within the vicinity of active nests during their respective breeding seasons.
- Condition 51: Limit project-related activities during the willow flycatcher breeding season within 350 feet of suitable nesting habitat during the breeding season.
- Condition 52: Consult with a bat biologist prior to significant structural modifications and vegetation management activities.
- Condition 53: Consult with a bat biologist prior to loud/vibration activities along Three Lakes Road or at Three Lakes Dam.

- Condition 54: Inspect project tunnels for bats prior to initiating O&M activities in winter and develop appropriate protective measures.
- Condition 55: Revise the Recreation Management Plan to delete text related to the removal of amenities at sites 4 and 5 at Bucks Lake Boat-In Campground, and revise the Recreation Monitoring Program section to address recreation use monitoring and demand over time.
- Condition 56: Revise the Bucks Lake SMP with a specific list of actions outlined by the PNF and implement the plan.
- Condition 57: Consult with the Forest Service prior to painting the exterior of project structures during routine maintenance or initial construction.
- Condition 58: Implement the Historic Properties Management Plan for locations on, or directly affecting, NFS land.
- Condition 59: Implement the Transportation Management Plan for locations on, or directly affecting, NFS land.
- Condition 60: Implement the Erosion Management Plan for locations on, or directly affecting, NFS land.
- Condition 61: Implement the Fire Prevention and Response Plan for locations on, or directly affecting, NFS land.

Water Quality Certification Conditions

The Water Board has not yet acted on the licensees' request for certification under section 401 of the Clean Water Act; however, by letter filed on October 5, 2018, the Water Board provided 22 preliminary conditions. We consider preliminary conditions 2 and 20 through 22 to be administrative so they are not analyzed in this EIS. The remaining preliminary conditions of the certification (appendix C) specify the following:

- Condition 1: Provide minimum instream flows below project diversions. These would likely be specified by location, month and water year type.
- Condition 3: Close Milk Ranch Conduit Diversion during Wet water years. Operation of the diversion would differ depending on water year type.
- Condition 4: Develop a drought management plan to protect beneficial uses of water when minimum pool targets for project reservoirs or minimum instream flow requirements cannot be achieved.
- Condition 5: Manage large woody material at Bucks Lake, Lower Bucks Lake and Grizzly Forebay to allow material to be passed below the impoundments. This could occur during spill events, channel maintenance flows, or through mechanical removal of material from the reservoirs.

- Condition 6: Implement ramping rate and spill management criteria to minimize project-related fluctuations in affected river reaches (e.g., below Grizzly Forebay and Lower Bucks Dam). Coordinate spill management with the Rock Creek-Cresta Project.
- Condition 7: Adopt minimum reservoir operating levels. Any minimum reservoir condition would be designed to maximize recreational opportunities and satisfaction, protect aquatic resources and allow flexible power generation.
- Condition 8: Implement Three Lakes Reservoir drawdown schedule to balance brook trout spawning (*Salvelinus fontinalis*), recreational interests and power generation.
- Condition 9: Formalize an Ecological Consultation Group specific to the Bucks Creek project. The group should meet annually at a minimum to discuss license implementation, monitoring and maintenance activities, and allow an opportunity for the public to comment on project activities.
- Condition 10: Develop an erosion and sediment control plan designed to minimize and avoid undesirable erosion conditions near project streams and reservoirs.
- Condition 11: Develop an aquatics resource monitoring plan to protect the beneficial uses of project waterways and ensure the underlying assumptions of any water quality certification over the life a new FERC license. The plan should address water temperature, water quality, large woody material, stream channel morphology, fish and amphibian populations, and benthic macroinvertebrates.
- Condition 12: Develop a SNYLF management plan in consultation with FWS, Forest Service, California DFW, and the Water Board. This plan most likely would include BMPs for operations and maintenance activities in designated critical habitat within the project boundary.
- Condition 13: Provide annual notification to the Water Board regarding plans to stock fish in project waters (timing, location, weight, etc.).
- Condition 14: Develop a gaging plan, including plan objectives, gage locations, operations and maintenance protocols, data collection protocols, and information that will be included in annual reports.
- Condition 15: Develop a recreation management plan describing existing and proposed recreation facilities and measures to protect water quality and beneficial uses of the surface waters during construction and maintenance activities associated with recreational facilities.

- Condition 16: Develop a road management plan that describes the protection, maintenance, and construction of project roads in a manner that protects water quality.
- Condition 17: Develop a gravel augmentation plan to include potential augmentation locations to be finalized in consultation with relicensing participants, timing of pre- and post-augmentation monitoring, and reporting and consultation.
- Condition 18: Develop an AIS management plan. The goal of this plan is to establish a framework with specific activities to minimize the spread and impact of AIS on native fauna and habitats.
- Condition 19: Manage inactive diversions of Milk Ranch Creek to minimize project-related erosion. The licensees should seal or otherwise render these diversions permanently inoperable.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include most proposed environmental measures developed by the licensees and relicensing participants, with the exception of the proposed annual employee training (GEN-1), annual review of federally listed and special-status species lists (GEN-2), and annual ecological group meeting (GEN-3).

Although we recognize that annual employee training in project operations and maintenance (GEN-1) would benefit environmental resources, the licensees are expected to train their employees to the extent needed to comply with the terms of a license; therefore, we do not recommend inclusion of this as a specific license condition.

We do not recommend annual consultation with the Forest Service and other agencies to review monitoring status, proposed modifications to facilities, management and maintenance (GEN-2) because consultation and reporting is a requirement of each resource-specific compliance plan.

Similarly, we do not recommend organizing an ecological group meeting (GEN-3) because the licensees are already required to consult with agencies during preparation of reports that are components of Commission-approved management plans.

In addition, the staff alternative also includes the following recommended modifications of the licensees' proposal and additional measures.

- Develop a drought management plan that defines drought conditions based on available data specific to the project, rather than regional or state-wide proclamations, to ensure modifications to operations during extended low-water periods are only implemented as necessary and in a manner that protects aquatic resources.

- Modify the proposed annual determination of water year type (WR-7) to also provide the results to FWS, Water Board, and California DFW, in addition to Forest Service and FERC.
- Modify the proposed Aquatic Resources Monitoring Plan (AR-2) to include only monitoring of gravel in Bucks Creek downstream of Lower Bucks Lake Dam spillway and in Grizzly Creek downstream of the Grizzly Creek gaging weir because only the proposed gravel monitoring would have a project-related benefit.
- Modify the proposal to fund fish stocking by the California DFW to a requirement that the licensees implement a fish stocking plan for Bucks Lake, Grizzly Forebay, and Middle and Lower Lakes to improve the recreational fishery.
- Develop an avian protection plan that outlines the design of any proposed modifications to the project transmission line to protect birds from electrocution or collisions that may result from the licensees' review of existing facilities (TR-5).
- Revise the project boundary to include the area from the proposed location of the Bucks Lake Shoreline Trail to the shoreline of Bucks Lake because the proposed trail would be part of the licensees' recreation facilities that support public access to the project.

2.4 STAFF ALTERNATIVE WITH MANDATORY CONDITIONS

The staff alternative with mandatory conditions includes the staff-recommended measures noted above along with the mandatory conditions that we did not include in the staff alternative: (1) annual consultation with the Forest Service (preliminary 4(e) condition 1); (2) organizing an Ecological Consultation Group and hosting meetings (preliminary 4(e) condition 2, preliminary 401 condition 9); (3) annual employee training (preliminary 4(e) condition 27); (4) preparation of biological evaluations for any new project features on NFS land (preliminary 4(e) condition 28); (5) annual review of special-status species lists and assessment of new species (preliminary 4(e) condition 29); and (6) aquatic resources monitoring (preliminary 4(e) condition 43, preliminary 401 condition 11).

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

2.5.1 Federal Government Takeover of the Project

We don't consider federal takeover to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. While that fact alone wouldn't preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No party has

suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2.5.2 Issuing a Nonpower License

A non-power license is a temporary license that the Commission will terminate when it determines that another governmental agency will assume regulatory authority and supervision over the land and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider issuing a non-power license a realistic alternative to relicensing in this circumstance.

2.5.3 Retiring the Project

Project retirement could be accomplished with or without dam removal. Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions. No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. Project reservoirs serve other important purposes, such as recreation, regardless of whether power is produced. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we don't consider project retirement or removal of the electric generating equipment to be a reasonable alternative.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area. Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.2, *Comprehensive Development and Recommended Alternative*.²¹

3.1 DESCRIPTION OF THE RIVER BASIN

The project is located in the NFFR Basin in the Bucks Creek, Grizzly Creek, and Milk Ranch Creek watersheds within Plumas County. The NFFR is a tributary of the Feather River, which in turn is a tributary of the Sacramento River. Bucks Creek, Grizzly Creek, and Milk Ranch Creek are contiguous watersheds that originate near the crest of the northern Sierra Nevada Mountains at elevations over 7,000 feet above mean sea level. Bucks Creek flows approximately 15 miles through Bucks Lake and Lower Bucks Lake before joining the NFFR. Grizzly Creek flows approximately 16 miles from its headwaters south of Bucks Lake through Grizzly Forebay and into the NFFR. Milk Ranch Creek flows approximately 4 miles from the Three Lakes area to the NFFR. Combined, the three watersheds drain approximately 86 square miles. Elevations in the project area range from 1,600 feet to 7,076 feet.

The project area typically experiences warm, dry summers and cool winters with moderate to heavy snowfall in elevations above 5,000 feet and heavy rain in the lower elevations. Annual precipitation ranges from approximately 85 inches at the upper elevations to 65 inches at the lower elevations, with the majority falling between November and April (PG&E, 1991b). Temperatures recorded at the nearby Quincy weather station (17 miles away) report summer averages ranging from 42 degrees Fahrenheit (°F) to 86°F and winter averages ranging from 29°F to 46°F.

PNF-managed NFS land in this area are heavily used for recreation as well as timber harvest and rangeland grazing. Upper Bucks Creek Watershed and portions of Milk Ranch Creek Watershed are within the Bucks Lake Wilderness Area, a federally-protected area managed for recreation and wilderness preservation. In addition to the hydropower and public recreation facilities, there are several recreational home sites and

²¹ Unless otherwise indicated, our information is taken from the application for license for this project (PG&E and City, 2016a) and supplemental information filed by the licensees (PG&E and City, 2018a).

commercial recreation facilities (i.e., rental lodging and restaurants). Population density is among the lowest in California, with 20,007 residents reported in the 2010 census.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 CFR, section 1508.7), a cumulative effect is an effect on the environment that results from the incremental effect of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application and agency and public comments, we have identified that water resources, aquatic resources, vegetation, and special-status amphibians could be cumulatively affected by the project. Based on our analysis of each resource area, we focus our cumulative effects analysis on water temperature, resident trout, vegetation, and FYLF and SNYLF. Our analysis of cumulative effects is found in the corresponding resource sections.

3.2.1 Geographic Scope

The geographic scope of analysis defines the physical limits or boundaries of the proposed action's effects on the resources.

We identify the point upstream where the NFFR enters Lake Almanor, the most upstream reservoir of the Upper North Fork Feather River Project, to the point downstream where the NFFR flows into Lake Oroville, as our geographic scope of analysis. The extent of existing hydropower development in this reach of the NFFR is illustrated in figure 2-1.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and reasonably foreseeable future actions and their effects. Based on the likely term of any new license that may be issued, we will look 30 to 50 years into the future, concentrating on the effects of reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effect of project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the

existing condition and baseline against which we measure potential effects. We then discuss and analyze the specific cumulative and site-specific environmental issues.

Only the resources that would be affected by the project, or about which comments have been received, are addressed in detail in this EIS. Based on our analysis, we have determined that soils; water quantity and quality; aquatic, terrestrial, and threatened and endangered species; and recreation, land use, aesthetics, and cultural resources may be affected by the proposed action and action alternatives. Socioeconomics were not identified as an issue during the scoping process, and the licensees do not propose any major construction that would have the potential for socioeconomic effects. For this reason, socioeconomics is not discussed further in this document.

We present our recommendations for each resource in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.1 Geologic and Soil Resources

3.3.1.1 Affected Environment

Geology

The project is located in the Western Sierra Nevada Geomorphic Province. The Milk Ranch and Bucks Creek watersheds are almost entirely underlain by Mesozoic plutonic rocks consisting primarily of quartz and diorite. These plutonic rocks are erodible and prone to shallow landslides. A belt of metasedimentary, metavolcanic, and ultramafic rocks underlies the headwaters of the north-draining tributaries to Grizzly Creek. These thin-bedded, foliated and steeply dipping metamorphic rocks are extensively folded and faulted. Ultramafic rocks consisting largely of serpentinite underlie a portion of this area. Serpentinite is a moderately soft and structurally weak rock generally associated with shear zones and is prone to mass failure. Tertiary stream gravel that locally contains placer gold deposits is buried by these volcanic materials in the vicinity of the Bucks Lake area.

Project area topography is mountainous with deeply incised southwest trending river canyons and a relatively broad highland plateau. Elevations within the project area range from approximately 1,600 feet at the Grizzly Creek confluence with the North Fork Feather River to 7,067 feet at Mount Pleasant.

Faulting and Seismicity

There are no major fault zones crossing the project area, but fault zones bound the Bucks Creek watershed to the east and the Grizzly Creek watershed to the south. The dominant geologic structure in the project area is a series of north to northwest-trending, east-dipping reverse faults, referred to as the Foothills Fault System, a zone of deformation developed approximately 123 to 160 million years ago. Some of the fault segments in the fault system were reactivated as recently as the Quaternary Period (0 to

2.6 million years ago). One segment was reactivated in the recent past (the August 1, 1975 magnitude 5.7 earthquake along the Cleveland Hills Fault located about 35 to 40 miles southwest of the project).

Soils

Soils in the project vicinity are derived from a variety of parent materials, including granite, schist, serpentine (ultramafic rocks), metavolcanic, and metasedimentary rocks. Many of the soils are shallow, and associations with “rock outcrop” cover much of the project vicinity. Weathering profiles produced on metasedimentary and metavolcanic rock consist of loose, shallow to moderately deep, well-drained gravelly sandy loam soils. Weathered granite rocks typically produce firm, moderately deep to very deep, well drained sandy clay loam soils. These soil types have moderate permeability, with runoff ranging from slow to very rapid. Soils on upland surfaces are highly weathered and in places are composed of saprolite (soft, weathered, clay-rich soil). These soils are susceptible to erosion and have potential for high fine sediment yields if sparsely vegetated or denuded. Soils mantling the steep-sided canyon slopes are thin and rocky. Typically, sediment production from these areas is coarser with less fine material. Debris flows commonly are triggered on steep canyon slopes with convergent topography and thick soil mantle during and following major storm events.

Shoreline Erosion

The Bucks Lake shoreline ranges from gradual to steep and is sparsely to densely vegetated with mixed coniferous forest, broadleaf deciduous trees and shrubs, chaparral, and herbaceous plants and grasses. Riparian vegetation occurs as a narrow band along steep shoreline sections and more extensively in lower gradient alluvial areas. Erosion hazard along the Bucks Lake shoreline is generally low where the shoreline is comprised of bedrock, boulder, and cobble substrates. Shorelines with the greatest potential for erosion hazard are located where wind waves hit: along the southwest portion of the reservoir; on the south side of Rainbow point; and in the vicinity of Middle Fork Mill Creek.

Areas with high potential erosion hazard pose the greatest risk where they are closely associated with residential or commercial structures and transportation infrastructure. These high-risk areas are concentrated in the vicinity of the Forest Service’s Bucks Lake Summer Home Tract and the PG&E Summer Home Tract. Potential erosion hazard is relatively low around Grizzly Forebay and Lower Bucks Lake due to extensive bedrock exposure, and there are no cases where human infrastructure near these reservoirs is significantly at risk.

Hillslope Erosion

The combination of erodible soils, steep topography, and occasional summer thunderstorms leads to high erosion rates and frequent mass failures in many parts of the

project area. The Bucks and Milk Ranch watersheds are inherently susceptible to erosion, as are the ultramafic rocks and metamorphosed sedimentary rocks underlying the southern portion of the Grizzly Creek watershed. Although the geomorphic setting has a high rate of hillslope sediment production and supply to the channel network, the steep channel network results in high fluvial sediment transport capacity and relatively little storage of mobile coarse sediment deposits.

The dominant hillslope processes in the Milk Ranch Creek, Bucks Creek, and Grizzly Creek watersheds include rock falls and rock slides, shallow debris slides, debris flows, snow avalanches, and streamside landslides. Areas most prone to erosion include convergent headwall swales filled with colluvium and thick soils, steep streamside slopes, and channel banks composed of unconsolidated materials. Hillslope processes are also influenced by the degree of rock weathering, fracturing, jointing, exfoliation, and root penetration, as well as road construction and other human disturbances. Intense rainstorms, periods of rapid snowmelt, and periods of extreme freeze-thaw are the dominant mechanisms triggering hillslope mass wasting.

The project area is relatively unpopulated with a moderate density of paved and unpaved roads, a relatively high potential for wildfire, and ongoing timber harvest activities. Erosion processes such as gullyng, shallow land sliding, and debris flow result from inadequate maintenance of road drainage infrastructure, road use, timber harvest activities, and wildfires. Recent landslides and debris flows in 1997 and 1998 severed the Milk Ranch Conduit, destroyed portions of roads and delivered large volumes of wood and sediment to Bucks Creek. Due to the steep channel gradient and confinement in the adjacent downstream gorge, the effects of the debris flows extend several miles downstream in Bucks Creek. It does not appear that the Milk Ranch Conduit influenced initiation of these debris flows; however, discharge from the severed pipeline may have exacerbated sediment production and delivery from the debris flow paths.

3.3.1.2 Environmental Effects

Road/Trail, Shoreline and Hillslope Erosion

Erosion of soil may occur during stormwater runoff from exposed surfaces such as dirt roads, trails, and other unpaved areas. Project operations may also result in tributary erosion, shoreline erosion, and localized landslides. In addition, construction of new recreational facilities, modification of existing recreational facilities, or other ground-disturbing activities could increase upland soil erosion and fine sediment delivery to project waterways. Fine sediment can adversely affect water quality and associated aquatic habitat by increasing turbidity and total suspended solids. Accumulation of fine sediment in aquatic substrate can adversely affect fish spawning success and limit habitat suitability for many aquatic invertebrates. The project can result in: reservoir shoreline and tributary channel erosion; road/trail and upland erosion; spillway and dam outlet

erosion; and landslides and erosion rates. The licensees propose several measures that would affect erosion rates associated with project facilities including:

- Annual Drawdown of Three Lakes (WR-3).²² The licensees propose to begin the annual drawdown of Three Lakes in mid-August instead of mid-September, consistent with Forest Service preliminary 4(e) condition 37, Water Board preliminary condition 8, FWS 10(j) recommendation 4, and California DFW 10(j) recommendation 7.
- Project Reservoir Operations (WR-5). The licensees propose to continue to manage reservoir level operations as they are under the existing license, consistent with Forest Service preliminary 4(e) condition 36, Water Board preliminary condition 7, and FWS 10(j) recommendation 6.
- Transportation Management Plan (LU-1). The licensees propose maintenance and upgrades of project roads, based on the level of road use, to provide safe passage and minimize erosion. This measure is consistent with Forest Service preliminary 4(e) condition 59 and Water Board preliminary condition 16.
- Erosion Management Plan (LU-6). In this plan, the licensees identify erosion and sediment control measures for any future project-related actions that could disturb soils or result in erosion. The plan stipulates that the licensees would prepare project-specific erosion control measures for actions that could result in erosion. In addition, the licensees would annually consult with the Forest Service to discuss erosion and sediment control on or affecting NFS land within the FERC project boundary to identify potential remedies, as needed. The plan provides for regular reporting, reviews, updates, and submittals to FERC. This measure is consistent with Forest Service preliminary 4(e) condition 60, Water Board preliminary condition 10, FWS 10(j) recommendation 22, and California DFW 10(j) recommendation 28.

Additional details on these plans are included in sections 3.3.2.2, *Aquatic Resources* and 3.3.5.2, *Land Use*; the effects of these plans on erosion are discussed here.

Our Analysis

The licensees completed a detailed inventory of past and on-going erosion areas associated with project facilities (reservoirs, structures, roads and trails) and identified areas of high, medium, and low erosion potential, estimated potential erosion volume, and delivery potential (PG&E and City, 2018p). No identified erosion areas were

²² The alpha-numeric designations refer to the licensees' proposed measures described in detail in their supplemental final license application (PG&E and City, 2018a).

associated with project structures (dams, spillways) as most are located in areas of stable bedrock.

Road/Trail Erosion and Landslides. Thirty-five (35) erosion sites were identified along project roads; two with high severity, 25 medium severity, and eight low severity. The majority of identified road erosion issues were associated with plugged or crushed culverts, culverts with eroding outlet drops, or lack of adequate road drainage which results in water running over road surfaces and causing sheet or gully erosion on the road and downslope of culvert outlets. Eight erosion sites were also found at project-related recreation use areas and included plugged culverts, surface erosion, rilling, and gullying at campgrounds, marinas, and trails.

The licensees' proposed Transportation Management Plan (LU-1) (PG&E and City, 2018f) outlines both annual and long-term maintenance activities to address these on-going erosion issues. Short-term maintenance activities would include routine upkeep such as blading roads, cleaning culverts and ditches, and rockfall and landslide cleanup and repair. Long-term maintenance activities would take place over a 20-year schedule with timing for each road and activity (e.g., upslope stabilization, resurfacing, culvert replacement) specified in the Plan. It does not appear from Plan descriptions that annual maintenance activities would adequately resolve drainage issues associated with all roads, although cleaning plugged culverts and road re-grading would reduce erosion in many areas. The long-term maintenance actions would help to resolve the culvert and erosion issues and reduce road-related erosion; however, some of the long-term maintenance would not take place for many years. Road erosion would continue at sites with plugged/crushed culverts and those without adequate road drainage until the sites are fixed.

Shoreline and Tributary Channel Erosion. The shoreline erosion inventory found that most shoreline areas of Upper Bucks Lake, Lower Bucks Lake, and Grizzly Lake had low to moderate erosion potential under current reservoir operations. Areas with high erosion potential included locations where wind waves hit erodible soils on the south side of Rainbow Point and in the vicinity of Middle Fork Mill Creek. Areas with intense recreation use or private development in the vicinity of the Forest Service's Bucks Lake Summer Home Tract and the PG&E Summer Home Tract were also identified as having a high erosion potential due to human uses.

The licensees' proposed Annual Drawdown of Three Lakes (WR-3) and Project Reservoir Operations (WR-5) measures are intended to protect and enhance aquatic habitat during the winter and recreation resources during the peak recreation season and make only minor modifications to existing lake levels. As a result, they would not be anticipated to cause increased erosion along shorelines or in tributary mouths. Areas with existing erosion from wind waves and human use would continue to experience on-going erosion.

Facility/Spillway/Dam Outlet Erosion. No erosion sites were found around project dams, spillways, or facilities.

Future Construction-related Erosion. Any future construction-related activities could result in erosion following ground disturbance if appropriate erosion control measures are not implemented. The Erosion Management Plan (LU-6) indicates that the licensees would implement erosion control measures and consult with the Forest Service and other regulatory agencies (as appropriate) prior to implementing the erosion control measures.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

Water Quantity

The project is located on Bucks, Grizzly, and Milk Ranch Creeks, which are tributaries to the NFFR. Up to 400 cfs of flow from these creeks is diverted through Grizzly Powerhouse and Bucks Creek Powerhouse for power generation.

The project reservoirs include Bucks Lake and Lower Bucks Lake on Bucks Creek (105,605 acre-feet and 5,843 acre-feet, respectively), Grizzly Forebay on Grizzly Creek (1,112 acre-feet) and Three Lakes on Milk Ranch Creek (605 acre-feet). Flow from Bucks Lake is released through two steel outlet pipes and immediately flows into Lower Bucks Lake. The Milk Ranch Conduit conveys flow from Three Lakes Reservoir and nine (currently active) small intervening tributary diversions to Lower Bucks Lake. Five of the nine active small tributary diversions are in the Milk Ranch Creek drainage and four are in the Bucks Creek drainage. Water from Lower Bucks Lake is conveyed through the Grizzly Powerhouse Tunnel to Grizzly Powerhouse and discharges into Grizzly Forebay or is released as instream flow into Bucks Creek. Water from Grizzly Forebay is conveyed through Grizzly Forebay Tunnel to Bucks Creek Powerhouse and discharges into the Rock Creek reach of the NFFR upstream of Cresta Reservoir. Instream flow releases are made from Grizzly Forebay into Grizzly Creek.

Hydrology in the Project Area

The project is located in the NFFR drainage within the Sacramento River Hydrologic Region of northern California (CVRWQCB, 2016). Bucks Creek, Grizzly Creek and Milk Ranch Creek are contiguous watersheds that originate near the crest of the northern Sierra Nevada Mountains at elevations up to about 7,100 feet (figure 3-1).

Bucks Creek flows approximately 15 miles from its headwaters through Bucks Lake and Lower Bucks Lake before joining the NFFR. The Bucks Creek basin can be divided into upper and lower portions, with the division at Lower Bucks Lake Dam.

Grizzly Creek flows approximately 16 miles from its headwaters just south of Bucks Lake through Grizzly Forebay and into the NFFR. Upper Grizzly Creek watershed includes the area that drains into Grizzly Forebay, and Lower Grizzly Creek watershed begins at the Grizzly Forebay Dam and extends to the confluence with the

NFFR. Grizzly Creek enters the NFFR about 5 miles downstream of the Bucks Creek confluence.

Milk Ranch Creek, located northeast of Bucks Creek, flows approximately 4 miles from Three Lakes to the NFFR. The creek enters the NFFR about 5.4 miles upstream of the Bucks Creek confluence. Milk Ranch Creek has the smallest drainage area of the three project watersheds.

Within the project area, the licensees maintain several streamflow and reservoir gages, and report hydrologic data for a number of gages to the U.S. Geological Survey (USGS). The key gages associated with this project have two designations: USGS designations are 8-digit numbers that indicate certain watershed and region codes; and the licensees' project ID designation. Table 3-1 provides information on key gages in the area which are shown on figure 3-2.

Table 3-1. Stream, canal, conduit, and reservoir gaging stations in the project area. (Source: PG&E and City, 2016cc, as modified by staff).

Project ID	USGS Number	Period of Record	Gage Type	Name
NF10	11403300	1973-2002	Storage (Manual)	Three Lakes Reservoir
NF11	11403450	1970-2013	Flow (Continuous)	Milk Ranch Conduit at Outlet
NF12	114035301	1970-2013	Flow (Calculated from Elevation)	Lower Bucks Lake Spillway
NF13	11403520	1970-2013	Storage (Continuous)	Lower Bucks Lake near Bucks Lodge
NF16	11403500	1929-2013	Storage (Continuous)	Bucks Lake near Bucks Lodge
NF19	11404250	1970-2013	Storage (Continuous)	Grizzly Forebay Creek Diversion near Storrie
NF20	11403700	1970-2013	Flow (Calculated from Power)	Bucks Creek Powerhouse
NF22	11404300	1970-2013	Flow (Continuous)	Grizzly Creek below Grizzly Diversion Dam
NF82	11403530 ¹	1976-2013	Flow (Continuous)	Bucks Creek below Bucks Diversion Dam
NF108	11404240	1994-2013	Flow (Continuous)	Grizzly Powerhouse
BUCKS1	N/A	2002-2013 ²	Flow (Seasonally Continuous)	Bucks Creek at NFFR
GR1	N/A	2002-2013 ²	Flow (Seasonally Continuous)	Grizzly Creek at NFFR
MR1	N/A	2002-2013 ²	Flow (Seasonally Continuous)	Milk Ranch Creek at NFFR

1. USGS 11403530 represents the total release from Lower Bucks, which is the sum of NF12 and NF82.

2. Recorded during summer months only.



Figure 3-2. Stream, canal, conduit, and reservoir gaging stations in the project area (Source: PG&E and City, 2016cc).

During project relicensing, the licensees completed an Indicators of Hydrologic Alteration (IHA) analysis in each of the project-affected stream reaches using historic flow data (WY 1970 to 2013) (PG&E and City, 2016cc). Unimpaired instream flow and regulated hydrology were calculated for each of the three project area watersheds (Bucks, Grizzly and Milk Ranch Creeks) at two points: (1) the lower watershed (at NFFR) and (2) the upper watershed (below the dam [Lower Bucks Lake, Grizzly Forebay, and Milk Ranch Conduit] (figures 3-3 through 3-8). The licensees then used the IHA results as the hydrologic input into their operations model to simulate ongoing operations and to evaluate effects on those operations of proposed new license conditions.

Bucks Creek. Streamflow in Bucks Creek below the Lower Bucks Lake Dam are controlled by instream flow release requirements, operational spills during high flows and required channel maintenance releases. Regulated peak flow (large and medium floods) are reduced compared to unimpaired flow due to Bucks Lake and Lower Bucks Lake storage. The largest reduction in flow occurs in the winter/spring runoff period when reservoirs are filling. At the upper extent of the project, the regulated mean annual flow for the period of record was 8 cfs, compared to 132 cfs under unimpaired conditions (figure 3-3). Considerable accretion occurs along the reach. At the downstream end (upstream of the confluence with the NFFR), the regulated mean annual flow was 71 cfs, compared to 195 cfs under unimpaired conditions (figure 3-4).

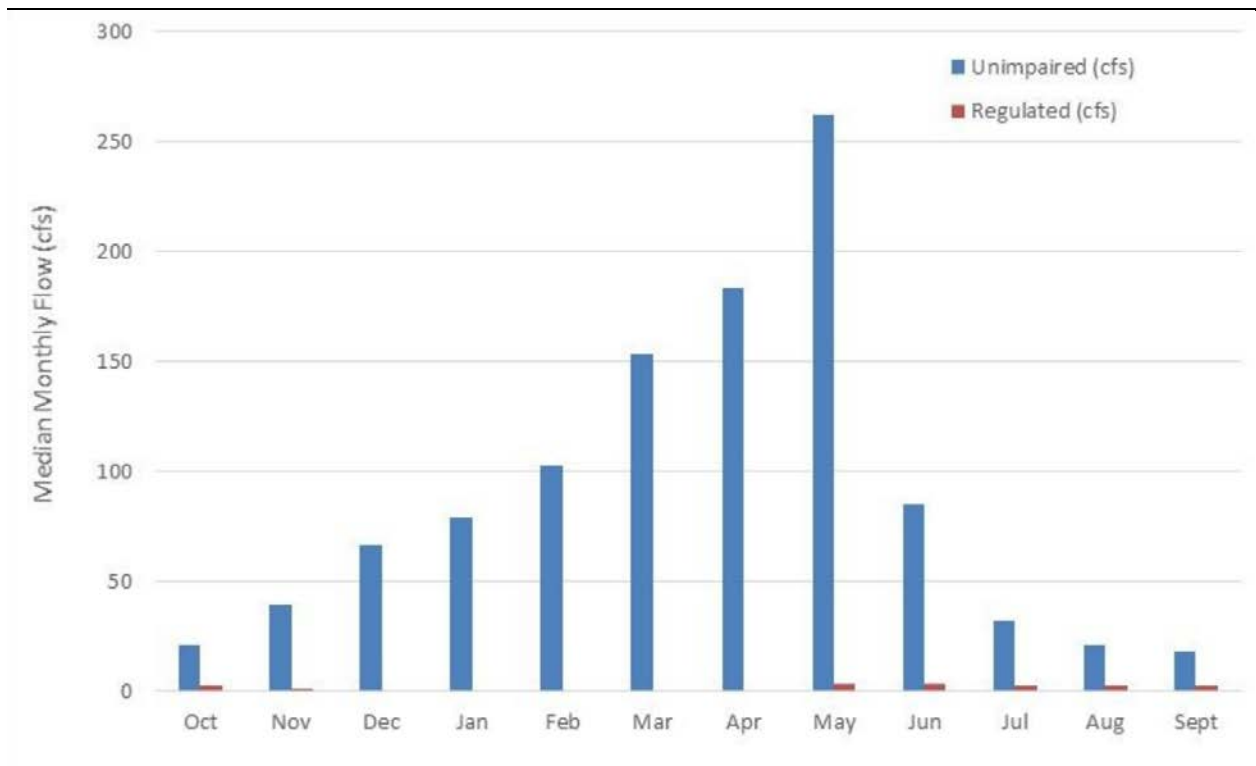


Figure 3-3. Unimpaired and regulated median monthly flow in Bucks Creek below Lower Bucks Lake (WY 1970-2013) (Source: PG&E and City, 2016cc).

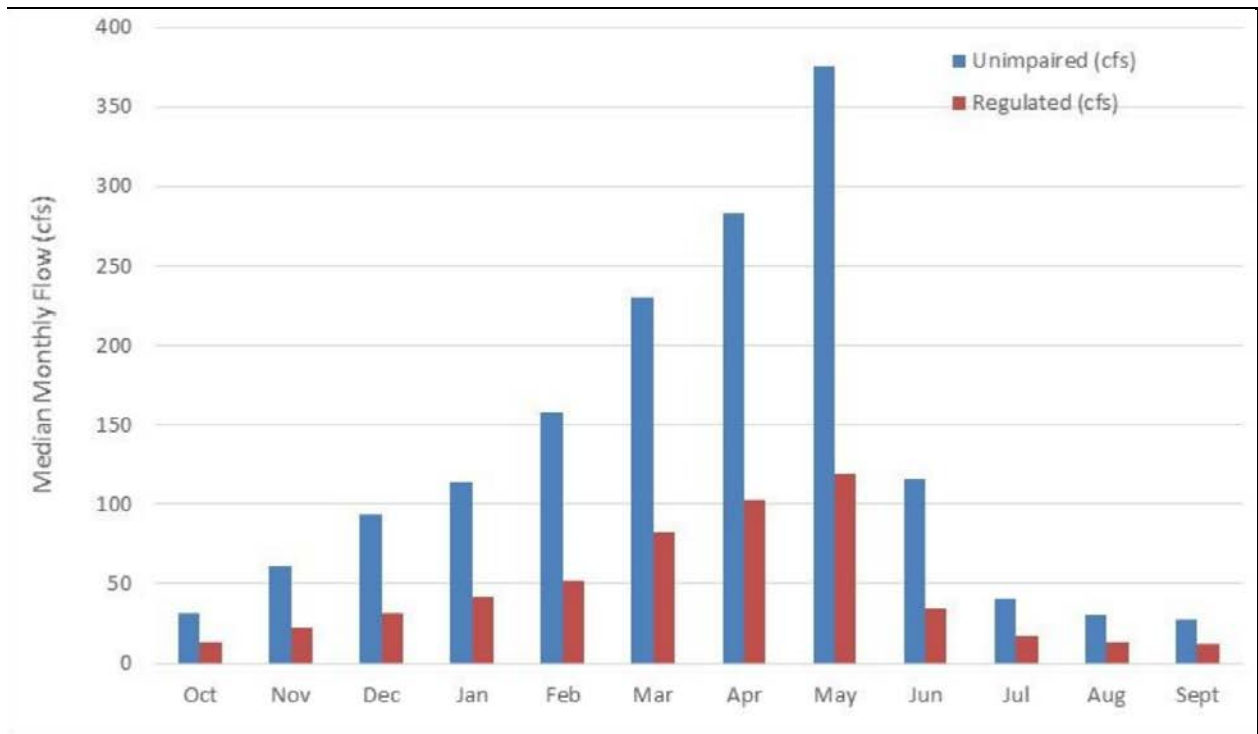


Figure 3-4. Unimpaired and regulated median monthly flow in Bucks Creek at NFFR (WY 1970-2013) (Source: PG&E and City, 2016cc).

Grizzly Creek. Grizzly Creek streamflow is regulated by required instream flow releases and operational spills during high-flow events. The IHA analysis of Grizzly Creek unimpaired instream flow and regulated flow shows a similar relationship to Bucks Creek. Peak flows are reduced under the regulated flow condition because of the diversion in the watershed, with the largest reduction occurring during the winter/spring runoff period. Many flood peaks continue to occur, as Grizzly Forebay storage is small and much of the inflow passes through with only minor regulation. At the upstream end of the project reach the effects of flow regulation are greatest; the mean annual flow during the period of record was 4 cfs compared to 72 cfs under unimpaired conditions (figure 3-5). Considerable accretion flow occurs along the reach. At the downstream end (upstream of the NFFR), the mean annual flow for the period of record was 107 cfs under regulated flow compared to 159 cfs under unimpaired conditions (figure 3-6).

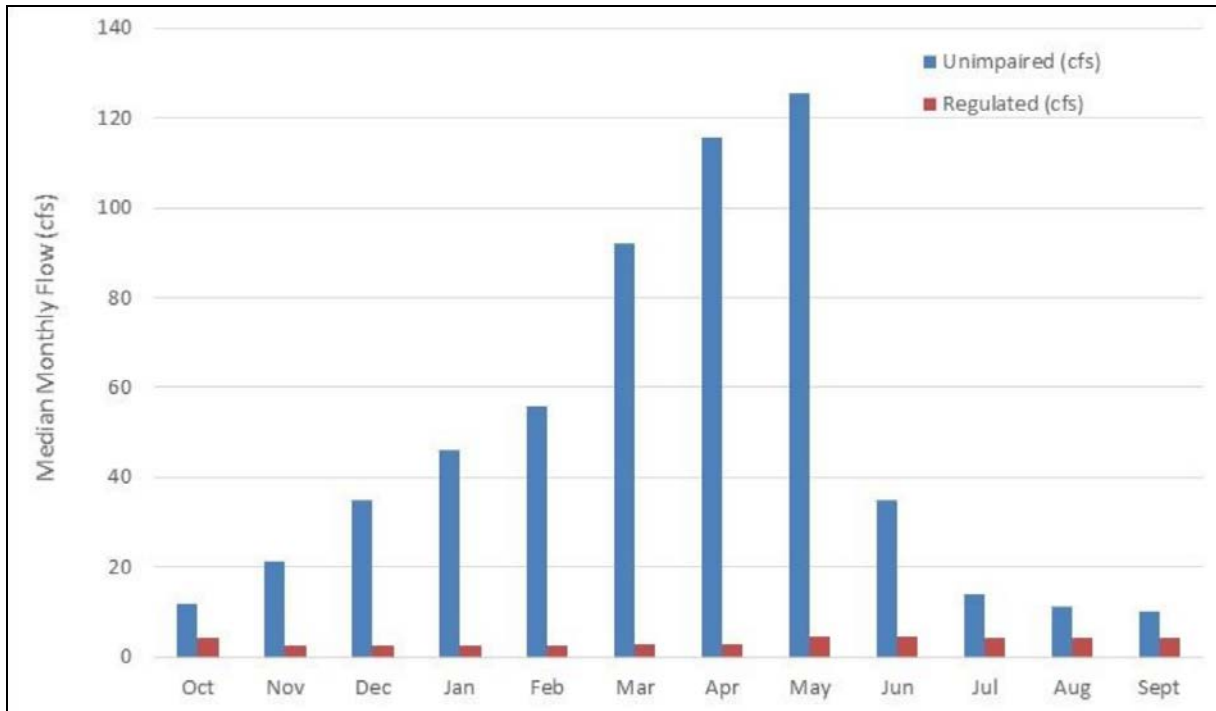


Figure 3-5. Unimpaired and regulated median monthly flow in Grizzly Creek below Grizzly Forebay (WY 1970-2013) (Source: PG&E and City, 2016cc).

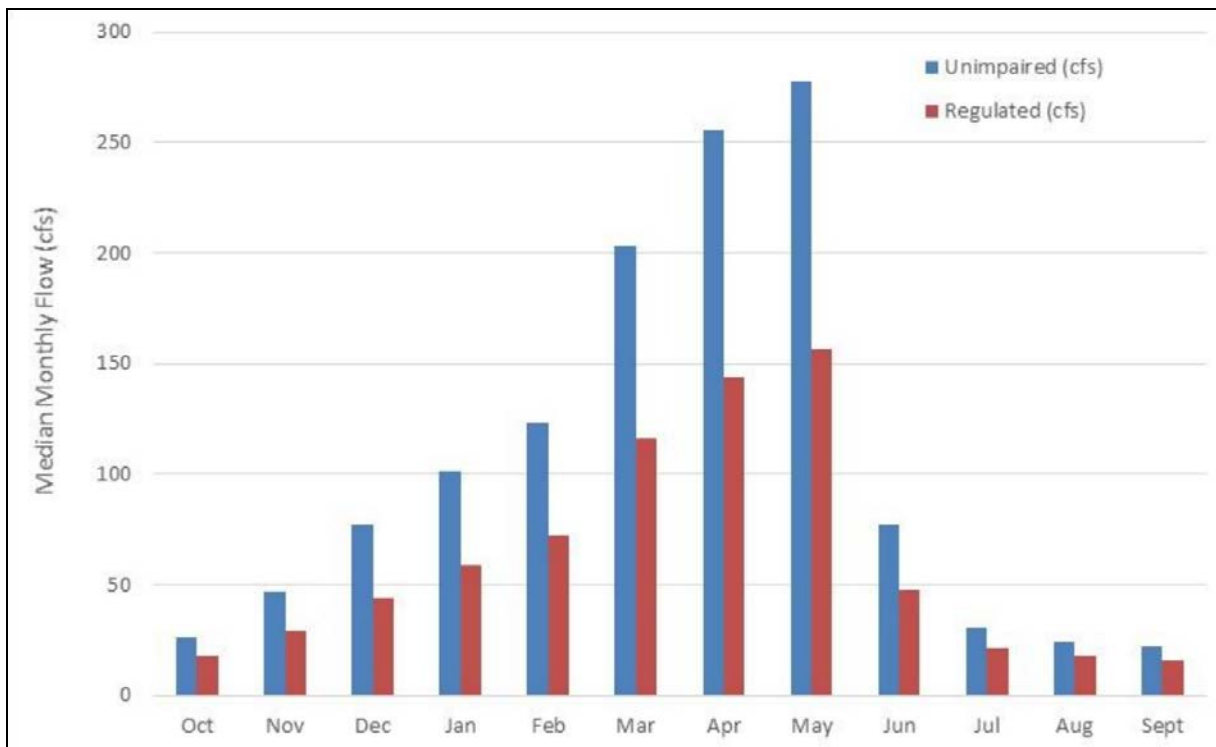


Figure 3-6. Unimpaired and regulated median monthly flow in Grizzly Creek at NFFR (WY 1970-2013) (Source: PG&E and City, 2016cc).

Milk Ranch Creek. Streamflow in Milk Ranch Creek is regulated as a result of storage in Three Lakes and Milk Ranch Conduit diversions. There are nine active diversions along the Milk Ranch Conduit (five in Milk Ranch Creek and four in the Bucks Creek watershed). Milk Ranch Creek receives additional flow from the tributary streams when flow exceeds the diversion pipe capacity of the five active Milk Ranch Conduit diversions. The mean annual flow during the period of record was 0.3 cfs compared to 4.9 cfs under unimpaired conditions. Median monthly flows are less under current operations compared to unimpaired conditions, with the greatest reduction during the winter/spring runoff period.

During low-flow periods, some water bypasses the Milk Ranch Conduit diversions and about 10 percent of the contributing watershed is not diverted into the Milk Ranch Conduit. The calculated regulated flow immediately downstream of Diversion No. 1 can be very low or zero (figure 3-7). Flow in Milk Ranch Creek increases as the surface runoff downstream of the diversion enters the creek. At the NFFR confluence, the mean annual flow is 25 cfs, compared to 31 cfs under unimpaired conditions (figure 3-8).

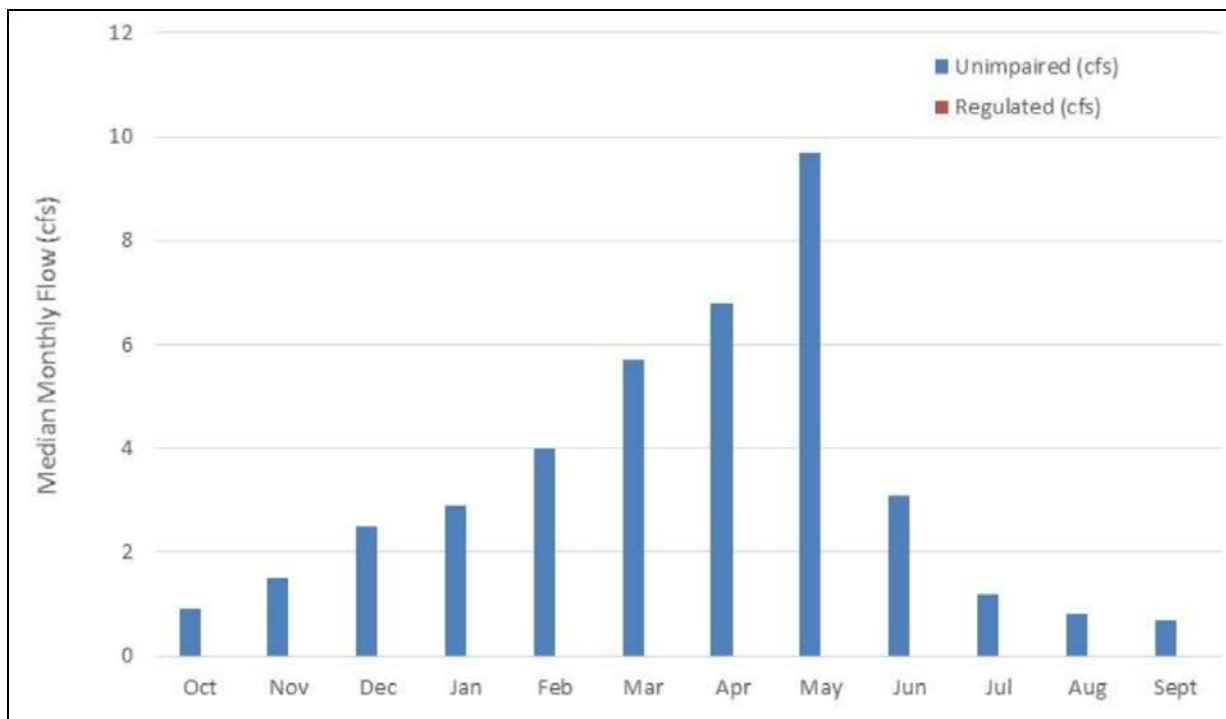


Figure 3-7. Unimpaired and regulated median monthly flow in Milk Ranch Creek below Milk Creek Conduit Diversion No. 1 (WY 1970-2013) (Source: PG&E and City, 2016cc).

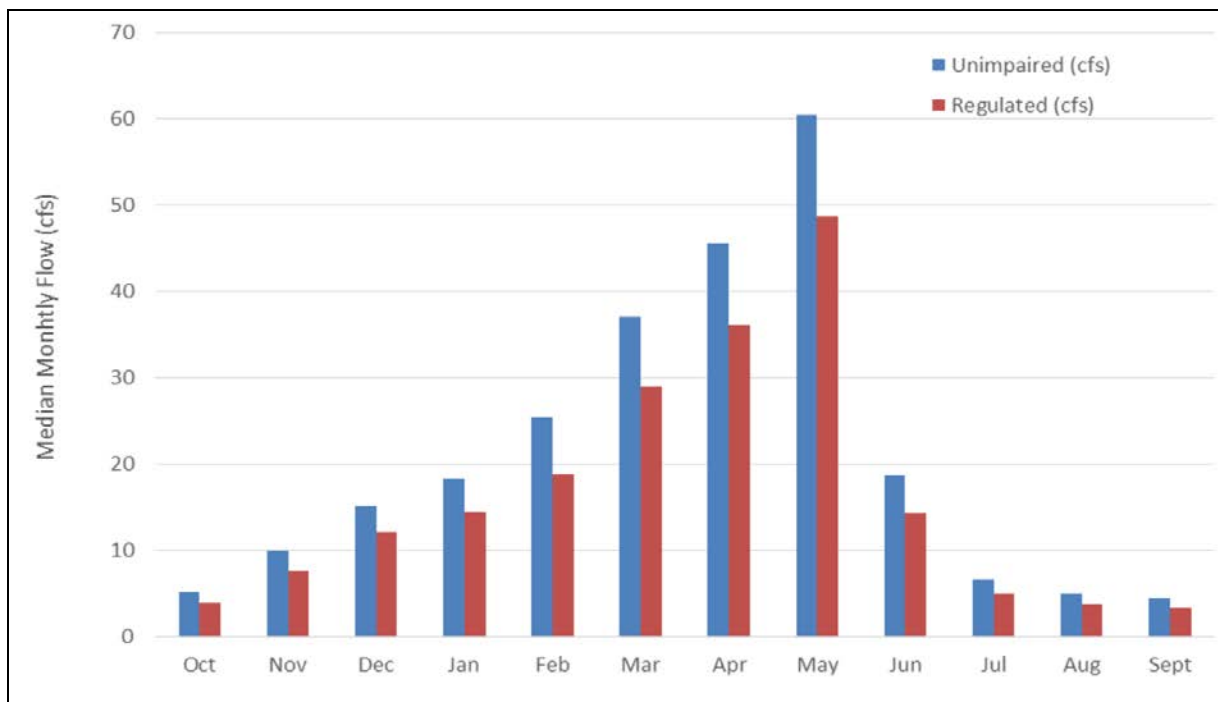


Figure 3-8. Unimpaired and regulated median monthly flow in Milk Ranch Creek at NFFR (WY 1970-2013) (Source: PG&E and City, 2016cc).

The IHA results show that current project operations reduce flow in the project area creeks, with the greatest reduction in flow in the upper portions of the reaches. Immediately below the dams/diversions, project operations reduced unimpaired instream flow by 94 percent in Bucks Creek below Bucks Lake, 71 percent in Grizzly Creek below Grizzly Forebay, and 94 percent in Milk Ranch Creek below Diversion No. 1 during the period of record (figures 3-3, 3-5, and 3-7). Flow accretion during the winter and spring from the surrounding watersheds occurs along the length of the project reaches, transforming the altered hydrographs at the top of the reaches into a flow regime further downstream that has a relatively natural seasonal pattern (high winter/spring flows and lower summer/fall flows). At the confluence with the NFFR, upstream project operations modify the mean annual flow in Bucks Creek by 64 percent, in Grizzly Creek by 33 percent, and in Milk Ranch Creek by 19 percent (figures 3-4, 3-6, and 3-8).

Reservoir Operation

Bucks Lake. Bucks Lake is operated to store runoff for eventual downstream use in power production. Water is released from the dam through two 30-inch steel pipes at 5,158 feet elevation to Lower Bucks Lake. High flows may spill over the uncontrolled spillway at elevation 5,155 feet. Storage is important for recreation uses; therefore, the lake is subject to minimum reservoir level restriction (see existing License Article 13 in FERC, 2006a). The normal maximum water surface elevation is 5,157 feet and the minimum water surface elevation is 5,100 feet (Normal water year) or 5,080 feet (Dry water year).

The rule curve for Bucks Lake is shown in figure 3-9. From January through June during drier years, outlet releases are limited to store water in the reservoir; however, from January through June during wetter years, outlet releases are generally higher to maximize generation. In April, once the spillway can be safely accessed, flashboards are installed on the spillway to a height of 2 feet (elevation 5,157 feet), effectively increasing the storage capacity by 3,679 acre-feet. Spring runoff flows usually end by July and reservoir storage is typically released for power production as power demands peak, and in accordance with “[drawdown] on Bucks Lake for a year other than a dry year during June 1 through September 1 shall not exceed 15 feet below the water surface elevation of June 1, and at no time shall the water surface elevation go below elevation 5,100 feet.” (PG&E, 1998). In recent years, the licensees have voluntarily prevented Bucks Lake from being drawn down below elevation 5,135 feet from June 1 through Labor Day for recreational purposes. After Labor Day, the reservoir usually continues to be drawn down until winter precipitation begins to fill it (around January), restarting the cycle of operations.

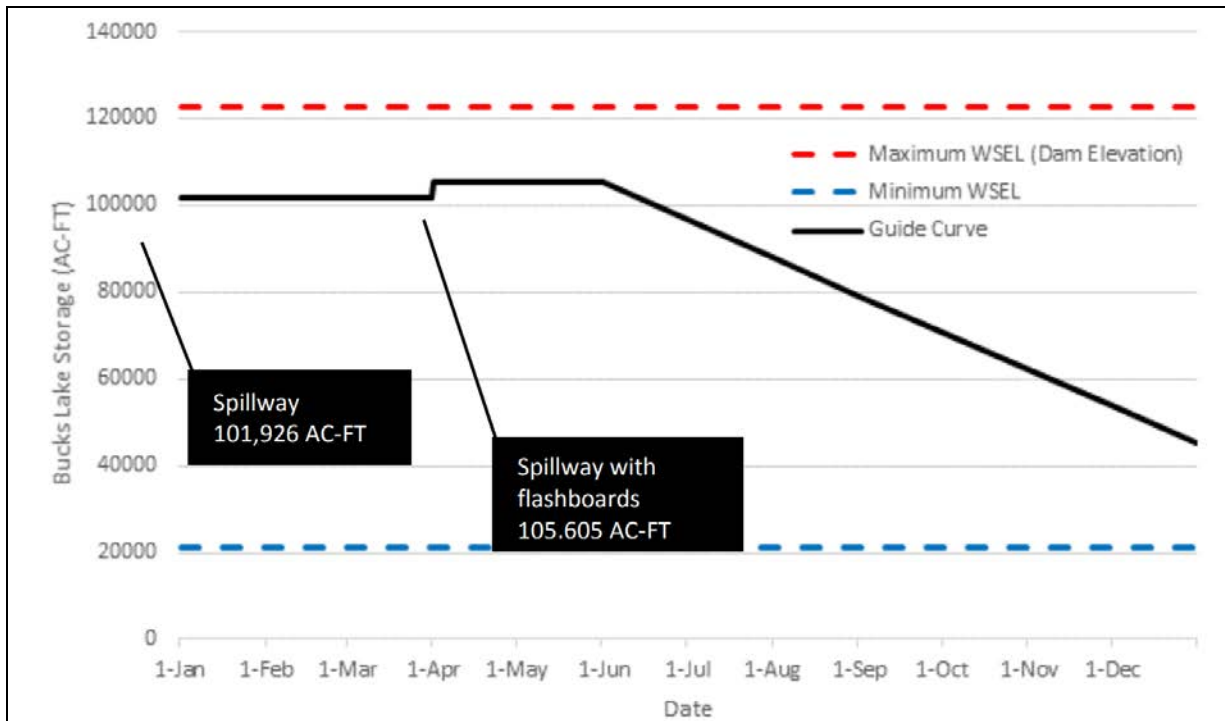


Figure 3-9. Bucks Lake rule curve (Source: PG&E and City, 2016a).

Lower Bucks Lake. Lower Bucks Lake is operated to provide water to Grizzly Powerhouse for power production and to meet the minimum instream flows in Bucks Creek released from the Lower Bucks Lake Dam. Minimum instream flow to Bucks Creek are released through a low-level outlet pipe. Additionally, high flows, or flows required to meet channel maintenance requirements may also be released downstream over the spillway. The normal maximum and minimum water surface elevations are

5,022 feet and 5,003.5 feet, respectively. Since this reservoir is a regulating reservoir for Grizzly Powerhouse, the water surface elevations fluctuate throughout the day.

The rule curve for Lower Bucks Lake is shown in figure 3-10. Since Lower Bucks Lake is a regulating reservoir and not a storage reservoir, the rule curve is flat with a seasonal adjustment to operating range. Levels are maintained by automatically opening and closing valves at Bucks Lake to cycle Lower Bucks Lake water levels. Channel maintenance flows are required annually (during non-dry years) in Bucks Creek downstream of Lower Bucks Lake. The required channel maintenance flows exceed the capacity of the outlet pipe to Bucks Creek, and therefore water must be released over the spillway to meet these high-flow requirements. If the required flows aren't released over the spillway during a flood event, upstream releases from Bucks Lake accumulate in Lower Bucks Lake, raising the water surface level until it exceeds the spillway crest, spilling the required channel maintenance flow.

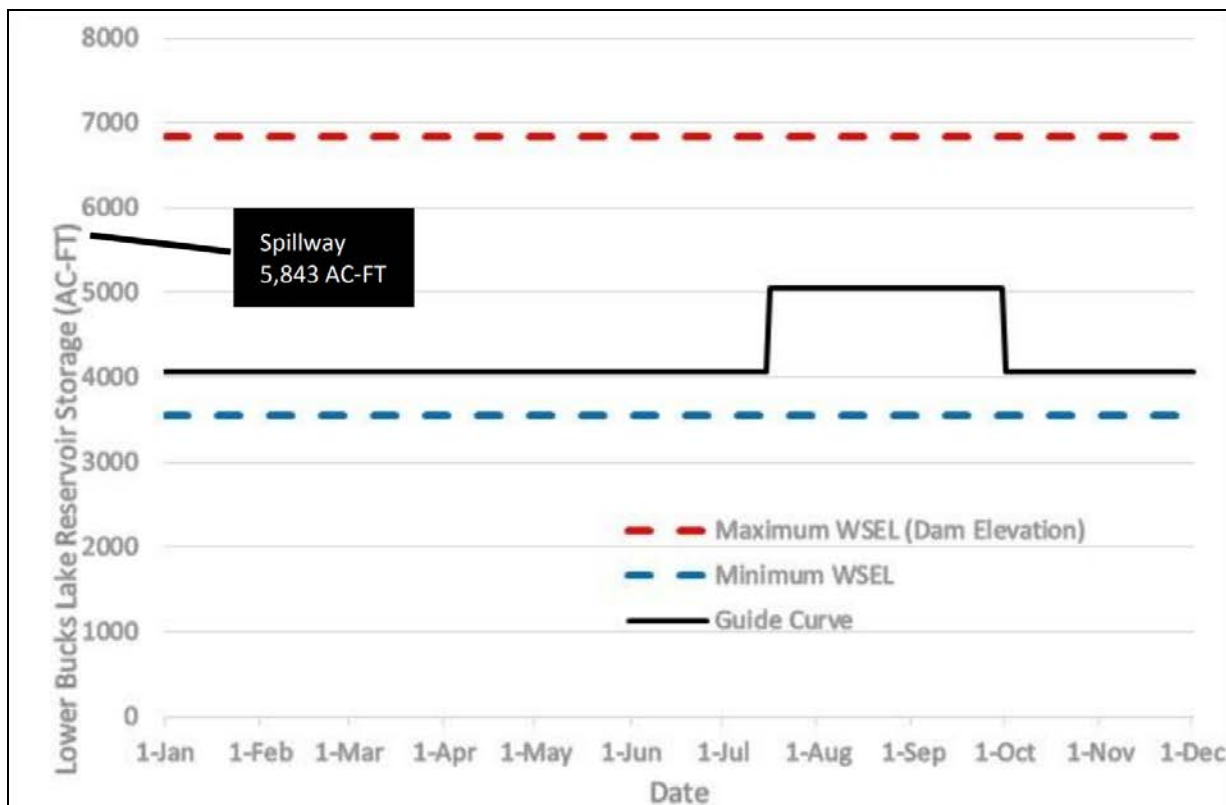


Figure 3-10. Lower Bucks Lake rule curve (Source: PG&E and City, 2016a).

Grizzly Forebay. Grizzly Forebay stores water before it is routed to the Bucks Creek Powerhouse. Storage in the forebay is variable as water enters from Lower Bucks Lake in addition to inflow from Upper Grizzly Creek and is temporarily stored or released for power production. Water is released from the dam to the creek through an outlet structure located at 4,250 feet. When the Forebay is at capacity, water may also flow over the uncontrolled spillway (4,316 feet). The normal maximum and minimum water surface elevations are 4,316 feet and 4,304.5 feet, respectively.

The rule curve for Grizzly Forebay is shown in figure 3-11. Similar to Lower Bucks Lake, Grizzly Forebay is a regulating reservoir, not a storage reservoir, and the rule curve is flat. Grizzly Forebay receives on average about 60 percent the amount of watershed runoff that Bucks Lake receives, while its storage is only about two percent of that of Bucks Lake. As a result, Grizzly Forebay often receives more flow from direct runoff than it is able to release through Bucks Powerhouse, and spills are common.

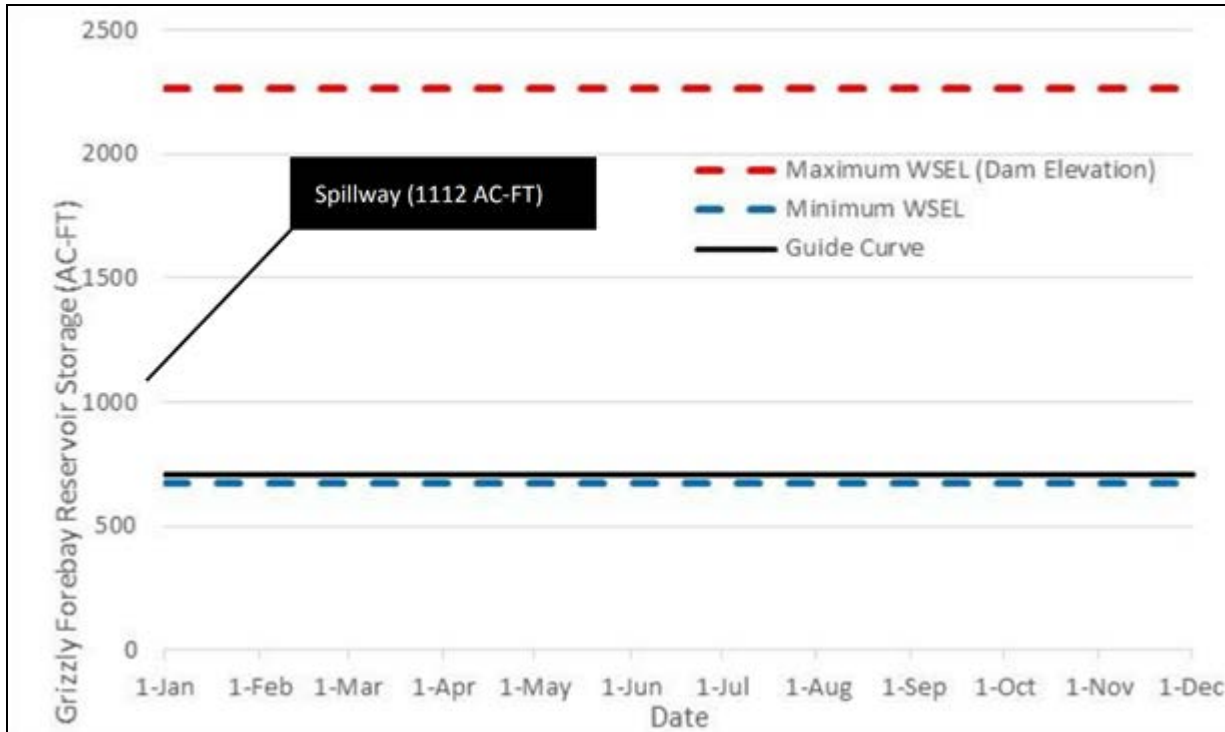


Figure 3-11. Lower Bucks Lake rule curve (Source: PG&E and City, 2016a).

Three Lakes. There are no power generation facilities associated with Three Lakes. A portion of the water annually stored in Three Lakes is conveyed through the Milk Ranch Conduit to Lower Bucks Lake for use in the Grizzly and Bucks Creek Powerhouses. Three Lakes Dam impounds 513 acre-feet of water with normal maximum and normal minimum water surface elevations of 6,077.8 and 6,050 feet, respectively. Releases to Milk Ranch Creek are controlled by a 15-inch outlet gate valve with an invert elevation of 6,050 feet.

The rule curve for Three Lakes is shown in figure 3-12. Under current practices, the release valve at Three Lakes is closed in the late spring (usually in April) to allow Three Lakes to fill throughout the summer. Spillway flashboards are also installed at this time to create additional storage capacity. Beginning in late summer (usually around Labor Day), the licensees typically release 4 to 12 cfs from Three Lakes Dam into Milk Ranch Creek, depending on the water year, until the lower lake is drawn down to minimum pool elevation. If the total inflow during this period is greater than the storage capacity, the additional inflow is released over the spillway. The stored water released

from Three Lakes Dam is diverted from Milk Ranch Creek into the Milk Ranch Conduit and conveyed to Lower Bucks Lake for generation at the Grizzly and Bucks Creek Powerhouses. The conduit also collects water from several intermittent tributary streams within the Milk Ranch Creek and the Bucks Creek watersheds. Any Milk Ranch Creek flows greater than 25 cfs bypass the diversion structure and continue downstream in Milk Ranch Creek. Once all of the stored water has been released from the reservoir, the gate valve is fully opened, the flashboards are removed, and the reservoir remains in this condition until the process is repeated the following spring. Since the outlet invert elevation is flush with the bottom of the reservoir, Three Lakes effectively has no storage during the winter months and flows entering the reservoir passively flow downstream to Milk Ranch Creek.

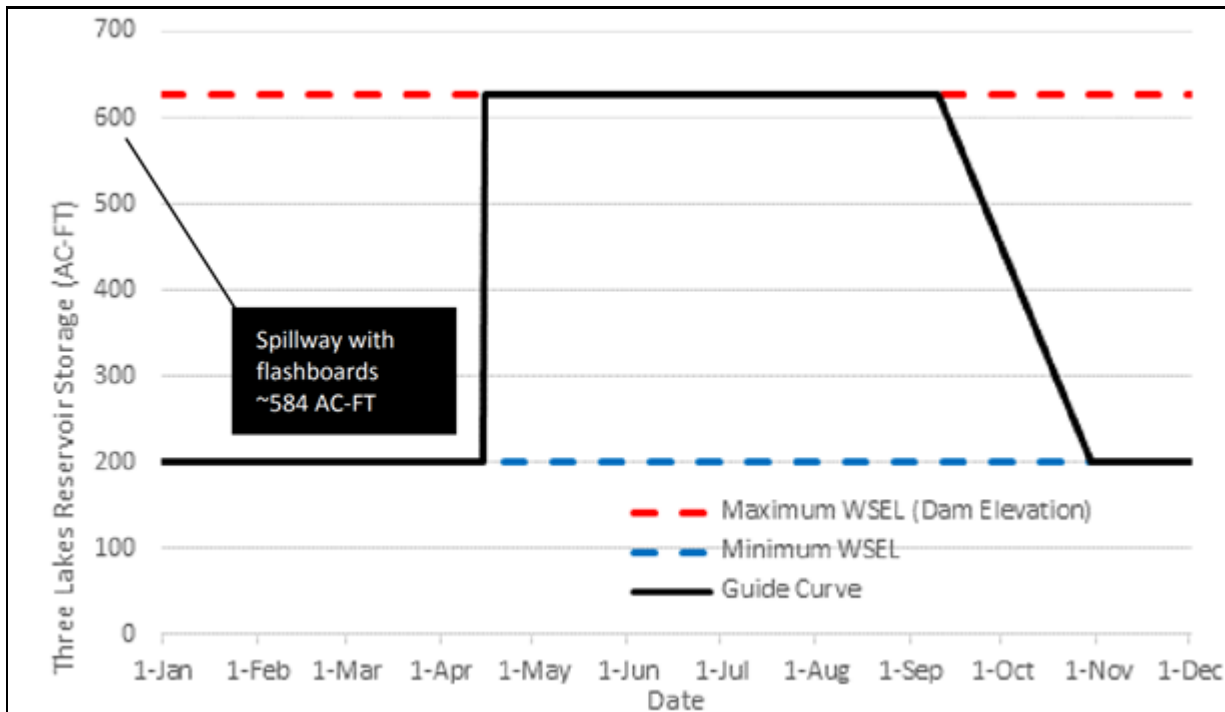


Figure 3-12. Three Lakes rule curves (Source: PG&E and City, 2016a).

Minimum Instream Flow Requirements

The licensees currently provide minimum instream flows in Bucks Creek and Grizzly Creek in accordance with the 2006 Amended FERC License. Milk Ranch Creek and Bucks Creek below Bucks Lake have no minimum instream flow requirements. A summary of existing and pre-2006 minimum instream flows is shown below (table 3-2).

Table 3-2. Existing minimum instream flow requirements for Grizzly Creek and Bucks Creek (Source: FERC, 2006a, as modified by staff).

Stream	Point of Release	Current	
		Period of Compliance ^a	Minimum Release (cfs)
Grizzly Creek	Grizzly Forebay Dam	May 1 – Jun 30	8
		Jul 1 – Oct 31	6
		Nov 1 – Apr 30	4
Bucks Creek	Lower Bucks Lake Dam	May 1 – Jun 30	8
		Jul 1 – Oct 31	6
		Nov 1 – Apr 30	4

^a Actual initiation of May 1—June 30 streamflow is subject to weather-dependent access conditions.

There is no minimum release requirement for Milk Ranch Creek downstream of Three Lakes Dam; however, depending on the water year, the licensees typically release 4 to 12 cfs from Three Lakes Dam beginning in late summer until the lower lake is drawn down to minimum pool. Once the lower lake is drawn down to minimum pool, the valve is typically kept open (25 cfs capacity) until spring in order to buffer flows downstream of the dam to minimize flood damage. The valve is closed at the conclusion of the winter/spring storm season.

There are no instream flow requirements downstream of the nine diversions to the Milk Ranch Conduit; however, the reaches of Milk Ranch Creek and Bucks Creek below the conduit diversions are re-watered primarily by accretion of ground water seepage. Natural accretion, based on the 50 percent exceedance values averaged over the summer months (June–September), was estimated at 4.25 cfs.

Channel Maintenance Flows

Since 2006, the licensees have been required to provide annual channel maintenance spills in Wet and Above Normal water years at Lower Bucks Lake Dam and Grizzly Forebay Dam in accordance with License Article 13 (FERC, 2006b). Water-year type for channel maintenance flow releases is based on the predicted unimpaired inflow to Lake Oroville and monthly spring snowmelt runoff forecasts provided by licensees and California DWR from March through May. Both annual spill (50 to 70 cfs flows for a minimum of 12 hours) and periodic (every 5 years) high spill (150 to 245 cfs spills for a minimum of 12 hours) events are required, should natural spill events of this magnitude not occur. At Grizzly Forebay Dam, annual spill requirements of 50 to 70 cfs for a minimum of 12 hours are required in Wet and Normal water years, if natural spill events of this magnitude haven't occurred in the previous 18 months.

Water Quality

In the *Water Quality Control Plan for the Sacramento and San Joaquin Basins* (Basin Plan), the Central Valley Water Board designates existing beneficial uses and water quality objectives for the Bucks Creek Project (CVRWQCB, 2016). Designated beneficial uses of surface waters for the NFFR are domestic supply, hydropower, contact and non-contact recreation, canoeing and boating, cold freshwater habitat, spawning of coldwater fishes, and wildlife habitat. Basin Plan water quality objectives to support these designated beneficial uses are shown below (table 3-3).

The most recent EPA-approved section 303(d) list of impaired waters under the Clean Water Act (CWA) denotes the NFFR as a Category 5 water segment, where “standards are not met and a total maximum daily load (TMDL) is required, but not yet completed for at least one of the pollutants being listed for this segment.” The NFFR is listed as non-compliant for mercury, polychlorinated biphenyls, water temperature, and toxicity from Poe Reservoir to Lake Oroville, a 54-mile-long reach (Water Board, 2016). TMDLs for these listings are expected to be completed by 2021. In addition, the California Office of Environmental Health Hazard Assessment issued mercury-based ingestion advisories for fish from the Upper Feather River (OEHHA, 2014).

The licensees’ water quality studies indicate that the surface waters within the project area and cumulatively affected stream reaches in the NFFR from the confluence with the East Branch Feather River to Lake Oroville generally meet the state’s water quality standards. Any exceedances of these standards, and potential cumulative project effects specific to water temperature and dissolved oxygen (DO) are described in the licensees’ 2014 Technical Memorandum (TM-1 as updated in TM-26, PG&E and City, 2018v), Water Temperature Monitoring; and Updated Technical Memorandum (TM-10, PG&E and City, 2018j), Water Quality Assessment, respectively.

Project-related factors contributing to thermal conditions and DO levels in the NFFR from Lake Almanor to Lake Oroville include water storage in Three Lakes, Bucks Lake, Lower Bucks Lake, and Grizzly Forebay; water released from project reservoirs combined with groundwater accretions entering the NFFR via Milk Ranch Creek, Bucks Creek, and Grizzly Creek; and water diverted from project reservoirs entering the NFFR at Bucks Creek Powerhouse. Stream and reservoir water temperature and water quality data are summarized below.

Table 3-3. Water quality objectives to support designated beneficial uses in the project area (Source: Central Valley Water Board, 2016, as modified by staff).

Water Quality Objective	Description
Temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Quality Control Board that such alteration in water temperature does not adversely affect beneficial uses. In waters designated as cold freshwater habitat, increases in water temperatures must be less than 5.0°F above natural receiving-water temperature.
Bacteria	In waters designated for contact recreation, fecal coliform concentration must be: (1) less than or equal to a geometric mean of 200 per 100 milliliters of water based on a minimum of five samples collected in any 30-day period, and (2) less than 400 per 100 milliliters of water in at least 90 percent of all samples taken in all 30-day periods.
Biostimulatory substances	Water shall not contain biostimulatory substances that promote aquatic growth in concentrations that cause nuisance or adversely affect beneficial uses.
Chemical constituents	Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At minimum, waters designated for use as domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels specified in Title 22 of the California Code of Regulations, which are incorporated by reference into the Basin Plan.
Color	Water shall be free of discoloration that causes a nuisance or adversely affects beneficial uses.
Dissolved Oxygen	<p>The DO concentrations shall not be reduced below the following minimum levels at any time.</p> <ul style="list-style-type: none"> • Waters designated as warm freshwater habitat: 5.0 mg/L • Waters designated as cold freshwater habitat: 7.0 mg/L • Waters designated as spawning habitat: 7.0 mg/L <p>The monthly median of the average daily DO concentration shall not fall below 85 percent of saturation in the main water mass, and</p>

Water Quality Objective	Description
	the 95 percentile concentration shall not fall below 75 percent of saturation.
Floating material	Water shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.
Oil and grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.
Pesticides	Waters shall not contain individual pesticides or a combination of pesticides in concentrations that adversely affect beneficial uses. ^a Waters designated for use as domestic or municipal supply shall not contain concentrations of pesticides in excess of the limiting concentrations set forth in Title 22 of the California Code of Regulations or in excess of 1.0 µg/L for thiobencarb. ^b
pH	The pH shall neither be depressed below 6.5 nor raised above 8.5.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause a nuisance or adversely affect beneficial uses.
Settleable material	Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affect beneficial uses.
Suspended material	Waters shall not contain suspended material in concentrations that cause a nuisance or adversely affect beneficial uses.
Taste and odor	Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies, fish flesh or other edible products of aquatic origin, or that cause nuisance or otherwise adversely affect beneficial uses. ^c

Water Quality Objective	Description
Toxicity	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by analysis of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests as specified by the Regional Water Quality Control Board.
Turbidity	<p>Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:</p> <ul style="list-style-type: none"> • where natural turbidity is less than 1 NTU, increases shall not cause downstream turbidity to exceed 2 NTU • where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU • where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent • where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTU • where natural turbidity is greater than 100 NTU, increases shall not exceed 10 percent

Notes: DO: dissolved oxygen, °F: degrees Fahrenheit, °C: degrees Celsius, mg/L: milligrams per liter, µg/L: micrograms per liter, NTU: nephelometric turbidity unit.

- ^a The Basin Plan defines pesticide as: “(1) any substance, or mixture of substances, which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment whatsoever, or (2) any spray adjuvant, or (3) any breakdown products of these materials that threaten beneficial uses.”
- ^b Thiobencarb, also referred to as benthocarb, is an active ingredient of rice herbicides including Bolero® and Abolish®.
- ^c Taste and odor limits for drinking water are provided as secondary maximum contaminant levels in Title 22 of the California Code of Regulations.

North Fork Feather River and Tributary Temperatures

The area affected by the project drains into the NFFR downstream of its confluence with the East Branch of the NFFR. Elevation ranges from 6,400 feet at Three Lakes to 1,600 feet at the confluence of Grizzly Creek and the NFFR. The total drainage area of the project is 85.9 square miles (mi²), divided among the Milk Ranch (7.3 mi²), Bucks (45.6 mi²), and Grizzly Creek (33.0 mi²) watersheds.

The licensees conducted water temperature monitoring from 2013 through 2016 in Milk Ranch Creek, Bucks Creek, and Grizzly Creek immediately below project reservoirs and at the lower end of each stream near their confluence with the NFFR, and in the NFFR at locations upstream and downstream of tributary or powerhouse inflows. The licensees conducted water temperature monitoring in 2015 and 2016 in Grizzly Creek above Wildcat Creek and in Wildcat Creek near the confluence with Grizzly Creek (figure 3-13).

Water temperatures at the NFFR sites were consistently warmer than tributary sites, and not substantially altered by inflow from project-affected stream reaches (figure 3-14). The licensees attribute this to the larger volume of water in the NFFR in contrast to flow from project reaches. Mean daily average flows at both gaged stations in the NFFR (NF56 and NF57) were above 200 cfs between June 1 and September 30 during the 2014–2016 monitoring years, while mean daily average flows in project-affected tributaries ranged from less than 2 cfs in Milk Ranch Creek up to a high of 16 cfs in Grizzly Creek in the same monitoring periods.

The licensees developed a water temperature model to explore potential effects of project operations at Grizzly Forebay on water temperature in the NFFR. The model starts at Grizzly Forebay, extends down Grizzly Creek to the NFFR, and 1.6 miles further down the NFFR to Arch Rock. Model results are reported in Volume III, *TM-36 Water Temperature Model (WR-S5)* (PG&E and City, 2016ee). In addition to the water temperature model output, TM-36 includes a set of mass balance calculations quantifying the thermal effects of Bucks Powerhouse flows on NFFR waters in the mixing zone downstream of the Bucks Powerhouse tailrace.

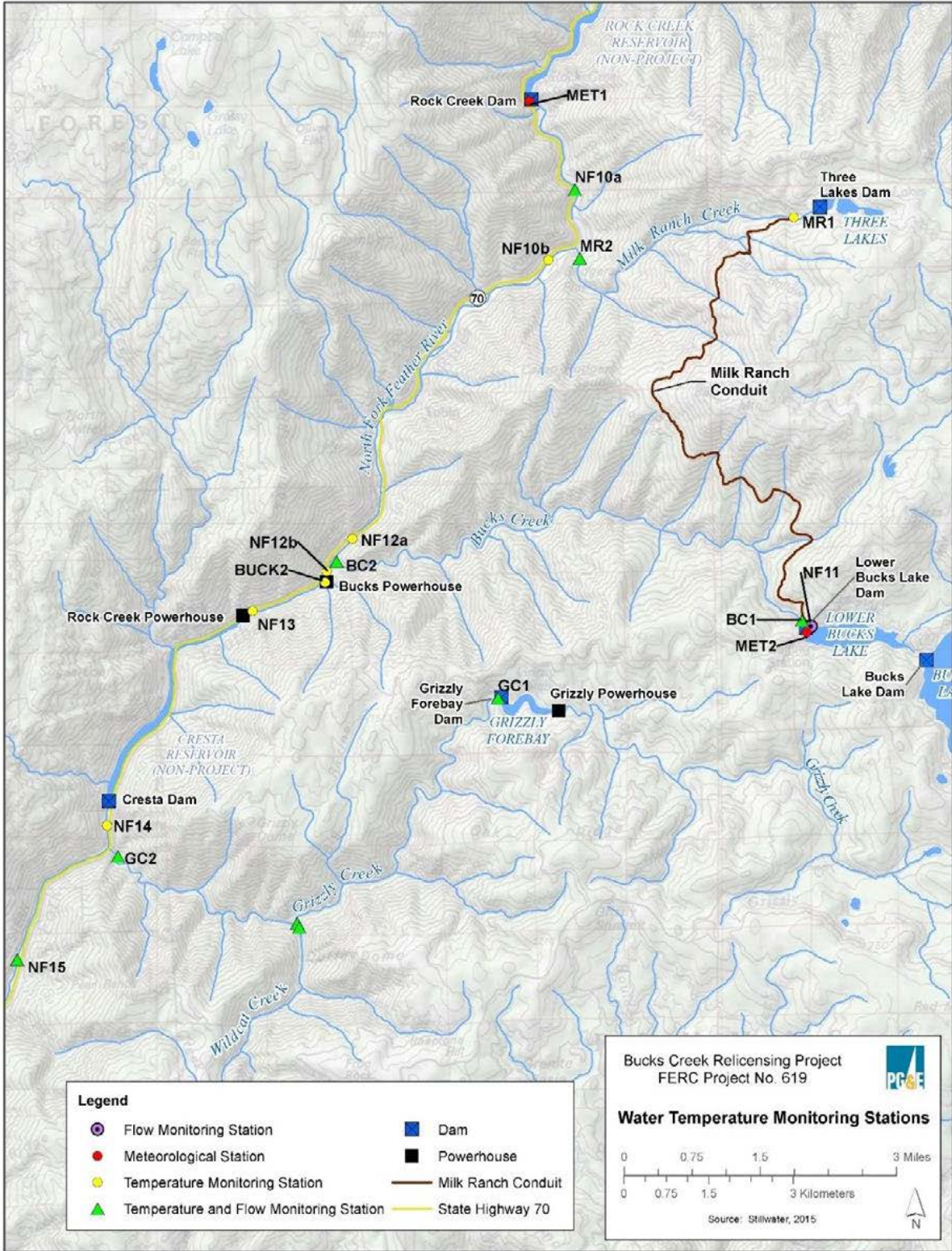


Figure 3-13. Water temperature, flow, and meteorological monitoring stations (Source: PG&E and City, 2016ee).

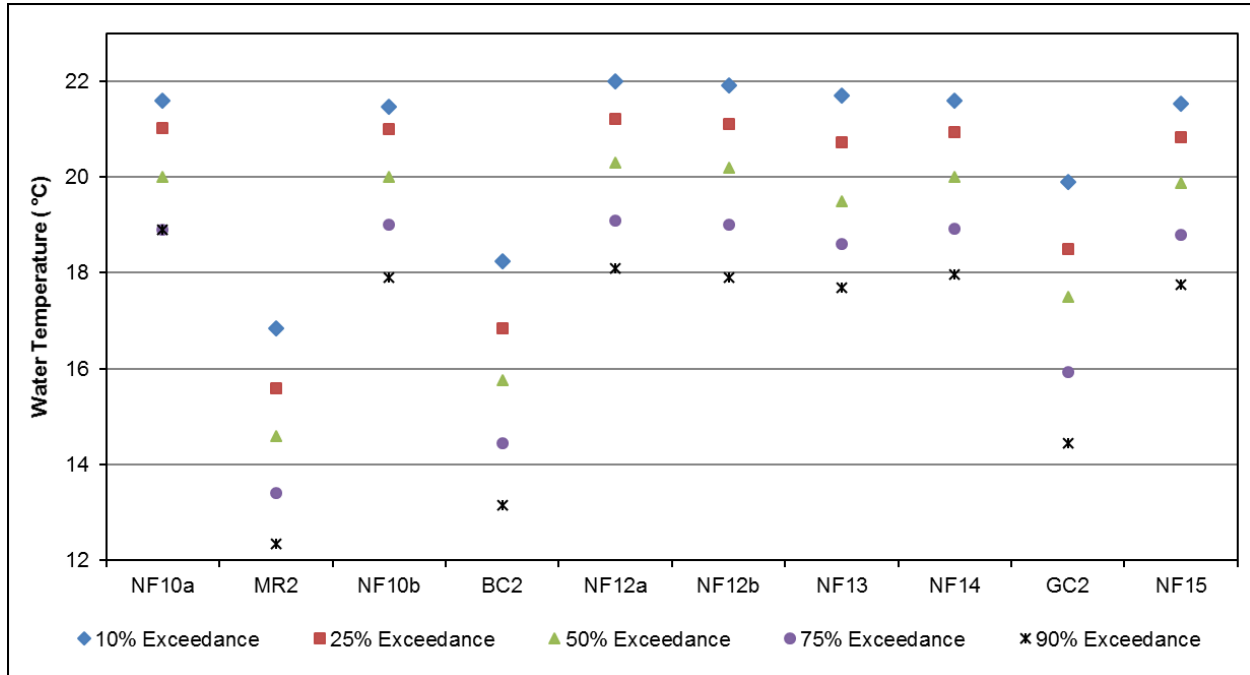


Figure 3-14. Stream temperature frequency distribution at NFFR stations (2014–2016) and project tributaries (2013–2016) during June–September (Source: PG&E and City, 2016ee).

Stream Water Quality Studies

The licensees assessed water quality in project-affected stream reaches to evaluate whether project operations and maintenance activities affect compliance with Basin Plan water quality standards. Water quality sampling stations are shown below in figure 3-15. Parameters monitored include pH, DO, conductivity, nutrients, taste and odor (iron and manganese), and total dissolved solids. Monitoring results were typically within Basin Plan surface water quality objectives (CVRWQCB, 2016). General water quality conditions and any exceedances are described below based on the licensees’ updated studies (PG&E and City, 2018ee).

Milk Ranch Creek. The licensees sampled Milk Ranch Creek at two locations; below Three Lakes Dam just upstream of the diversion structure supplying Milk Ranch Conduit (site MR1) and at the downstream end of Milk Ranch Creek (site MR2) near the confluence with the NFFR. No exceedances of Basin standards occurred for any of the constituents.

Bucks Creek. The licensees did not sample water quality in the 0.25-mile section of Bucks Creek between Bucks Lake and Lower Bucks Lake. This reach does not have a minimum instream flow and is dewatered when water is not released from Bucks Lake Dam. Previously released water, including dam leakage, can become stagnant in this reach due to a lack of hydrologic connectivity.

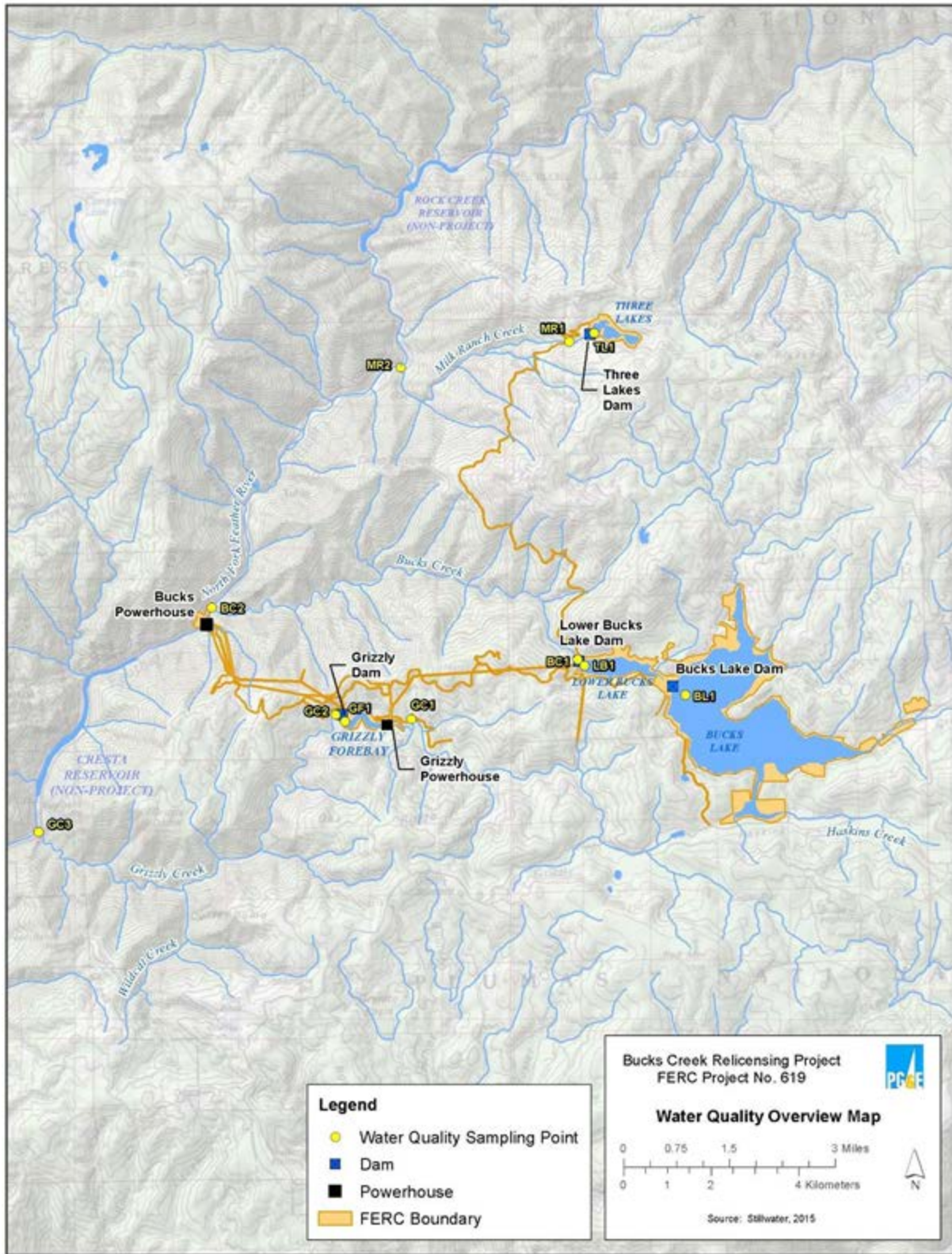


Figure 3-15. Water quality monitoring locations (Source: PG&E and City, 2016ee).

The licensees sampled water quality in Bucks Creek below the Lower Bucks Lake Dam (site BC1) and at the downstream end of Bucks Creek (site BC2) near the confluence with the NFFR. Bucks Creek receives water from low-level dam releases that originate near the bottom of Lower Bucks Lake.

Total iron at site BC2 measured in October slightly exceeded the objective for tastes and odors; no other exceedances occurred.

Grizzly Creek. Grizzly Creek receives water from Grizzly Forebay, which receives most of its water from the bottom of Lower Bucks Lake and the remainder from upper Grizzly Creek. The licensees sampled water quality in Grizzly Creek above Grizzly Forebay (site GC1), below Grizzly Forebay Dam (site GC2), and at the downstream end of Grizzly Creek (site GC3) near the confluence with the NFFR. Basin Plan objectives were exceeded only at site GC2, with an October 2015 pH measurement of 6.1, and in July and October 2015 for taste and odor for total iron.

Reservoir Water Quality and Temperature

Three Lakes. Three Lakes receives water almost entirely from snowmelt, with little inflow outside the late spring/early summer runoff period. Due to natural hydraulic controls, the upper and middle lakes do not drain completely, whereas the lower lake is typically drawn down to minimum pool at an elevation below the outlet conduit by late summer. Under normal operations (*e.g.*, non-spill conditions) water from Three Lakes Dam is released into a short section of Milk Ranch Creek before being diverted to Lower Bucks Lake via the Milk Ranch Conduit.

The reservoir was at full pool and was approximately 13 meters deep near the outlet at site TL1 (figure 3-15) during spring and summer 2015 sampling events. By fall 2015, the reservoir level was drawn down to 9 meters depth (during August). No floating material or algae were observed during sampling events.

Water temperatures in Three Lakes ranged from 6.2 to 21.6 degrees Celsius (°C). Maximum surface water temperatures were found in the summer when thermal stratification was strongest. DO was influenced by thermal stratification during all sampling events, with anoxic conditions increasing in summer and fall. In all seasons, DO concentrations in the hypolimnion²³ were below the Basin Plan objective of 7.0 mg/L for surface waters.

Conductivity was low and ranged from 0.010 to 0.038 millisiemens per centimeter (mS/cm). The low conductivity values are within the Basin Plan objectives for tastes, odors, and chemical constituents.

²³ The lower layer of water in a stratified lake, typically cooler than the water above and relatively stagnant.

Measured pH ranged from 5.4 to 7.4, with minimum pH levels at the bottom of the reservoir during fall. Measured pH values at depth were below the Basin Plan objective for surface waters during all seasons; water quality objectives for pH were met only during the spring and fall in the epilimnion.²⁴ Secchi depths indicated high water clarity, and turbidity was generally low throughout the water column in Three Lakes.

Nutrient concentrations were low during all sampling events and were below the numerical objectives of the Basin Plan. Chlorophyll-*a* was not detected above the minimum reporting limit (RL).

Iron and manganese were detected in Three Lakes during all three sampling events, increasing from the surface to the bottom of the water column and increasing from spring to fall sampling events. Total iron in the bottom of the reservoir during summer and fall and total manganese during the fall exceeded the secondary water quality objectives for tastes and odors in the Basin Plan.

Hardness and alkalinity were low throughout the water column in Three Lakes and total dissolved solids were found at low levels. Total suspended solids were not detected above the minimum reporting limit.

Bucks Lake. Bucks Lake is the largest reservoir in the project area, receiving inflow from Mill Creek, Bucks Creek, Haskins Creek, and other smaller streams. Water stored behind Bucks Lake Dam is released into a short section of Bucks Creek before being impounded in Lower Bucks Lake. Reservoir water levels are 23 to 25 meters deep near the dam (site BL1). No floating material or algae was observed during sampling events. Strong thermal stratification was found in summer and fall, with anoxic conditions below approximately 15 meters in summer and fall. Conductivity was low (0.025 to 0.040 mS/cm). The low conductivity values were well within the Basin Plan objectives for tastes, odors and chemical constituents. Measured pH was below the Basin Plan objective for surface water samples collected at depths greater than 19 meters during summer and fall. Water clarity was fairly high and turbidity was low throughout the water column in Bucks Lake.

Nutrient concentrations in Bucks Lake were low during the spring, summer, and fall 2015 sampling events and chlorophyll *a* was not detected. Total iron (21 to 3,030 micrograms/liter [$\mu\text{g/L}$]) and total manganese (0.9 to 187 $\mu\text{g/L}$) in the bottom of the water column increased in concentrations between seasonal sampling events and exceeded the secondary water quality objectives for tastes and odors identified in the Basin Plan. Total iron measured at the bottom of Bucks Lake was the highest measured by the licensees. Hardness, alkalinity, and total dissolved solids were low throughout the water column and total suspended solids were not detected. Total dissolved solids were well within water quality objectives for tastes and odors.

²⁴ The upper layer of water in a stratified lake.

Lower Bucks Lake. Lower Bucks Lake is directly downstream of Bucks Lake, primarily receiving cold water inflow from the bottom of Bucks Lake Dam. Some of the water stored in Lower Bucks Lake is released downstream into Bucks Creek, while the rest is diverted through Grizzly Powerhouse into Grizzly Forebay.

Lower Bucks Lake water levels were similar during the three sampling events in 2015; depths were 20 to 21 meters near the dam. No floating material or algae was observed during sampling events.

Temperatures in the reservoir ranged from 6.8 to 18.8°C and stratification was apparent during the spring and summer. DO concentrations ranged from 0.4 to 9.9 mg/L and were below the Basin Plan water quality objective during all seasons, decreasing in the water column as the seasons progressed.

Conductivity was low during all seasons, ranging from 0.025 to 0.042 mS/cm, well within the Basin Plan water quality objectives for tastes, odors and chemical constituents. Measured pH values at depth were below the Basin Plan water quality objective during summer and fall in the mid and bottom of the reservoir water column.

Secchi depths were relatively deep and turbidity was generally low in Lower Bucks Lake. An increase in turbidity (1 to 12 nephelometric turbidity unit) was observed in the bottom of the reservoir water column during the spring and fall.

Nutrient concentrations were low during the spring, summer, and fall 2015 sampling events. Ammonia concentrations and nitrate+nitrite were below the numerical objectives for toxicity in the Basin Plan and total phosphorus and chlorophyll-a were not detected.

Elevated concentrations of total iron and total manganese were found at the bottom of Lower Bucks Lake during the spring, summer, and fall 2015 sampling events, exceeding secondary water quality objectives for taste and odor defined in the Basin Plan. Hardness, alkalinity, and total dissolved solids were low and similar in concentration throughout the water column in Lower Bucks Lake. Total suspended solids were not detected and total dissolved solids were within secondary water quality objectives for tastes and odors in the Basin Plan.

Grizzly Forebay. Grizzly Forebay receives flow from Grizzly Creek and Lower Bucks Lake via the Grizzly Powerhouse Tunnel. Water from Grizzly Forebay is released downstream into Grizzly Creek and/or diverted to Bucks Creek Powerhouse.

Water levels in Grizzly Forebay were similar during each of the three sampling events; depths were 16–18 meters near the outlet at site GF1 (figure 3-15). No floating material or algae was observed during sampling events.

Grizzly Forebay was stratified in spring and summer; temperatures ranged from 7.0–17.6°C. DO ranged from 0.5 to 9.6 mg/L (5 to 96 percent saturation) with anoxic conditions increasing in summer and fall. DO concentrations below the Basin Plan water quality objective for surface water (CVRWQCB, 2018) were found in the hypolimnion

during all seasons, with the lowest DO values found in the summer at the bottom of the water column.

Conductivity was low and ranged from 0.026 to 0.048 mS/cm; values were within the Basin Plan water quality objectives for tastes and odors and chemical constituent objectives.

Comparatively high pH values were found in Grizzly Forebay. Values ranged from 6.3 to 7.2, approaching the lower end of the Basin Plan target range but within the numerical objective of between 6.5 and 8.5.

Fishery Resources

Stream Habitat

Project-affected stream reaches are steep (over five percent), with streambanks typically composed of bedrock and large boulders. Project-affected stream channels have predominantly cascade and step-pool morphology that is confined to narrow valley bottoms with little to no floodplain. Transient sediment deposits resulting from landslides and debris flows are commonly found in channels and on valley bottom fluvial terraces throughout the project area. Project-affected stream reaches typically have high transport capacity relative to sediment supply, such that little cobble and gravel is stored for long periods. Steep bedrock channel reaches with little stored sediment are punctuated by short boulder step-pool and cobble-gravel plane-bed reaches. Cobble and gravel are locally stored in small patches associated with boulders and bedrock outcrops, in pool tails, and in short and infrequent lower gradient reaches with plane-bed morphology.

Two general channel types exist within the Bucks Lake tributaries, with differing response to reservoir level fluctuation. The stable, boulder-bedrock channel morphology in the Mill Creek tributaries do not appear to be influenced by reservoir level fluctuations and pose little risk of instability. Changes in the low-gradient gravel-bed reaches of Bucks Creek and Haskins Creek appear to be affected by some combination of fluctuation of reservoir water levels, roads, and other watershed factors (e.g., runoff, groundwater, sediment dynamics, land use, and fire) that have led to channel entrenchment within their historical valleys and widespread evidence of recent channel widening.

The project-affected stream reaches of Bucks, Grizzly, and Milk Ranch Creeks support a coldwater rainbow and brown trout fishery; tributary streams to Milk Ranch Conduit are ephemeral or intermittent, lack connected flow in summer, and do not support fish populations upstream or immediately downstream of the diversions.

Milk Ranch Creek. Milk Ranch Creek downstream of Three Lakes is the steepest of the project-affected reaches, with an average gradient of 22 percent over 3.7 miles, and is characterized almost entirely by high gradient riffles, cascades, and pools (figure 3-16). Substrate in this reach is composed primarily of boulders, cobble, and

bedrock, with gravel contained within pockets protected by the large boulders in the channel.

Milk Ranch Creek's high average gradient make long, open sections of the stream impassible for fish (figure 3-16). Two barriers located below RM 0.40 prohibit upstream passage of fish from the NFFR. A complete fish barrier at RM 0.09 just upstream of the NFFR is located at the outfall of a railroad culvert. Another complete barrier at RM 0.39 is composed of a large cascade/falls that drops approximately 25 feet over a short distance. The barrier at RM 0.09 precludes fish in the NFFR from migrating further up Milk Ranch Creek, and additional upstream barriers likely limits upstream fish movement to short sections throughout the reach.

Milk Ranch Creek contains small patches of spawning gravel, even within the narrow and confined upper sections of the reach. Ground mapping in this creek was limited due to very steep gradients and numerous barriers.

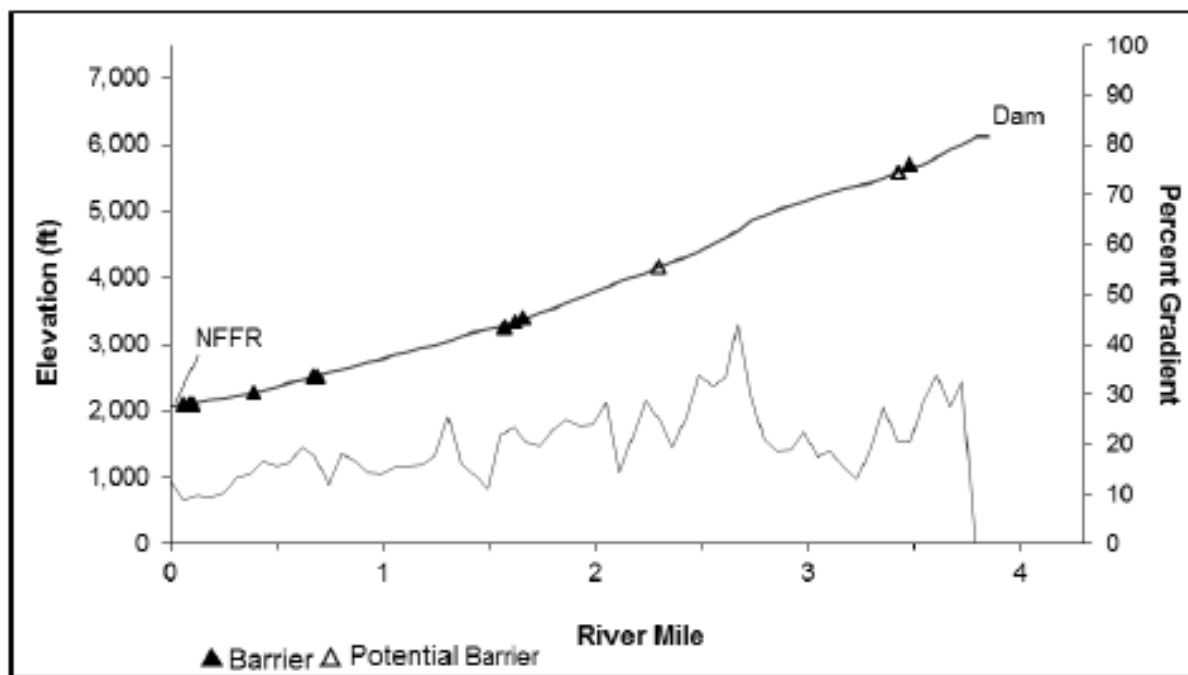


Figure 3-16. Milk Ranch Creek longitudinal profile, channel gradient, and fish passage barriers (Source: PG&E and City, 2016u).

Bucks Creek Downstream of Lower Bucks Lake. Bucks Creek is well-shaded with an 11 percent gradient in the upper 4 miles and five percent in the lower 3.2 miles, and is characterized by high gradient riffles, cascades, and pools, as well as low gradient habitats (riffles and runs). Substrate in Bucks Creek is composed primarily of boulders, cobble, and bedrock. Gravel is contained in pockets protected by the large boulders in the upper section of the reach and in larger deposits in the lower sections of the reach.

Fifty-seven barriers were mapped in Bucks Creek between Lower Bucks Lake and the NFFR, where the average stream gradient is eight percent (figure 3-17). Two barriers

were identified in Bucks Creek near the NFFR: (1) a partial barrier (i.e., potentially passable under high winter storm or spring runoff conditions) at RM 0.22, composed of a short cascade with two distinct vertical drops, and (2) a partial barrier at RM 0.35, composed of a small vertical falls with a 10-foot drop. These barriers restrict fish migration from the NFFR into Bucks Creek, and the presence of additional upstream barriers likely limits upstream fish movement throughout the reach.

Salmonid spawning gravel in Bucks Creek is evenly distributed, although the quality improves from upstream to downstream.

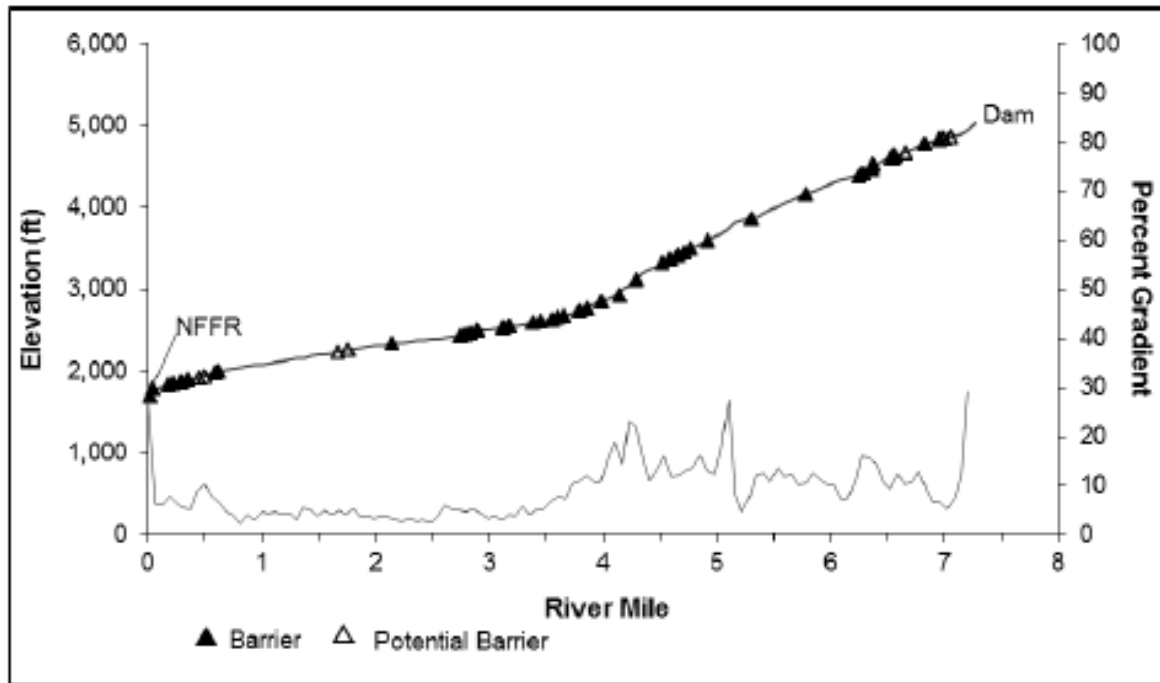


Figure 3-17. Bucks Creek longitudinal profile, channel gradient, and fish passage barriers (Source: PG&E and City, 2018u).

Grizzly Creek Downstream of Grizzly Forebay. Grizzly Creek is moderately shaded, with an average gradient of 4.5 percent in the upper 1.5 miles, and 7.5 percent in the lower 6 miles. The average gradient is steep, the stream channel is relatively wide and contains both high- and low-gradient habitats, composed primarily of boulders, cobble, and bedrock. Gravel is contained within pockets protected by the large boulders in the upper section of the reach, with larger deposits in the lower sections of the reach.

Thirty-five passage barriers were mapped in Grizzly Creek between Grizzly Forebay Dam and the NFFR, where the average stream gradient is seven percent (figure 3-18). Two barriers were identified in Grizzly Creek near the NFFR: (1) a partial barrier at RM 0.31, composed of a short, steep cascade; and (2) a partial barrier at RM 0.49, composed of a large cascade. These barriers restrict fish migration from the NFFR into Grizzly Creek, and the presence of additional upstream barriers likely limits upstream fish movement throughout the reach.

The amount of spawning gravel in Grizzly Creek increases in abundance and quality from upstream to downstream, with large patch sizes in the middle and lower sections of the reach.

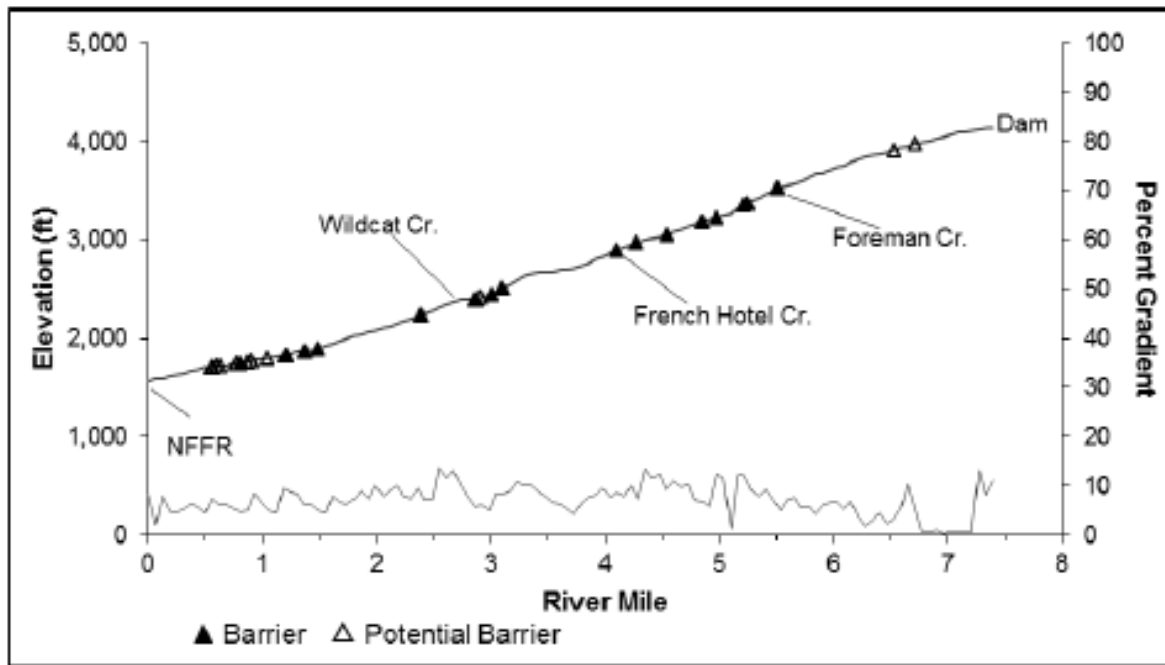


Figure 3-18. Grizzly Creek longitudinal profile, channel gradient, and passage barriers (Source: PG&E and City, 2018u).

Reservoir Habitat

Bucks Lake. Bucks Lake has a total surface area of 1,827 acres, is 5 miles long, has 14 miles of shoreline, and has a maximum depth of 120 feet. Minimum pool in Bucks Lake is 5,080 feet in a Dry or Critically Dry year, and 5,100 feet in a Normal or Wet year (figure 3-19). Normal maximum water surface elevation is 5,157 feet. The lake level does not fluctuate much on a daily basis. Three primary tributary streams flow into Bucks Lake (Mill Creek, Haskins Creek, and Whitehorse Creek). The licensees identified no physical passage barriers within spawning tributaries in the reservoir fluctuation zone. A man-made partial passage barrier exists in Mill Creek upstream of the Bucks Lake high-water line. Native spring-spawning fishes would be able to pass this barrier; however, it appears to have been designed to limit passage for some fall-spawning fishes (kokanee, brook trout, and brown trout). Access to other tributaries for fall-spawning fishes is limited by natural inflow. In extreme low water years, where inflow from all tributaries is low, spawning habitat may not be available to fish in Bucks Lake.

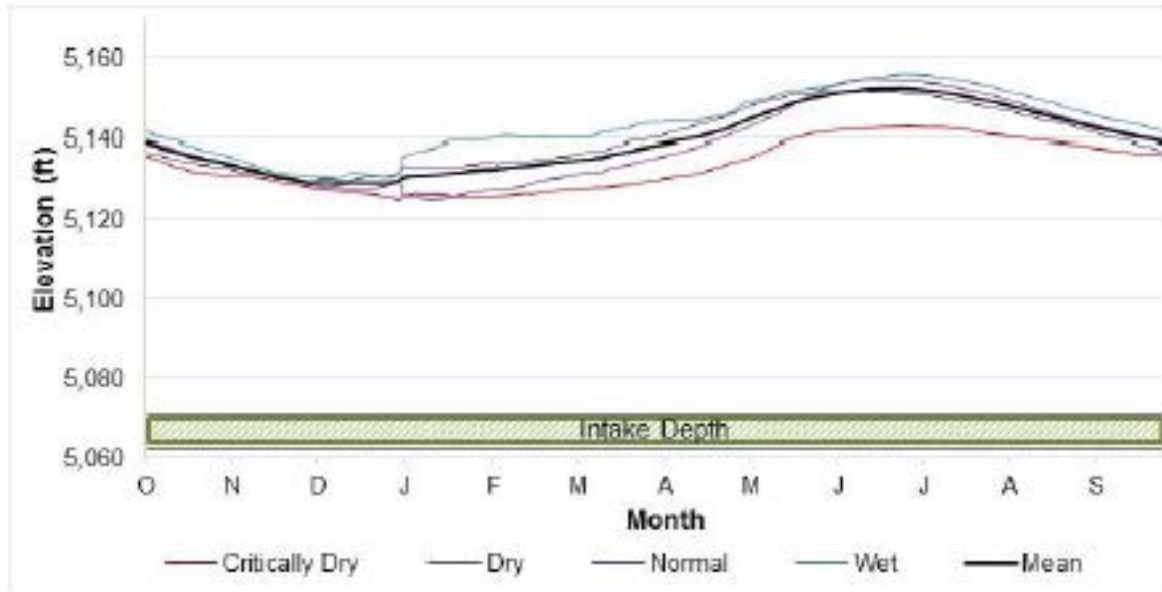


Figure 3-19. Average surface elevation by water year (1994-2013) and intake depth of Bucks Lake (Source: PG&E and City, 2018a).

Lower Bucks Lake. Lower Bucks Lake has a total surface area of 136 acres, is 1.1 miles long, has 2.7 miles of shoreline, and has a maximum depth of 59 feet. Minimum pool in Lower Bucks Lake is 4,966 feet, and normal maximum water surface elevation is 5,022 feet (figure 3-20). Lower Bucks Lake derives its water from Bucks Lake and from Three Lakes through the Milk Ranch Conduit and four small tributaries. Bucks Lake Dam is a physical upstream passage barrier for fish in Lower Bucks Lake. The Grizzly Powerhouse intake in Lower Bucks Lake is screened to prevent fish entrainment. Substrate in Lower Bucks Lake is typically a mix of sand and gravel with some cobble and large boulders.

Three Lakes. Three Lakes Dam on Milk Ranch Creek has a drainage area of 1.3 square miles. Normal maximum water surface elevation is 6,077.8 feet, and normal minimum water surface elevation is 6,044 feet. Three Lakes has a total surface area of 40 acres, is 0.75 mile long, and has 2 miles of shoreline. Two tributaries flow into Three Lakes, with little inflow outside of the late spring/summer runoff period. Due to natural hydraulic controls, all three lake segments do not drain completely. Rearing habitat in Three Lakes is not very complex and contains little wood, aquatic vegetation, or riparian cover. Substrate in Three Lakes is typically cobble and boulder dominated, with areas of sand.

Grizzly Forebay. Grizzly Forebay has a total surface area of 38 acres, is 0.8 miles long, has 1.75 miles of shoreline, and has a maximum depth of 52 feet. Minimum pool in Grizzly Forebay is 4,303 feet, and normal maximum water surface elevation is 4,316 feet (figure 3-21). Water in Grizzly Forebay is derived from Lower Bucks Lake and delivered through the Grizzly Powerhouse; additional water enters Grizzly Forebay

from Grizzly Creek upstream of the Forebay. Substrate in Grizzly Forebay is typically gravel with some cobble.

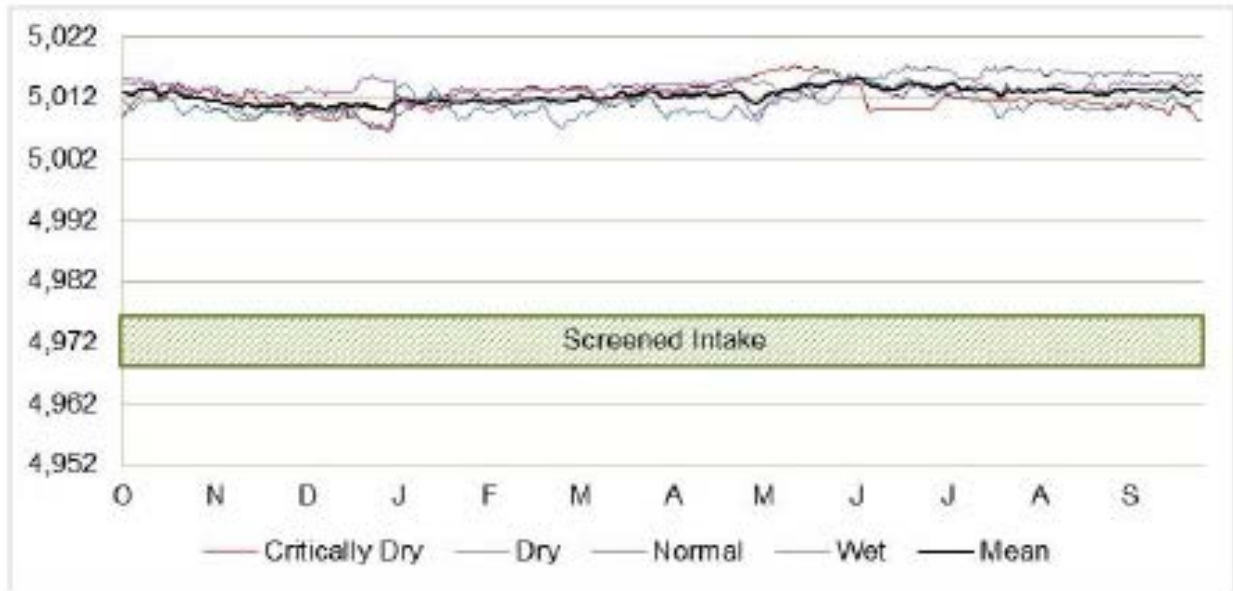


Figure 3-20. Average surface elevation by water year (1994-2013) and intake depth of Lower Bucks Lake (Source: PG&E and City, 2018a).

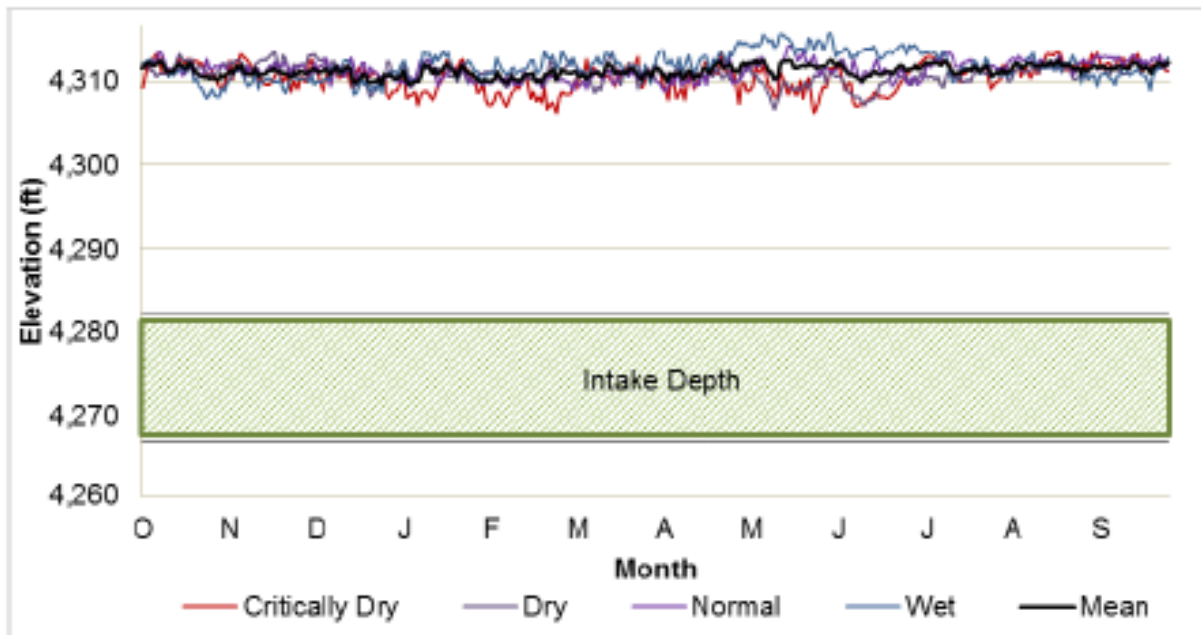


Figure 3-21. Average surface elevation by water year (1994-2013) and intake depth of Grizzly Forebay (Source: PG&E and City, 2018a).

Instream Flow Releases

As a component of its 2006 License Amendment, the licenses conducted an instream flow study in the Project's bypass reaches (Thomas R. Payne & Associates, 1991). Based on the study results, the licensees' amended license included the minimum flow release schedule that is outlined in table 2-1. In addition to minimum instream flow requirements, the amended license required annual channel maintenance flow releases from both Lower Bucks Lake and Grizzly Forebay Dams into Bucks and Grizzly Creeks, respectively. Channel maintenance flow events consist of releases of 50 to 70 cfs for at least 12 hours in March if a natural spill in excess of 70 cfs in Bucks Creek, or 50 cfs in Grizzly Creek, has not occurred in the previous 18 months. The channel maintenance flow may be accomplished by any combination of release, spill, and accretion flow.

Large Woody Material Abundance and Distribution

In project affected reaches, large woody material (LWM) is transported downstream during periods of high flow and deposited in or on the margins of the channel as flows subside. There are relatively low amounts of large wood in project streams, and most is less than 25 feet long and between 6 and 17 inches in diameter. LWM is generally more abundant in the upper sections of stream reaches, particularly in Milk Ranch and Bucks Creeks. The abundance of LWM in the upper Bucks Creek area is the result of a large debris flow that occurred in 1997-1998. LWM abundance is lowest in Grizzly Creek. The low abundance and/or small size of LWM in project-affected streams provides little habitat complexity.

Passage of woody material over Lower Bucks Lake and Grizzly Forebay dams into the downstream reaches is currently initiated during spill flows or in concert with channel maintenance flows. In 2006, the licensees began passing LWM over project dams during spill events and/or mechanically removing LWM from reservoirs and depositing it in the channel downstream of the dams. The passage of woody material over Grizzly Forebay Dam was observed during a December 2015 spill flow of approximately 92 cfs.

Fish Populations

Project stream reaches support coldwater game fish species. The licensees conducted fish population studies in 7 years between 2002 and 2016 and documented rainbow trout in all three of the project streams, and brown trout in only Bucks and Grizzly Creeks (PG&E and City, 2018k). Other fishes observed included California roach, and sculpin (table 3-4). In the 2002 to 2016 population surveys, rainbow trout was the most abundant species; however, brown trout was dominant at the two survey sites immediately downstream of Lower Bucks and Grizzly Forebay dams.

Table 3-4. Fish species observed, by site, during and prior to relicensing (Source: PG&E and City, 2018k, as modified by staff).

Species	Milk Ranch Creek			Bucks Creek			Grizzly Creek		
	Upper Reach	Mid Reach	Lower Reach	Upper Reach	Mid Reach	Lower Reach	Upper Reach	Mid Reach	Lower Reach
Brown trout				◆◆	◇	◆	◆◆	◆◆	◆◆
Rainbow trout			◆◆		◆◆	◆◆	◆◆	◆◆	◆◆
Brook trout		◆							
CA roach				◆					
Sculpin									◇

◇ Observed during relicensing studies (2002-2016).

◆ Observed prior to 2002.

Three Lakes. The fish population in Three Lakes is composed of golden shiner (91 percent), brook trout (8 percent), and brown trout (1 percent). Brown, brook, and rainbow trout were stocked as early as 1912 (California Fish and Game Commission, 1913), and prior to 1985 California DFW stocked golden trout. They used aerial planting techniques to annually stock between 500 and 8,000 (mostly) brook and rainbow trout fingerlings into Three Lakes. Stocking in Three Lakes was discontinued in 1985 after surveys indicated that the lakes supported self-sustaining populations of resident trout (PG&E, 1992). It is unclear when or how golden shiner were introduced to Three Lakes, but the population had reached nuisance levels by the 1960s, even though it provided a food source for the trout populations (PG&E, 1992). Studies in 1992 found that most of the fish were distributed in the lower and middle lakes and that the rainbow trout, brook trout, and golden shiner populations were self-sustaining and appeared to be in good condition; however, rainbow trout were last observed in Three Lakes in 1992.

Although the fishery in Three Lakes was historically supplemented, the absence of stocking over the past 31 years and the ages of fishes present indicate some natural reproduction.

Bucks Lake. The fish population in Bucks Lake is made up of Lahontan redbreasted shiner, California roach, speckled dace, kokanee, brown trout, rainbow trout, brook trout, and lake trout. Bucks Lake has been managed by California DFW as a coldwater trout fishery for over 80 years, with millions of hatchery fish released into the reservoir over

this period, including brown trout, rainbow trout, brook trout, kokanee, and lake trout. Other introductions include Lahontan redbside and golden shiner.

Bucks Lake is currently planted with catchable rainbow trout, brown trout, and brook trout to augment naturally spawned populations. This stocking, along with the existing populations of lake trout and kokanee, support a significant recreational fishery.

Kokanee, first introduced into Bucks Lake by California DFW in 1954, had overpopulated the lake by the 1970s, resulting in stunted fish. Eradication efforts were initiated by California DFW in the mid-1970s that included construction of fish barriers to prevent kokanee from migrating into spawning tributaries, as well as use of rotenone in Haskins and Bucks Creeks to kill kokanee and their eggs.

Lake trout were first introduced to Bucks Lake in 1984 and 1985 to prey upon the prolific kokanee populations that tended to reside in the deeper, colder areas of the lake where rainbow and brown trout did not forage regularly. Lake trout were last planted in Bucks Lake in 2008. Lake trout still reside in Bucks Lake, and the licensees captured Age 2–3+ fish in 2015, indicating natural spawning is occurring in the lake.

Although the fishery in Bucks Lake continues to be stocked with fish, the age-class distributions for kokanee, brook trout, lake trout, Lahontan redbside, California roach, and speckled dace indicate some natural reproduction is occurring in Bucks Lake.

Lower Bucks Lake. The fish population in Lower Bucks Lake includes brown trout, Lahontan redbside, kokanee, lake trout, California roach, and speckled dace. The Lower Bucks Lake fishery historically has not been stocked, although catchable-size brown trout were stocked in 1994 as part of a FERC-approved fish stocking plan to mitigate for any trout losses during the Grizzly Development construction, and California DFW planted an additional 50,000 fingerling brown trout that year. The reservoir has not been supplemented since 1994. Angler reports, and the current species composition, indicate that Lower Bucks Lake supports a self-sustaining population of rainbow and brown trout. Golden shiners have been reported to be abundant in Three Lakes, although none were captured in surveys of Lower Bucks Lake (1989, 1990, 1994, or 2015).

Fish age-class distributions in Lower Bucks Lake indicate natural reproduction of most species. However, the only two lake trout captured in Lower Bucks Lake were Age 8+ to 10+.

Grizzly Forebay. Fish in Grizzly Forebay includes brown trout and rainbow trout. Recreational anglers report catching naturally produced rainbow trout and brown trout; however, there is no information on historical stocking and California DFW does not currently stock this reservoir. Both species migrate upstream and spawn in Grizzly Creek.

The age-class distributions of fish present in Grizzly Forebay indicate some annual natural reproduction of rainbow trout. However, the brown trout captured in Grizzly Forebay included only Age 3+ through 5+ fish. Steitz and Fry (1991) noted that brown trout do spawn in Grizzly Creek upstream of the Forebay.

Benthic Macroinvertebrates

The licensees collected benthos samples in 2015 and 2016 from 12 sites throughout Milk Ranch Creek downstream of Three Lakes, Bucks Creek downstream of Lower Bucks Lake, and Grizzly Creek downstream of Grizzly Forebay. They identified 147 distinct taxa from these samples. A suite of standard metrics that characterize benthic macroinvertebrate (BMI) assemblages was calculated for each sample; these metrics have been found to be reliable responders to disturbance. A subset of these metrics was used to calculate the Sierra Index of Biotic Integrity (Sierra IBI) (Rehn, 2008) and the California Stream Condition Index (CSCI, Rehn et al., 2015).

BMI assemblages were generally of very good quality in project streams as indicated by high overall taxonomic richness, presence of sensitive taxa, average to above average Sierra IBI scores, and CSCI scores that fell within the “likely intact condition.” An exception was the sample collected from a site below Three Lakes in 2015, which had a below average Sierra IBI score and a CSCI score that fell within the “possibly altered condition.” The release of water from Three Lakes, associated with its annual drawdown, which began prior to and occurred during the sampling event, may have been a contributing factor to the lower scores for this site. This site was resampled in 2016 prior to the beginning of the annual drawdown. Sierra IBI scores for both the sample and the replicate collected from this site in 2016 were substantially higher and CSCI scores for both fell within the “likely intact condition,” which suggests that adverse effects related to the drawdown were temporary.

Physical habitat at sites throughout the study area was diverse with adequate substrate for BMI colonization. With a few exceptions, sampling sites were remote with human disturbance absent or minimal. Sites where human disturbances were recorded included a site on Bucks Creek upstream of Bucks Lake near a campground, and a site on Grizzly Creek upstream of the North Fork Feather River confluence, which had vertical concrete walls within the bankfull width of the channel. Despite evidence of disturbance at these sites, CSCI scores were within the range of “likely intact condition,” and two special-status species were observed, black juga and western pearlshell.

Aquatic Invasive Species

AIS that have the potential to occur within the project area based on proximity of documented occurrences to the NFFR watershed include quagga mussel and zebra mussel. The licensees did not document these species during macroinvertebrate or other relicensing studies.

3.3.2.2 Environmental Effects

Water Quantity

In their Supplemental FLA (PGE and City, 2018a), the licensees propose several measures that would affect water quantity in project-affected stream reaches and water

levels in Bucks Lake, Three Lakes, and Grizzly Forebay. In this section, we analyze the effects of the following measures on water quantity: Water Year Type Determination (WR-7), Minimum Instream Flow Releases (WR-1) and Full Natural Flow²⁵ in Bear Ravine at Milk Ranch Conduit Diversion No. 8 (WR-2), Drought Management Plan, Manage Diversions Milk Ranch Conduit for Safety and Aesthetics (WR-8), Wet Water Year Milk Ranch Conduit Diversion Nos. 1 and 2 Bypass Flows (WR-9), and Streamflow and Reservoir Level Gaging Plan (WR-10). Many of these measures also have the potential to affect water quality, fishery resources, terrestrial resources, and recreation, and are addressed later in this section.

Water Year Type Determination

California DWR and other water management agencies and hydropower projects in the region account for hydrologic variability by establishing water year types that guide water allocation decisions. The water year type determination at the project would govern how instream flow releases are adjusted based on the surrounding river basin conditions.

In their Supplement to the Final License Application (PG&E and City, 2018a), the licensees propose to classify water years into four water-year types based on California DWR's water year forecast of unimpaired runoff in the Feather River at Oroville (as set forth in DWR's Bulletin 120) (table 3-5) (WR-7). California DWR's *Bulletin 120, Water Year Conditions in California*, is a publication issued four times a year, in the second week of February, March, April, and May, forecasting the volume of seasonal runoff from the state's major watersheds. It provides summaries of precipitation, snowpack, reservoir storage, and runoff to define water year type classifications. The licensees would use water year type forecasts to guide the implementation of its proposed instream flows (WR-1), channel maintenance flows (WR-4), and project reservoir operations (WR-5). The licensees would also use the April forecast to determine if conditions are met for the Wet water year Milk Ranch Conduit Diversion Nos. 1 & 2 bypass flows (WR-9).

The licensees would apply California DWR's forecast of the water year type on or about February 10 and operate for the remainder of that month and until the next month's forecast is available. New forecasts would be developed on or about the tenth of March, April and May after the snow surveys are completed, and operations would be changed within two business days, or as soon thereafter as accessible for manually operated gages. The licensees would also provide notice to the Forest Service and FERC of the final water year type determination within 30 days of making the determination.

²⁵ Full Natural Flow refers to unimpaired flows in this context.

Table 3-5. Licensees’ proposed water year types based on California DWR’s Bulletin 120 (Source: PG&E and City, 2018a, as modified by staff).

Water Year Type	Feather River Flow to Oroville
Wet	Greater than or equal to 5,679 TAF
Normal	Less than 5,679 TAF but greater than or equal to 3,228 TAF
Dry	Less than 3,228 TAF but greater than or equal to 2,505 TAF
Critically Dry	Less than 2,505 TAF

TAF: Thousand acre-feet

The licensees’ proposed water year type classifications for project operations are consistent with Forest Service preliminary 4(e) condition 30, Water Board preliminary condition 2, FWS 10(a) recommendation 2, and California DFW 10(j) recommendation 3. California DFW (10(j) recommendation 3) states that the licensees should provide notice to the FWS, Water Board, and California DFW in addition to the Forest Service and FERC of final water year type determination.

Our Analysis

The licensees propose to establish four water year types linked to California DWR’s forecasts for annual unimpaired flow volume in the Feather River at Oroville, which are provided in California DWR’s Bulletin 120. The four water year types for this project were chosen to match the water year types already established for confluent and downstream hydroelectric projects in the North Fork Feather River: Rock Creek-Cresta Hydroelectric Project (FERC No. 1962) and Poe Hydroelectric Project (FERC No. 2107). Because California DWR Bulletin 120 is typically not published until approximately the 10th of each month, implementation of the water year type would take effect within two days of the release of this bulletin.

California DWR and other water management agencies and hydropower projects in the region account for hydrologic variability by establishing water year types that guide water allocation decisions. We find that the water year type determination would effectively and consistently guide delivery of instream flow releases based on the surrounding river basin conditions. Notice to FWS, Water Board, and California DFW of final water year type determination is specified under preliminary Forest Service condition 30.

Minimum Instream Flow Releases and Full Natural Flow²⁶ in Bear Ravine

The licensees historically operated the project to store snowmelt from springtime runoff in the project reservoirs to be used for recreation, hydropower, and environmental benefits. The project attenuates high flows in Bucks Creek and Grizzly Creek from winter storms and spring runoff and stores water in Bucks Lake, Lower Bucks Lake, and Grizzly Forebay. The project also diverts water from Milk Ranch Creek for hydropower generation. Water levels in Bucks Lake, Lower Bucks Lake, and Grizzly Forebay are maintained relatively high for recreation and safety.

The licensees' proposed minimum instream flow releases for each project-affected stream reach and water year type are summarized in table 2-3 (WR-1). These include monthly releases into Bucks Creek below Bucks Lake, Bucks Creek below Lower Bucks Lake, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek below Three Lakes, Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1, and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3. The four different water year types, Critically Dry, Dry, Normal, and Wet, are defined in Annual Determination of Water Year Type (WR-7).

Under measure WR-1, the licensees would implement their proposed minimum instream flow releases as soon as reasonably practicable within the first 90 days of the new license term (subject to weather and road conditions), and would measure compliance with these flows using an average hourly flow calculated at the top of each hour. The licensees would calculate the average hourly flow by taking the mean of four instantaneous measurements at 15-minute intervals, as specified by USGS standards. The average hourly streamflow would be at least 90 percent of the applicable minimum streamflow requirement set forth in table 2-3. If the average hourly flow temporarily falls below the requirement, the licensees would restore the required minimum streamflow as soon as reasonably practicable and would document the duration and cause for temporary decreases in flows in an annual report.

The licensees would file a report with FERC, the Forest Service, Water Board, FWS, and California DFW within 30 days of any incident where the average daily flow deviates below the applicable minimum streamflow requirement.²⁷ The report would identify, to the extent possible, the cause, severity, and duration of the deviation; any observed adverse environmental effects resulting from the deviation, and any corrective actions taken. The licensees would notify FERC, the Forest Service, Water Board, FWS,

²⁶ Full Natural Flow refers to unimpaired flows in this context.

²⁷ Streamflow requirements would be temporarily modified as required for maintenance or repair of facilities, with 5 working days' notice provided to FERC, the Forest Service, Water Board, FWS, and California DFW.

and California DFW within two business days of any modification to minimum streamflow requirements due to operational emergencies.

Finally, the licensees would submit a draft annual report from the prior water year to the Forest Service, Water Board, FWS, and California DFW by January 31. Daily mean data would be included in the report for all continuously gaged locations. The annual report would include dates the licensees checked valves; estimated flow release when valves were checked; documentation of any adjustments to valves; and the date the valves were adjusted for the winter setting or minimum over-winter valve settings at Milk Ranch Creek downstream of Three Lakes and at Milk Ranch Conduit Diversion No 1. The licensees propose to file a final report with FERC within 90 days of providing the draft to the agencies, including 45 days for the resource agencies to provide their input. The licensees would review the instream flow documentation each year during the Forest Service consultation meeting (GEN-2) and the Ecological Consultation Group meeting (GEN-3).

The licensees' proposed minimum instream flow releases, as described above and in table 2-3, are consistent with Forest Service preliminary 4(e) condition 31, FWS 10(j) recommendation 2, and California DFW 10(j) recommendation 5. In the licensees' Reply Comments, Recommendations, Terms and Conditions (filed November 19, 2018), the licensees agreed to minor modifications to their proposed language in WR-1 and defer to the Forest Service in its preliminary 4(e) condition 31.

In its preliminary condition 1, the Water Board indicates that it supports this measure but recommends minimum streamflow compliance be based on a 24-hour average (mean daily flow) instead of mean hourly flows, and instantaneous readings instead of hourly averages. In addition, the Water Board recommends instantaneous flows be used to construct the averages of the mean daily flow value and that they be measured in time increments of not more than 15 minutes; mean daily flows should be 24-hour averages of the instantaneous readings from midnight of one day to midnight the next day; and instantaneous flow measurements should be at least 90 percent of the minimum flow requirements.

Under WR-2, the licensees would cease diverting water from Bear Ravine at the Milk Ranch Creek Diversion No. 8. This would allow all water from Bear Ravine upstream of the current diversion point to flow into Bear Ravine downstream of the diversion point. This measure is consistent with Forest Service preliminary 4(e) condition 32, Water Board preliminary condition 1, FWS 10(j) recommendation 3, and CDFW 10(j) recommendation 6.

Our Analysis

Under WR-1, the licensees would increase their minimum instream flow releases into project-affected stream reaches, during all water year types, except for portions of Critically Dry years. Releases from lower Bucks Lake into Bucks Creek would vary seasonally and by water year type and would be up to 9 cfs higher than existing

conditions. Minimum flow releases from Grizzly Forebay into Grizzly Creek below Grizzly Forebay Dam would also vary seasonally by water year type and would be up to 9 cfs higher than existing conditions.

Currently, there are no minimum instream flow releases from Bucks Lake into Bucks Creek or into Milk Ranch Creek or its tributaries. Under WR-1, the licensees would release 3 cfs into Bucks Creek (immediately below the dam), up to 2 cfs into Milk Ranch Creek below Three Lakes and at Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1; and up to 0.5 cfs at South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3. These minimum instream flows would provide additional water in these affected stream reaches and would be most noticeable immediately downstream of the release points in each stream.

During relicensing studies, the licensees developed an operations model that analyzed the combined effect of these measures on streamflows and reservoir elevations in select streams and reservoirs, using a 43-year flow period. For comparison purposes, the licensees used a baseline condition with existing operational measures to analyze the effects of the proposed streamflow and reservoir operation changes (labeled PA [Proposed Action] in the following figures). The following sections describe the effects of these instream flow measures on water quantity in Bucks Creek below Bucks Lake, Bucks Creek below Lower Bucks Lake, Bucks Creek with the confluence of Bear Ravine, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek below Three Lakes, Milk Ranch Conduit Diversions 1 and 3, and storage in Bucks Lake and Three Lakes Reservoir.

Instream Flows. The net effect of the licensees proposed minimum instream flow releases on monthly percentile curves (20, 50, and 80 percent)²⁸ for Bucks Creek below Bucks Lake, Bucks Creek below Lower Bucks Lake, Bucks Creek at the confluence with Bear Ravine, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek below Three Lakes, Milk Ranch Creek below Milk Ranch Conduit Diversion No. 1, and Milk Ranch Creek at the confluence with South Fork Grouse Hollow Creek are shown in figures 3-22 through 3-28.

In Bucks Creek below Bucks Lake (figure 3-22), the 20th percentile flows from March to June and 50th percentile flows in March and April reflect the increased minimum instream flows. Flows are similar during other months of the year when spill normally occurs.

²⁸ Percentile curves refer to the flow (or reservoir level) that is exceeded for all but 20, 50, or 80 percent of the days in that month.

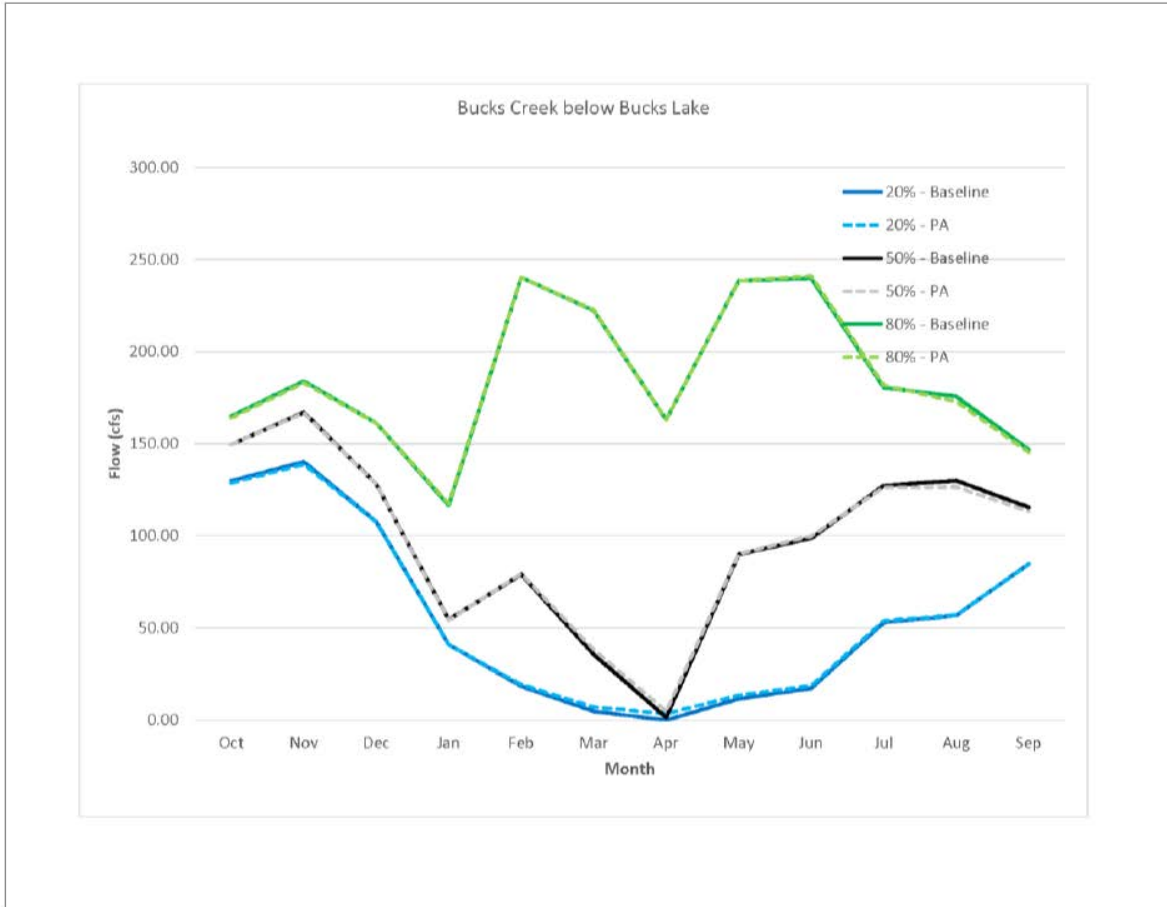


Figure 3-22. Bucks Creek below Bucks Lake (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

In Bucks Creek below Lower Bucks Lake (figure 3-23), flows generally would be higher during all months due to the proposed increased minimum instream flows (WR-1) and changes to channel maintenance flows (WR-4).

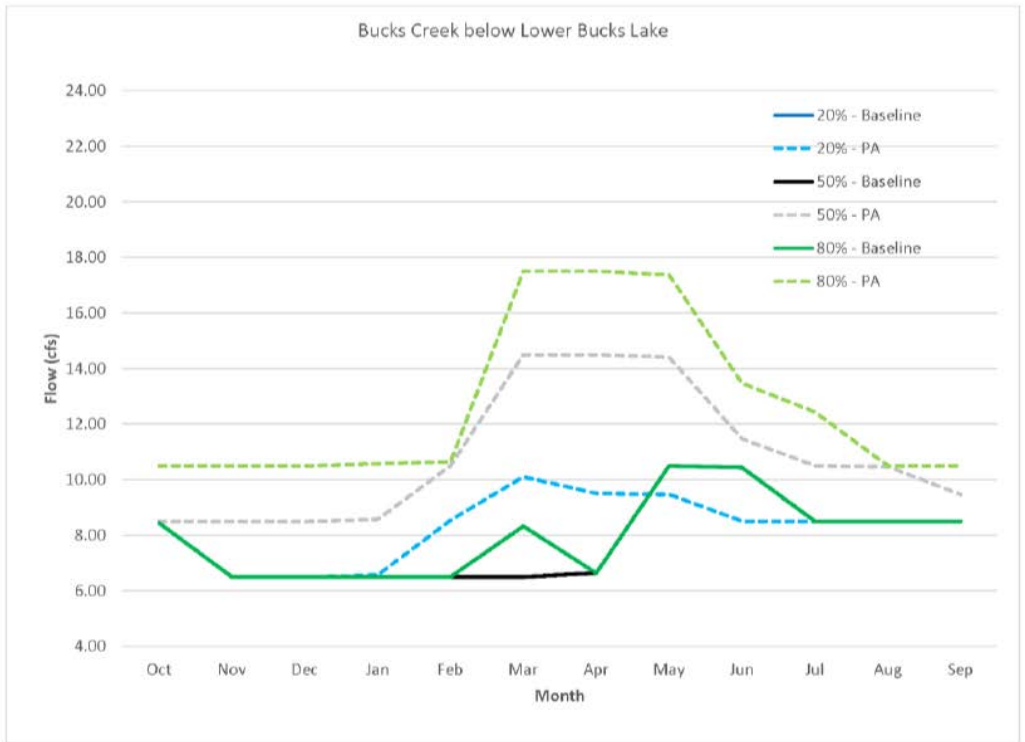


Figure 3-23. Bucks Creek below Lower Bucks Lake (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

In Bucks Creek at the confluence with Bear Ravine (downstream of Milk Ranch Conduit Diversion No. 8; figure 3-24), flows also would be higher under most conditions due to increased instream flows (WR-1), channel maintenance flows (WR-4) and unimpaired flow in Bear Ravine (WR-2).

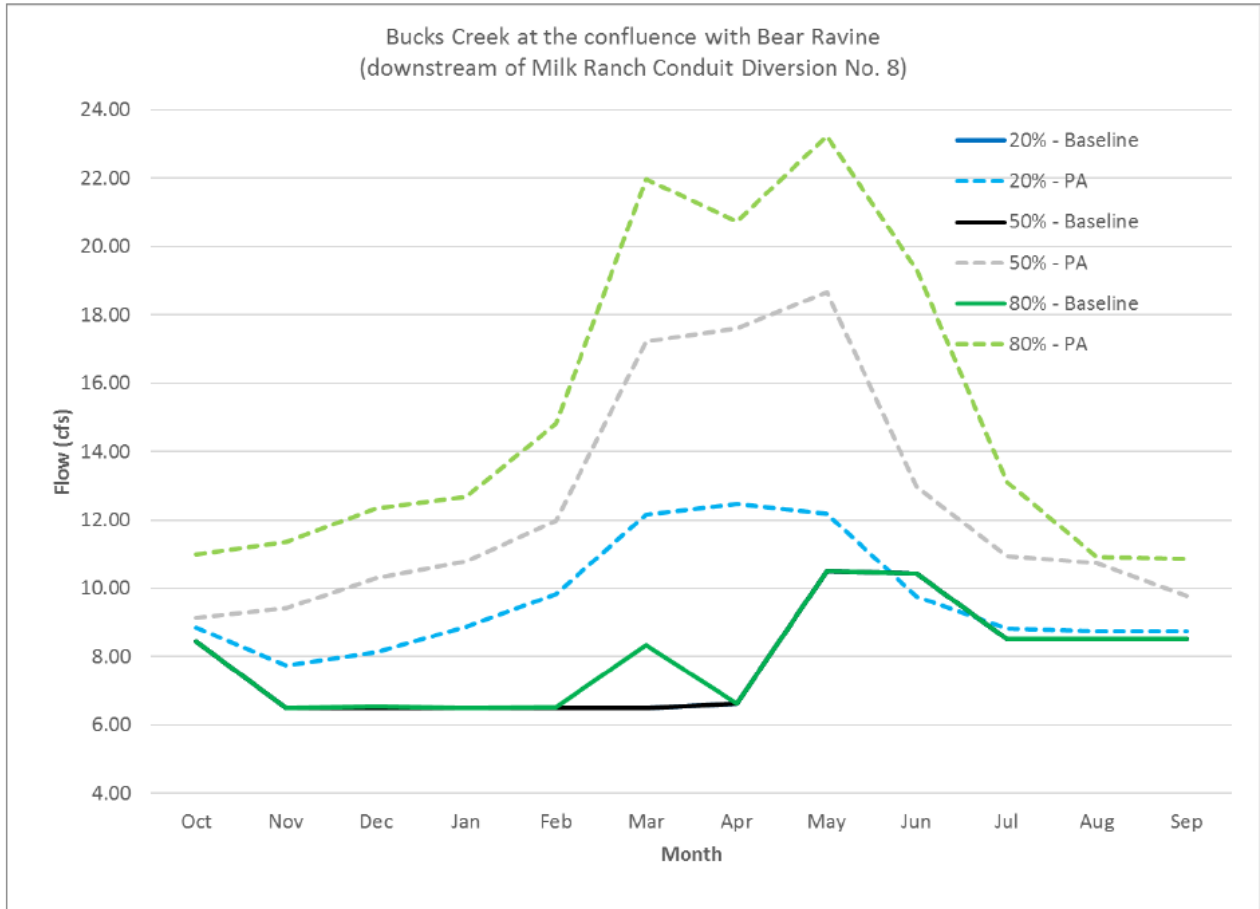


Figure 3-24. Bucks Creek at the confluence with Bear Ravine, downstream of Milk Ranch Conduit Diversion No. 8 (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

In Grizzly Creek below Grizzly Forebay (figure 3-25), the 20th percentile flows would be the same from July through October and December. In May and June, the 20th percentile flows decrease due to the reduced minimum instream flow requirements during Critically Dry years but increase in November and January through April. The volume of spills (maximum flows) is nearly the same; however, spills would shift to different months.

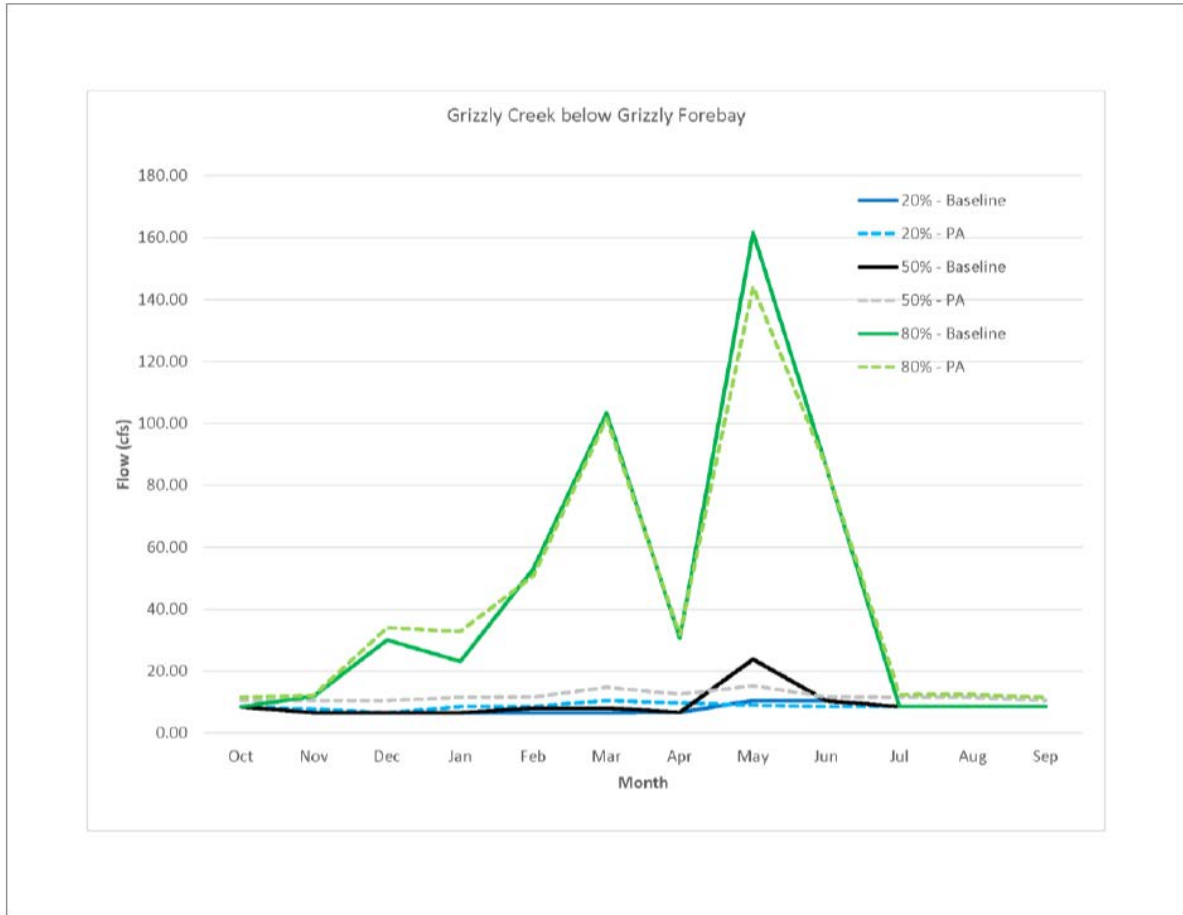


Figure 3-25. Grizzly Creek below Grizzly Forebay (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

In Milk Ranch Creek below Three Lakes (figure 3-26), flows from November through March would be similar due to similar operating conditions (Three Lakes' outlet valve is fully open) during these months. The largest change in flows would occur from September (when Three Lakes is drawn down under existing conditions) to August (when Three Lakes is proposed to be drawn down under measure WR-3). Spills (maximum flows) would be reduced due to proposed measure WR-1.

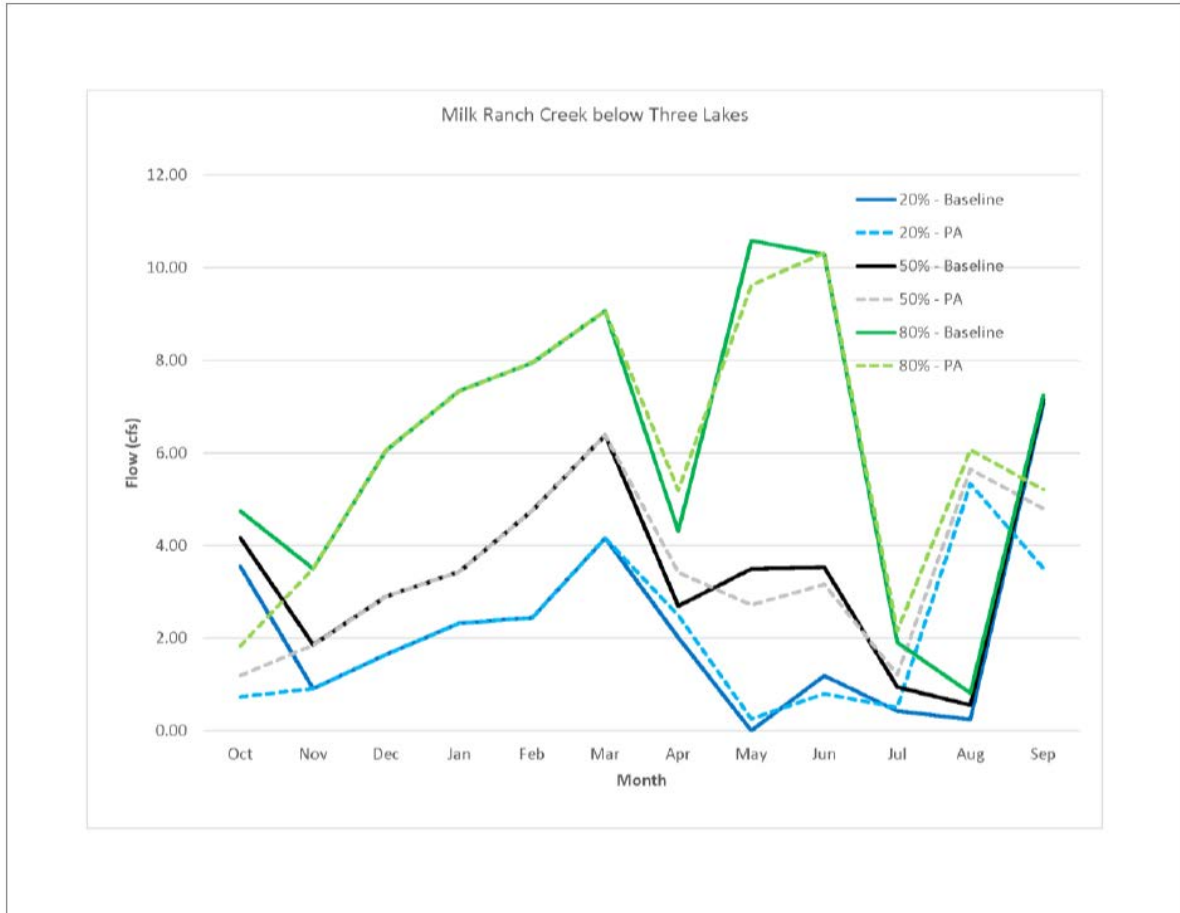


Figure 3-26. Milk Ranch Creek below Three Lakes (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

In Milk Ranch Creek below Milk Ranch Conduit Diversion No. 1 (figure 3-27), the 20th and 50th percentile flows would increase due to measure WR-1. Maximum (80th percentile) flows also would increase due to measures WR-1 (Instream Flows) and/or WR-9 (Wet Water Year Milk Ranch Conduit Diversion Nos. 1 and 2 Bypass Flows).

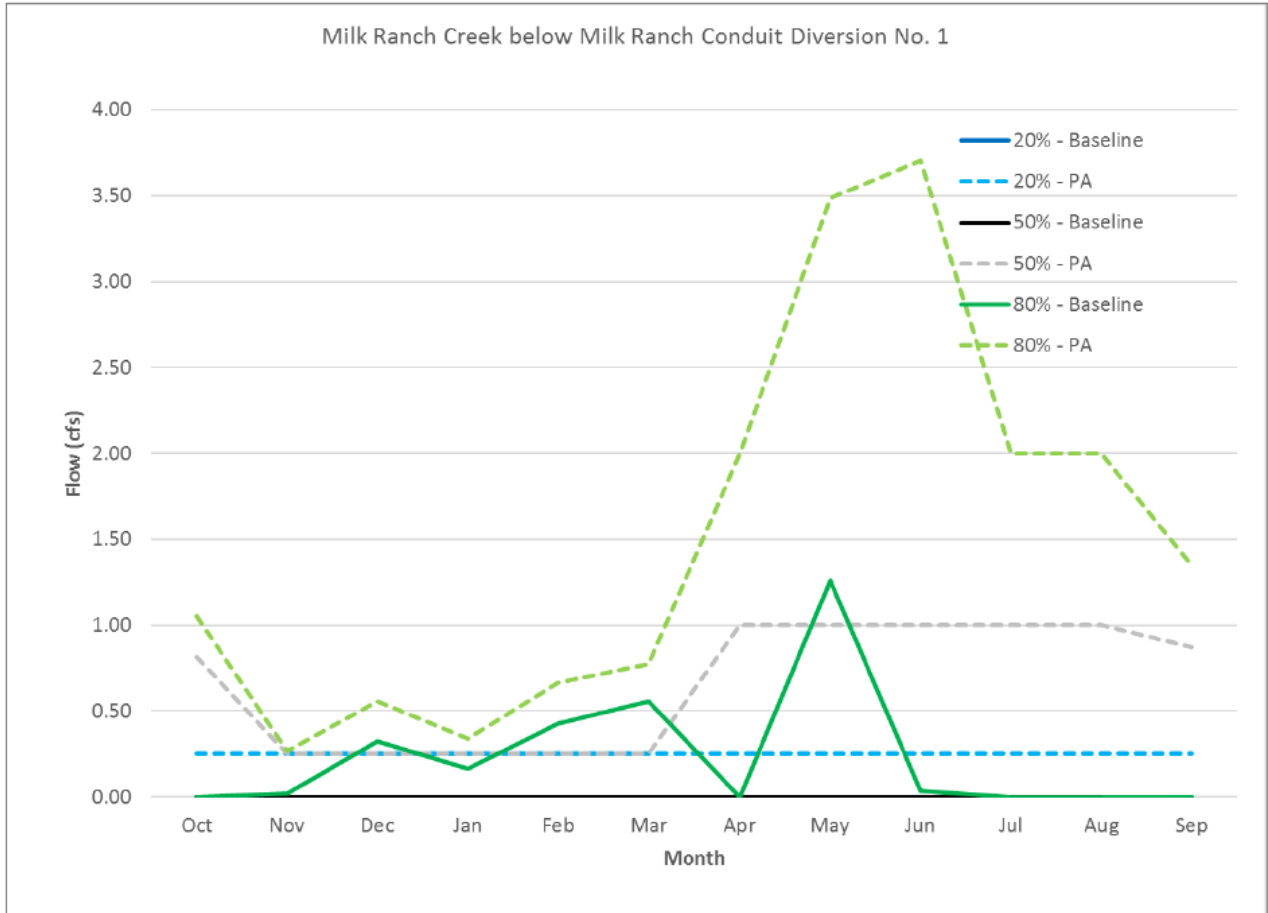


Figure 3-27. Milk Ranch Creek below Milk Ranch Conduit Diversion No. 1 (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

In Milk Ranch Creek at the confluence with South Fork Grouse Hollow Creek (downstream of Milk Ranch Conduit Diversion No. 3; figure 3-28), the 20th and 50th percentile flows would increase each month under measure WR-1. The volume of spills (maximum flows) is nearly the same; however, flows would increase in July, August and September due to measures WR-1 (Instream Flows) and/or WR-9 (Wet Water Year Milk Ranch Conduit Diversion Nos. 1 and 2 Bypass Flows).

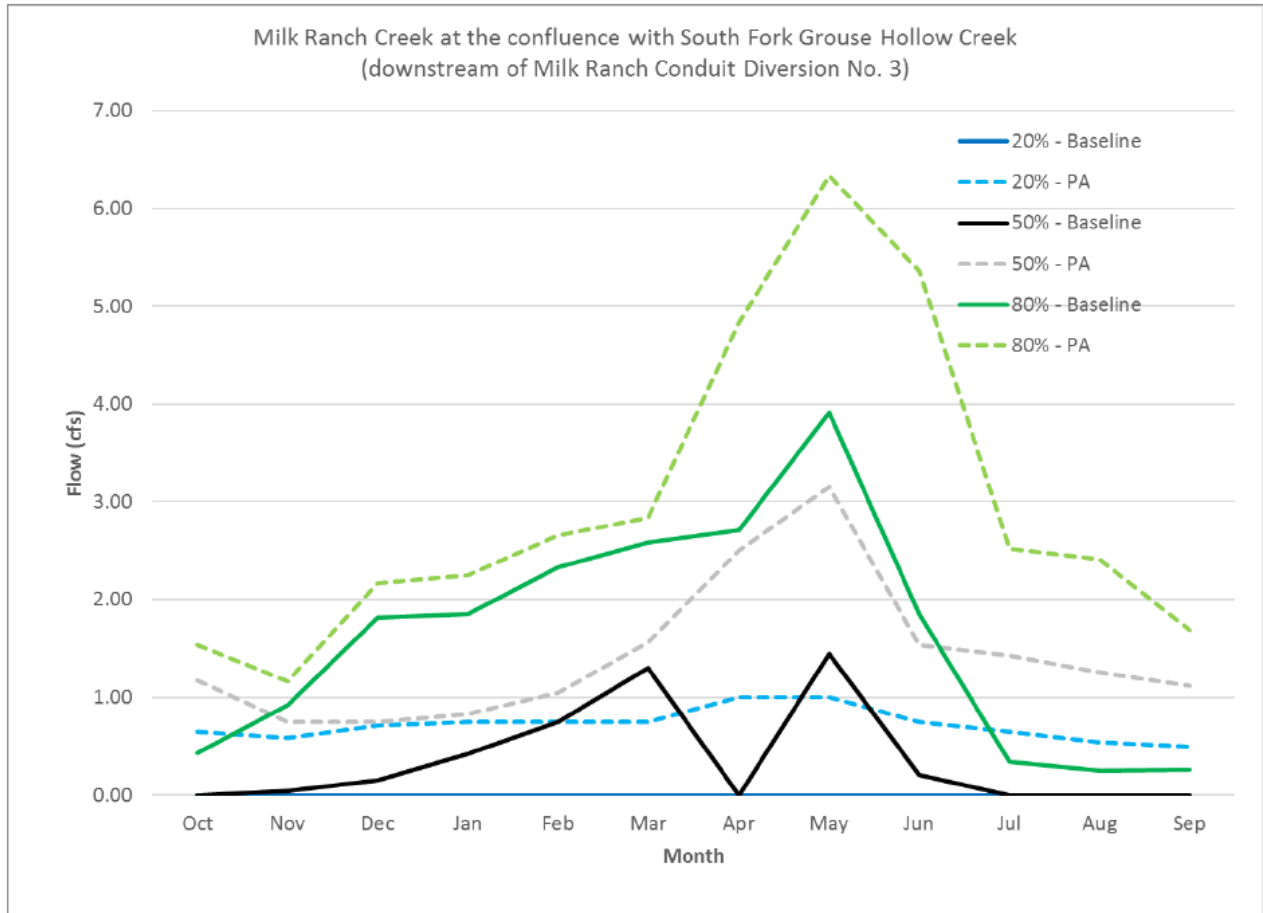


Figure 3-28. Milk Ranch Creek at the confluence with South Fork Grouse Hollow Creek, downstream of Milk Ranch Conduit Diversion No. 3 (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

Reservoir Storage. At Bucks Lake, the storage follows the same general pattern for all measured statistics as under existing operational conditions (figure 3-29).

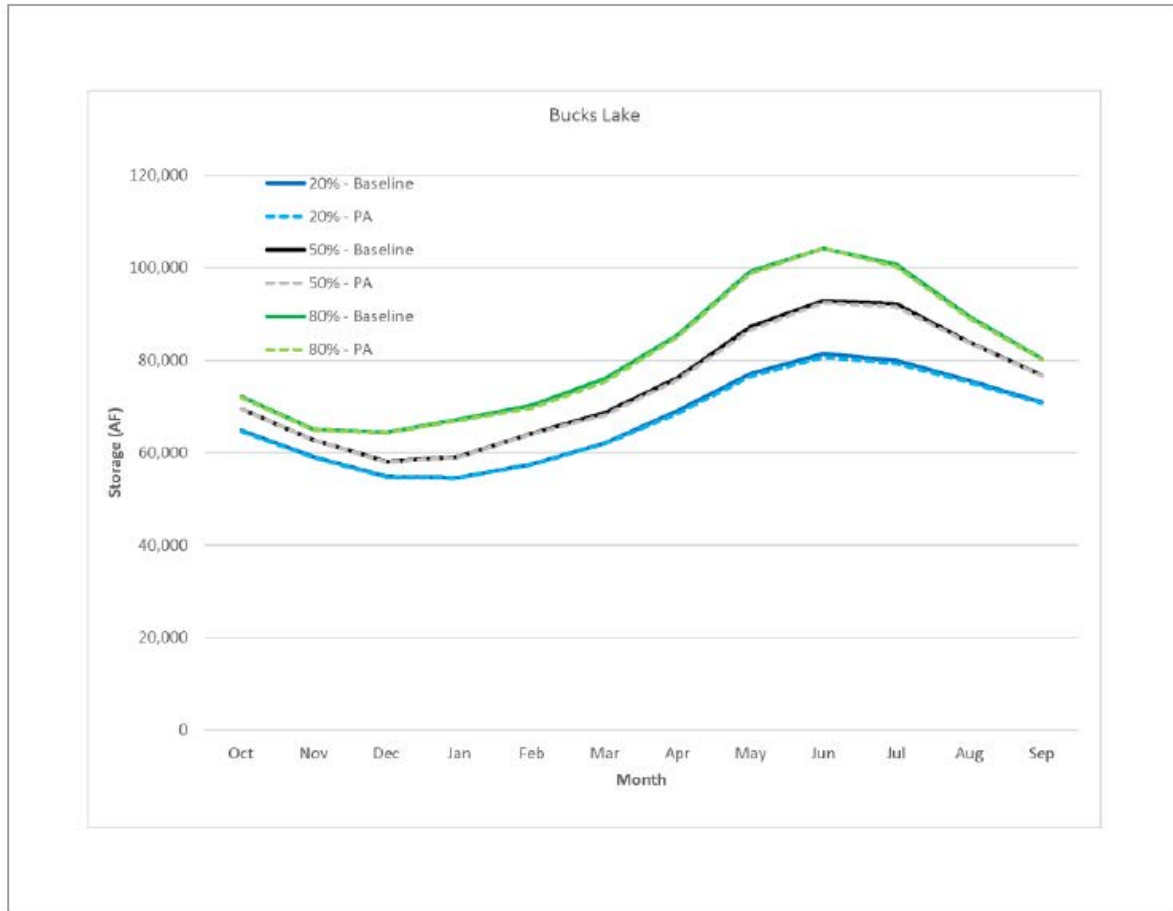


Figure 3-29. Bucks Lake (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

At Three Lakes, reservoir levels would generally be lower from April through October under measures WR-1 (Instream Flows) and WR-3 (Annual Drawdown of Three Lakes) as shown in figure 3-30.

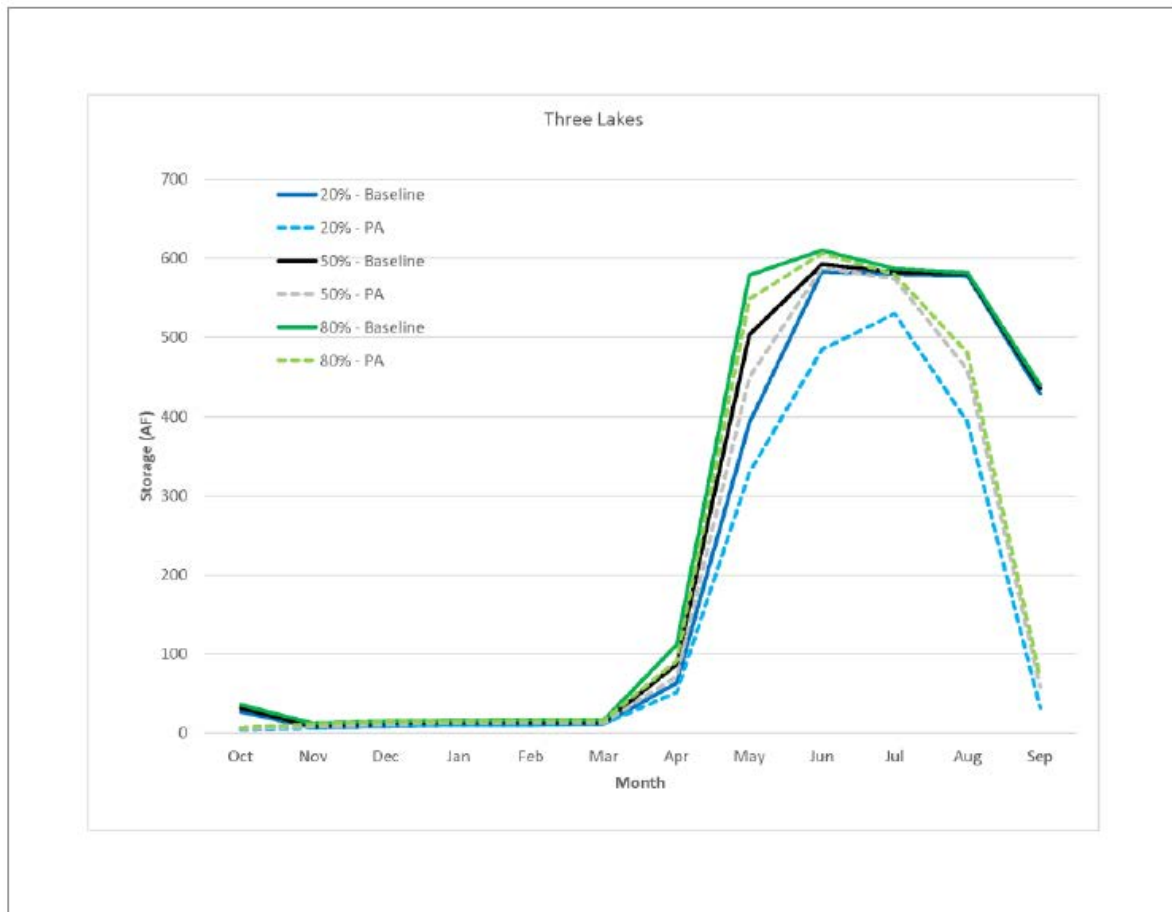


Figure 3-30. Three Lakes (WY 1970-2013): monthly percentile curves (20th, 50th, and 80th) for baseline and proposed action (PA) (Source: PG&E and City, 2018a).

Bear Ravine. Ceasing to divert water from Bear Ravine would re-establish an unaltered flow regime in lower Bear Ravine that would be most noticeable immediately downstream of the current diversion location. The effects of these increased flows on terrestrial resources are discussed in later in this section and in section 3.3.4.2, *Terrestrial Resources*.

Drought Management Plan

Droughts are a recurring feature of California's climate. Drought management often requires variance to one or more license conditions to meet other water supply needs.

The Water Board (preliminary condition 4) requires the licensees to develop a Drought Management Plan to set a default process to protect beneficial uses of water

when water supply dictates that project reservoir minimum pool targets or minimum instream flow requirement cannot be achieved. The plan is to outline thresholds for requests, consultation requirements, timing for requests, public participation and any additional monitoring and reporting required.

Our Analysis

The operational guidelines included in any new license issued for the project would determine the required water levels and streamflows in project-affected stream reaches and reservoirs. Drought conditions could make it difficult for the licensees to meet all license requirements, such as minimum flow, flood storage, and recreation. Project operations would also have the potential to exacerbate drought conditions in downstream stream reaches. These issues could be compounded during multiple Critically Dry years. Developing and implementing a drought management plan, as required by the Water Board, would provide a mechanism for the licensees to balance competing needs. Consultation with the Water Board and other agencies would be appropriate to accurately determine drought conditions specific to the project area. We find that establishing a Drought Management Plan would allow the licensees to coordinate hydroelectric generation during drought conditions and document environmental compliance with the terms of the new license.

Manage Diversions along Milk Ranch Conduit for Safety and Aesthetics (WR-8)

Several of the diversions along Milk Ranch Conduit are currently inoperable (FERC Diversion Nos. 1, 4, 5, 6, 7, and 8). Under WR-8, the licensees propose to leave the six diversions and ancillary features inoperable. Control valves and plumbing would be rendered inoperable and left in place. The structures would be left in place and managed for safety by monitoring for undermining and collapse, and FERC Diversion Nos. 1 and 7 would be modified or concealed to create a more natural appearance in consultation with the Forest Service.

This would provide habitat for SNYLF, as discussed in the Terrestrial Resources section. This measure is consistent with Forest Service preliminary 4(e) condition 38, Water Board preliminary condition 19, FWS 10(j) recommendation 8, and CDFW 10(j) recommendation 11.

Our Analysis

Leaving the diversions inoperable would have no effect on existing flows or project operations since these diversions are not currently operable and either filled with sediment or no longer physically intact. The diversions are located at varying distances and elevations above Three Lakes Road, and removal of the diversions could likely only be accomplished with hand equipment. The removal of remaining structures at the diversions could potentially compromise the integrity and stability of the stream channel and would result in the removal of established riparian vegetation in the vicinity of each of the diversions, which could have negative effects on water quality and temperature.

The licensees' proposed measures for maintaining the six diversions include actions to seal facilities to prevent entrainment of aquatic species and wildlife, monitoring for disturbance and erosion, which could affect water quality, and modifying or concealing the face of diversions to create a more natural appearance.

Therefore, maintaining the inoperable status of six diversions along the Milk Ranch Conduit would retain current ecological function at the diversions and would not have an adverse effect on aquatic or terrestrial resources.

Wet Water Year Milk Ranch Conduit Diversion Nos. 1 and 2 Bypass Flows

Licensees propose to temporarily close two of the Milk Ranch conduit diversions if Bucks Lake is over 5,142.0 feet in elevation by the end of March and the April forecast is over 5,679 thousand acre-feet (Wet year) (WR-9) in order to retain water in the tributaries that are diverted to the Milk Ranch Conduit during wet water years, rather than diverting those flows and then later spilling the water at project reservoirs. Flows would be bypassed at Diversions No. 1 and No. 2 (FERC Diversions Milk Ranch Creek and 15) within two business days from publication of the April forecast, through August 15 or when Three Lakes drawdown is initiated (WR-3). By January 31, when flows were bypassed the previous year, the licensees would provide a report to resource agencies documenting dates when diversion valves were closed and reopened. Resource agencies would have 45 days to comment, and final report would be filed with FERC within 90 days. This measure is consistent with Forest Service preliminary 4(e) condition 33, Water Board preliminary condition 3, FWS 10(j) recommendation 9, and California DFW 10(j) recommendation 8.

Our Analysis

Diversion Nos. 1 and 2 to Milk Ranch Conduit are on intermittent tributaries (Milk Ranch Creek and North Fork Grouse Hollow Creek) where flows are seasonally diverted into the conduit. During wetter years or seasons, the capacities of the diversions are exceeded and excess flow is bypassed downstream. The largest reservoir on this project, Bucks Lake, spills to Lower Bucks Lake during most wet years. The goal of this measure is to keep water in the tributaries diverted to the Milk Ranch Conduit, rather than diverting those flows and then later spilling the water at project reservoirs.

Currently, tributaries downstream of the Milk Ranch Conduit only receive flow when the diversions are overflowing. This measure would return all spring and summer flow from two of the larger diverted tributaries (Milk Ranch Creek and North Fork Grouse Hollow Creek) to their stream of origin, during years when Bucks Lake reservoir is high and would spill, also leading to spill in Lower Bucks Lake, due to basin-wide high runoff conditions.

This measure would increase flows in Milk Ranch Creek and North Fork Grouse Hollow Creek during spring and summer of wet years and slightly reduce spill in Lower Bucks Lake during these months.

Streamflow and Reservoir Level Gaging Plan

The licensees maintain a network of streamflow and reservoir level gages to monitor flows in project streams and water levels in project reservoirs. They propose a detailed Streamflow and Reservoir Level Gaging Plan that describes the gage locations, maintenance, data collection/review, and publication of records from the gages. Changes from the existing gaging protocols include:

- Providing real-time streamflow data for the reach of Grizzly Creek downstream from Grizzly Forebay Dam;
- Developing rating curves for Milk Ranch Creek below Three Lakes Reservoir, Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1, and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3;
- Installing and developing a rating curve for a Howell-Bunger valve at the base of Bucks Lake Dam to provide and measure minimum instream flow releases.

The Forest Service preliminary 4(e) condition 39, Water Board preliminary condition 14, FWS 10(a) recommendation 3, and California DFW 10(j) recommendation 12 all support streamflow and reservoir level gaging by the licensees to monitor compliance with license conditions.

Our Analysis

Accurate monitoring and timely reporting of compliance with streamflow and reservoir level fluctuations provides documentation of stream and reservoir habitat protection measures related to flow and water levels. The Streamflow and Reservoir Level Gaging Plan, as proposed, provides details of how gaging would function, how gages would be maintained, and how data would be recorded and reported to monitor compliance with other license measures (WR-1, WR-4, WR-5, and WR-6) and allow real-time determination of issues with flows or reservoir levels so they can be corrected quickly, thus protecting aquatic resources.

Water Quality

Minimum Instream Flow Releases

The minimum instream flow releases proposed by the licensees (WR-1) and recommended by the resource agencies (see section 3.3.2.2, *Water Quantity*) have the potential to alter water quality in the project affected stream reaches and reservoirs. Even if water quality conditions are unchanged, continuation of any negative water quality effects has the potential to adversely affect beneficial uses.

As described in section 3.3.2.1, *Affected Environment*, the licensees monitored water temperatures in Milk Ranch, Bucks, and Grizzly Creeks in 2013, 2014 and 2015. Monitoring sites were located immediately downstream of the project reservoirs, at the

downstream end of each stream near its confluence with the NFFR, and in the NFFR at locations upstream and downstream of tributary or powerhouse inflows. The licensees also monitored water temperatures in Grizzly Creek above Wildcat Creek and in Wildcat Creek near the confluence with Grizzly Creek in 2015 and 2016. In addition, the licensees developed a water temperature model for the reach beginning at Grizzly Forebay, extending downstream through Grizzly Creek to the NFFR, and down the NFFR approximately 1.6 miles to Arch Rock. Furthermore, the licensees developed mass balance calculations to quantify the thermal effects of Bucks Creek Powerhouse flows on NFFR waters in the mixing zone downstream of the Bucks Creek Powerhouse tailrace (separate from the NFFR reach downstream of Cresta Reservoir that was included in the water temperature model).

Simulated daily average temperatures for water entering the NFFR from the project area were consistently lower than daily average temperatures for adjacent NFFR locations, yet water temperatures in the NFFR were not substantially altered by project inflow. As described in our *Affected Environment* section (section 3.3.2.1), modeling results show that water temperature in Grizzly Creek downstream of Grizzly Forebay, with simulated flow releases ranging from 4 to 28 cfs, had little to no effect on water temperature in the NFFR downstream of the confluence with Grizzly Creek.

The Basin Plan stipulates that DO levels in surface waters remain above 7.0 mg/L at all times. Under current operations, DO concentrations in project-affected stream reaches and reservoir surface waters were consistently above the 7.0 mg/L objective. Reservoir DO concentrations in the epilimnion and at all downstream sites were consistently above the objective. DO in project reservoirs dropped below 7.0 mg/L in the hypolimnion of Bucks Lake, Lower Bucks Lake, and Grizzly Forebay. Anoxic conditions (<0.5 mg/L) were found in 2015 near the sediment-water interface in July at Bucks Lake, and in July and October at Three Lakes, Lower Bucks Lake, and Grizzly Forebay. However, water column DO was typically above 7.0 mg/l, and the nearest downstream sites exhibited DO levels above the Basin Plan objective.

Our Analysis

Under existing conditions, the Bucks Creek and Grizzly Creek bypassed reaches support a cold-water rainbow and brown trout fishery and have CSCI scores that meet or exceed the threshold for “likely intact condition” (PG&E and City, 2016k). Existing water temperatures in these reaches are also consistent with beneficial use attainment of COLD (Cold Freshwater Habitat) and SPWN (Spawning, Reproductive, and/or Early Development) designations per the Basin Plan. Under WR-1, Minimum Instream Flow Releases, the licensees would provide monthly minimum instream flow releases (based on water year type) into Bucks Creek downstream of Bucks Lake Dam, Bucks Creek downstream of Lower Bucks Lake Dam, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek downstream of Three Lakes, Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1, and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 (table 2-3). These proposed flow releases are intended to increase the amount of

available habitat for fish and other aquatic organisms relative to the flows that were implemented in 2006, particularly in upper ends of the project-affected stream reaches. As such, we anticipate these flows would, at a minimum, continue to maintain the existing water temperature and DO regimes in the project area. The licensees' proposed 3-cfs minimum instream flow release into the short section of Bucks Creek between Bucks Lake Dam and Lower Bucks Lake would also be expected to enhance BMI communities by maintaining wetted stream channel conditions.

Aquatic Resources Monitoring Plan

Proposed project operations have the potential to affect bacterial density, water temperature, and turbidity in project-affected stream reaches relative to existing operation. As a component of their Aquatic Resources Monitoring Plan (AR-2) the licensees are proposing to: (1) determine bacterial density in recreational areas of Bucks Lake, Lower Bucks Lake, Grizzly Forebay, and Three Lakes for comparison with Basin Plan water quality objectives; and (2) monitor turbidity in Bucks Creek downstream of Lower Bucks Lake when Lower Bucks Lake water surface elevation falls below 5,005 feet. To meet these objectives, the licensees would collect bacteriological samples within a 30-day period in reservoirs to allow for comparison with Basin Plan water quality objectives. Sites and sampling frequencies are identified in table 1 of the Aquatic Resources Monitoring Plan (PG&E and City, 2018a). In addition to bacteriological monitoring, the licensees would monitor turbidity in Bucks Creek below Lower Bucks Lake on a continuous (hourly) basis when the lake is below 5,005 feet for two months or until the end of September.

The licensees would also monitor water temperature in the lower portions of Milk Ranch Creek, Bucks Creek, and Grizzly Creek. Proposed temperature monitoring could inform management and operational actions affecting water quality and aquatic resources, and compliance with the Water Control Board's preliminary conditions. The licensees' proposed monitoring plan is consistent with Forest Service preliminary 4(e) condition 43, Water Board preliminary condition 11, FWS 10(j) recommendation 12, and California DFW 10(j) recommendation 16.

Our Analysis

The licensees' sampled for total fecal coliform in all project-affected stream reaches and in Bucks and Lower Bucks lakes during the summers of 2002 and 2015 (PG&E and City, 2016j). The geometric means of all samples met the Basin Plan criteria.

As described in section 3.3.2.2, *Water Temperature*, the licensees also monitored water temperatures in the Bucks, Grizzly, and Milk Ranch bypassed reaches during the relatively dry years of 2013 through 2016. During this time, mean daily water temperatures in Bucks, Grizzly, and Milk Ranch Creeks were within a suitable range for rainbow and brown trout and never exceeded the upper tolerable limit for these species (PG&E and City, 2016a, section E.7.2.2.2, *Water Quality*). Under existing conditions,

the project supports rainbow and brown trout populations throughout the entire length of Bucks and Grizzly Creeks in the bypassed reaches. Project operations do not contribute to deleterious changes in water temperature in the NFFR, and proposed operations would result in small or no change in flows and water temperature in stream reaches in the project area.

As discussed in section 3.3.2.1, *Water Quality*, turbidity is generally low in project affected reaches, although higher at depth during spring and fall in Lower Bucks Lake. Secchi readings in project reservoirs are deep, which is indicative of high water clarity.

After the initiation of channel maintenance flows in 2006, the licensees conducted 2 years of turbidity monitoring and found no evidence of adverse turbidity levels (PG&E and City, 2016a, section E.7.2.2.2, *Turbidity*). The licensees' proposed channel maintenance flows (WR-4) are slightly modified from existing flows; in Bucks Creek, durations of high flows would increase from 12 to 18 hours and the magnitude of the high flow would be increased by approximately 25 percent. In Grizzly Creek, annual high flows volumes would remain the same as current conditions, but duration would increase from 12 to 18 hours. The proposed channel maintenance flows are scheduled to occur during the winter in order to target periods with high ambient turbidity in the NFFR as well as high flows. CMFs released from Lower Bucks Lake are provided via the spillway, reducing the potential for turbid water to be released from the low-level outlet at Lower Bucks Lake Dam. Given minor changes that would be implemented, the proposed channel maintenance flows would not increase turbidity in the project-affected reaches or in the NFFR.

With respect to bacteriological monitoring, there are no proposed changes in project recreation facilities or O&M activities that warrant such monitoring or would lead to an increase in bacteria in the project-affected stream sites, or in Bucks Lake, and continued operation of the project would not adversely affect COLD and SPAWN beneficial uses in affected stream reaches.

Given the relatively large volume of water in the NFFR compared to flow from the project area streams, water temperature monitoring and model results indicate that water temperatures in the NFFR are not substantially altered by inflow from stream reaches in the project area; therefore, project operations that influence water temperatures in Milk Ranch, Bucks, or Grizzly Creeks have no cumulative effect on the NFFR downstream of the Grizzly Creek confluence.

In addition, both the water temperature and water quality elements of AR-2 lack evaluation criteria and associated actions that would signal the need to adaptively manage water quality. Without such ties to management actions it is unclear how these data would be used to address project effects on the resource or inform changes in future project operations. Based on the above, there appear to be few project-related benefits from requiring the licensees to monitor water quality of any type or bioaccumulation in aquatic organisms. As such, there would be no value, from a license compliance

perspective, in monitoring these parameters to identify unexpected water quality issues under a new license.

Hazardous Materials Management Plan

Construction of new project facilities, modification of existing project facilities, and routine and non-routine maintenance could affect water quality if pollutants (e.g., fuels, lubricants, herbicides, pesticides, and other hazardous materials) are discharged into project waterways.

To minimize potential contamination of project waters, the licensees propose to implement the Hazardous Materials Management Plan (LU-5), which addresses the storage, use and transportation of hazardous materials used within the proposed FERC project boundary, with special emphasis on NFS land. Under the plan, the licensees store hazardous materials, hazardous material clean-up materials and equipment at the Bucks Creek Powerhouse and Grizzly Powerhouse. They do not store hazardous materials or clean-up materials anywhere else within the project boundary, including on NFS land. The use and storage of these materials follow the protocols of the licensees' Spill Prevention, Control, and Countermeasure Plans (SPCCP) and Hazardous Materials Business Plans (HMBPs) (PG&E and City, 2018b). Hazardous materials that are transported to work sites throughout the greater watershed are all returned to the licensees' maintenance facilities associated with the powerhouses for proper disposal. Hazardous materials are not disposed of within the FERC project boundary or on NFS land.

To minimize the potential contamination of project waters, public land, and to protect human health and safety, the licensees propose to implement SPCCPs for the Bucks Creek Powerhouse and Switchyard and Grizzly Powerhouse and Switchyard, and HMBPs for Bucks Creek Powerhouse and Grizzly Powerhouse. The Hazardous Materials Management Plan addresses prevention of hazardous substance spills, ensures equipment to contain and cleanup any spills are located within each powerhouse, and lists notification procedures and contact information for the PNF, California DFW, and the National Resource Damage Assessment Department of the FWS. The plan also commits to a work-specific spill prevention and control plan for new construction performed by contractors, and states that management of herbicides and pesticides would be in accordance with state and county regulations.

The licensees would annually consult with the Forest Service to discuss hazardous materials on NFS land within the FERC project boundary. This would occur as part of the Annual Consultation with the Forest Service (GEN-2). During this meeting, the licensees would report on spills of hazardous materials on NFS land in the previous calendar year, if any, and list any work planned on NFS land in the upcoming calendar year that would require the development of a project-specific spill prevention and control plan.

The Forest Service would require implementation of the Hazardous Material Management Plan for locations on, or directly affecting, NFS land in its preliminary 4(e) condition 21. The FWS requests implementation of the licensees proposed Hazardous Material Management Plan in its 10(j) condition 21. California DFW 10(j) recommendation 4 supports this measure.

Our Analysis

A plan for hazardous substance control would prevent accidental spills and address any discharges of hazardous substances to project lands and waters. Specifically, this plan would address the prevention of hazardous substance spills, ensure protocols and equipment are in place to contain and cleanup any spills, and ensure appropriate notification procedures are followed.

Measures proposed by the licensees to address hazardous materials include but are not limited to the following: (1) identification of specific areas for the maintenance and refueling of vehicles and equipment; (2) contingencies with appropriate measures for containment and cleanup in the event of a spill or accident; (3) provisions to remove oil and other contaminants from condensate and leakage from the turbines and other equipment in the powerhouse; and (4) reporting requirements to minimize project construction effects on water quality.

These measures would effectively manage risks associated with the project's use of hazardous materials by defining storage locations for hazardous materials used for the project; ensuring staff receive training for managing and cleaning up hazardous material spills. The plan would also describe the associated consultation, reporting, and notification processes.

The proposed plan for hazardous substance control would minimize the likelihood of accidental spills and address any potential discharges of hazardous substances to project lands and waters. This plan would address the prevention of hazardous substance spills, ensure protocols and equipment are in place to contain and cleanup any spills, and ensure appropriate notification procedures are followed.

Fishery Resources

Minimum Instream Flow Releases

As described in section 3.3.1.2, *Water Quantity*, operation of the Bucks Creek Project affects the seasonal instream flow pattern in Bucks, Grizzly, and Milk Ranch Creeks. These altered flow conditions affect the capacity of these creeks to support spawning, rearing, and other life stages of resident fish and may also affect additional physical processes, including sediment and large wood transport and water temperature.

In regulated stream reaches that contain productive aquatic habitat, resource managers often establish instream flow regimes to maintain ecological functions and processes that are important for sustaining aquatic biota. However, balancing different

resource values associated with a given flow regime often involves a complex series of tradeoffs that affect conditions for different fish species and life stages, project operational or facility limitations, hydroelectric generation, water storage at project reservoirs, and recreation.

In their Supplemental FLA, the licensees propose to implement monthly Instream Flows Releases (WR-1), as specified in table 2-3, in Bucks Creek downstream of Bucks Lake Dam, Bucks Creek downstream of Lower Bucks Lake Dam, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek downstream of Three Lakes, Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1, and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 in four different water year types. These proposed minimum flow releases, which are also based on water year type, are consistent with Forest Service preliminary 4(e) condition 31, FWS 10(j) recommendation 2, and California DFW 10(j) recommendation 5. As discussed in section 3.3.2.2, *Minimum Instream Flow Releases (WR-1)*, the licensees agreed to minor modifications to their proposed language in WR-1 and defer to the Forest Service in its preliminary 4(e) condition 31. The Water Board, through preliminary condition 1, also supports this measure with the modifications.

Our Analysis

Bucks Creek below Bucks Lake Dam. Under existing conditions, there is no minimum instream flow release into the 0.25-mile-long reach of Bucks Creek between Bucks Lake Dam and Lower Bucks Lake. While very little data were collected in this short reach during project relicensing, relicensing participants suggested that the licensees release a minimum of 3 cfs from Bucks Lake to Lower Bucks Lake to ensure connectivity of flows upstream and downstream of project features. Based on our observations of water depth, channel conditions, and apparent habitat connectivity throughout this high-gradient reach during the environmental site review (at a flow release of approximately 3 to 5 cfs), we anticipate a year-round minimum flow of 3 cfs, as proposed by the licensees and specified by the Forest Service and Water Board, would be adequate to maintain a wetted stream channel and provide hydrologic connectivity to enhance BMI communities and maintain riparian vegetation between Bucks Lake Dam and Lower Bucks Lake. Maintaining a wetted stream channel would allow BMI communities to increase their primary productivity in this reach and would be adequate to flush the stagnant water from the area and prevent stagnation from occurring in the future.

Bucks Creek below Lower Bucks Lake Dam and Grizzly Creek below Grizzly Forebay. Prior to completion of the Grizzly Development, the licensees completed a

Physical Habitat Simulation (PHABSIM)²⁹ study in Grizzly Creek below Grizzly Forebay, Bucks Creek below Lower Bucks Lake, and Milk Ranch Creek below Three Lakes (Thomas R. Payne & Associates, 1991). The objective of this study was to determine the relationship between instream flows and habitat availability (expressed as weighted useable area [WUA]) for fry, juvenile, adult and spawning life stages of rainbow and brown trout; however, too few observations were made to develop rainbow trout fry or brown trout criteria curves. Using data collected during this study, the licensees derived monthly WUA estimates for these species/life stages in average water years, incorporating simulated effects of seasonal accretion flow (Thomas R. Payne & Associates, 1991). The analyses suggested that increased flows would improve habitat for resident trout in the upstream study reaches of Bucks and Grizzly Creeks, whereas improvements in habitat in the lower study reaches were limited because accretion flows already resulted in higher WUA values.

Based on the results of this study, the licensees provided new (post-2006) minimum instream flow releases into Bucks and Grizzly Creeks, as specified in table 2-1. In addition to these minimum flows, the licensees implemented annual spill events at both Lower Bucks Lake and Grizzly Forebay dams (see section 3.3.2.1, *Channel Maintenance Flows*). Following the implementation of these flow measures, rainbow and brown trout abundances generally increased in the lower portion of Bucks Creek without much change in the upper portion of the reach; however, population responses varied by species and there were no clear patterns for trout abundance in Grizzly Creek.

The licensees currently propose minimum instream flow releases in Bucks, Grizzly, Milk Ranch, and South Fork Grouse Hollow Creek in table 2-3 to further enhance juvenile, adult, and spawning rainbow trout WUA values relative to the minimum flows implemented in 2006, and may further improve stream habitat, stream fish populations, BMI assemblages, and aquatic ecosystem health in the affected stream reaches. Flows were developed in consultation with the resource agencies and were based on WUA targets for rainbow trout (primarily adults) in Bucks and Grizzly Creeks in all water year types, with an emphasis on stream-wide results (i.e., the weighted average of WUA for the entire stream reach, considering the monthly differences in flow/accretion and WUA versus flow relationships in different sub-basins). The licensees also analyzed WUA versus flow relationships in the upper-most sub-basins of these reaches (Basin 1) which have the lowest accretion and therefore the greatest dependence on minimum flow releases from the upstream dams.

²⁹ PHABSIM predicts physical microhabitat changes associated with flow alterations. It provides a variety of simulation tools to characterize the physical microhabitat structure of a stream and describe the flow-dependent characteristics of physical habitat in light of selected biological responses of target species and life stages.

The licensees' WUA targets for Bucks Creek were as follows:

- Stream-wide WUA for rainbow trout adults and juveniles of $\geq 80\%$ maxWUA in all months and water year types.
- Basin 1 WUA for rainbow trout adults of $\geq 70\%$ maxWUA in all months and water year types.
- Basin 1 WUA for rainbow trout juveniles of $\geq 60\%$ maxWUA in all months and water year types.

The licensees' WUA targets for Grizzly Creek were as follows:

- Stream-wide WUA for rainbow trout adults and juveniles of $\geq 70\%$ maxWUA in all months of Critically Dry water year types.
- Stream-wide WUA for rainbow trout adults and juveniles of $\geq 80\%$ maxWUA in all months of Dry, Normal, and Wet water year types.
- Basin 1 WUA for rainbow trout adults and juveniles of $\geq 50\%$ maxWUA in all months of Critically Dry water year types; $\geq 60\%$ maxWUA in all months of Dry water year types; $\geq 70\%$ maxWUA in all months of Normal and Wet water year types.

The licensees then used its existing PHABSIM data (Thomas R. Payne & Associates, 1991) in combination with a "WUA Tool" to evaluate WUA values for numerous alternative flow regimes.

Based on the results of this study, 100 percent of maximum WUA for Bucks Creek below Lower Bucks Creek Dam would be available at flows greater than 27 cfs for adult rainbow trout and greater than 45 cfs for rainbow trout spawning. One hundred percent of maximum WUA for Grizzly Creek below Grizzly Forebay would be attainable at flows over 44 cfs for adult rainbow trout, and 26 cfs for rainbow trout spawning (table 3-6). The available spawning area in Bucks and Grizzly Creeks does not change considerably relative to flow; however, of the habitat that is available for rainbow and brown trout spawning, relatively high WUA values are associated with ranges between 10 and 70 cfs in the winter/spring, and between 15 and 100 cfs for brown trout in fall in Bucks Creek. In Grizzly Creek, relatively high WUA values for spawning are associated with flows between approximately 10 and 50 cfs in winter/spring for rainbow trout, and between approximately 10 and 55 cfs for brown trout in fall.

Under the minimum instream flow required by the 2006 License Amendment (FERC, 2006a), the annual average rainbow trout adult habitat availability (WUA) in Bucks Creek is about 90 percent of maximum WUA in all water year types, and about 86 percent of maximum WUA for rainbow trout juveniles (table 3-7).

Table 3-6. Eighty and 100 percent of the maximum WUA in Bucks Creek below Lower Bucks Lake Dam and Grizzly Creek below Grizzly Forebay (total reach) for rainbow trout (Source: Thomas R. Payne & Associates, 1991, as modified by staff).

System	Bucks Creek		Grizzly Creek	
	80% Max WUA	100% Max WUA	80% Max WUA	100% Max WUA
Rainbow Trout Adult	4 cfs	27 cfs	4 cfs	44 cfs
Rainbow Trout Spawning	24 cfs	45 cfs	13 cfs	26 cfs

Table 3-7. Average annual stream-wide WUA (percent of maximum) results by water year type for Bucks Creek below Lower Bucks Lake Dam (Source: PG&E and City, 2018a, as modified by staff).

Species/ Lifestage	Flow Regime	Critically Dry	Dry	Normal	Wet	Aver All
						Water Year Types
Rainbow Trout Adults	Current	89	90	90	89	90
	Proposed	90	91	92	91	91
Rainbow Trout Juveniles	Current	86	87	86	85	86
	Proposed	87	89	89	87	88

As noted in the resource agencies' preliminary conditions and 10(j) recommendations, rainbow trout populations in Bucks Creek have not improved in response to incrementally higher flows instituted in Bucks Creek in 2006. The proposed and recommended minimum flow regime is intended to emulate the natural timing, mode, and pattern of natural flow regimes, provide more than 80 percent of maximum WUA for adult rainbow trout during summer to maintain a living stream at all times, and provide more than 80 percent maximum WUA for spawning and juvenile rearing rainbow trout during the spring to provide resident native fish migration flows.

The licensees' proposed minimum flow releases would be equal to or greater than existing minimum flows in Bucks Creek below Lower Bucks Dam in all months of all

water year types, with the exception of May and June of Critically Dry water years (table 2-3). The minimum flows in a Critically Dry water year would be 7 cfs in May and 6 cfs in June instead of the 8 cfs under existing conditions. These flow decreases would have no change in stream-wide WUA for rainbow trout adults or juveniles in May and would decrease WUA for both rainbow trout adults and juveniles from 96 percent of maximum to 95 percent of maximum in June. These slight decreases would not have a significant effect on the average annual stream-wide WUA for either rainbow trout adults or juveniles, which increases from 89 percent to 90 percent in Critically Dry years under the proposed minimum flows. While changes in minimum instream flow would lead to a 1 percent decrease in WUA for rainbow trout juveniles stream-wide, juvenile rainbow trout just downstream of Lower Bucks Creek Dam (identified by the licensees as Basin 1) appear to be more sensitive to changes in minimum flows. The decrease of 1 cfs in June would reduce rainbow trout adult WUA from 82 percent to 80 percent of maximum WUA in Basin 1 and would reduce rainbow trout juvenile WUA from about 90 percent to about 85 percent in Basin 1 in a Critically Dry water year. However, any adverse effects on rainbow trout are expected to be negligible

Based on the above analysis, the licensees' proposed and the agency-recommended minimum flows throughout the year would not significantly change aquatic habitat availability and likely maintain or slightly improve existing fisheries resources in Bucks Creek because they would increase average annual stream-wide WUA for rainbow trout adults and juveniles in all water year types. However, spawning gravel is likely the limiting factor for trout in Bucks Creek below Lower Bucks Dam, and the proposed and recommended minimum flows, combined with the proposed and recommended measures included in the Gravel Augmentation Plan (GS-2), discussed in section 3.3.2.2 subsection *Gravel Augmentation Plan for Bucks and Grizzly Creeks*, are expected to improve aquatic habitat quality and trout abundance in reaches below the Lower Bucks Dam.

Under the minimum flow associated with the 2006 License Amendment (FERC, 2006a), the annual average rainbow trout adult and juvenile habitat availability (WUA) in Grizzly Creek is about 83 percent of maximum WUA in all water year types (table 3-8).

As noted in the resource agencies' 10(j) recommendations, rainbow trout populations in Grizzly Creek have not improved in response to the incrementally higher flows instituted in Grizzly Creek starting in 2006.

Table 3-8. Average annual stream-wide WUA (percent of maximum) results by water year type for Grizzly Creek below Grizzly Forebay (Source: PG&E and City, 2018a, as modified by staff).

Species/ Lifestage	Flow Regime	Critically Dry	Dry	Normal	Wet	Aver All Water Year Types
Rainbow Trout Adults	Current	81	83	84	84	83
	Proposed	81	85	87	88	85
Rainbow Trout Juveniles	Current	81	83	83	83	83
	Proposed	81	86	89	89	86

The proposed minimum flow regime would be equal to or greater than existing minimum flows in Grizzly Creek below Grizzly Forebay in all months of Dry, Normal, and Wet water year types, causing an increase in the average annual stream-wide WUA for rainbow trout adults and juveniles (tables 2-3 and 3-9). The only exception is a decrease in the proposed minimum flows in May and June of Critically Dry water years. The minimum flows in a Critically Dry water year would be 6 cfs in May and June instead of the 8 cfs under existing conditions. Thus stream-wide WUA for both rainbow trout adults and juveniles would decrease from about 91 percent of maximum WUA to about 90 percent in May; stream-wide WUA for rainbow trout adults would decrease from about 88 to about 86 percent; and stream-wide WUA for rainbow trout juveniles would decrease from about 91 to 88 percent in June.

These decreases would not have an effect on the average annual stream-wide WUA, which would remain at 81 percent of maximum in Critically Dry years under the proposed minimum flows for both rainbow trout adults and juveniles (table 3-9). Changes in minimum instream flow have a greater effect on fisheries resources just downstream of Grizzly Forebay (Basin 1). The decrease of 2 cfs in May would reduce rainbow trout adult WUA from about 78 to 72 percent of maximum WUA in Basin 1, and rainbow trout juvenile WUA from about 88 to 79 percent of maximum WUA in Basin 1 of Grizzly Creek. The decrease of 2 cfs in June would reduce rainbow trout adult WUA from 70 to 64 percent of maximum WUA in Basin 1 of Grizzly Creek and would reduce rainbow trout juvenile WUA from about 78 to 69 percent in Basin 1 of Grizzly Creek. These reductions are not expected to have an effect on rainbow trout habitat as a whole, however, because the average annual stream-wide WUA is expected to be maintained (table 3-9).

Based on the above analysis, the licensees' proposed and the agency-recommended minimum flows throughout the year would not significantly change

aquatic habitat availability and would maintain or slightly improve existing fisheries resources in Grizzly Creek because they increase average annual stream-wide WUA for rainbow trout adults and juveniles in all water year types. However, spawning gravel is likely the primary limiting factor for trout in Grizzly Creek below Grizzly Forebay Dam. The proposed and recommended minimum flows, combined with the proposed and recommended Gravel Augmentation Plan (GS-2), discussed in section 3.3.2.2 subsection *Gravel Augmentation Plan for Bucks and Grizzly Creeks*, are expected to improve aquatic habitat quality and trout abundance in stream reaches below the Grizzly Forebay Dam.

Table 3-9. Average annual stream-wide WUA results by water year type for Grizzly Creek below Grizzly Forebay (Source: PG&E and City, 2018a, as modified by staff).

Species/ Lifestage	Flow Regime	Critically Dry	Dry	Normal	Wet	Aver All Water Year Types
Rainbow Trout Adults	Current	81	83	84	84	83
	Proposed	81	85	87	88	85
Rainbow Trout Juveniles	Current	81	83	83	83	83
	Proposed	81	86	89	89	86

Milk Ranch Creek Below Three Lakes and Milk Ranch Conduit Diversion No. 1 – Currently there is no instream flow release requirement for Milk Ranch Creek below Three Lakes Dam or below Milk Ranch Conduit Diversion No. 1; however, depending on water year, the licensees typically release between 4 and 12 cfs from Three Lakes Dam, and Milk Ranch Creek continues to receive flow from dam leakage and tributary accretion.

The licensees’ proposed and resource agencies recommended minimum flow releases below Three Lakes are intended to convey water for instream flows approximately 0.25 mile from Three Lakes to the longer reach below Diversion No. 1, as little accretion occurs between Three Lakes and Milk Ranch Conduit Diversion No. 1. The only difference between the proposed and recommended flows for the two locations is that winter flows below Three Lakes Reservoir are not numerically specified in order to allow the natural inflow into the Three Lakes Reservoir to pass downstream into Milk Ranch Creek.

During its evaluation of instream flows, relicensing participants recreated mean unimpaired flows for Milk Ranch Creek downstream of Diversion No. 1 using a

combination of gage pro-ration and gage summation. They found that flows ranged from a low of 0.5 cfs in September of a Critically Dry year to a high of 13.8 in May of a Wet year. Results of the PHABSIM study found that 100 percent maximum WUA for adult rainbow trout was achieved at 9 cfs below Diversion No. 1. These flows were only achieved in an unimpaired Milk Ranch Creek in April, May, and June of a Wet water year, and in May of a Normal water year. Very few fish were observed in Milk Ranch Creek. Rainbow trout were observed only in the lower reaches of Milk Ranch Creek due to the steep gradient of the middle and upper reaches and dry stream conditions in winter (table 3-4). Accretion throughout Milk Ranch Creek is expected to maintain fish habitat in the lower reaches, even under existing conditions without minimum flow releases. Therefore, the proposed and recommended minimum instream flows for Milk Ranch Creek are intended to enhance BMI communities and riparian vegetation by maintaining wetted stream channel conditions and hydrologic connectivity in the upper reaches of Milk Ranch Creek, as opposed to improving fish habitat. The proposed and recommended flows would be adequate to maintain wetted stream channel conditions in all water year types and would mimic the natural timing and pattern of the natural flow regime.

South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 –

There is no existing flow release requirement for Milk Ranch Creek below Milk Ranch Conduit Diversion No. 3. The diversion pipe is currently broken, preventing diversion of any natural flow from South Fork Grouse Hollow Creek. The licensees propose to complete repairs to Diversion No. 3 and modify the structure to comply with WR-1 as soon as reasonably practicable, but no later than 2 years after receiving all required permits and approvals for the work.

The licensees conducted a study to determine the minimum instream flow required to maintain a wetted channel during the time when natural hydrologic conditions produce surface water flow in the creek. The licensees found that flow levels of approximately 0.2 cfs result in continuous flow downstream of the diversion.

The proposed and recommended minimum flows are intended to maintain a wetted channel during the time when natural hydrologic conditions produce surface water flow in the creek. This would maintain aquatic habitat and BMI communities downstream of the diversions and continue to provide suitable habitat for SNYLF that could colonize the creek. The proposed and recommended minimum flows of 0.5 cfs, or natural inflow, whichever is less, provided year-round in South Fork Grouse Hollow Creek would be adequate to maintain a wetted channel when hydrologic conditions allow surface water in the system.

Effect of Project Operations on Aquatic Habitat in Three Lakes

Under existing conditions, annual drawdown of Three Lakes Reservoir generally begins after September 1 when the licensees typically release from 4 to 12 cfs from Three Lakes Dam (depending on the water-year type) until the lower lake reaches minimum

pool (i.e., elevation 6,050 feet). The scheduling and duration of this drawdown has the potential to affect the availability of spawning and rearing habitat for resident brook trout and may also result in the entrainment of juvenile trout. The licensees propose to implement measure WR-3, Annual Drawdown of Three Lakes, to minimize brook trout redd dewatering within the drawdown zone.

Under measure WR-3, the licensees would verify the water surface elevation of Lower Three Lakes by August 15 and initiate annual drawdown on or about August 15th. This would be accomplished by setting the low-level outlet valve to release 9 cfs if the water surface elevation is above 6,072 feet, as measured at PG&E gage NF10. Conversely, if the water surface elevation is at or below 6,072 feet, a start date would be calculated to initiate drawdown at a rate of 9 cfs to reach minimum pool (as identified in WR-5, Project Reservoir Operations) by September 15. The licensees would leave the low-level outlet valve set to release 9 cfs until November 1, at which time it would be fully opened to the “winter setting”. The low-level outlet valve could be fully opened to the “winter setting” prior to November 1 if weather is predicted that could restrict safe access to the valve house.

By January 31, the licensees would provide a report to the resource agencies documenting the water surface elevation of Three Lakes around August 15, the date the drawdown was initiated, the date when minimum pool was reached, and the date when the outlet valve was fully opened. Agencies would have at least 45 days to provide input on the draft report before the report is finalized and submitted to FERC.

The licensees’ proposal to modify the schedule for the annual drawdown of Three Lakes is consistent with Forest Service preliminary 4(e) condition 37, Water Board preliminary condition 8, FWS 10(j) recommendation 4, and California DFW 10(j) recommendation 7.

Our Analysis

Three Lakes Reservoir is a relatively primitive setting where visitors enjoy fishing and other types of recreation. Three Lakes Trailhead at the terminus of Three Lakes Road accommodates parking for visitors accessing the Pacific Crest Trail and Bucks Lake Wilderness. Dispersed camping and brook trout angling occur along the shoreline of the reservoir. However, brook trout densities are relatively low in the reservoir, and their long-term viability may be adversely affected by the reservoir’s annual fall drawdown as a result of redd desiccation in the reservoir and/or entrainment.

Under WR-3, the licensees would move the start of the annual drawdown at Three Lakes Reservoir from September 1 to August 15. This earlier drawdown period is designed to limit access to spawning habitat that will be dewatered at minimum pool within Three Lakes Reservoir and reduce the risk of entrainment at the low-level outlet, while still allowing the licensees to meet minimum pool requirements.

Brook trout are fall spawners and generally initiate spawning as soon as average daily water temperatures reach 11°C (Blanchfield and Ridgway, 1996) or lower. In

California, brook trout typically spawn in mid-September to January (Moyle, 2002), and they have been documented to spawn along the margins of Three Lakes. However, at Three Lakes, water temperatures on average drop below 11°C by late-August, typically before the onset of fall and winter operations in Three Lakes.

Data presented in California DFW (2015) and in the licensees' Technical Memo 02 (PG&E and City, 2016b), indicate that the existing brook trout population in Three Lakes Reservoir is small and does not exhibit a healthy age class structure. Young-of-year (YOY) trout are very rare and there are large gaps in age-class cohort structure. Given the life-history of brook trout in the region, the current September 1 drawdown of Three Lakes Reservoir may dewater redds that were formed prior to the onset of drawdown (Ridgway and Blanchfield, 1998). Similarly, recently emerged YOY fish, which are the most susceptible to entrainment, would be at risk of entrainment over prolonged drawdown periods.

Because this proposed measure would require the licensees to start the Three Lakes drawdown on or before August 15, it is expected to minimize adverse effects of project operations on brook trout spawning. Drawing down the lake to the minimum pool elevation earlier would likely limit spawning in the drawdown zone, because water temperatures would not reach those required for spawning until after drawdown had begun, and thereby increase spawning success for brook trout by limiting redd dewatering. Drawing down the reservoir at a quicker rate, as required by the proposed measure, would limit the amount of time YOY fish are exposed to entrainment, but would also increase the flow rate through the outlet and could increase the potential for entrainment. As discussed in section 3.3.2.2, subsection *Effects of Project Operation on Fish Entrainment*, the licensees sampled Three Lakes for 21 days and found no entrainment of brook trout during this time (PG&E et al., 2016ff), and the shorter duration of higher potential for entrainment is not likely to have an effect on YOY brook trout. An additional benefit of this proposed measure is that it should reduce the risk of entrainment of pea clams (*Pisidium* sp.) and other lentic-associated species from Three Lakes Reservoir into Milk Ranch Creek. During relicensing studies in 2015, BMI sampling indicated that high flows during the annual drawdown likely entrained large numbers of pea clams into Milk Ranch Creek (PG&E and City, 2016dd), resulting in a BMI score at site MRC-2 of "potentially altered." The required 9 cfs release, as compared to current releases as high as 12 cfs during drawdown, is expected to be at a low enough flow rate to reduce or eliminate this type of entrainment in the future.

Channel Maintenance Flows

Channel maintenance flows are moderate peak flows that maintain aquatic habitat quality and diversity by recruiting and redistributing spawning gravels. Channel maintenance flows also recruit, transport, and redistribute LWM that has beneficial effects on channel structure, habitat formation, and food supply. Under existing conditions, the project reduces the magnitude and duration of channel maintenance flows in Bucks Creek, Grizzly Creek and Milk Ranch Creek. However, since 2006, the

licensees have been required to provide annual channel maintenance spills in Wet and Above Normal water years at Lower Bucks Lake Dam and Grizzly Forebay Dam in accordance with License Article 13. The licensees provide both annual spill (50 to 70 cfs flows for a minimum of 12 hours) and periodic (every 5 years) high spill (150 to 245 cfs spills for a minimum of 12 hours), should natural spill events of this magnitude not occur. At Grizzly Forebay Dam, the licensees are required to provide an annual spill of 50 to 70 cfs for a minimum of 12 hours in Wet and Normal water years, should natural spill events of this magnitude not occur in the previous 18 months.

In their Supplemental FLA (PG&E and City, 2018a), the licensees propose to implement revised channel maintenance flows and annual flows in Wet and Normal water years at Bucks Creek below Lower Bucks Lake, and Grizzly Creek below Grizzly Forebay, based on the Annual Determination of Water Year Type (WR-7). Measurement of channel maintenance flows in Bucks Creek would be based on reservoir elevation and appropriate rating tables for the spillways for each dam. Telemetered reservoir elevations would be available to the licensees to allow monitoring and control of channel maintenance flows. Flows in Grizzly Creek would be measured at project gage NF22, Grizzly Creek below Grizzly diversion dam.

These proposed channel maintenance flows, which are described in detail below, are consistent with Forest Service preliminary 4(e) condition 34, FWS 10(j) recommendation 10 and California DFW 10(j) recommendation 9.

Bucks Creek below Lower Bucks Lake

The licensees would provide minimum streamflows of 50 to 70 cfs in Bucks Creek below Lower Bucks Lake Dam for a period of at least 18 hours prior to March 31 of each water year if natural spill in excess of 70 cfs, or a High Spill, as defined below, has not occurred in the last 18 months. Spill requirements would be met by any combination of spill, release, and accretion flows. The licensees would make an effort to smoothly taper off the flow, consistent with the Spill Management at Grizzly Forebay and Lower Bucks Lake measure (WR-6). The licensees would also attempt to coordinate channel maintenance flows with high flows in the NFFR, which would not be required in Dry and Critically Dry years if spill is not implemented before issuance of California DWR's March 1 Bulletin 120³⁰ forecast.

Prior to March 31 of each Normal or Wet water year in which a High Spill (spill of 200 to 300 cfs for at least 18 hours) has not occurred in the previous 5 years in Bucks Creek below Lower Bucks Lake Dam, the licensees would make a good faith effort to

³⁰ The California DWR Bulletin 120 is a publication issued four times a year, in the second week of February, March, April, and May by the California DWR. It contains forecast of the volume of seasonal runoff from the state's major watersheds, and summaries of precipitation, snowpack, reservoir stage, and runoff in various regions of the State.

schedule a High Spill event of 200 to 300 cfs, to be concurrent with flows in excess of 3,000 cfs at PG&E gage NF57 on the NFFR. The licensees would not be required to implement a High Spill if flows in excess of 3,000 cfs are not present in the NFFR. The licensees would consider a High Spill concurrent with flows less than 3,000 cfs but in no event less than 1,600 cfs. The licensees would notify the Forest Service, Water Board, FWS, and California DFW of the planned High Spill and incorporate their suggestions.

Upon completion of the High Spill, the licensees would make a good faith effort to taper off the flow consistent with measure WR-6 regarding spill management at Grizzly Forebay and Lower Bucks Lake. In the event that the High Spill has not occurred before the California DWR March 1 Bulletin 120 forecast and the forecast indicates that the water year type is Dry or Critically Dry, the High Spill would be postponed to the next eligible year.

If an unplanned and unavoidable spill were to occur, the licensees would notify the Forest Service, Water Board, FWS, and California DFW, and use best efforts to minimize the magnitude of such spill if corresponding high-flow conditions are not present in the NFFR. If an unplanned spill occurs before March 31 and could be increased to over 200 cfs for at least 18 hours, the licensees would notify the resource agencies prior to taking advantage of the opportunity to spill in excess of 200 cfs.

Grizzly Creek

If, prior to March 31 of each year, a spill of at least 50 cfs for at least 18 hours duration has not occurred in the last 18 months, the licensees would provide minimum streamflows of 50 to 70 cfs in Grizzly Creek below Grizzly Forebay Dam for a period of at least 18 hours prior to April 15. Spill requirements may be met by any combination of spill, release, and accretion flows. The licensees would make an effort to smoothly taper off the flow, consistent with the Spill Management at Grizzly Forebay and Lower Bucks Lake measure (WR-6). The licensees' proposed channel maintenance flows would not be required in Dry and Critically Dry years if spill is not implemented before issuance of the California DWR March 1 Bulletin 120 forecast. The licensees would not provide notification of unplanned spill events because they are common at Grizzly Forebay in Normal and Wet water years.

The licensees would submit a draft report to the resource agencies each year that a channel maintenance flow is released into either Bucks Creek or Grizzly Creek. The report would include data on the timing, magnitude, and duration of the flows, turbidity data collected, and any observations made by operations and maintenance personnel. The draft report would be submitted by January 31 of the following year, with 45 days to comment before submitting a final report to FERC within 90 days of providing the draft report to the agencies. The licensees also propose to discuss the results of the channel maintenance flow report at the annual meetings with the Forest Service and the Ecological Consultation Group.

Our Analysis

Peak flow events provide a number of important ecological functions in streams. Channel maintenance flows are moderate peak flows that maintain aquatic habitat quality and diversity by recruiting and redistributing spawning gravels. Channel maintenance flows also recruit, transport, and redistribute large woody material that has beneficial effects on channel structure, habitat formation, and food supply. Riparian habitat benefits of channel maintenance flows include periodic scouring and vegetation recruitment events to maintain a diversity of native plants, vegetation age classes, and habitat structures.

Channel maintenance flows may also transport larval BMI downstream of the reservoirs. However, daily flows released from Lower Bucks Dam and Grizzly Forebay Dam may also provide this transport, and channel maintenance flows are not expected to have an adverse effect on BMI in Lower Bucks Lake or Grizzly Forebay. Channel maintenance flows are not proposed at Three Lakes Dam, and decreased peak flow during drawdown is expected to reduce or eliminate entrainment of BMI in Lower Lake.

The licensees have been providing channel maintenance flows in Bucks and Grizzly Creeks downstream of the reservoirs since 2006 under existing license conditions. The proposed channel maintenance flows are slightly modified from current flows. In Bucks Creek, durations of high flows would increase from 12 to 18 hours and magnitude of the high flow would increase by approximately 25 percent. Spill events in Bucks Creek downstream of Lower Bucks Lake are extremely rare due to the relatively large storage capacity of Bucks Lake and Lower Bucks Lake and diversions. In Grizzly Creek, annual high-flow volumes would remain the same as current conditions, but the duration would increase from 12 to 18 hours. The 2006 channel maintenance flows were based on sediment transport modeling (PG&E and City, 2016j). In 2006 and 2011, channel maintenance flows were implemented in Bucks Creek below Lower Bucks Lake along with annual maintenance flow in Grizzly Creek below Grizzly Forebay; however, no monitoring was conducted to determine if any geomorphic changes resulted from the flows, so the effectiveness of those specific flows could not be determined.

Based on geomorphology studies conducted by the licensees (PG&E and City, 2018a) and existing aquatic habitat monitoring data, current channel maintenance flows appear to be adequate to recruit and distribute current levels of gravel and LWM and in Bucks and Grizzly Creeks. As discussed in section 3.3.2.2, subsection *Gravel Augmentation Plan for Bucks and Grizzly Creeks*, current trout spawning gravels are relatively limited in the upper reaches of Grizzly Creek below Grizzly Forebay Dam and Bucks Creek below Lower Bucks Dam, and the reduction of spawning gravel likely limits the abundance of trout in these reaches. The new recommendation would increase both the magnitude and duration of channel maintenance flows leading to a high likelihood of improving aquatic and riparian habitat conditions. In addition, the enhanced flows are meant to help redistribute wood and gravel that is proposed to be added

downstream of Lower Bucks and Grizzly dams as part of proposed measures GS-1 and GS-2.

Effects of Reservoir Fluctuations on Aquatic Resources

Winter water level drawdowns can threaten littoral zone ecological integrity and block access to important riverine spawning and rearing habitat, if upstream migration barriers exist within the reservoir's drawdown zone. The volume of water in the project's reservoirs also affects the licensees' ability to achieve minimum instream flows, channel maintenance flows, and water temperature/water quality objectives.

The licensees propose to maintain current minimum pool elevations, as required by the 2006 License Amendment, at project reservoirs for the protection and enhancement of aquatic habitat over the winter (WR-5, Project Reservoir Operations). In addition, an existing MOU (PG&E, 1998) between the Forest Service and licensees stipulates water level management at project reservoirs to support peak season recreation use, public safety, and winter aquatic habitat. Proposed measure WR-5 continues the current practice defined in the MOU and is expected to provide similar benefits during the new license period. The licensees' proposed minimum reservoir elevations are presented in table 3-10.

These proposed minimum reservoir elevations are consistent with Forest Service preliminary 4(e) condition 36, Water Board preliminary condition 7, and FWS 10(j) recommendation 6.

Our Analysis

Current minimum reservoir elevations balance the needs of multiple resources and are sufficient to provide rearing habitat for resident fish, as well as unencumbered access to reservoir tributaries. These minimum reservoir elevations also allow for seasonal recreation use and support special-status plant habitats. Because these operations would not change compared to existing conditions, it is anticipated that they would continue to have a negligible effect on fish populations residing in Lower Bucks Lake, Lower Three Lakes, Middle Three Lakes, Bucks Lake, and Grizzly Forebay. In addition, compliance with the operational requirements of any license issued for the project would be measured and would avoid disagreements about whether the project was operating within these requirements.

Table 3-10. Proposed minimum elevations for project reservoirs under existing and proposed operations (WR-5) (Source: staff).

Reservoir	Minimum Elevation	Gage Location
Lower Bucks Lake	4,966 feet	PG&E gage NF13
Lower Three Lakes	6,050 feet	PG&E gage NF10
Middle Three Lakes	6,057 feet	PG&E gage NF10
Bucks Lake	Normal or Wet water year type: June 1 – Sept 1: would not exceed 15 feet below the water surface elevation on June 1, and at no time would go below 5,100 feet Dry or Critically Dry: 5,080 feet, and would not be reached prior to Sept 1	PG&E gage NF16
Grizzly Forebay	4,303 feet	PG&E gage NF19

Spill Management at Grizzly Forebay and Lower Bucks Lake

In measure WR-6, the licensees propose managing ramping rates downstream from project dams and powerhouses using a stepwise approach. The measure first specifies that the project’s reservoirs would be drawn down in advance of anticipated spills, and allows that when the powerhouses are both “block loaded” (i.e., held at constant load for the duration of the spill), there would be no constraints on flow ramping; as long as powerhouse flows are equivalent, the only spills that are expected to occur would be due to inflow hydrology that should mimic the natural hydrograph. Next, to protect special-status species in the NFFR (within the confluent hydroelectric project, Rock Creek-Cresta, FERC No. 1962), the measure specifies annual periods when managed spills and/or outages that would affect Grizzly Creek are not allowed. Finally, the measure contains a series of tables that specify the allowable load change at each powerhouse, for spills at Lower Bucks Dam and Grizzly Forebay Dam. The measure then describes when, within each step in the table, flexible powerhouse scheduling (or peaking) would be allowed. Details of the measure are described below.

WR-6 describes stream stage/depth monitoring and reporting during the first 5 years of license implementation. Using this monitoring data, licensees, the Forest Service, and other resource agencies would assess whether there are ways that project operators could improve compliance with these ramping requirements, and as appropriate, recommend revisions to this measure.

In order to minimize the effect of unavoidable spills on Grizzly Creek, Grizzly Forebay would be drawn down to the extent practical in advance of forecasted spill events.

The remainder of this measure applies to spills caused or influenced by powerhouse load changes, herein referred to as “managed spills.” Load changes are the only method of significantly affecting rate of change of project spills at Grizzly Forebay and Lower Bucks, which have uncontrolled spillways and small low-level outlets designed for minimum instream flow releases.

The following requirements do not apply to spills during periods when the applicable powerhouses are block loaded; nor do they apply to spills at Grizzly Forebay when load changes are made in parallel at both Grizzly and Bucks Powerhouses such that flows through the powerhouses are as equivalent as possible (i.e., “paired schedules” achieving a natural rate of change in flow).

At no time would managed spills that affect flows on Grizzly Creek be scheduled during the first 5 days or the last two days of the prescribed daily steps of the Rock Creek-Cresta Project NFFR Cresta Reach 21-day spill recession (CSR). Preferentially, managed spills that affect flows on Grizzly Creek would be scheduled prior to the CSR; however, if that is impractical, they may be scheduled during the 15 days of constant flow within the CSR (i.e., days 6 to 20).

For additional protection of the FYLF population in the Cresta Reach, extended outages greater than 2 weeks at Bucks and Grizzly Powerhouses would not be scheduled during April through July to avoid potential spills in Grizzly Creek during that ecologically sensitive period.

Outages during August and September are unlikely to result in spills; however, no outages would be scheduled for these months if they would cause a spill. For down-ramping of managed spills from April through September, the load change over 24 hours would not exceed the megawatt value in tables 3-11, 3-12, or 3-13 corresponding to the applicable powerhouse and instantaneous spill flow at the beginning of that 24-hour increment. These tables present three different ramping scenarios.

Table 3-11. Grizzly Powerhouse load changes for spills at Grizzly Forebay Dam
(Source: PG&E and City, 2018a, as modified by staff).

Initial Flow at Gage NF22 (cfs)	Allowable Change (MW)	Approximate Powerhouse Flow Change Per Step (cfs)
> 800	N/A	N/A
551 - 800	12.0	203 - 209
351 - 550	8.0	135 - 140
150 - 350	4.0	67 - 70
< 150	2.0*	33 - 35

*Depending on the 9 to 11 MW no-run zone, may require a 3 MW step.

Note: Changes in powerhouse flows result in corresponding changes in instream flows – i.e., powerhouse flows are increasing, instream flows would decrease at a similar magnitude.

Table 3-12. Bucks Powerhouse load changes for spills at Grizzly Forebay Dam (Source: PG&E and City, 2018a, as modified by staff).

Initial Flow at Gage NF22 (cfs)	Allowable Change (MW)	Approximate Powerhouse Flow Change Per Step (cfs)
> 800	N/A	N/A
551 - 800	40.0	40 - 207
351 - 550	24.0	119 - 158
150 - 350	12.0	58 - 86
< 150	6.0*	29 - 45

Note: Changes in powerhouse flows result in corresponding changes in instream flows – i.e., powerhouse flows are increasing, instream flows would decrease at a similar magnitude.

Table 3-13. Grizzly Powerhouse load changes for spills at Lower Bucks Dam (Source: PG&E and City, 2018a, as modified by staff).

Initial Flow at NFC12 (cfs)	Allowable Change (MW)	Approximate Powerhouse Flow Change Per Step (cfs)
> 800	N/A	N/A
551 - 800	12.0	203 - 209
351 - 550	8.0	135 - 140
150 - 350	4.0	67 - 70
< 150	2.0*	33 – 35

*Depending on the 9 to 11 MW no-run zone, may require a 3-MW step

Note: Changes in powerhouse flows result in corresponding changes in instream flows – i.e., powerhouse flows are increasing, instream flows would decrease at a similar magnitude.

For down-ramping of managed spills that occur from October through March, any load changes over 60 minutes would not exceed the megawatt value in tables 3-11, 3-12, or 3-13 corresponding to the applicable powerhouse and instantaneous spill flow at the beginning of that 60-minute increment.

During extended spills greater than 350 cfs that occur from October through March, flexible schedules and bidding are allowed, but load changes cannot exceed the megawatt value in tables 3-11, 3-12, or 3-13 corresponding to the applicable powerhouse and instantaneous spill flow at the beginning of that increment. For spills at Grizzly Forebay, this flexibility applies only when flows on the NFFR exceed 3,500 cfs at the NF56 gage.

Stream stage and calculated flow would be monitored in Bucks Creek downstream of Lower Bucks Lake Dam and in Grizzly Creek downstream of Grizzly Forebay Dam for the first 5 years of the license, or until all three ramping scenarios are implemented, whichever may come first. Flow measurement methods are described in the Streamflow and Reservoir Level Gaging Plan (PM&E Measure WR-10). After License Year 5, the licensees would compile a report that documents the effects of implementation of the measure on instream flow conditions in Bucks Creek, Grizzly Creek, and the NFFR. The report would also provide recommendations to improve the licensees’ compliance with this measure.

Based on the report and associated hydrologic data, the licensees, in consultation with the Forest Service, FWS, California DFW, Water Board, and interested stakeholders, would revise the measure as needed to protect aquatic species and file the updated measure with FERC.

The proposal to manage spill at Grizzly Forebay and Lower Bucks Lake is consistent with Forest Service preliminary 4(e) condition 35, Water Board preliminary condition 7, FWS 10(j) recommendation 7, and California DFW 10(j) recommendation 10.

Our Analysis

Rapid changes in streamflow associated with project operations have the potential to adversely affect aquatic resources by stranding fish in shallow, low gradient gravel bar areas and off-channel habitat; causing temporary loss of fish habitat or loss of habitat access; and dewatering amphibians, aquatic insects, and plant life (Hunter, 1992). Fry and juvenile fish less than 2 inches long are normally the most vulnerable to stranding because of their weak swimming ability; preference for shallow, low-velocity habitat such as edge-water and side channels; and a tendency to burrow into the substrate to hide. Rapid changes in streamflows also can affect fish behavior and reduce spawning success. As discussed in section 3.3.3.2, *Special-status Amphibians*, the FYLF may also be potentially affected by rapid flow fluctuations in Bucks and Grizzly Creeks, as well as the NFFR downstream of the confluences, where rapid changes in flow may strand egg masses.

In order to minimize the potential for project-related flow fluctuation effects during managed spills, this measure decreases the rate of down-ramping by changing unit loads on the associated powerhouses for the benefit of the fisheries and breeding and rearing FYLF. Further, licensees would not schedule extended outages more than 2 weeks long at Bucks and Grizzly Powerhouses during April through July to avoid potential effects to breeding or rearing FYLF in the NFFR resulting from spills in Grizzly Creek.

This measure was developed using a consensus-based process based on data from stream cross sections measured for the instream flow analysis, the capability of managing releases due to equipment constraints, and timing of life stages of various aquatic organisms. While no specific quantitative measurements of the effects of ramping rates on organisms are available, gradually decreasing flows from managed spills at Lower Bucks Lake and Grizzly Forebay Dams would help protect aquatic resources, including fish species and FYLF populations in the NFFR several miles downstream of the Grizzly Creek confluence. This measure is expected to improve recruitment of woody riparian vegetation. Also, recession rates for Grizzly Creek were coordinated with the Rock Creek-Cresta Project downstream in the North Fork Feather River to minimize the risk for stranding FYLF egg masses in the mainstem NFFR.

Effects of Project Operation on Fish Entrainment

Fish entrained into intakes at hydropower projects can be subject to injury or mortality resulting from turbine-blade strike, pressure changes, sheer forces, and water velocity accelerations. Alternatively, entrained fish may survive and interact with fish populations located downstream of the powerhouse. Juvenile fish have the greatest

potential for entrainment because they have poor swimming ability, whereas stronger adult fish generally can avoid entrainment, unless fish desire to migrate downstream. Although project-specific entrainment rate studies were not conducted to estimate fish mortality through the project's turbines, mortality rates for fish that pass through turbines can vary from five to 90 percent depending on turbine design, head, and fish size.

The Grizzly Powerhouse intake at Lower Bucks Lake is screened, but the intakes at Three Lakes Dam, Bucks Lake Dam, and Grizzly Forebay Intake Tunnel (intake to Bucks Powerhouse) at Grizzly Forebay are not screened. The licensees do not propose and no entity recommends measures to prevent or minimize resident fish entrainment at the intake structures.

Our Analysis

Participants in scoping identified potential entrainment as an issue that should be analyzed in the EIS. To address this concern, the licensees conducted fish entrainment studies in Lower Bucks Lake and Three Lakes as part of the Grizzly Development Amendment (PG&E, 1994), and in Bucks Lake, Grizzly Forebay as part of relicensing studies (PG&E et al., 2016ff).

The Grizzly Powerhouse intake structure in Lower Bucks Lake includes a 0.25-inch mesh screen to prevent fish entrainment. The licensees evaluated entrainment and impingement potential at this screen and found a low risk of both intake entrainment and impingement on the screens (PG&E, 1994).

Brook trout and golden shiner are the two most abundant fish species in Three Lakes. The licensees have not observed either species in Lower Bucks Lake, which receives water from Three Lakes via the Milk Ranch Conduit diversion, and have not observed golden shiner in Milk Ranch Creek below the diversion. The licensees sampled Three Lakes for 21 days and found no entrainment of brook trout during this time (PG&E et al., 2016ff). Entrainment of golden shiner, if it occurs, does not appear to be affecting the population within Three Lakes or downstream reaches.

During the fish entrainment studies, the licensees observed only large lake trout in the vicinity of the intake in Bucks Lake, and only large brown trout in the vicinity of the intake in Grizzly Forebay. Both lake trout and brown trout have sustained and burst speeds that exceed the mean monthly and mean monthly maximum approach velocities³¹ at the facility intakes and are not likely at risk of involuntary entrainment (table 3-14). If entrained, brown trout from Grizzly Forebay would not survive due to the high mortality associated with the Pelton turbines in Bucks Powerhouse.

³¹ Approach velocities were calculated for the Bucks Lake Dam and Grizzly Forebay Tunnel intakes based on historical flow rates and dimensions of the intake openings at the trash racks.

Table 3-14. Velocity and fish swim speed measures at Bucks Creek Hydroelectric Project intake structures (Source: PG&E and City, 2016ff, as modified by staff).

		Fish			Intake		
Sample Depth	Species	Size (feet)	Sustained Speed (fps)	Burst Speed (fps)	Mean Maximum Velocity (fps)	Mean Velocity (fps)	Turbine Type
Bucks Lake							
Bottom	Lake Trout	2.85	11.4	28.5	1.74	0.99	N/A
90%		2.17	8.66	21.65			
Mid-Column		2.3	9.188	22.97			
Grizzly Forebay							
90%	Brown Trout	1.02	4.08	10.2	2.97	1.83	Double Overhung Pelton
		1.06	4.24	10.6			

fps = feet per second

N/A = Direct release into Lower Bucks Lake, there is no powerhouse at the base of Bucks Lake Dam.

Some losses of resident lake fish species may occur in Bucks Lake, Grizzly Forebay, and Three Lakes because they are not screened. Given the low risk associated with entrainment at Bucks Lake and Grizzly Forebay due to the fish species observed near the intakes, and the finding that the population of golden shiner in Three Lakes is not affected by existing rates of entrainment that may occur, we conclude that resident fish populations would not be negatively affected by the licensees' proposed operations of the Bucks Creek Project.

Effects of Project Operation on Large Woody Material and Coarse Sediment Movement

Regulated flows and capture of LWM and coarse sediment can alter key components of habitat for aquatic resources including the characteristics and distribution of substrate material in streams and the availability of woody debris in downstream reaches. Woody debris can enhance habitat for fish and other aquatic organisms, and

project operation could affect the quantity and quality of aquatic habitat by altering the availability and dispersal of woody debris. The licensees propose to re-introduce woody material retained in project facilities to be re-deposited downstream of Grizzly Forebay Dam and Lower Bucks Dam by implementing GS-1 (Pass Large Woody Material). The licensees also propose to maintain spawning gravels below the project facilities by implementing minor modifications to the existing channel maintenance flows (WR-4) and implementing the Gravel Augmentation Plan (GS-2). These measures are described and discussed in detail sections 3.3.1.2, *Geology and Soils*. The effects of these combined measures on fish habitat is discussed below.

Passage of Large Woody Material at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay Dams

LWM provides structure in streams that can influence sediment storage and channel morphology through its effects on flow, water velocity, and sediment transport. LWM also provides cover and holding habitat for fish, serves as substrate for the growth of algae and invertebrates (which are important components of the aquatic food web), and affects patterns of sediment deposition and scouring. Loss of LWM can reduce aquatic habitat complexity and subsequently reduce carrying capacity for aquatic biota.

In their Supplemental FLA (PG&E and City, 2018a), the licensees propose to allow woody material to pass over Grizzly Forebay Dam during spill events and channel maintenance flows (WR-4) by leaving the downstream end of the reservoir's log boom attached only to the right side of the spillway year-round, allowing debris to freely pass over the spillway during spill events. If spill events and channel maintenance flows are not sufficient to pass woody material (e.g., during multiple dry year conditions), the licensees would periodically mechanically remove woody material from the reservoir.

At Lower Bucks Lake Dam, the licensees would allow woody material to pass over the dam's spillway during spill events and mechanically remove woody material from the reservoir if necessary.

To avoid effects to downstream culverts in Bucks Creek (below Bucks Lake), wood at Bucks Lake spillway would be relocated to Lower Bucks Lake spillway. If site conditions preclude placement and passage of wood on Lower Bucks Lake spillway, the licensees may transport wood offsite following consultation with the agencies as described below.

All sizes of woody material, including woody material with root wads attached, would be allowed to pass downstream of the dams. The licensees would avoid cutting the wood, unless it is unsafe for project operations or it cannot mechanically be moved due to its large size. For any woody material that cannot be passed downstream of project dams, the licensees would consult with the Forest Service, FWS, California DFW, and the Water Board to determine appropriate methods for removal, transport, and disposal.

This proposed measure is consistent with Forest Service preliminary 4(e) condition 40, Water Board preliminary condition 5, FWS 10(j) recommendation 10, and California DFW 10(j) recommendation 13.

Our Analysis

Under existing conditions, LWM is generally more abundant within the upper portions of project-affected stream reaches and is relatively low in Grizzly Creek. The majority of LWM found in both Bucks Creek and Grizzly Creek were pieces less than 25 feet long and ranging from 6 to 16 inches in diameter. The number of pieces of LWM varied by creek, ranging from three to 32 per pieces per 100 meters for Grizzly and Bucks Creeks, respectively. Along with the relatively small size class of wood described above, no key stable pieces were identified during relicensing studies.

The licensees proposed plan to pass (or mechanically transport) LWM over the project spillways would facilitate the natural movement of material through the two creeks and would help prevent damage to the culvert located between Bucks Lake and Lower Bucks Lake. Allowing LWM to move over the dams would provide continuity of LWM transport through the stream reaches, benefitting aquatic habitat diversity and benthic macroinvertebrate production, and would provide additional LWM to the reaches downstream of the dams in reaches that have either low existing levels of LWM (Grizzly Creek) or small sizes of LWM (both Bucks Creek and Grizzly Creek), improving aquatic habitat conditions in these creeks.

Gravel Augmentation Plan for Bucks and Grizzly Creeks

The licensees propose to implement the Gravel Augmentation Plan in Bucks and Grizzly Creeks (GS-2). The plan would place (in year 2 of any license issued for the project) 37 cubic yards of 0.25- to 2.5-inch diameter gravel in Bucks Creek downstream of Lower Bucks Lake Dam spillway and in Grizzly Creek downstream of the Grizzly Creek gaging weir. Gravel would be distributed in at least two stream sites per stream. In license years 6, 10, 14, and 18, the licensees would place sufficient gravel to maintain 37 cubic yards of gravel at these locations. Gravel would be placed between August 1 and September 30 to minimize effects on fish. Gravel abundance would be monitored using repeated measurements of topography and particle size distribution, facies mapping, fine sediment sampling (McNeil cores), and photographs. Three samples would be collected per stream. Monitoring would occur in years prior to scheduled gravel augmentation (license years 1, 5, 9, 13, 17, and 21). The need for additional gravel augmentation would be determined using the results of the monitoring plan and any observed changes in trout spawning habitat conditions. The need for gravel augmentation after license year 21 would be determined based on monitoring and consultation with the Ecological Consultation Group.

The licensees' proposal to augment gravel is consistent with Forest Service preliminary 4(e) condition 41, Water Board preliminary condition 17, FWS 10(j) recommendation 11, and California DFW 10(j) recommendation 14.

Our Analysis

Operation of the Bucks Creek Project disrupts natural sediment transport processes in Bucks and Grizzly Creeks and effectively traps 100 percent of the coarse substrate that would otherwise enter these systems downstream of Lower Bucks Lake and Grizzly Forebay. As a result, trout spawning gravels are relatively limited in the upper reaches of Grizzly Creek below Grizzly Forebay Dam and Bucks Creek below Lower Bucks Dam, and are markedly less abundant than in the downstream reaches of these creeks. This reduction in spawning gravel likely limits the abundance of trout in these stream reaches.

The proposed plan to place and maintain 37 cubic yards of spawning-sized gravel downstream of these dams would provide a source of gravel to the two creeks to help offset gravel from upstream sources that is stored in the lakes and forebay.

Providing additional spawning-sized gravel in these areas, along with proposed flushing flows (WR-4) and LWM movement over the dams (GS-1) would increase the availability of gravel and wood, and consequently, improve aquatic habitat quality in reaches below the two dams. The gravel would likely be moved by peak flows and distributed downstream. The proposed monitoring plan would provide information to evaluate gravel movement and retention, allowing for replenishment of the gravel source over the course of the license.

Fish Stocking

Following development of hydropower facilities in the basin, California DFW established and maintained a significant recreational trout fishery in Bucks Lake, Grizzly Forebay, and Middle and Lower Three Lakes. Under existing conditions, recreational angling on project reservoirs is a highly valued resource and the continued stocking of fish in project waters could help maintain the fishery for those species that are not self-sustaining due to a lack of natural reproduction.

Consistent with Forest Service 10(a) recommendation 2 and California DFW 10(j) recommendation 29, the licensees propose to fund the stocking of fish by California DFW in Bucks Lake, Grizzly Forebay, and Middle and Lower Three Lakes, starting in the first full calendar year after a license is issued (AR-1). The licensees propose to enter into renewable 5-year contracts with California DFW to support fish stocking and stocking targets (table 3-15), as determined by California DFW. Water Board preliminary condition 13 states that the Water Board will most likely require the notification of any arrangements to stock fish in project waters.

Table 3-15. Fish species and stocking targets as determined by California DFW
(Source: PG&E and City, 2018a, as modified by staff).

Area	Rainbow Trout	Brown Trout	Brook Trout
Bucks Lake	Up to 5,000 pounds of catchable trout	6,000 pounds of catchable trout	6,400 pounds of catchable trout
Grizzly Forebay	N/A	Up to 10,000 fingerlings	N/A
Lower and Middle Three Lakes	Up to 10,000 fingerling trout species to be determined annually		

Our Analysis

The reservoirs and impoundments within the Bucks Creek Project area support a popular shoreline and boat-based recreational fishery. California DFW administers an ongoing salmonid stocking program in Bucks Lake and Grizzly Forebay, and historically stocked brook and brown trout in Three Lakes. The existing program is designed to maintain angling opportunities that have been lost due to fish entrainment into project facilities or when access to quality spawning habitat is limited by reservoir operations. Additionally, the licensees estimate that recreational use within the project area could increase by almost 18 percent by 2036.

While the principal direction of California DFW's trout management program is to maintain self-sustaining wild populations, as reflected in the California Fish and Game Commission Trout Policy, California DFW uses artificial production (hatchery fish) to augment fisheries where natural production and growth are inadequate to support fishing.

California DFW's fishery management goals for the Bucks Creek Project area reservoirs are to:

- Protect and enhance reservoir angling opportunities (shoreline and boat) at project reservoirs consistent with overall reservoir-based recreation and reservoir level goals through fish stocking, maintenance of structures, and access.
- Ensure fish stocking in project reservoirs is adequate for a quality angling experience. California DFW classifies a reservoir fishery as good to excellent if the catch per unit effort (CPUE) is 1.0 fish per hour or greater, fair to good if the CPUE is 0.5 to 1.0 fish per hour, and poor to fair if the CPUE is 0.0 to 0.5 fish per hour.

Under existing conditions, the restriction of fish movement as a result of project operations has several potential consequences, including limiting access to spawning areas, reducing survival by reducing or eliminating access to overwintering or over-summering areas, and causing gene flow between and among populations to be

essentially one-directional (downstream). For example, the licensees reported that reservoir operations at Bucks Lake may influence passage in three of six tributaries (PG&E et al., 2016u). Passage limitations due to low flow and disconnected surface flow were reported for Middle Fork Mill Creek, Haskins Creek, and Pat Maloy Creek. In addition, operations at Three Lakes (the September 1 drawdowns) likely contributed to the decline in the brook trout fishery that was once thought to be self-sustaining. Without supplementing natural production, the fishery and its associated recreational fishing experiences would likely decline.

The licensees' proposed measure, consistent with California DFW and Forest Service recommendation to fund California DFW's stocking programs in Bucks Lake, Grizzly Forebay, and Middle and Lower Three Lakes would likely result in the maintenance of the existing reservoir fishery and could also help meet the projected increases in recreational fishing demand over time.

Aquatic Resources Monitoring Plan

The licensees propose measures that could affect existing aquatic habitat and biota in or near the project area waterbodies, such as increased minimum instream flows, LWM and sediment management, controlled drawdowns, and spill recession rates. These measures are expected to increase the distribution and abundance of resident salmonids and BMI in the project area.

To address the effects of these measures on aquatic resources, the licensees propose to implement their Aquatic Resources Monitoring Plan (AR-2) (PG&E and City, 2018g). The primary goal of the plan is to monitor aquatic resource conditions under the new license. As such, it provides information on the methods, survey locations, and survey timing for the following resources within the Bucks Creek Hydroelectric Project Area:

- Water Temperature/Water Quality
- Stream Fish
- Three Lakes Brook Trout
- Benthic Macroinvertebrates
- FYLF
- Stream Channel Morphology
- Large Woody Material
- Riparian Vegetation

Below, we analyze the need for the proposed plan.

Stream Fish. The goal of this plan element is to monitor stream fish populations in Milk Ranch, Bucks, and Grizzly Creeks downstream of project dams following license

issuance. The objectives are to determine and quantitatively describe: (1) fish species composition and distribution, (2) total or relative abundance of fish by species, (3) fish population size and age-class distributions, and (4) fish condition.

The licensees would conduct these population surveys using standard multiple-pass depletion backpack electrofishing procedures identified by Reynolds (1996) at sites in Bucks, Milk Ranch, and Grizzly Creeks, and adhere to the schedule described in section 3.3 and table 1 of the plan. Stream fish population monitoring would generally occur in late summer or early fall, as specified in table 1 of the plan. Sites would be approximately 100 meters in length, depending on topography and accessibility. The licensees would develop species composition estimates using the total count of fish observed during sampling and would determine age classes for all fish captured using breaks or modalities within the length-frequency histograms. Finally, the licensees would develop trout density estimates for age classes including YOY and juvenile/adult trout using software developed by Van Deventer and Platts (1989) or Pollock and Otto (1983).

Three Lakes Brook Trout. The goal of this plan element is to monitor brook trout in Three Lakes following issuance of a new license. The objectives are to describe, quantify, and periodically monitor: (1) brook trout spawning and determine brook trout spawning periodicity, (2) collect redd density data, (3) identify unique features of brook trout spawning areas, and (4) assess populations to inform long-term stocking/management of brook trout.

The licensees would conduct visual spawning surveys for brook trout redds using boat/kayak or snorkeling within the lower and middle lakes, and by pedestrian surveys in tributaries to, and stream channels connecting, the lakes. Once a spawning area is located, crews would collect additional information to precisely document redd locations and redd count (i.e., the water depth and distance from the shoreline at each redd). Additional observations would include approximate location, species identification, approximate size, and in situ water chemistry (i.e., water temperature, DO, pH, and conductivity). The licensees would conduct these surveys biweekly to determine spawning locations and periodicity immediately following drawdown of Three Lakes until November 1 during the first 4 years of the new license following implementation of the Annual Drawdown of Three Lakes (WR-3).

In addition to the above surveys, the licensees would conduct fish population surveys using variable-mesh gill nets. Gill nets would be set in June of each monitoring year for two approximate 8-hour net-set periods, including one day and one-night period, over approximate 24 hours to facilitate good coverage and to separate diel periods in the lower and middle lakes. Gill net surveys would be conducted during years 10, 20, 30, and 40 of the new license to describe fish populations and inform stocking and brook trout management.

Benthic Macroinvertebrates. The objective of this plan element is to monitor BMI assemblages, habitat, and associated metrics in project-affected reaches of Bucks, Grizzly, and Milk Ranch Creeks.

The licensees would monitor BMI using the standard reach-wide benthos method for documenting and describing BMI assemblages and physical habitat described by the Surface Water Ambient Monitoring Program (Ode, 2007), or a method consistent with generally accepted scientific best practices. The licensees would sample at sites in Bucks, Milk Ranch, and Grizzly Creeks, and adhere to the plan schedule described in section 3.3 and table 1 of the plan.

Stream Channel Morphology. As described in section 2.7 of the monitoring plan, the objective of the licensees' stream channel morphology monitoring is to periodically survey gravel-sized substrate at a series of index sites located downstream of Lower Bucks Lake and Grizzly Dams. The results of these surveys would then be used to determine if additional gravel is needed to meet the objectives of the proposed Gravel Augmentation Plan. The methods used in this monitoring would be virtually identical to those described in the licensees' proposed Gravel Augmentation Plan for Bucks and Grizzly Creeks, and include a combination of evaluating surficial sediment distribution (facies mapping), pebble counts, sub-surface substrate composition (McNeil cores) and photo documentation.

Large Woody Material. The objective of the licensees' LWM monitoring is to document long-term changes in the size distribution and abundance of LWM passed downstream of Lower Bucks Lake and Grizzly Forebay. The licensees would conduct regular surveys within the proposed channel morphology index sites to document total LWM and "Key LWM" influencing channel morphology. LWM pieces would be grouped into five length bins and four diameter bins. Key pieces of LWM would include those pieces that are either longer than 0.3 times the bankfull width; have a root wad or are greater than 50 percent buried at one end; or are of sufficient size and/or are deposited in a manner that alters floodplain, channel morphology, and aquatic habitat (e.g., trapping sediment or altering flow patterns). The licensees would monitor LWM according to the schedule described in Section 3.8 of the plan in coordination with the proposed stream channel and riparian surveys.

In its Section 4(e) condition 34, the Forest Service requires the licensees to implement the Aquatic Resources Monitoring Plan (PG&E and City, 2018g). California DFW 10(j) recommendation 16 and FWS 10(j) recommendation 12 recommend the licensees implement their Aquatic Resources Monitoring Plan, and the Water Board indicates that it likely would require the development of such a plan to protect the beneficial uses of project waterways and assure that the underlying assumptions of any water quality certification over the life a new FERC license. The Water Board further recommends the plan should include the following elements at a minimum: (1) objectives and goals; (2) monitoring methodologies; (3) monitoring locations and frequencies; (4) an opportunity to revise the monitoring plan in future; (5) and address the

following aquatic resources areas: water temperature, bacteriological sampling, turbidity, LWM, stream channel morphology, riparian vegetation, FYLF, stream fish populations, Three Lakes brook trout, and BMI.

Our Analysis

Fish population monitoring, if conducted, is typically based on the presence or absence of particular species, numbers of particular species, spawning success, or community parameters (such as productivity, density, and diversity) and is usually conducted over multiple years. Fish habitat monitoring usually focuses on the long-term assessment of habitat variables that have the greatest influence on aquatic species. BMI have several characteristics that make them potentially useful indicators of water quality and overall stream health. They are relatively non-mobile, and thus well suited for assessing site-specific effects. BMI are also abundant in most streams, and sampling is relatively easy and inexpensive. Disadvantages of monitoring BMI include a high degree of natural variability within or between sample sites, sample seasons, and sample years.

Implementing the licensees' proposed LWM augmentation plan would likely increase aquatic habitat diversity in Bucks and Grizzly Creeks and provide cover and holding habitat for juvenile salmonids. It would also aid in the retention of spawning gravel, and organic debris; and create habitat for macroinvertebrates and other aquatic organisms (which are important components of the aquatic food web).

Developed in consultation with the Forest Service, California DFW, FWS, Water Board and other relicensing participants, the licensees propose a comprehensive fish habitat and fish population monitoring plan for the Bucks Creek Project area. However, the majority of the monitoring measures included in this plan do not appear to take into account the effects of non-project related influences on species abundance and/or diversity and appear to have no clear connection to future license conditions (i.e., they do not contain any evaluation criteria that could lead to changes in operations that would be enforceable under any new license issued for the project). In addition, the monitoring measures are not specifically designed to isolate project effects.

For example, whereas the licensees' proposed stream fish and Three Lakes brook trout monitoring plans would provide fish population information, such as the abundance, size, and spawning locations of important fish species found in the project area, it is unclear how these data would be used to identify and address specific project effects on the resource. It is well known that the annual abundance of salmonids can be highly variable and is influenced by angler harvest, annual hatchery augmentation, state and federal fishery management, disease, fire, and prolonged droughts. All of these factors are outside the licensees' control and are not otherwise related to the project. Based on the above, there appear to be few benefits from the licensees' proposal to monitor stream fish, Three Lakes brook trout, BMI, or LWM in Bucks and Grizzly Creeks.

In the Gravel Augmentation Plan for Bucks and Grizzly Creeks, the licensees propose to introduce gravel into Bucks and Grizzly Creeks (GS-2). This plan would

place and maintain 37 cubic yards of gravel in Bucks Creek downstream of Lower Bucks Lake Dam spillway and in Grizzly Creek downstream of the Grizzly Creek gaging weir. Periodically monitoring the introduced spawning gravels would be necessary to ensure that 37 cubic yards of gravel is maintained in Bucks Creek and Grizzly Creek over the term of the license.

Aquatic Invasive Species Management

AIS, such as New Zealand mudsnails, quagga mussels, zebra mussels, and Asian clams can compete for habitat resources with native species and have the potential to affect aquatic communities. While these species have not been documented during macroinvertebrate or other relicensing studies, signal crayfish, *Ceratonova Shasta* (formerly *Ceratomyxa shasta*), white spot disease, and the amphibian chytrid fungus have been documented in project reservoirs and affected stream reaches. Lake Mead is currently the closest known location of quagga mussels, and zebra mussels have become established in San Justo Reservoir in San Benito County in California.

New Zealand mudsnails are known to reproduce quickly with large numbers of offspring; a single female is capable of producing 2.7 billion offspring within 4 years (California DFW, 2017). If New Zealand mudsnails became established in the Bucks or Grizzly creek watersheds, they would pose similar threats as AIS in other areas, including clogging facility pipes and out-competing other aquatic macroinvertebrates for food, thereby disrupting ecosystem balances across the food web.

To minimize the threats associated with AIS, the licensees propose (AR-4) replacing the existing Quagga and Zebra Mussel Prevention Program with a new AIS management plan that includes management of AIS that occur or have the potential to be introduced into project-affected waters within the FERC project boundary. The proposed plan would be filed with FERC, after approval by the resource agencies, within 1 year after license issuance. At a minimum the plan would include BMPs to prevent the introduction of AIS into project waters, early detection monitoring and monitoring of known AIS populations, and management of existing populations. BMPs would include, at a minimum, a public education program; early detection monitoring for quagga and zebra mussels, consisting of surface surveys, artificial substrate monitoring, and/or plankton tow sampling at project reservoirs; monitoring of other focal AIS; observations of other AIS; downloading data from online AIS databases at least annually; conducting annual employee AIS training; conducting control and management actions of AIS species detected within the FERC project boundary; and providing an annual report of AIS prevention and monitoring activities by March 31 of the following year to the resource agencies.

The licensees' proposed plan is consistent with Forest Service preliminary 4(e) condition 44, FWS 10(j) recommendation 14, and California DFW 10(j) recommendation 17. The Water Board recommends (preliminary condition 18) developing and implementing a plan to manage AIS, and include at a minimum, the following measures:

(1) actions to minimize and prevent the introduction and spread of AIS into and throughout project-affected waters; (2) provide education and outreach to ensure public awareness of AIS effects and management; (3) implement monitoring programs for early detection of AIS; (4) ensure all project AIS management activities comply with federal and State of California laws, regulations, policies, and management plans, and with Forest Service directive and orders regarding AIS; and (5) monitor and minimize spread of established AIS.

Our Analysis

The Bucks Creek Project area supports popular recreational angling and boating opportunities, and consequently provides frequent opportunities for boats and trailers to inadvertently transfer AIS into the reservoirs. Educating the public on practices to reduce the spread of invasive species, by providing signage and informational cards at public recreational access sites and on PG&E's AIS website, as proposed by the licensees and recommended by the Forest Service, California DFW, and FWS, would help minimize the risk of transporting invasive species from infected waterbodies.

The licensees propose and resource agencies recommend development of BMPs to prevent the introduction of AIS into project-affected waters. The listed BMPS, including public education, early detection monitoring, monitoring of focal AIS, incidental observations, annual AIS database queries, annual employee training, control and management actions, and annual reporting would help minimize the introduction and potential spread of invasive species. Additionally, including access restrictions and consultations with the appropriate agencies as a default action to be taken if AIS are discovered, as proposed by the licensees and recommended by the resource agencies, would minimize the potential spread of any discovered species compared to not having a default action. Including annual employee training to identify AIS would increase the potential for incidental observations of non-native species.

Early detection is a critical component in effectively managing the spread of invasive species and routine monitoring as proposed and recommended by the resource agencies would provide a means for early detection. As mentioned previously, invasive mollusks have not been reported in the Bucks Creek project area, and the nearest occurrence of quagga and zebra mussels is over 200 miles away and the nearest New Zealand mudsnails are located in the Sacramento and Feather rivers. Recording incidental observations of non-native species during project activities in Bucks Creek project reservoirs and in stream reaches regulated by the Bucks Creek Project, and immediately (within three days) reporting any observations to the Forest Service, FWS, Water Board, and California DFW, would also provide a means for effectively managing invasive species.

The licensees consider the overall vulnerability of project reservoirs to the introduction of dreissenid mussels³² to be low, as calcium levels in project waters are unlikely to support dreissenid mussel establishment (Claudi and Prescott, 2011; Mackie and Claudie, 2010). The plan proposed to be developed by the licensees and resource agencies would address AIS that occur or have the potential to be introduced into project-affected waters within the FERC project boundary, including New Zealand mudsnail, Whirling Disease vector, *Ceratonova shasta*, *Tetracapsuloides bryosalmonae*, *Ichthyophthirius multifiliis*, *Batrachochytrium dendrobatidis*, Ranavirus, signal and virile crayfish, American bullfrog, Eurasian milfoil, hydrilla, curly leaf pondweed, Brazilian waterweed, parrot's feather milfoil, water primrose, and didymo, in addition to the dreissenid mussels included in the existing Quagga and Zebra Mussel Prevention Program. Re-assessing project waters' vulnerability, early detection, applying BMPs, and public education on these AIS would provide appropriate management of AIS for the Bucks Creek Project.

3.3.2.3 Cumulative Effects

Water resources (water temperature), aquatic resources (resident trout), and aquatic amphibians (FYLF and SNYLF) have the potential to be cumulatively affected by the continued operation of the Bucks Creek Project in combination with other activities in the upper NFFR basin (FERC, 2014a). Cumulative effects on FYLF and SNYLF are discussed in section 3.3.3.3 and section 3.3.4.3, respectively.

Water Temperature

The licensees' water temperature modeling demonstrated that flows in project-affected reaches (Bucks, Grizzly, Milk Ranch, and Grizzly Creeks) are low relative to the NFFR, which ameliorates project effects on water temperature downstream of the project. Modeled Grizzly Creek flows ranged from 4 to 28 cfs, an order of magnitude lower than NFFR flows. Model results indicate that project operations have no cumulative effect on the NFFR downstream of the Grizzly Creek confluence.

Flow measures that would be implemented for other projects that may affect water temperatures in the NFFR are anticipated to enhance aquatic habitat for native species. These projects include Upper North Fork Feather Project (FERC No. 2015), the Rock Creek-Cresta Project (FERC No. 1962), and the Poe Project (FERC No. 2107). The large ratio of flows in the NFFR to those of Bucks, Grizzly, and Milk Ranch Creeks is expected to be maintained with the implementation of new flow measures associated with

³² Dreissenid mussels are a family of small, freshwater mussels that attach themselves to hard surfaces, including nonnative zebra and quagga mussels that are considered invasive species in the state of California.

these other hydroelectric projects. The proposed action would therefore have no significant negative cumulative effect on water temperature in the NFFR.

DO measurements in surface waters of project reservoirs and affected stream reaches were all above Basin Plan numerical limits for the NFFR (CVRWQCB, 2018). Hypolimnetic DO concentrations in the reservoirs were lower than the Basin Plan objective; however, the majority of the water column and the next nearest downstream sites exhibited DO levels above the 7.0 mg/L objective in all sampling events (see PG&E and City, 2016j, table 12). The project therefore would not cumulatively affect DO in stream reaches in the NFFR from its confluence with the East Branch Feather River to Lake Oroville.

Aquatic Resources (Resident Trout)

The three project-affected streams (Milk Ranch, Bucks, and Grizzly Creeks) contain naturally occurring passage barriers near the NFFR confluence that prohibit significant upstream migration of trout from the NFFR. Trout from the NFFR can spawn and rear in streams below these barriers; spawning generally takes place between late January and April.

Resident trout migrating upstream into Milk Ranch Creek from the NFFR encounter a permanent passage barrier at a railroad trestle just a few hundred feet upstream of the confluence. However, as part of PG&E's Rock Creek-Cresta Project (FERC No. 1962), flow is diverted from Milk Ranch Creek downstream of the train trestle into a man-made spawning channel for rainbow trout. Rainbow trout migrating upstream from the NFFR find spawning habitat in the stream and spawning channel.

Resident trout migrating upstream into Bucks Creek from the NFFR encounter a natural, partial passage barrier (potentially passable under high winter storm or spring runoff conditions) 0.22 mile upstream of the confluence. If passable, Bucks Creek contains numerous additional natural passage barriers throughout the reach that would further restrict access into upstream portions of the creek.

Resident trout migrating upstream into Grizzly Creek from the NFFR encounter a natural, partial passage barrier 0.31 mile upstream of the confluence. Similar to Bucks Creek, if passable, Grizzly Creek contains numerous additional natural passage barriers throughout the reach that would further restrict access into upstream portions of the reach.

Resident trout populations in the project-affected stream reaches above the upstream passage barriers are likely a source of recruitment for the NFFR. Flows in these reaches provide sufficient habitat for maintaining self-sustaining fish populations in good condition above passage barriers.

Since project reaches support resident trout populations and the proposed action would improve fish habitat and further minimize adverse effects on trout populations in

the NFFR, there are no significant negative cumulative effects on resident trout populations as a result of the proposed action.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

Vegetation

The licensees mapped vegetation communities within 0.5 mile of (1) the project boundary, (2) Milk Ranch Creek below Three Lakes, (3) Grizzly Creek below Grizzly Forebay, and (4) Bucks Creek below Lower Bucks Lake. Mapping also covered a small area between the Bucks Creek and Grizzly Creek watersheds just beyond the 0.5-mile buffer and areas within 0.25 mile of upper Grizzly Creek.

The licensees initially used aerial photos and information from previous surveys, and in 2015, updated the maps by ground-truthing at least three representative sites within each upland vegetation type, as well as all riparian, wetland and littoral areas, areas that potentially support rare plant communities, and areas with potential habitat for willow flycatchers (a state Endangered species).

Table 3-16 shows the vegetation communities/ habitat types and their approximate acreages. The licensees mapped 58 vegetation communities within the study area. About eight percent of the study area is non-vegetated and consists of reservoirs, lakes, and rivers, and roads and other developed areas.

The mapping effort shows that high elevations (5,600 to 7,060 feet) are a mixture of forest and chaparral. Mid-elevations (4,000 to 5,600 feet) and low elevations (1,530 to 4,000 feet) are primarily forested. The most common upland forest communities include ponderosa pine-Douglas fir, white fir-sugar pine, red fir-white fir, white fir, and California black oak forest. Upland shrubland consist primarily of golden chinquapin thickets and huckleberry oak chaparral. Upland herbaceous communities comprise less than one percent of the study area.

Table 3-16. Vegetation communities and other habitat types within the Bucks Creek study area (Source: PG&E and City, 2016h, as modified by staff).

Vegetation Communities/Habitat Types	Acres	Percent of Study Area
Upland Vegetation Communities	26,011	88%
Forest and Woodland (total)	21,811	74%
<i>Ponderosa pine-Douglas fir forest</i>	3,968	
<i>White fir-sugar pine forest</i>	3,893	
<i>Red fir-white fir forest</i>	3,451	
<i>White fir forest</i>	3,247	
<i>California black oak forest</i>	2,579	
<i>Ponderosa pine forest</i>	1,823	
<i>Canyon live oak forest</i>	1,346	
<i>White fir-Douglas fir forest</i>	650	
<i>Jeffrey Pine forest</i>	441	
<i>Red fir forest</i>	312	
<i>Mixed conifer forest</i>	82	
<i>Incense cedar forest</i>	9	
<i>California bay forest</i>	6.6	
<i>Sugar pine forest</i>	3.8	
Shrubland (total)	4,142	14%
<i>Golden chinquapin thickets</i>	1,487	
<i>Huckleberry oak chaparral</i>	1,127	
<i>Deer brush chaparral</i>	510	
<i>Tobacco brush chaparral</i>	448	
<i>Green leaf manzanita chaparral</i>	414	
<i>Largeflower bush monkeyflower scrub</i>	82	
<i>Mountain white thorn chaparral</i>	69	
<i>Bitter cherry thickets</i>	2.7	
<i>Whiteleaf manzanita chaparral</i>	2.4	

Vegetation Communities/Habitat Types	Acres	Percent of Study Area
Herbaceous Vegetation (total)	58	<1%
Wetland Vegetation Communities	1,099	4%
Lacustrine	1,970	7%
Riverine	46	<1%
Barren/unvegetated areas	157	<1%
Developed	65	<1%
Roads	239	<1%
Total Acreage within Study Area	29,587	100%

Invasive Weeds

Noxious and invasive weeds include those identified by the California Department of Food and Agriculture (CDFA) and the California Invasive Plant Council (Cal-IPC) as having known ecological, environmental, or economic effects. The PNF provided a target list of NNIPs and occurrence data within the project area. This list was cross-referenced with CDFA and Cal-IPC rankings. These sources were used to generate a list of 33 target NNIPs potentially occurring in the project area.

Focusing on the target species, the licensees conducted field surveys for invasive weeds during 2015 (PG&E and City, 2016hh). Surveys included all areas within 200 feet of project structures and other facilities, including roads, reservoirs, and recreation sites. Surveyors digitally mapped all targeted non-native invasive plant occurrences and recorded the following information: extent of infestation (i.e., overall patch size), percent cover, and estimate of the number of individuals per occurrence.

The 2015 surveys documented 36 occurrences of four target weed species (table 3-17). Yellow star-thistle (*Centaurea solstitialis*), Canada thistle (*Cirsium arvense*), and Himalayan blackberry (*Rubus armeniacus*) are considered noxious weeds by Cal-IPC and the CDFA. CDFA also identifies quackgrass (*Elymus repens*), which may hybridize with tall wheatgrass (*Elymus ponticus*), as a noxious weed; the Cal-IPC assessment of quackgrass status is pending (CalFlora.org, accessed January 20, 2019). The most widespread weeds observed in the project area were tall wheatgrass x quackgrass and Himalayan blackberry. The majority of occurrences were along project roads (21). Weed populations were also documented at project facilities (6), recreation facilities (5), and along the transmission line (4) (table 3-18). Overall, invasive weeds have a very limited distribution in the project area.

Table 3-17. Non-native invasive plant species occurrences identified during 2015 surveys in the Bucks Creek Project area (Source: PG&E and City, 2016h, as modified by staff).

Species	Number of Populations¹	Total Gross Area² (feet²)	Total Infested Area³ (feet²)
Yellow star-thistle ⁴	1	4	2
Canada thistle ⁴	8	151	37
Tall wheatgrass x quackgrass (hybrid)	20	58,012	2,604
Himalayan blackberry ⁴	7	3,735	2,578
Total	36	61,902 (1.42 acres)	5,220 (0.12 acre)

¹Populations documented within 200 feet of project features during 2015 surveys.

²Sum of the total geographic extent of each patch, regardless of the percent cover within each patch.

³Sum of the total geographic extent of each patch, multiplied by the percent cover observed within a patch (e.g., a patch with 4 square feet of gross area and 50 percent cover equals 2 square feet of infested area).

⁴Listed by the CDFA as noxious weeds.

Table 3-18. Non-native invasive plant species occurrences summarized by location in the Bucks Creek Project area (Source: PG&E and City, 2016f, as modified by staff).

Project Feature	Species	Number of Populations¹
Project Facilities	Yellow star-thistle	1
	Tall wheatgrass x quackgrass	2
	Himalayan blackberry	3
	<i>Subtotal</i>	<i>6</i>
Recreation facilities	Tall wheatgrass x quackgrass	4
	Himalayan blackberry	1
	<i>Subtotal</i>	<i>5</i>
Project Roads	Canada thistle	8
	Tall wheatgrass x quackgrass	12
	Himalayan blackberry	1

Project Feature	Species	Number of Populations¹
	<i>Subtotal</i>	<i>21</i>
	Tall wheatgrass x quackgrass	2
Transmission Line	Himalayan blackberry	2
	<i>Subtotal</i>	<i>4</i>
	Total	36

¹ Populations documented within 200 feet of project features during 2015 surveys.

Special-status Plants

Special-status plants include those species listed or proposed for listing under the ESA or California ESA (CESA), designated by the Forest Service as Sensitive or Watch List species, or on the California DFW's Special Vascular Plants, Bryophytes or Lichens List with a California Rare Plant Rank of 1, 2, 3 or 4.³³

The licensees identified a list of special-status plant species and rare natural communities that have the potential to occur in the project area by querying several agency databases and reviewing relevant literature, aerial photos, maps, and previous field survey reports. Field surveys were conducted in spring and summer of 2015 (PG&E and City, 2016hh). A follow-up survey was conducted in 2016 at two sites. Surveys included all areas within 200 feet of project structures and facilities, including roads, reservoirs, and recreation sites.

The 2015 and 2016 surveys documented 94 occurrences of 16 special-status plant species, including 14 vascular plants and two bryophytes. No rare lichens or fungi were documented. None of these species are federally or state listed, but all have a California Rare Plant Rank of 1 to 4 or are designated by the Forest Service as Sensitive or Watch List species.

The surveys documented 80 populations of special-status plants within the project boundary; 70 of these are located near project features, including 56 populations located along roads, four along transmission line corridors, six immediately adjacent to the fluctuating Bucks Lake reservoir perimeter, and four at recreation sites. Ten populations are not near any project feature and 14 populations are outside of the project boundary.

³³ Rankings range from presumed extinct (1A) to limited distribution species on a watch list (4) (<https://www.cnps.org/rare-plants/cnps-rare-plant-ranks>).

The 14 identified special-status vascular plant species include:

- Clifton's Eremogone (*Eremogone cliftonii*) – 15 occurrences
- Closed-throated beardtongue (*Penstemon personatus*) – 1 occurrence
- Clustered lady's-slipper (*Cypripedium fasciculatum*) – 1 occurrence
- Coleman's rein orchid (*Piperia colemanii*) – 5 occurrences
- Fern-leaved monkeyflower (*Erythranthe filicifolia*) – 1 occurrence
- Giant checkerbloom (*Sidalcea gigantea*) – 8 occurrences
- Long-leaved starwort (*Stellaria longifolia*) – 3 occurrences
- Mildred's clarkia (*Clarkia mildrediae* subsp. *mildrediae*) – 35 occurrences
- Obtuse starwort (*Stellaria obtusa*) – 8 occurrences
- Round-leaved sundew (*Drosera rotundifolia*) – 2 occurrences
- Siskiyou Mountains huckleberry (*Vaccinium coccineum*) – 6 occurrences
- Slender cottongrass (*Eriophorum gracile*) – 1 occurrence
- Yellow willowherb (*Epilobium luteum*) – 1 occurrence
- Yosemite moonwort (*Botrychium simplex* var. *compositum*) – 1 occurrence

The two identified special-status nonvascular plant taxa were:

- Peat mosses (*Sphagnum* spp.) – 3 occurrences
- Three-ranked hump moss (*Meesia triquetra*) – 3 occurrences

The licensees documented 19 rare natural communities including one provisional alliance – round-leaved sundew meadow (table 3-19). These communities comprise 2,125 acres.

Table 3-19. Rare natural communities mapped within the Bucks Creek study area
(Source: PG&E and City, 2016h, as modified by staff).

Common Name	Number of Polygons¹	Proximity to Project Features	Total Acres	Percent of Study Area
Upland Communities: Forests and Woodland				
Incense cedar forest	4	Two polygons adjacent to Bucks Penstock Road	9	0.03%
Sugar pine forest	2	Two polygons adjacent to Three Lakes Road and a diversion	3.8	0.01%
California bay forest	5	One polygon 50 feet from Grizzly Powerhouse Transmission Line	6.6	0.02%
Upland Communities: Shrubland				
Golden chinquapin thickets	64	13 polygons near or adjacent to project roads	1,487	5.03%
Upland Communities: Herbaceous Vegetation				
Blue wild rye meadows	3	None (all >0.5 mile from nearest project feature)	4.5	0.02%
Wetland Communities: Forests and Woodland				
Bigleaf maple forest	3	Two polygons adjacent to Three Lakes Road	14	0.05%
Aspen groves	13	Two polygons adjacent to project roads and spillways. Three polygons adjacent to Bucks Lake perimeter.	8.2	0.03%
Shining willow groves	7	Two polygons near (~100 feet) project roads	45	0.15%
Wetland Communities: Shrubland				
Rocky mountain maple thickets	2	Two polygons adjacent to Three Lakes Road downstream of diversions.	2.3	0.01%
Mountain alder thickets	165	Approximately 25% of polygons are near or	407	1.38%

Common Name	Number of Polygons¹	Proximity to Project Features	Total Acres	Percent of Study Area
		adjacent to project features, including 16 adjacent to roads		
Red osier thickets	7	Five polygons near or adjacent to project roads or other features.	12	0.04%
Jepson willow thickets	1	Near Three Lakes Road and diversion.	0.05	<0.01%
Lemmon's willow thickets	38	Seven polygons near or adjacent to project roads or other features.	107	0.36%
Bog blueberry wet meadows	9	Three adjacent to Bucks Lake perimeter; one adjacent to Lower Bucks Lake perimeter; one near Mill Creek Campground Road.	7	0.02%
Wetland Communities: Herbaceous Communities				
Shore sedge fens	2	None	3.1	0.01%
Round-leaved sundew meadows	3	One adjacent to Bucks Lake perimeter.	0.6	<0.01%
Meadow barley patches	2	None	1.2	<0.01%
Sierra rush marshes	2	None	6.4	0.02%
Yellow pond-lily mats	1	None	0.3	<0.01%
Total			2,125 acres	7%

¹ Polygons vary in size; across the project area, 1,303 polygons were mapped with an average size of 21.5 acres.

Wetland and Riparian Vegetation

The licensees developed preliminary wetland maps using aerial photos taken in 2014, information from previous studies and field surveys conducted during June-July 2015 to ground-truth the maps. As shown in table 3-16, the study area contains 1,099 acres of wetland and riparian areas, including 30 vegetation communities.

Mountain alder is the predominant wetland shrub community and occurs in riparian areas, near springs and along meadow edges at mid- and high elevations. Lodgepole pine is the most extensive wetland forest community and occurs along shorelines and meadow edges. The majority of remaining wetland habitat is dominated by willow communities. Several special-status wetland communities are discussed below in *Special-status Plants*.

Riparian and wetland resources in the project area are described in table 3-20.

Table 3-20. Riparian and wetland resources within the Bucks Creek study area (Source: PG&E and City, 2016i, as modified by staff).

Site	Description of Habitat
Grizzly Creek below Grizzly Forebay, Bucks Creek below Lower Bucks Lake, and Milk Ranch Creek below Three Lakes	Riparian corridors are narrow (30 to 89 feet) with steep gradients (8-10%) and coarse substrates.
Four tributaries to Bucks and Milk Ranch Creeks diverted into Milk Ranch Conduit (Bear Ravine, Slide Ravine, an unnamed tributary, and Grouse Hollow)	Riparian corridors are narrow (20 to 60 feet) with extremely steep gradients and coarse substrates.
Tributaries flowing into Bucks Lake and Bucks Creek below Bucks Lake, including Haskins, Mill and Bucks Creeks	Lower reaches of riparian corridors are subject to backwater effect from reservoir and are notably wider than upstream areas in Bucks and Mill Creeks.
Bucks Creek between Bucks Lake and Lower Bucks Lake	Riparian corridor averages 49 feet in width with high flow variability due to releases from Bucks Lake.
Aspen groves, wet meadows, seeps/springs and fens along reservoir margins (Bucks Lake, Lower Bucks Lake, Grizzly Forebay, and Three Lakes)	Wetland habitats include large, multi-age aspen stand near Haskins Bay. Small, degraded aspen stand along Bucks Lake with conifer encroachment. Wet meadows along Haskins Bay. Spring/seep along Grizzly Forebay. Fen along Bucks Lake near Mill Creek Campground.

Wildlife

The project area contains habitat for a variety of wildlife species. During field surveys in 2015-2017, surveyors directly (by observation) or indirectly (based on tracks, burrows, scat, call, song, or other evidence) documented the presence of more than 90 bird, six reptile, five amphibian, and 17 bat species (PG&E and City, 2016ii, 2016f, 2016m, 2016n, 2016l, 2018c, and 2016bb). Species commonly observed in the project area during field surveys include Steller's jay, American crow, mountain chickadee, red-breasted nuthatch, American robin, dark-eyed junco, and Sierra Nevada newt. Large mammals such as black-tailed deer and black bear were also frequently encountered during surveys.

Special-status Wildlife Species

Special-status wildlife species (Tables 3-21, 3-22 and 3-23) include those listed as endangered or threatened under the California Endangered Species Act (CESA), candidates for listing under the CESA, California species of special concern (SSC), and Forest Service sensitive species (FSS). Special-status bird species also include those listed by FWS as birds of conservation concern (BCC) (FWS, 2008) and bald and golden eagles, which are federally protected under the Bald and Golden Eagle Protection Act. Federally listed species under the ESA are discussed in section 3.3.4, *Threatened and Endangered Species*.

The licensees identified special-status wildlife species that are known to occur or may occur within the project area by querying agency databases and performing a literature review. Based on this effort, the licensees selected several species for focused surveys; this section summarizes the survey results.

Special-status Bird Species

Bald Eagle and Osprey. The licensees conducted surveys for bald eagles and evaluated potential wintering, breeding, and nesting habitat in the project area in 2015 and 2016 (PG&E and City, 2016e). The surveys encompassed all areas within a one-mile radius of project reservoirs (Bucks Lake, Lower Bucks Lake, Grizzly Forebay, and Three Lakes). Surveys were also conducted within 0.25 mile of 13 project helipad sites.

Bald eagles are present in the project area year-round. Winter and breeding surveys were conducted by helicopter, maintaining a distance of at least 100 meters from eagles and nests to avoid disturbance. Surveys also monitored human use near bald eagle nest areas to identify any ongoing conflicts between humans and eagles.

Osprey are present in the project area during the breeding season (March 15 through August 31). Surveys recorded the location and status of any osprey nests during bald eagle surveys, as the presence of osprey nests is often an indicator of bald eagle habitat quality.

Surveys found two active bald eagle nesting territories in the project area, one at Bucks Lake and the other at Grizzly Forebay. Both territories were occupied continuously from 2006 to 2016. No new nesting territories were found during 2015 or 2016 surveys. Average annual productivity of the nest sites from 2006-2016 was 1.1 young for Bucks Lake and 0.7 young for Grizzly Forebay, close to the average productivity for California nests of 1.0 young per occupied nest.

Surveyors observed small numbers of bald eagles during winter surveys (three subadults in 2015 and three adults in 2016). At Bucks Lake, surveys found 10 occupied osprey territories in 2015 and nine in 2016. In both years, surveys found one occupied osprey territory near Grizzly Forebay. One bald eagle nest and one osprey nest were located within 0.25 mile of project helipads.

Northern Goshawk. The licensees conducted surveys for northern goshawks in 2015 in the project area, which is within the known range of the species (PG&E and City, 2016n). The project area is predominantly forested and contains suitable nesting and foraging habitat (i.e., mid- to late-successional coniferous forest) for northern goshawks. The objective of the surveys was to assess nesting activity and occupancy in areas where project helicopter operations and transmission line maintenance activities occur. The project area includes 13 helicopter landing pads and approximately 4 miles of transmission line corridor. Surveys included all suitable northern goshawk habitat within a 0.5-mile buffer of the helipads and project transmission line.

Broadcast surveys in 2015 detected northern goshawks five times. Four additional incidental observations were reported during other resource surveys. Three northern goshawk territories were mapped during intensive ground searches conducted to determine occupancy and/or nesting status. Two nests fledged young in 2015. One of the nests that successfully fledged young was located within 0.25 mile of a project helipad.

California Spotted Owl. The licensees conducted surveys for California spotted owls in 2015 in the project area, which contains suitable foraging and nesting habitat (i.e., mid- to late-successional coniferous forest) and is within the known range of the species (PG&E and City, 2016m). As with northern goshawk surveys, the objective of the surveys was to assess nesting activity and occupancy in areas where project helicopter operations and transmission line maintenance activities occur. Surveys to determine occupancy and assess nesting activity of California spotted owls were conducted in areas with suitable habitat within a 0.5-mile buffer of project helipads and the 4.2-mile-long transmission line corridor.

The licensees conducted nocturnal broadcast surveys during March through August 2015 and detected 22 responses from California spotted owls. In areas where responses were detected, surveyors conducted diurnal follow-up surveys and delineated the boundaries of six active California spotted owl territories. Surveys documented four nests, one of which successfully fledged young.

Willow Flycatcher. The licensees conducted surveys for breeding willow flycatchers at 10 sites within the project area that contained potentially suitable nesting habitat. Sites surveyed during 2015 and 2016 included Haskins Valley, Bucks Creek (upstream and downstream of White Horse Campground), and sites at Bucks Lake and Lower Bucks Lake. Surveys were designed to determine the presence or absence of willow flycatchers at each site and the relative abundance of the species in the project area.

Potentially suitable nesting habitat for willow flycatchers is relatively limited in the study area. Riparian corridors tend to be narrow and have steep slopes, and many sites are surrounded by coniferous forest and have substantial canopy closure. Willow flycatchers do not typically occur on sites with these habitat features.

In 2015, surveys detected one willow flycatcher territory in Haskins Valley. No nesting willow flycatchers were detected in 2016. Previous surveys of willow flycatchers conducted in Haskins Valley in 2002 detected a total of eight individuals, but the study site extended 1.6 miles upstream from Bucks Road. The study area in 2015 and 2016 extended only 350 feet upstream from Bucks Road.

Table 3-21 shows the status, habitat requirements, and likelihood of occurrence for each of the special-status bird species that potentially occur within the project area.

Special-status Bats

The licensees conducted surveys for special-status bat species in 2015 (PG&E and City, 2016bb). Surveys targeted six special-status species potentially occurring the project area, including western mastiff bat, pallid bat, Townsend's big-eared bat, spotted bat, western red bat, and fringed myotis. The project area contains suitable habitat for roosting and foraging bats, including human-made structures. The goal of surveys was to determine if any special-status bat species roost inside or on the exterior of project facilities.

The licensees conducted surveys at project facilities and campgrounds between April and October 2015. Survey methods included daytime structure evaluations to identify potential roost sites, emergence surveys, night roost assessments, mist netting and acoustic sampling. Surveys did not document any special-status bat species roosting in project facilities, although 11 project structures were used by other species of bats. Intake structures are used most frequently as day, night, and maternity roosts due to proximity to water and thermal storage. Acoustic surveys recorded 17 species using the project area, including all six special-status species.

Three project sites were important roost sites (maternity colonies documented) for non-special-status bat species. These sites are Bucks Lake Dam intake tower, Lower Bucks Lake Tunnel intake tower, and Grizzly Forebay Tunnel intake tower. Several structures may provide winter roost habitat including: Lower Bucks Lake Tunnel outlet, Grizzly Powerhouse Tunnel portal and Bucks Lake Dam Outlet tunnel. No winter roost surveys were conducted.

Table 3-22 shows the status, habitat requirements, and likelihood of occurrence for each of the special-status bat species that could occur within the project area.

Special-status Amphibians and Aquatic Reptiles

The licensees conducted field surveys for amphibians and aquatic reptiles in the project area in 2015 and 2016 (PG&E and City, 2016l). Surveys included the area within 0.5 mile of the normal high water line of all project reservoirs and associated stream reaches, extending 0.5 mile along perennial and intermittent tributary streams with permanent pools. Surveys targeted five special-status species that potentially occur in the project area based on historical records and the presence of suitable habitat: CRLF, Cascades frog, FYLF, SNYLF, and western pond turtle. The project area contains lakes, streams, and reservoirs that provide potential aquatic habitat for these species. Surveys covered 19 sites (16 for amphibians and three for western pond turtle) considered to be potentially suitable habitat for these species.

Four amphibian and six reptile species were found during focused herpetofaunal surveys and as incidental observations during other resource surveys conducted in 2015 and 2016 (PG&E and City, 2016l). No special-status amphibian or aquatic reptile species were found during field surveys conducted in 2015 and 2016, or during the 2002 surveys conducted for the Grizzly Amendment. However, the licensees conducted supplemental surveys in 2017 and documented SNYLF in the project area (PG&E and City, 2018c). Therefore, a total of five amphibian and six reptile species were found in the project area during surveys conducted in 2015-2017.

Table 3-23 shows the status, habitat requirements, and likelihood of occurrence for Cascades frog, FYLF, and western pond turtle. The SNYLF and CRLF are discussed in detail in Section 3.3.4, *Threatened and Endangered Species*.

Table 3-21. Special-status bird species potentially occurring in the Bucks Creek project area (Source: PG&E and City, 2016e, f, m and n, as modified by staff).

Species (scientific name)	Status (FWS/California DFW/ Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	BGEPA/CAE, CAFP/FSS	This species nests in mature trees and snags and on cliffs, rocks, and artificial structures, generally within one mile of water. Forages over water and other open habitats. Nesting activity occurs from January through August.	Species was observed in 2015 and 2016 during both the breeding season and during winter surveys. Two known nest sites are located in the project area.
Golden Eagle (<i>Aquila chrysaetos</i>)	BGEPA/CAFP/- -	Generally inhabit open and semi-open country such as prairies, sagebrush, savannah or sparse woodland, and barren areas, especially in hilly or mountainous regions, in areas with sufficient mammalian prey base and near suitable nesting sites. Nests are most often on rock ledges of cliffs but sometimes in large trees including oak and eucalyptus.	Not known to nest in the project area. Nonresident visitor to the project area.
Osprey (<i>Pandion haliaetus</i>)	--/WL/--	Suitable habitat includes large trees, snags, cliffs, or structures near riparian or open water habitats.	Species was observed during the breeding season in 2015 and 2016 on active nest sites (11 nests in 2015, 10 nests in 2016).

Species (scientific name)	Status (FWS/California DFW/ Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Northern Goshawk (<i>Accipiter gentilis</i>)	--/SSC/FSS	Prefers subalpine and upper montane forests with relatively dense canopy closure and open understory.	Species was observed in 2015 on three active territories. Two nests successfully fledged young.
California Spotted Owl (<i>Strix occidentalis occidentalis</i>)	--/SSC/FSS	This species nests and forages in late and mid-successional forest and dense, multi-layered mixed conifer forests up to 7,500 feet in elevation.	Species was observed in 2015 on six active territories. Four nests were detected, one of which fledged young.
Willow Flycatcher (<i>Empidonax traillii</i>)	BCC*/CAE/FSS	Suitable nesting habitat consists of moist meadows and riparian woodland with deciduous shrubs such as willow or alder. Nesting sites typically have perennial streams or spring-fed or boggy areas. Nests are built in deciduous shrubs.	Species was observed during the breeding season in 2015 (one active nest was found in the project area). Species was not observed in 2016.
Lewis's Woodpecker (<i>Melanerpes lewis</i>)	BCC/--/--	Uncommon, local winter resident occurring in open oak savannahs, broken deciduous, and coniferous forests.	--

Species (scientific name)	Status (FWS/California DFW/ Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Olive-sided Flycatcher (<i>Contopus cooperi</i>)	BCC/--/--	Occurs in forest and woodland, in burned- over areas with standing dead trees, in taiga, subalpine coniferous forest, and mixed coniferous-deciduous forest. Also swampy edges of lakes, marshy streams, and backwaters of rivers	Species was observed during the breeding season in 2015.
Rufous Hummingbird (<i>Selasphorus rufus</i>)	BCC/--/--	Nest in coniferous forests and forage in nearby meadows, early successional habitats and forest openings.	Species was observed during the breeding season in 2015.
Williamson's Sapsucker (<i>Sphyrapicus thyroideus</i>)	BCC/--/--	Summer resident in coniferous forests, nesting habitat includes lodgepole pine, but will nest in aspens adjacent to stands of red fir, Jeffrey pine, and eastside pine habitats.	--
Cassin's Finch (<i>Carpodacus cassinii</i>)	BCC/--/--	Common montane resident, breeds in higher mountain ranges. Prefers open coniferous forests in breeding season, most numerous near wet meadows and grassy openings. Irregular in California foothills and lowlands.	Species was observed during the breeding season in 2015.

Status Codes:

FWS: BGEPA = Bald and Golden Eagle Protection Act, BCC = FWS Bird of Conservation Concern

California DFW: CAE = California Endangered, CAFP = California Fully Protected, SSC = Species of Special Concern,

WL = California Watch List

Forest Service: FSS = Forest Service Sensitive

*BCC based on review of FWS’s online Information for Planning and Conservation database, <https://ecos.fws.gov/ipac>, accessed February 11, 2019.

Table 3-22. Special-status bat species potentially occurring in the Bucks Creek project area (Source: PG&E and City, 2016bb, as modified by staff).

Species (scientific name)	Status (FWS/California DFW/ Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Western Mastiff Bat (<i>Eumops perotis</i>)	--/SSC/--	Roosts in crevices in cliffs, buildings, large boulders, and rock outcrops associated with river drainages. Colony size 35–200. Forages over reservoirs and large pools in streams.	Species was detected in project area during 2015. Not known to roost in project structures. Detected acoustically at Three Lakes Dam, Bucks Lake Dam, and other project facilities. Relatively low activity at most sites, but greater than other special-status bat species.
Pallid Bat (<i>Antrozous pallidus</i>)	--/SSC/FSS	Roosts in rock crevices, live or dead tree hollows, mines, caves, bridges, and buildings. Colony size 35–300. Forages low to or on the ground in a variety of open habitats, primarily in riparian zone and open mixed deciduous forest.	Species was detected in project area during 2015. Not known to roost in project structures. Detected acoustically at Bucks Lake and Lower Bucks Lake. Relatively low activity at most sites.

Species (scientific name)	Status (FWS/California DFW/ Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>)	--/SSC, CACT/FSS	Roosts in cavities, including tunnels, caves, buildings, and mines near water. Forages above creeks and river drainages.	Species was detected in project area during 2015. Not known to roost in project structures. Detected acoustically at several project facilities. Relatively low activity at most sites.
Spotted Bat (<i>Euderma maculatum</i>)	--/SSC/--	Roosts in crevices of cliffs, caves, and buildings. Forages over open areas and along forest edges and wet meadows.	Species was detected in project area during 2015. Not known to roost in project structures. Detected acoustically at one river and three reservoir sites. Highest activity in July and August.
Western Red Bat (<i>Lasiurus blossevillii</i>)	--/SSC/--	Often roosts in riparian vegetation. Forages in a number of terrestrial and aquatic habitats, including over rivers and reservoirs.	Species was detected in project area during 2015. Not known to roost in project structures. Relatively low activity at most sites. Activity at sites on Bucks Lake, Lower Bucks Lake, and the Feather River, including two intake towers and one bridge.

Species (scientific name)	Status (FWS/California DFW/ Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Fringed Myotis (<i>Myotis thysanodes</i>)	--/--/FSS	Roosts in rock crevices, foliage, cavities, caves, mines, buildings and bridges, and large-diameter snags. Colony size 35–300. Forages in open air and by gleaning prey from vegetation.	Species was detected in project area during 2015. Not known to roost in project structures. Acoustic surveys indicated very low activity at all sites during study period, with a notable peak at Three Lakes Dam site.

Status Codes:

FWS: None

CDFW: CACT = California Candidate Threatened, SSC = Species of Special Concern

Forest Service: FSS = Forest Service Sensitive

Table 3-23. Special-status amphibians and aquatic reptiles potentially occurring in the Bucks Creek project area (Source: PG&E and City, 2016l, as modified by staff).

Species (scientific name)	Status (FWS/California DFW/Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Cascades Frog (<i>Rana cascadae</i>)	--/SSC/FSS	Inhabits ponds, lakes, and small streams. Lays eggs in shallow stream pools, lake margins, and clear mountain ponds with silty, sandy, or gravelly substrates.	Species was not observed during 2015 and 2016 surveys. Project area is outside the species' current distribution. Southernmost extent of range is 30 miles north of the project area near Mt. Lassen.
Foothill Yellow-legged Frog (FYLF) (<i>Rana boylei</i>)	--/SSC*/FSS	Habitat includes streams, rivers, and pools with cobble-sized rocky substrate and shallow, low-velocity flows. Eggs are attached to gravel or rocks in moving water near stream margins.	Species was not observed during 2015 and 2016 surveys. Streams in the project area below 5,000 feet are potential habitat. Project area generally lacks large areas of shallow water with low-velocity flows and warmer water temperatures, habitat features found in areas that support breeding populations of FYLF. Nearest documented record is on the NFFR, 1.5 miles downstream of the confluence with Grizzly Creek.

Species (scientific name)	Status (FWS/ California DFW/ Forest Service)	Habitat Requirements	Potential to Occur in the Bucks Creek Project Area
Western Pond Turtle (<i>Actinemys marmorata</i>)	--/SSC/FSS	Habitat includes permanent ponds, lakes, reservoirs, and low-velocity rivers and side channels. Eggs are deposited on upland, low-gradient slopes near aquatic habitats. Basking sites include logs, rock outcrops, banks, and mats of submergent vegetation.	Species was not observed during 2015 and 2016 surveys. Potential habitat exists in Grizzly Forebay and Lower Bucks Lake (downed logs and exposed banks provide basking habitat). Nearest documented occurrence is 10 miles to the southwest in 1997 on the mainstem NFFR.

Status Codes:

FWS: None

California DFW: SSC = Species of Special Concern

Forest Service: FSS = Forest Service Sensitive

*FYLF is a candidate for listing under the California ESA.

3.3.3.2 Environmental Effects

Vegetation Management

Project operations and maintenance activities and recreational use have the potential to remove or damage vegetation in the project area. Vegetation and soil disturbance could alter the composition of existing plant communities and increase the potential for the introduction or spread of NNIPs. Such disturbance could also affect wildlife habitat quality.

Project operations and maintenance activities are conducted along the project transmission line, roads, tunnels, conduits, diversions, gages, powerhouses, dam faces, reservoirs, and recreation facilities. Activities typically include road grading, vegetation trimming and clearing, hazard tree removal, ditch cleaning, snow and slide removal, and spraying of herbicides.

Recreation sites within the Bucks Creek project area include campgrounds, day use areas, trails and trailheads, and fishing access points around Three Lakes, Bucks Lake, Lower Bucks Lake, and Grizzly Forebay. Activities such as camping, boating, hiking, fishing, picnicking, and campground maintenance could result in damage or removal of vegetation, trampling, and soil disturbance. The licensees propose to develop new recreation sites, including campsites, trails, and other facilities and estimate that construction of the new facilities would result in temporary disturbance or permanent loss of vegetation in small areas along the Bucks Lake and Lower Bucks Lake.

To minimize potential effects of project operations and maintenance on vegetation, the licensees propose to implement an Integrated Vegetation Management Plan (TR-1) (PG&E and City, 2018a). The plan provides guidance to manage vegetation, including NNIPs, special-status plant species, and special-status natural communities within the Bucks Creek project boundary. The plan also includes guidelines for revegetation of areas disturbed by project activities, pesticide and herbicide use, and annual employee training. The purpose of these measures is to protect and enhance special-status plant species and natural communities, minimize the spread of NNIPs, and ensure that vegetation management is coordinated with wildlife protection measures and Forest Service requirements. Some components of the plan, such as pesticide and herbicide use, have different measures for NFS and non-NFS land.

The resource agencies (Forest Service, California DFW, and FWS) worked collaboratively with the licensees to develop the Integrated Vegetation Management Plan. The proposed plan is consistent with Forest Service preliminary 4(e) condition 45, FWS 10(j) recommendation 15, and California DFW 10(j) recommendation 18. In addition, Forest Service preliminary 4(e) condition 22 specifies that pesticides may not be used on NFS land or in areas affecting NFS land without prior written approval from the Forest Service. Any pesticide deemed necessary to use on NFS land within 500 feet of known locations of western pond turtles, SNYLF, FYLF, or known locations of Forest Service special-status or culturally significant plant populations would be designed to avoid

adverse effects to individuals and their habitats. Application of pesticides would also be consistent with Forest Service riparian conservation objectives.

Additional restrictions on pesticide use are described in the SNYLF Management Plan and are discussed below under management of NNIPs. Further restrictions on operations and maintenance activities that involve removing vegetation are discussed in section 3.3.4, *Threatened and Endangered Species*. We discuss various components of the Integrated Vegetation Management Plan below.

Non-native Invasive Plants

NNIPs have the potential to displace native plant species and alter composition of the native plant community, degrade wildlife habitat, and affect human uses by generating higher fuel loads and increased wildfire risk. Some NNIPs are toxic to wildlife as well as humans.

In the Bucks Creek project area, populations of NNIPs are generally found in areas of high disturbance near project facilities, recreation facilities, roads and the transmission line (table 3-18). Project operations and maintenance activities and recreation use have the potential to introduce or spread NNIPs.

Effects of Project Operations and Maintenance. Project operations and maintenance activities such as road grading, vegetation trimming and clearing, hazard tree removal, ditch cleaning, and snow and slide removal have the potential to disturb soils and native vegetation and introduce and spread invasive weeds. The species of NNIPs most likely to be spread during project operations and maintenance activities due to their presence near the following project features include (table 3-18):

- Project facilities: tall wheatgrass x quackgrass hybrid, Himalayan blackberry and yellow star-thistle.
- Recreation facilities: tall wheatgrass x quackgrass hybrid and Himalayan blackberry.
- Roads: Canada thistle, tall wheatgrass x quackgrass hybrid and Himalayan blackberry.
- Transmission line: tall wheatgrass x quackgrass hybrid and Himalayan blackberry.

Effects of Recreation. Recreational sites within the Bucks Creek project area include campgrounds, day use areas, trails and trailheads, and fishing access points around Three Lakes, Bucks Lake, Lower Bucks Lake, and Grizzly Forebay. Recreational activities at these sites have the potential to disturb soils and native vegetation and introduce and spread invasive weeds. Himalayan blackberry and tall wheatgrass x quackgrass hybrid populations were documented within 200 feet of recreation sites in the project area. Under a new license, recreation use would continue at existing sites and at additional campsites and facilities proposed by the licensees. Although recreation

activities have the potential to introduce and spread NNIPs, the licensees do not have the ability to control public access to recreation areas and facilities in the project area.

The proposed Integrated Vegetation Management Plan includes measures to minimize the effects of project operations and maintenance and recreation activities on NNIPs (TR-1). Specifically, the plan includes measures to: (1) prevent the introduction and spread of NNIPs, (2) control and eradicate existing infestations, (3) monitor known populations of NNIPs, and (4) conduct field surveys to detect new infestations. The measures apply to target NNIPs on the PNF Priority Invasive Plant List. The list contains species of concern to the California DFA due to their invasiveness and potential to spread rapidly, species that may affect wildlands in California, and species known or suspected to occur on the PNF. The list is regularly updated by the PNF. The licensees would obtain the most recent list directly from the PNF prior to conducting field surveys.

To prevent the introduction and spread of non-native invasive species, the licensees propose specific measures to minimize soil disturbance, revegetate disturbed areas, use weed-free construction and erosion control materials (e.g., mulch, sand, and gravel) when possible, restrict travel to established roads and trails, and clean equipment and vehicles after working in NNIP-infested areas.

To assist with early detection of new populations of NNIPs, the Integrated Vegetation Management Plan includes protocols for annual environmental awareness training of project staff during the term of the license. The licensees would provide annual employee training that includes information about NNIPs, emphasizing the importance of preventing the introduction and spread of NNIPs. Employees would be trained to identify target NNIPs known to occur in the project area and would be informed of locations of known occurrences.

To control and eradicate existing infestations, the Integrated Vegetation Management Plan includes BMPs for treatment of weeds. NNIPs would be treated throughout the Bucks Creek project area on both NFS and licensee-owned land. NNIPs occurring on non-PG&E-owned private lands are not addressed under this Plan. Target NNIPs for treatment are California DFA A-, B-, C-, and Q-rated weeds as well as Cal-IPC high- or moderate-ranked weeds. Management efforts for target NNIPs would aim to eradicate small occurrences and control larger ones, as determined through collaboration with the Forest Service. Non-target NNIPs would be addressed through project-wide prevention and education efforts. On NFS land, approvals for control efforts would be subject to all Forest Service regulations. On PG&E land, all federal, state, and local regulations would be followed during herbicide applications.

Additional restrictions on herbicide and pesticide (collectively, pesticides) use apply to the project area to protect the ESA-listed SNYLF. These measures include buffers around critical and occupied habitat and seasonal restrictions on pesticide application and are described in detail in the SNYLF Management Plan (PG&E and City, 2018k).

Finally, as part of the Integrated Vegetation Management Plan, the licensees propose to conduct annual field surveys to update the status and extent of previously mapped NNIP populations, as well as periodic comprehensive field surveys (every 5 years) to detect new infestations. In years between comprehensive surveys, any new inadvertently discovered NNIP populations would be inventoried and mapped. Known populations would be monitored annually beginning the first year of application of control treatments (generally within 30 days of treatment). Monitoring would be conducted on both NFS and PG&E-owned land within the project boundary. Monitoring results would be used to adaptively manage NNIPs as follows: (1) if monitoring shows declining NNIP populations in the project area, the frequency of monitoring may be reduced; and (2) any new populations documented during surveys would be treated and monitored until they no longer warrant control measures.

Our Analysis

Overall, invasive weeds have a very limited distribution at the project. The Noxious Weed Control and Prevention Plan (PG&E, 2006b) has substantially reduced the extent and distribution of NNIP species at the project. The number of quackgrass and yellow star-thistle plants was reduced from 1,215 and 512 plants, respectively, in 2011, to 32 and 0 plants, respectively, in 2015 (PG&E, 2015).

Under a new license, continued project O&M activities and recreation use have the potential to contribute to the spread of NNIPs on project lands. The Integrated Vegetation Monitoring Plan takes a comprehensive approach to controlling NNIPs on project lands, including employee training, preventative measures, surveying and monitoring, and treatment of existing infestations. Implementing the plan is likely to minimize the spread of any existing infestations. These measures would benefit vegetation resources by limiting the introduction of new invasive plants onto project lands and controlling the spread of existing populations of target species.

The periodic surveys proposed by the licensees would identify any new areas on project lands where target species become established and provide for early treatment to prevent further spread. As specified by the Forest Service in preliminary 4(e) condition 27, providing employees with training in the identification of target NNIP species and reporting methods if a new population of NNIPs is found incidentally would promote rapid treatment of any new occurrences.

The licensees would, in consultation with the Forest Service, develop a schedule to control (contain or eradicate) identified populations of target NNIPs on NFS land within the project boundary. All new occurrences of target NNIPs would be managed within 12 months of detection, or as soon as reasonably practical. The emphasis would be on rapid treatment after detection. Areas where completed treatment has resulted in bare ground unlikely to be recolonized by adjacent native vegetation would be restored and/or revegetated to prevent the reintroduction of NNIP species, consistent with guidelines in the plan.

Annual monitoring of existing NNIP populations and periodic (every 5 years) comprehensive surveys would take place on project land owned by both PG&E and NFS. As outlined in the Integrated Vegetation Management Plan, BMPs for treatment of NNIP populations would be applied on project land. The licensees would collaborate with the NFS to develop treatment plans on project land owned by the NFS and obtain required approvals for control and eradication efforts. As described above, additional restrictions on pesticide use apply to project lands to protect the ESA-listed SNYLF.

The proposed BMPs to prevent the introduction or spread of NNIPs, monitoring project lands to detect any new occurrences, and treating areas on project lands as soon as possible after detection would ensure that project activities do not increase the extent or distribution of NNIPs. These measures would protect vegetation resources project lands and prevent adverse effects to habitat for wildlife species, including the SNYLF.

In addition to the Integrated Vegetation Management Plan, the licensees' proposed Recreation Management Plan (RR-1) includes measures that would help to minimize adverse effects on native plant communities. As part of the Recreation Management Plan, the licensees would implement public education measures at the project's boat launches, popular dispersed recreation areas, campgrounds, and elsewhere on project lands to increase public awareness and reduce the potential for damage or removal of vegetation or introduction or spread of NNIPs within the project area. Forest Service preliminary 4(e) condition 55 would require this measure to be implemented.

Special-status Plants and Natural Communities

Project operations and maintenance activities, recreational use, and reservoir fluctuations adjacent to special-status plants and natural communities have the potential to affect these resources through disturbance and removal of plants and soil, habitat loss and degradation, introduction and spread of NNIPs, and inundation by project reservoirs.

Effects of Project Operations and Maintenance. Project operations and maintenance activities have the potential to damage or remove special-status plants or natural communities that occur adjacent to project roads, the transmission line, and recreation facilities. In the project area, most special-status plant species populations are located adjacent to project roads or within 100 feet of proposed project roads (56 populations) or within the transmission line corridor (four populations). These populations could be damaged or removed by project O&M activities such as road or transmission line maintenance, vegetation clearing, ditch clearing, hazard tree removal, snow and slide removal, and spraying of herbicides.

Similarly, special-status natural communities that occur along project roads and transmission lines are the habitats most likely to be damaged by operations and maintenance activities (table 3-24). These areas could be affected during vegetation trimming and clearing, hazard tree removal, and herbicide spraying activities.

Table 3-24. Project operations and maintenance activities potentially affecting special-status natural communities (Source: PG&E and City, 2016a, as modified by staff).

Project Feature	O&M Activity	Special-status Natural Community Potentially Affected
Roads	Vegetation trimming and hazard tree removal	Incense Cedar Forest Alliance (2 polygons)
		Sugar Pine Forest Alliance (2 polygons)
		Golden Chinquapin Shrubland Alliance (13 polygons)
		Bigleaf Maple Forest Alliance (2 polygons)
		Quaking Aspen Forest Alliance (2 polygons)
		Rocky Mountain Maple Provisional Shrubland Alliance (2 polygons)
		Mountain Alder Shrubland Alliance (16 polygons)
		Red Osier Shrubland Alliance (2 polygons)
		Jepson Willow Shrubland Alliance (1 polygon)
Lemmon's Willow Shrubland Alliance (1 polygon)		
Transmission line	Hazard tree removal	California Bay Forest Alliance (1 polygon)
	Vegetation clearing	California Bay Forest Alliance (1 polygon)
	Herbicide spraying	California Bay Forest Alliance (1 polygon)
Recreation facilities	Hazard tree removal	Mountain Alder Shrubland Alliance (2 polygons)

Effects of Recreation. Recreation sites within the Bucks Creek project area include campgrounds, day use areas, trails and trailheads, and fishing access points around Three Lakes, Bucks Lake, Lower Bucks Lake, and Grizzly Forebay. Project-related activities such as camping, boating, hiking, fishing, picnicking, and campground maintenance could result in damage or removal of vegetation, trampling, and soil disturbance in adjacent special-status natural communities. Unauthorized OHV use also has the potential to damage vegetation.

Project-related recreational activities have the potential to affect 11 special-status plant populations near the project's campgrounds, trails, or along reservoir margins. Such activities also have the potential to affect special-status natural communities located

near the project’s recreation sites (table 3-25). Recreational activities along the perimeter of Bucks Lake and near the fen community adjacent to Mill Creek Campground have the greatest potential to affect special-status natural communities.

Table 3-25. Recreational activities potentially affecting special-status natural communities (Source: PG&E and City, 2016a, as modified by staff).

Recreational Site	Special-status Natural Communities Potentially Affected
Lower Bucks Lake Campground	Mountain Alder Shrubland Alliance (1 polygon)
Lower Bucks Lake Day Use Area	Mountain Alder Shrubland Alliance (1 polygon)
Mill Creek Campground	Mountain Alder Shrubland Alliance (1 polygon) Bog Blueberry Shrubland Alliance (1 polygon) Round-leaved Sundew Provisional Herbaceous Alliance (1 polygon)
Bucks Lake	Mountain Alder Shrubland Alliance (6 polygons) Bog Blueberry Shrubland Alliance (2 polygons) Quaking Aspen Forest Alliance (3 polygons)

Effects of Reservoir Fluctuations. Reservoir fluctuations have the potential to affect special-status natural communities along the margins of Lower Bucks Lake and Bucks Lake (table 3-26). At Lower Bucks Lake, the licensees propose to maintain the current maximum water surface level. All special-status natural communities adjacent to Lower Bucks Lake are above the high water line and would not be affected by project operations.

At Bucks Lake, reservoir level fluctuations contribute to limited quaking aspen grove recruitment and temporary inundation of a portion of a fen wetland located south of the Mill Creek Campground. They also have the potential to affect six special-status plant populations associated with the fen south of Mill Creek Campground and the seep on the eastern shoreline of Bucks Lake. The licensees propose to maintain existing reservoir levels in Bucks Lake to benefit fish and other aquatic resources.

The spillway between Bucks Lake and Lower Bucks Lake is adjacent to four rare plant community polygons, but the licensees do not propose any operational changes below Bucks Lake. Therefore, existing conditions would be maintained.

Table 3-26. Reservoir Fluctuations Potentially Affecting Special-status Natural Communities (Source: PG&E and City, 2016a, as modified by staff).

Reservoir	Special-status Natural Communities Potentially Affected
Lower Bucks Lake Campground	Mountain Alder Shrubland Alliance (6 polygons)
	Bog Blueberry Shrubland Alliance (1 polygon)
Bucks Lake	Mountain Alder Shrubland Alliance (7 polygons)
	Bog Blueberry Shrubland Alliance (3 polygons)
	Round-leaved Sundew Provisional Herbaceous Alliance (1 polygon)
	Quaking Aspen Forest Alliance (3 polygons)

The licensees propose to implement five measures that would help to minimize the effects of project operations and maintenance and recreation on special-status plants and natural communities. The first measure is annual employee environmental awareness training (GEN-1). Project hydro and maintenance staff would be trained annually to identify special-status plant species and natural communities known to occur within the project boundary. Staff would be provided with maps showing the locations of environmentally sensitive areas, and the licensees would direct staff to avoid activities that have the potential to disturb these areas. Providing annual training to staff would ensure they are informed of any changes in the occurrence or distribution of special-status species since the preceding year. Staff would also be trained to report any new populations of special-status species, NNIPs, or AIS observed incidentally during the performance of their work, or any project activities directly affecting these sensitive areas. Forest Service preliminary 4(e) condition 27 and FWS 10(j) recommendation 1 would require that this measure be implemented as filed. California DFW also recommends this measure (10(j) recommendation 1).

The second measure is an annual consultation meeting with the Forest Service (GEN-2). The goals of the meeting would be to share information, including the results of any monitoring performed the previous year; review any non-routine maintenance planned for the upcoming year; discuss any foreseeable changes to project facilities or features; discuss any revisions needed to existing management plans; and discuss any needed protection measures for newly listed special-status species. Forest Service preliminary 4(e) condition 1 would require implementation of this measure.

The third measure is an annual meeting with the Ecological Consultation Group (ECG; GEN-3). Under this measure, the licensees would organize and host meetings of the ECG, which would be open to representatives from the Forest Service, Water Board, FWS, California DFW, and other agencies. Meetings would be held at least once per year prior to April 15th. The purpose of the meeting would be to ensure that the

Commission, resource management agencies, and other participants have the opportunity to discuss the previous calendar year's license activities and review plans for the upcoming year, review plans for upcoming monitoring activities, and review current lists of special-status species. The licensees' proposed measure is consistent with Forest Service preliminary 4(e) condition 2, FWS preliminary 10(a) recommendation 1, and California DFW 10(j) recommendation 2.

The fourth measure is an Integrated Vegetation Management Plan (TR-1). The Integrated Vegetation Management Plan specifies multiple actions to protect special-status plants and natural communities from disturbance or damage during routine vegetation management activities within the project area. Provisions in the plan include: (1) comprehensive surveys for special-status plant species on project lands during the first full calendar year following issuance of the new license, and then every 10 years thereafter; (2) consultation with the Forest Service and California DFW to determine appropriate mitigation measures when the licensees conduct vegetation management activities in areas with special-status plants; (3) flagging sensitive areas prior to vegetation management activities; (4) using manual labor (e.g., hand tools) when possible; (5) implementing species-specific limited operating periods and work buffers around special-status plants; and (6) following weed treatment BMPs to protect special-status plants. In addition, the plan includes specific protection measures for aspen and fen communities. To minimize potential effects of project operations on the aspen and fen communities along Bucks Lake, the licensees propose to selectively remove conifers in the aspen groves and fen wetland to protect and enhance these communities. During comprehensive surveys conducted every 10 years, all previously documented special-status plant occurrences on project land would be revisited and mapped. Monitoring protocols would follow FWS, Forest Service and California DFW guidelines. Results would be compiled in a report provided to the Forest Service and California DFW.

In addition to these measures, the licensees propose to establish semi-permanent monitoring plots focusing on special-status plant species and natural communities located in areas immediately adjacent to roads that experience regular and intensive annual road work. Plots would be monitored annually for 3 years after the license is issued. If effects are detected (e.g., a population is reduced in size), the licensees would determine the next steps in coordination with the resource agencies (Forest Service, California DFW, and FWS). When planned (non-routine) O&M work would be conducted near known special-status plant populations or natural communities, these populations would be monitored before and after the work is conducted. In addition, quaking aspen grove and fen enhancement activities would be monitored to determine whether conifer removal has been effective in enhancing the communities and whether any additional management actions are necessary. The licensees' proposed plan is consistent with Forest Service preliminary 4(e) condition 45, FWS 10(j) recommendation 15, and California DFW 10(j) recommendation 18.

The fifth measure is a Recreation Management Plan (RR-1). Ongoing project-related recreational use would continue under a new license. As a part of the Recreation

Management Plan, educational measures would be implemented at the project's boat launches, popular dispersed use areas, campgrounds, and elsewhere on project lands to increase public awareness and reduce the potential for effects to special-status plants and natural communities. Forest Service preliminary 4(e) condition 55 would require this measure to be implemented.

In addition to the measures proposed by the licensees, the Forest Service specified two additional 4(e) conditions related to the management of special-status species. Under 4(e) condition 28, before taking actions to construct new project features on project land owned by the Forest Service and that may affect Forest Service special-status species or their critical habitat on Forest Service land, the licensees would be required to prepare and submit a Biological Evaluation (BE) for Forest Service approval.

Under Forest Service preliminary 4(e) condition 29, the licensees would be required to conduct an annual review of special-status species lists in consultation with the Forest Service. If any new special-status species is likely to occur on project land owned by the Forest Service, the licensees would develop and implement a study plan in consultation with the Forest Service to assess the effects of the project on the species and develop appropriate protection measures.

Our Analysis

Under a new license, continued project O&M activities and project-related recreational use have the potential to adversely affect special-status plant species and natural communities within the project boundary. These activities include vegetation management activities such as application of herbicides to NNIPs, routine vegetation management along project roads and the transmission line, recreational activities (i.e., trampling), or any other activities with the potential to disturb soil or vegetation.

The measures outlined in the Integrated Vegetation Management Plan (TR-1) are sufficient to minimize or eliminate potential adverse effects on special-status plant species and natural communities that could result from O&M activities on project lands. Flagging known populations before vegetation management activities take place and implementing work area buffers would minimize effects to known populations. Monitoring known special-status plant populations located near project roads where regular operations and maintenance activities take place would ensure that any project-related actions adversely affecting the populations would be addressed quickly. Periodic comprehensive surveys of all project lands (every 10 years) would document new occurrences of special-status species and provide an update on the status of known populations.

Employee environmental awareness training (GEN-1) would familiarize licensees' staff with special-status species identification and sensitive area locations within the project boundary.

The proposed Integrated Vegetation Management Plan includes the preparation of annual reports that would be submitted for agency review prior to being filed with the

Commission. This provides a mechanism for the licensees to inform California DFW, FWS and the Forest Service of project activities, and for the agencies to comment on monitoring results and make recommendations to the Commission regarding any need for additional measures or modifications to existing measures. Therefore, a separate annual meeting would be redundant.

Consultation prior to new construction and non-routine maintenance would help protect special-status species and their habitats over the term of the license (Forest Service preliminary 4(e) condition 28). In addition, annual review of sensitive species lists (Forest Service preliminary 4(e) condition 29) would help identify newly listed species that could be evaluated as potentially affected by the project. This measure could reduce the possibility that newly added species would be affected by project operations and maintenance activities.

Riparian and Wetland Vegetation

Riparian and wetland habitats are found along streams, near seeps and meadows and along reservoir margins in the project area. Project operations and maintenance activities, recreational use, and management of reservoirs and diversions have the potential to affect these habitats by damaging or removing vegetation or soil, introducing or spreading NNIPs, diverting or altering stream flows, trapping sediment, preventing periodic scour events, and inundating plant communities. Recreational activities at the project's campgrounds, trails, and reservoir margins have the potential to affect sensitive wetland and riparian habitats adjacent to or near these facilities.

At Bucks Lake, reservoir level fluctuations affect two wetland plant communities. Such fluctuations contribute to limited quaking aspen grove recruitment along the Bucks Lake shoreline and temporary inundation of a portion of a fen wetland located south of the Mill Creek Campground. The licensees propose to maintain existing reservoir levels in Bucks Lake to benefit fish and other aquatic resources.

To minimize the effects of project operations and maintenance, recreation, and management of reservoirs and diversions on riparian and wetland habitats, the licensees propose to implement three general measures (GEN-1, GEN-2, and GEN-3), discussed above; the Integrated Vegetation Management Plan (PG&E and City, 2018i) and Recreation Management Plan (PG&E and City, 2018h), also discussed above; seven operational measures affecting instream flows, reservoirs, and diversions (WR-1, WR-2, WR-4, WR-5, WR-6, WR-8, WR-9); and an Aquatic Resources Monitoring Plan (AR-2; PG&E and City, 2018g).

The Integrated Vegetation Management Plan includes monitoring special-status plants and natural communities in riparian, wetland, and littoral areas within the project boundary. Any adverse effects to these populations as a result of project operations and maintenance would be communicated to the resource agencies (Forest Service, California DFW, and FWS) to discuss the need for follow-up actions. As part of this plan, to minimize potential effects of maximum reservoir levels on the aspen and fen

communities along the Bucks Lake shoreline, the licensees propose selective removal of conifers in the aspen groves and fen to protect and enhance these communities.

The licensees propose four measures that would maintain or increase instream flows to protect and enhance aquatic and riparian resources. All of these measures would protect and enhance riparian vegetation by maintaining or increasing instream flows and providing conditions required for recruitment of riparian vegetation.

- The licensees propose to implement minimum instream flows (WR-1). This measure applies to Bucks Creek below Bucks Lake and Lower Bucks Lake, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek below Three Lakes, and the tributaries downstream of Milk Ranch Conduit diversions No. 1 on Milk Ranch Creek and No. 3 on South Fork Grouse Hollow Creek. The licensees' proposed minimum instream flows are consistent with Forest Service preliminary 4(e) condition 31, FWS 10(j) recommendation 2, and California DFW 10(j) recommendation 5. As discussed in section 3.3.2.1, the licensees agreed to minor modifications to their proposed language in WR-1 and defer to the Forest Service in their preliminary 4(e) condition 31. The Water Board, through preliminary condition 1, also supports this measure with the modifications described in section 3.3.2.1.
- Under a new license, the licensees would cease diversion of flows from Bear Ravine into Milk Ranch Conduit, thereby increasing instream flows in Bear Ravine to the unimpaired flows year round (WR-2). This measure is consistent with Forest Service preliminary 4(e) condition 32, Water Board preliminary condition 1, FWS 10(j) recommendation 3, and California DFW 10(j) recommendation 6.
- The licensees propose a new measure to leave six inoperable diversions along Milk Ranch Conduit in place (WR-8). The structures are no longer diverting water and would be left in place to continue to permit the unimpaired stream flow below each diversion year-round. By leaving the diversions in place, the current channel and riparian conditions would be maintained. This measure is consistent with Forest Service preliminary 4(e) condition 38, Water Board preliminary condition 19, FWS 10(j) recommendation 8, and California DFW 10(j) recommendation 11.
- Measure WR-9 is a new measure that would cease diversion of flows from Milk Ranch Conduit Diversions No. 1 and 2 during Wet water years. This measure is consistent with Forest Service preliminary 4(e) condition 33, Water Board preliminary condition 3, FWS 10(j) recommendation 9, and California DFW 10(j) recommendation 8.

The licensees also propose to implement channel maintenance flows (WR-4) in Bucks Creek downstream of Lower Bucks Lake and in Grizzly Creek downstream of Grizzly Forebay. The periodic release of flows higher than minimum flow requirements

is intended to improve stream channel resources, including riparian habitat, by providing periodic scour and vegetation recruitment events that are essential to maintaining a diversity of native plants, vegetation age classes, and habitat structures. This measure is a modification of an existing license condition, required as of 2006. For the modified condition, the durations of high flows would be increased from 12 to 18 hours and the magnitude of the high flow in Bucks Creek would be increased by about 25 percent. This measure is consistent with Forest Service preliminary 4(e) condition 34, Water Board preliminary condition 8, FWS 10(j) recommendation 10, and California DFW 10(j) recommendation 9.

The licensees propose project reservoir operations (WR-5) that would maintain the existing minimum pool levels in Lower Bucks Lake, Lower and Middle Three Lakes, Bucks Lake, and Grizzly Forebay, consistent with Forest Service preliminary 4(e) condition 36, Water Board preliminary condition 7, and FWS 10(j) recommendation 6. This measure is a continuation of an existing license condition and therefore would have no effect on existing riparian or wetland vegetation.

The licensees propose a new measure to modify spill management at Grizzly Forebay and Lower Bucks Lake (WR-6). The primary objective of this measure is to constrain flow fluctuations so that spills would be ramped down to be more protective of aquatic species in Bucks Creek and Grizzly Creek. While specifically intended to improve conditions for FYLF, this measure is also expected to provide conditions that allow recruitment of woody riparian vegetation. This measure is consistent with Forest Service preliminary 4(e) condition 35, Water Board preliminary condition 7, FWS 10(j) recommendation 7, and California DFW 10(j) recommendation 10.

Table 3-27 summarizes the sites and the riparian and wetland habitats that potentially would be affected by the proposed measures.

Table 3-27. Proposed operational measures potentially affecting riparian and wetland vegetation within the Bucks Creek project area (Source: PG&E and City, 2016a, PG&E and City, 2018a, as modified by staff).

Site	Description of Habitat	PM&Es
Grizzly Creek below Grizzly Forebay, Bucks Creek below Lower Bucks Lake, and Milk Ranch Creek below Three Lakes	Riparian corridors are narrow (30 to 89 feet) with steep gradients (8-10%) and coarse substrates.	TR-1, WR-1, WR-4, WR-6, WR-9

Site	Description of Habitat	PM&Es
Four tributaries to Bucks and Milk Ranch Creeks diverted into Milk Ranch Conduit (Bear Ravine, Slide Ravine, an unnamed tributary, and Grouse Hollow)	Riparian corridors are narrow (20 to 60 feet) with extremely steep gradients and coarse substrates.	TR-1, WR-1, WR-2, WR-8, WR-9
Tributaries flowing into Bucks Lake and Bucks Creek below Bucks Lake, including Haskins, Mill and Bucks Creeks	Lower reaches of riparian corridors are subject to backwater effect from reservoir. Generally wide corridors in backwater areas of Bucks Creek (190 feet), Mill Creek (82 feet) and Haskins Creek (279 feet), with willows and meadow vegetation.	TR-1, WR-1, WR-5
Bucks Creek between Bucks Lake and Lower Bucks Lake	Riparian corridor averages 49 feet wide with high flow variability due to releases from Bucks Lake.	TR-1, WR-5
Aspen groves, wet meadows, seeps/springs and fens along reservoir margins (Bucks Lake, Lower Bucks Lake, Grizzly Forebay, and Three Lakes)	Wetland habitats include large, multi-age aspen stand near Haskins Bay. Small, degraded aspen stand along Bucks Lake with conifer encroachment. Wet meadows along Haskins Bay. Spring/seep along Grizzly Forebay. Fen along Bucks Lake near Mill Creek Campground.	TR-1, WR-5

Finally, as discussed in section 3.3.2.2, *Fishery Resources*, the licensees propose to implement an Aquatic Resources Monitoring Plan (AR-2; PG&E and City, 2018g). In this section, we evaluate the plan’s monitoring measures for riparian vegetation. The goal of this plan element is to assess the long-term response of riparian vegetation to project operations at index sites in Bucks and Grizzly Creeks below Lower Bucks Lake Dam and Grizzly Dam, respectively. In addition, the licensees propose that the monitoring within select tributaries along Three Lakes Road would provide information on effects of project-related road maintenance on riparian communities below the road.

Surveys would involve taking photos at fixed transect locations established in Bucks and Grizzly Creeks and in the Milk Ranch Conduit tributary streams downstream of Three Lakes Road. Photos would be compared to those taken in previous years to evaluate changes in the extent and composition of vegetation. Monitoring would be

conducted during the first calendar year after license issuance and twice in the following 14 years (triggered by High Spill events, defined as 200-300 cfs for at least 18 hours), and every 8 years thereafter. Surveys would coincide with the channel morphology and large woody material surveys. The licensees propose to use the monitoring results to inform potential management actions affecting these vegetation communities. The licensees' proposed plan is consistent with Forest Service preliminary 4(e) condition 43, Water Board preliminary condition 11, FWS 10(j) recommendation 12, and California DFW 10(j) recommendation 16.

Our Analysis

Riparian and wetland areas support high biodiversity and provide important habitat to numerous terrestrial and aquatic species. Bucks Creek project operations have altered stream flows, which have the potential to affect water availability and substrates that influence the extent and composition of riparian vegetation. In addition, project O&M activities and recreational use at reservoirs could affect the physical conditions (such as inundation and water availability) that control the distribution and composition of wetland habitats around reservoirs, damage or destroy riparian and wetland vegetation, and introduce nonnative invasive plants.

Field surveys of riparian and wetland vegetation conducted by the licensees demonstrated that riparian corridors and wetlands in the project area are generally healthy based on the species diversity and variety of age classes present. The aspen stands and fen wetland along the shoreline of Bucks Lake are an exception, as these communities are experiencing conifer encroachment (upslope) and are seasonally inundated by the reservoir (downslope).

Surveys of Grizzly Creek below Grizzly Forebay, Bucks Creek below Lower Bucks Lake, and Milk Ranch Creek below Three Lakes found that, due to the relatively steep gradients and coarse substrates in these drainages, project operations appear to have little effect on riparian habitat. There have been no notable or consistent changes in riparian vegetation extent or composition since surveys were conducted in 2002, even though flows were modified under the 2006 Amendment (FERC, 2006a). The licensees propose to continue existing minimum instream flows (WR-1) and channel maintenance flow releases (WR-4) in Grizzly Creek below Grizzly Forebay and Bucks Creek below Lower Bucks Lake and to begin implementing minimum instream flow releases in Milk Ranch Creek below Three Lakes. These measures would protect and enhance the existing condition of riparian vegetation.

Surveys along the tributaries to Bucks and Milk Ranch Creeks that are diverted into Milk Ranch Conduit did not find significant differences in the extent or composition of riparian vegetation above or below the diversions, indicating that the diversions are not having an adverse effect on riparian vegetation. The licensees propose to cease operation of six diversions along Milk Ranch Conduit and to provide minimum flow releases at two of the diversions (WR-8 and WR-9), which should benefit riparian vegetation on these

tributaries. The licensees also propose initiating the annual drawdown of Three Lakes in mid-August. The proposed drawdown could provide increased instream flows in Milk Ranch Creek downstream of Three Lakes Dam, which could enhance conditions for riparian vegetation in the stream corridor.

Tributaries to Bucks Lake (Bucks, Mill and Haskins Creeks) are influenced by reservoir levels that fluctuate seasonally by 16 to 30 feet. Reservoir fluctuations contribute to streambank erosion at the mouths of the creeks. There are also some effects by recreation users along the tributaries due to their proximity to road, campgrounds, and trails. The licensees propose to maintain existing reservoir operations (WR-5), and public recreation use would increase slightly under a new license.

Bucks Creek between Bucks Lake and Lower Bucks Lake experiences highly variable flows, but the steep gradient shows little evidence of scour, with the exception of the area immediately downstream of the Bucks Lake outlet. The licensees do not propose any changes to flow releases below Bucks Lake, and continued operation of the project would have no effect on the existing condition of riparian vegetation.

The measures outlined in the Integrated Vegetation Management Plan are sufficient to minimize or eliminate any potential adverse effects on special-status species in riparian or wetland habitats as a result of O&M activities in the project area. Aspen groves along the perimeter of Bucks Lake are in decline and limited in extent by conifer encroachment (upslope) and inundation by peak reservoir levels (downslope). The licensees propose to maintain existing maximum reservoir levels at Bucks Lake because current levels benefit fish and other aquatic resources. As part of the Integrated Vegetation Management Plan, the licensees propose to reduce or minimize potentially significant project effects on quaking aspen groves by selectively removing conifers to enhance quaking aspen groves along the perimeter of Bucks Lake.

The fen along the perimeter of Bucks Lake is subject to reservoir level fluctuations from project operations, unauthorized off-highway vehicle (OHV) use from the adjacent Mill Creek Campground, and encroachment by lodgepole pine. As part of the Integrated Vegetation Management Plan, the licensees propose to reduce or minimize potentially significant project effects by selectively removing conifers to enhance the bog blueberry and sundew portions of the fen. In addition, environmental awareness training would be provided to prevent unauthorized OHV use in the fen by employees. The licensees also propose a Recreation Management Plan that includes educational measures to minimize recreation-related effects to the fen and other rare natural communities.

Finally, the licensees propose to conduct long-term monitoring of riparian vegetation as part of the Aquatic Resources Monitoring Plan (AR-2) at index sites in the project area to assess the effects of project operations. The monitoring methods proposed (establishing photo points at fixed locations) are standard methods used to evaluate the response of riparian vegetation to management actions. Monitoring would provide information to evaluate the condition of riparian vegetation in the project area and any changes observed over time. However, this measure does not appear to take into account

the effects of non-project related influences on riparian vegetation and appears to have no clear connection to future license conditions (i.e., it does not contain evaluation criteria that could lead to changes in operations that would be enforceable under any new license issued for the project). In addition, this monitoring measure is not specifically designed to isolate project effects.

Wildlife

Wildlife resources in the project area may be affected by project operations and maintenance activities and recreation. Activities that disturb soils and native vegetation or introduce or spread NNIPs may affect the quality of wildlife habitat. Noise from project machinery, helicopters, blasting and other activities has the potential to affect sensitive life stages of wildlife species that occur in the project area. Recreational activities such as boating, camping, and hiking may disturb nesting birds. No specific measures are proposed or recommended to protect species commonly found in the area, but measures to protect vegetation, special-status plants and natural communities and wetland and riparian areas may also affect wildlife.

Our Analysis

Project-related activities such as construction of new recreation facilities, vegetation maintenance along project roads and the transmission line, other routine project road and facility maintenance, and recreational use have the potential to disturb and/or displace wildlife, damage or destroy habitat, and reduce the productivity of breeding individuals. The licensees' proposal includes specific avoidance and disturbance minimization measures for special-status wildlife species.

Direct effects would result from the proposed construction of several new recreation facilities (e.g., campsites, toilets, and trails), but the extent of these new facilities is relatively small. Other ground-disturbing activities that would directly affect wildlife include routine vegetation management around project facilities, grading roads and parking areas, and recreational use. A small number of animals may experience mortality, injury, or displacement as a result of these construction and project O&M activities. Indirect effects of these activities on wildlife could result from habitat fragmentation or disturbance to animals, which could potentially change wildlife habitat use and reduce productivity. However, the new construction activities proposed by the licensees are limited in extent and direct and indirect effects to wildlife would be minor.

The measures outlined in the Integrated Vegetation Management Plan, described below, are sufficient to minimize or eliminate any potential adverse effects on wildlife habitat that could result from construction of recreational facilities and project operations and maintenance activities. The plan could enhance wildlife habitat by controlling the spread of NNIPs and protecting native habitats, including special-status plants and wetland and riparian areas. To limit effects to wildlife habitat associated with project construction, operations, and maintenance activities and to prevent the introduction and spread of non-native invasive species, the plan includes specific measures related to

minimizing soil disturbance, revegetation methods for disturbed areas, and restrictions that limit travel to established roads and trails.

Special-status Wildlife

Project O&M activities, such as vegetation clearing along roads and transmission lines, road grading, modification of existing facilities, construction of new project facilities, and noise associated with these activities (i.e., helicopter use, blasting, and heavy machinery use) could have both short-term and long-term, direct and indirect effects on special-status wildlife. Effects may include habitat modification, habitat destruction, mortality or disturbance to wildlife, nest abandonment, and reductions in productivity.

The licensees propose three general measures that would minimize any potential adverse project effects on special-status wildlife species. These proposed measures are the same as those described above under *Special-status Plants* (GEN-1, GEN-2, and GEN-3) and are consistent with Forest Service preliminary 4(e) conditions 1 and 2. In addition, Forest Service preliminary 4(e) conditions 28 and 29 would require additional consultation on activities that have the potential to affect special-status species and would require annual reviews of special-status species lists.

As described above, the Integrated Vegetation Management Plan proposed by the licensees includes measures to minimize or eliminate any potential adverse effects on wildlife habitat for special-status species. The plan includes measures to control the spread of NNIPs and protect native habitats, minimize soil disturbance, revegetate disturbed areas, and restrictions limiting travel to established roads and trails.

The licensees also propose species-specific protection measures for special-status birds, including nest buffers and limited operating periods for bald eagle, osprey, northern goshawk, California spotted owl and willow flycatcher; protection measures for special-status bats; and several terrestrial and aquatic measures to protect special-status amphibians and aquatic reptiles.

Our Analysis

In general, project-related effects on special-status wildlife species would be similar to those discussed above for wildlife. The proposed Integrated Vegetation Management Plan would reduce project-related effects on special-status wildlife by minimizing damage or removal of vegetation and limiting the introduction or spread of NNIPs. Implementing specific protection, mitigation, and enhancement measures for special-status wildlife species, including buffers and limited operating periods, would protect these species during critical times of the year. These measures are discussed in more detail below for special-status birds, bats, and amphibians and aquatic reptiles.

Special-status Birds

Bald Eagles and Osprey

The licensees propose to implement the Bald Eagle Management Plan (TR-2) (PG&E and City, 2018j), which is a continuation of an existing license condition to manage and periodically monitor bald eagles at the project. The purpose of the plan would be to provide: (1) guidance for mitigating disturbance within the project boundary to bald eagle NMZs; (2) descriptions of habitat use by bald eagles at the project; and (3) recommendations for annual monitoring of bald eagle productivity and nest site locations on project lands.

The licensees have established NMZs around the two existing bald eagle nesting territories to protect these sites from human disturbance and development and provide suitable habitat for future nesting opportunities. Additionally, the plan identifies avoidance measures that would be implemented by the licensees for each bald eagle nesting territory.

This plan also provides for periodic monitoring by the licensees at the project over a new license term. The purpose of monitoring is to assess bald eagle productivity, determine the effectiveness of the plan, and evaluate effects from project operations and recreational and other project-related human activities. Monitoring would also track any changes in locations in bald eagle nesting sites at the project and delineate new NMZs as required. For example, the Bucks Lake bald eagles have nested on two different sites on project lands. They nested on the Rainbow Point peninsula from the 1980s through 2015 and began using a new nest located near Bucks Lake Lodge in 2016.

To protect breeding osprey, the licensees propose to implement a limited operating period during the nesting season (TR-3). This measure includes a combination of pre-construction surveys, establishment of nest buffer zones, consultation with the Forest Service and other resource agencies, and on-site monitoring. The licensees would perform a pre-construction survey for nesting osprey at locations on project lands with suitable habitat and establish a 300- to 500-foot protective buffer around active nests when potentially project-related disruptive activities such as maintenance of recreational facilities, and/or other project O&M activities is planned during the osprey breeding season (March 15 to August 31). Buffers would extend to a 1,000-foot radius of project activities if prolonged helicopter use (i.e., multiple trips and hovering) is planned.

The measures proposed to protect the bald eagle and osprey are consistent with Forest Service preliminary 4(e) conditions 47 and 48, FWS 10(j) recommendations 16 and 19, and California DFW 10(j) recommendations 20 and 21. The Forest Service commented that the bald eagle and osprey measures would ensure that the project contributes to maintaining viable populations of these species on NFS land and that there are no adverse effects from project activities.

Our Analysis

Bald eagles are present at the project. The species has nested at Bucks Lake for more than 40 years and at Grizzly Forebay for almost 20 years. Osprey are present at the project during the nesting season (March 15 through August 31). Preventing nest failure is an important consideration when protecting sensitive species such as the bald eagle and osprey. Project operations that create loud disturbances (e.g., sirens, machinery, maintenance work, or helicopters), project-related recreation, and other project-related human activities may affect nesting bald eagles and osprey by causing nest abandonment, mortality of eggs or nestlings, premature fledging of young, and reduced productivity.

The Bald Eagle Management Plan (TR-2) and a limited operating period during the osprey nesting season (TR-3) would reduce the risk of disturbing nesting bald eagle and osprey by providing the licensees, the Forest Service, and other participating resource agencies with information about the presence and locations of nests and key habitats prior to project-related activities that could potentially disturb nesting birds. Annual monitoring information would be used to implement suitable nest buffers. The Bald Eagle Management Plan adheres to FWS Guidelines (FWS, 2007) for delineation of new nest management buffers around bald eagle nests at the project.

California Spotted Owl and Northern Goshawk

The licensees propose three measures to protect nesting California spotted owls and northern goshawks from project disturbance. The first measure would limit project-related activities during the California spotted owl and northern goshawk breeding seasons within the vicinity of active nests (TR-4). Under this measure, the licensees would avoid conducting potentially disruptive activities (e.g., helicopter use, blasting, jackhammer use, tree-felling, heavy equipment use) within a 0.25-mile buffer of known nests and/or suitable habitat during their respective breeding seasons (February 15 through August 31 for northern goshawk and March 1 through August 31 for California spotted owl). If potentially disruptive activities cannot be avoided in an area with a previously documented nest or suitable nesting habitat for California spotted owl and/or northern goshawk during the breeding season, the licensees would conduct pre-construction surveys to determine occupancy and/or nesting status and establish a 0.25-mile protective buffer (in which no work would occur) around active nests.

Pre-construction surveys for nesting California spotted owls and northern goshawks when potentially disruptive activities are planned in areas with previous nesting activity and/or in suitable habitat during the breeding season would inform the licensees as to whether the species is actively using the area. Establishing a 0.25-mile protective buffer around occupied California spotted owl and/or northern goshawk nests located during these surveys would minimize the potential for the breeding process for either species to be disrupted. This measure is consistent with Forest Service preliminary 4(e) condition 50, FWS 10(j) recommendation 20, and California DFW 10(j) recommendation 23.

The second measure proposed by the licensees is to evaluate, and upgrade if necessary, the project transmission line for consistency with APLIC avian electrocution and collision guidelines (TR-5), including changing conductor spacing, installing new insulators, or installing bird flight diverters. The licensees also propose to ensure all newly installed powerlines, poles, conductors, and other transmission infrastructure and associated equipment conform to current APLIC guidelines and record all incidental observations of bird electrocutions and/or collisions and dead birds found by the licensees' O&M staff within the project boundary. This measure is consistent with Forest Service preliminary 4(e) condition 46, FWS 10(j) recommendation 17, and California DFW 10(j) recommendation 19.

The third measure is to conduct periodic California spotted owl and northern goshawk nesting surveys (TR-6). The licensees would conduct surveys the first full calendar year following license issuance and every seven years thereafter to determine if there are any changes to nesting locations within existing territories and/or establishment of new territories. Surveys would focus on suitable nesting habitat that is safely accessible and within 0.25 mile of the project transmission line, roads, campgrounds, and helicopter landing pads. This measure is consistent with Forest Service preliminary 4(e) condition 49, FWS 10(a) recommendation 4, and California DFW 10(j) recommendation 22.

Our Analysis

Project operations that create loud noise (e.g., sirens, machinery, maintenance work, or helicopters), project-related recreation, and other human activities at the project may affect nesting California spotted owls and northern goshawks. Project operations or maintenance activities could disturb these species during their nesting seasons (California spotted owl: March 1 – August 15; northern goshawk: February 15 – September 15), which could result in egg endangerment, nest failure, premature fledging of young, and territory abandonment. Nesting territories identified during 2015 surveys are near or adjacent to project facilities, including transmission lines within or adjacent to the activity centers, helipads, a powerhouse, a communication tower, and access roads.

The project area includes 13 helicopter landing pads, approximately 4 miles of transmission line corridor, and 21 miles of access roads. Operation and maintenance activities, including the use of helicopters, have the potential to affect nesting California spotted owls and northern goshawks. These activities can create significant downdraft and loud noises that have potential to disturb California spotted owl and northern goshawk pairs during the nesting season.

Implementing nest buffers and surveying nesting territories would reduce the risk of disturbance to nesting northern goshawk and California spotted owl by providing information about the presence and locations of nests and key habitats prior to project activities that could disturb nesting birds. Identifying locations where goshawks and

spotted owls are nesting and implementing appropriate buffers would minimize the potential for nest failure.

Performing periodic surveys for California spotted owl and northern goshawk nesting territories would identify whether the species is actively using the area and, if so, allow the licensees to establish or adjust 0.25-mile protective buffers to avoid potentially disruptive activities (e.g., blasting, jackhammering, tree-felling, and/or helicopter hovering) during the breeding season for each species (February 15 through August 31 for northern goshawk and March 1 through August 31 for California spotted owl).

Raptors commonly use flyways to travel between foraging and reproductive areas. Transmission line corridors intersect flyways for these species and some powerline configurations can expose the birds to unnecessary collision or electrocution hazards. The existing 4.2-mile-long, 115-kV project transmission line includes 61 transmission towers and extends from Grizzly Powerhouse to Buck's Creek Powerhouse. The transmission line crosses existing California spotted owl and northern goshawk territories and is surrounded by suitable nesting and/or foraging habitat for these species. These species often use transmission line corridors to travel between foraging and reproductive sites. It is not known whether existing power poles pose an electrocution hazard to perching birds. Lines greater than 60-kV, however, pose a low risk because of required separation between conductors.

Evaluating the line for consistency with APLIC (2006 and 2012) guidelines and modifying any features determined to pose a significant hazard to birds, along with ensuring new transmission facilities meet those guidelines, would minimize the potential for project-related effects on these raptors, bald eagles, and other bird species as a result of electrocution or collision. However, it is unclear what modifications to the transmission line may be necessary to conform to these guidelines. APLIC (2006) guidelines provide specific recommendations for conductor spacing (generally 60-inch separation between energized conductors and/or energized conductors and grounded hardware) and arrangement and insulation of jumper wires, conductors, and equipment to eliminate or reduce the risk of avian electrocutions. Installation of nest and perch deterrents, perching poles, and nest platforms can also reduce the risk of electrocution. Further, APLIC (2012) guidelines provide descriptions of devices for marking lines to increase visibility of conductors or shield wires to minimize potential avian collisions but does not provide specific criteria for when marking is required, spacing between markers, or the most effective design for a particular situation. Development of an avian protection plan that outlines the modifications to the transmission line to avoid or minimize electrocution and collisions hazards would help ensure protection of raptors and other bird species.

Willow Flycatcher

The willow flycatcher is listed by California DFW as an endangered species and is designated as a sensitive species by the Forest Service. Project operations and

maintenance and project-related recreational activities could affect the willow flycatcher during the nesting season.

To minimize these potential effects, the licensees propose to avoid conducting potentially disruptive project activities (e.g., helicopter use, blasting, tree-felling, jackhammering, recreational facilities construction, and/or other loud operations and maintenance activities) within 350 feet of suitable willow flycatcher nesting habitat during the breeding season (June 1 through August 31). If disruptive project activities cannot be avoided within this buffer, the licensees would conduct preconstruction surveys for nesting willow flycatchers and establish a 350-foot protective buffer around active nests. The licensees would notify the Forest Service, FWS, and California DFW prior to conducting potentially disruptive activities during the nesting season within 350 feet of suitable habitat.

The proposed measure is consistent with Forest Service preliminary 4(e) condition 51, FWS 10(j) recommendation 18, and California DFW 10(j) recommendation 24. The measure ensures the project contributes to maintaining viable populations of this species on Forest Service land and prevents adverse effects. Further, this measure is consistent with the Plumas National Forest Land and Resource Management Plan (USDA Forest Service, 1988) management direction for the Wildlife Program to provide habitat leading to viable populations of endangered or sensitive species.

Our Analysis

The willow flycatcher is present at the project during its nesting season (June 1 through August 31) and is sensitive to disturbance while nesting. Surveys conducted in 2015 found suitable willow flycatcher nesting habitat in Haskins Valley. Disturbance during the nesting season could result in egg endangerment, nest failure, premature fledging of young, and territory abandonment. This measure would ensure that suitable willow flycatcher nesting habitat at the project is identified and protected from potentially disruptive O&M activities, described above, by establishing a 350-foot buffer around suitable habitat during the breeding season. This would reduce the risk of disturbing nesting willow flycatcher.

Special-status Bats

Operations and maintenance activities conducted at project structures (e.g., powerhouses, storage buildings, valve houses, and dams), recreational facilities, tunnels, or other structures where project staff have a routine presence have the potential to adversely affect bats and their roosting habitat, especially those facilities that support maternity colonies or winter hibernation roosts.

The licensees propose three measures to minimize potential effects of project operations and maintenance on bats:

- Consult with bat biologist prior to significant structural modifications and vegetation management activities (TR-8)

- Inspect project tunnels for bats prior to O&M activities in winter (TR-9)
- Consult with bat biologist prior to loud/vibration activities along Three Lakes Road or Three Lakes Dam (TR-10)

The licensees propose to consult with a biologist prior to initiating significant structural modifications of project facilities (i.e., directly modifying potential roost structures), vegetation management activities (e.g., removing trees that may support roosting bats), or loud noise and vibrations (e.g., blasting, jack hammering). This measure is intended to protect maternity colonies comprised of approximately 50 bats or more and colonies of any size if comprised of special-status bat species. If work must occur during the breeding season, the licensees would implement a limited operating period from May 1 through August 31 to avoid conducting potentially disturbing activities when young are unable to fly.

The licensees also propose to consult with a biologist prior to implementing loud or vibration causing activities (e.g., blasting, jack hammering) along Three Lakes Road or at Three Lakes Dam. The biologist would assess the project activity for the potential to directly affect special-status bats. Cliffs and rock faces within the vicinity of these facilities may provide roosting habitat for special-status bat species. Noises and vibrations can affect bat hearing and thermoregulation.

In addition, inspections of project tunnels or other structures where bats may hibernate would be conducted prior to work during winter months causing loud noise and vibration to potential roosting structures. This measure would apply during the winter (November 1 through March 31) at Grizzly Powerhouse Tunnel portal, Bucks Lake Dam Outlet tunnel, and other project structures identified as supporting hibernation sites. If O&M activities cannot be avoided at winter hibernation sites supporting special-status bats or approximately 50 or more non-special-status bats, the licensees would develop appropriate protective measures and contact the resource agencies (Forest Service, FWS, and California DFW).

These measures are consistent with Forest Service preliminary 4(e) conditions 52, 53, and 54; FWS 10(a) recommendations 5, 6 and 7; and California DFW 10(j) recommendations 25, 26, and 27.

Our Analysis

Several bat species in California are rare and at risk. Disease, human disturbance, and habitat loss have contributed to population declines. Loss or disturbance of roost habitat can be particularly harmful to bats since they use roosts during sensitive life history periods, including the maternity season and winter hibernation, and many roosts are used by successive generation of bats over many years. Disturbance to maternity colonies may cause bats to abandon young, and disturbance during winter hibernation may reduce overwinter survival. Measures to protect roosting bats, especially during the maternity and winter hibernation seasons, are important to bats due to their low reproductive rate and high roost site fidelity.

Project activities that modify structures, create loud noises or vibrational disturbances (e.g., blasting, jack hammering), or remove or modify roosting structures may affect bats during sensitive life stages. The licensees propose three measures to protect bats roosting at project structures (e.g., powerhouses, storage buildings, valve houses, and dams), recreation facilities, and other structures where project staff have a routine presence.

The licensees would consult with a qualified biologist prior to initiating significant structural modifications or vegetation management throughout the project area, and when O&M activities causing noise or vibrations may occur along Three Lakes Road or at Three Lakes Dam. In addition, a qualified biologist would inspect project tunnels or other project structures where bats may hibernate prior to work during winter months. The measures define limited operating periods to protect roosting bats. If work cannot be avoided during sensitive periods, the licensees would develop appropriate protective measures and contact the resource agencies (Forest Service, FWS, and California DFW). These measures focus on protection of maternity colonies and winter hibernation sites comprised of approximately 50 bats or more and special-status bat colonies of any size. If O&M activities cannot be avoided during the limited operating period, exclusion prior to the winter season would prevent special-status bats or large roosts of non-special-status species from being affected.

These measures are expected to identify locations of maternity colonies and winter roosts in project structures and mitigate effects of project operations and maintenance activities. These protection measures apply for the term of the new license and would protect bats within the project area, especially during the sensitive maternity and winter hibernation seasons.

Special-status Amphibians and Reptiles

Foothill Yellow-legged Frog

The licensees propose several measures to minimize potential effects of project operations on FYLF and their habitat both within and downstream of the project area. These include minimum instream flows, channel maintenance flows, spill management at Grizzly Forebay and Lower Bucks Lake, AIS surveys, employee environmental awareness training and aquatic resources monitoring.

The licensees propose to implement minimum instream flows (WR-1) in Bucks Creek below Bucks Lake and Lower Bucks Lake, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek below Three Lakes, and the tributaries downstream of Milk Ranch Conduit Diversions No. 1 on Milk Ranch Creek and No. 3 on South Fork Grouse Hollow Creek. The licensees' proposed minimum instream flows are consistent with Forest Service preliminary 4(e) condition 31, FWS 10(j) recommendation 2, and California DFW 10(j) recommendation 5. As discussed in section 3.3.2.2, the licensees agreed to minor modifications to their proposed language in WR-1 and defer to the Forest Service

in its preliminary 4(e) condition 31. The Water Board, through preliminary condition 1, also supports this measure with the modifications described in section 3.3.2.2.

In addition, the licensees propose to implement channel maintenance flows (WR-4) in Bucks Creek downstream of Lower Bucks Lake and Grizzly Creek downstream of Grizzly Forebay. As described in section 3.3.2.2, *Aquatic Resources*, existing channel maintenance flows would be modified slightly, and the magnitude and duration of flows would increase. This measure is consistent with Forest Service preliminary 4(e) condition 34, FWS 10(j) recommendation 10, and California DFW 10(j) recommendation 9.

The licensees propose to modify spill management at Grizzly Forebay and Lower Bucks Lake (WR-6). The primary objective of this measure is to constrain flow fluctuations so that spills would be ramped down to be more protective of aquatic species in Bucks Creek, Grizzly Creek, and in the NFFR downstream of the confluence with Grizzly Creek. In addition, the licensees would not schedule extended outages longer than 2 weeks at Bucks Powerhouse and Grizzly Powerhouse during April through July to avoid potential effects to breeding or rearing FYLF in the NFFR resulting from spills in Grizzly Creek. Ramping rates for Grizzly Creek would be coordinated with the Rock Creek-Cresta Project downstream in the NFFR to minimize the risk of stranding FYLF egg masses in the mainstem NFFR. This measure is consistent with Forest Service preliminary 4(e) condition 35, Water Board preliminary condition 7, FWS 10(j) recommendation 7, and California DFW 10(j) recommendation 10.

The licensees propose to conduct comprehensive surveys for AIS (WR-4) to document colonization at the project by American bullfrogs, which are known to limit the distribution and abundance of FYLF. This measure is consistent with Forest Service preliminary 4(e) condition 42, Water Board preliminary condition 12, FWS 10(j) recommendation 13, and California DFW 10(j) recommendation 15.

During annual employee environmental awareness training (GEN-1), project staff would be taught to report any observations of FYLF or AIS observed incidentally during the performance of their work. This measure is consistent with Forest Service preliminary 4(e) condition 27, FWS 10(j) recommendation 1, and California DFW 10(j) recommendation 1.

Finally, as discussed in section 3.3.2.2, *Fishery Resources*, the licensees propose to implement an Aquatic Resource Monitoring Plan (AR-2; PG&E and City, 2018g). In this section, we evaluate the effects of the plan's monitoring measures on FYLF. The goal of this plan element is to document any colonization of project-affected reaches of Bucks Creek, Grizzly Creek, or Milk Ranch Creek by FYLF. The plan proposes conducting surveys for FYLF during their period of peak activity, which occurs between June and September depending on local conditions. Visual encounter surveys (VES) would focus on detecting adult frogs during the breeding season. If the species is documented at the project, VES for egg masses, tadpoles, and young-of-year would be conducted the following year at the site where the species was observed. Five sites would be monitored every 5 years to provide documentation of any changes in

distribution of FYLF (i.e., colonization of the project area) and inform management actions in the project area. The licensees' proposed plan is consistent with Forest Service preliminary 4(e) condition 43, Water Board preliminary condition 11, FWS 10(j) recommendation 12, and California DFW 10(j) recommendation 16.

Our Analysis

Factors limiting the presence of the FYLF at the project are unknown, but are likely related to physical habitat characteristics and water temperature. In addition, the project area is near the elevational limit of the species' range. Streams in the project area below 5,000 feet in elevation are considered potential habitat for the FYLF because they are within the elevational range where the species typically occurs. However, these streams are generally steep with confined channels composed of high gradient cascades, riffles, and pools with boulder, cobble, and bedrock substrates. Streams in the project area generally lack the habitat features required to support breeding populations of FYLF, such as large areas of shallow water with slow water velocities (PG&E and City, 2016l). Some streams have small, occasional pockets with shallow, low-velocity edge habitat and cobble and/or boulder substrates, providing a limited number of areas with physically suitable habitat for egg-laying and tadpole rearing. However, basking sites are limited in project area stream corridors due to the presence of dense riparian cover and steep banks.

Water temperatures in project area streams are generally suitable for egg laying (>10°C by mid-May), but are generally too cold for optimal tadpole development (PG&E and City, 2016v). FYLF eggs are laid when average water temperatures exceed 10°C (Wheeler et al., 2014; Lind, 2005; Kupferberg, 1996) and after flow levels have decreased from winter runoff, typically between late April and June (Ashton et al., 1998), depending on local conditions. For tadpoles, optimal growth and development occurs when maximum 30-day average temperatures are near or above 20°C (Kupferberg et al., 2011). Colder temperatures are not suitable, because they slow tadpole development such that metamorphosis is not possible in a single season or size and weight at metamorphosis is not great enough for successful over-winter survival.

The licensees propose to implement two measures intended to enhance conditions for riparian and aquatic resources at the project. Minimum instream flows (WR-1) would enhance conditions in Bucks Creek downstream of Bucks Lake Dam, Bucks Creek downstream of Lower Bucks Lake Dam, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek downstream of Three Lakes, Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1, and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3. These proposed flow releases are intended to increase the amount of available habitat for fish and other aquatic organisms relative to the flows that were implemented in 2006, particularly in upper portions of the streams. As discussed in section 3.3.2, *Aquatic Resources*, we anticipate that these instream flows would not alter the existing water temperature regimes downstream of the project dams. Although temperatures in project area streams below 5,000 feet in elevation would continue to be suitable for FYLF egg laying, they would continue to be too cold to support tadpole development.

In addition, the licensees propose to improve in-channel habitat through periodic channel maintenance flows (WR-4). The periodic flow releases above minimum requirements are intended to improve stream channel resources by recruiting and redistributing spawning gravels and large woody material and providing periodic scouring and vegetation recruitment events. As discussed in section 3.3.2.2, *Aquatic Resources*, the licensees have been providing channel maintenance flows in Bucks and Grizzly Creeks downstream of the reservoirs since 2006 under existing license conditions. The proposed channel maintenance flows are slightly modified from current flows and would increase both the magnitude and duration of channel maintenance flows. As such, we anticipate that the new measure would improve the distribution of spawning gravels and large woody material in the stream and enhance conditions for recruitment of riparian vegetation.

While channel maintenance flows would not degrade potential habitat for FYLF, they are unlikely to enhance suitable habitat in these stream corridors (i.e., by providing the habitat features required by FYLF, such as warmer stream temperatures and shallow areas with low-velocity flows). Channel maintenance flows are not expected to alter stream temperature regimes at and downstream of the project. The proposed flows are likely to alter the stream corridors by redistributing spawning gravels and large woody material, but the steep, confined corridors in the project area streams below 5,000 feet in elevation would continue to lack slow-moving, backwater areas required for FYLF egg laying.

The primary project-related risks to FYLF result from downstream effects of altered flow regimes and flow fluctuations during the breeding season from April to July. FYLF lay their egg masses under river rocks on the edges of creeks and rivers. Unnaturally high flows can dislodge egg masses and wash tadpoles and adults downstream into unsuitable habitat. Conversely, pulse flows can rapidly dewater habitat as flows recede and can kill FYLF eggs and tadpoles, which are vulnerable to stranding and desiccation.

Rapid flow fluctuations in Bucks and Grizzly Creeks, as well as in the NFFR downstream of the project, have the potential to affect water velocity and water levels in reaches downstream of the project area. Fluctuations in spill rates at Grizzly Forebay and Lower Bucks Lake may affect breeding FYLF by stranding egg masses in the NFFR. The licensees propose to modify spill management at Grizzly Forebay and Lower Bucks Lake (WR-6) to protect aquatic resources downstream of the project area. As discussed in section 3.3.2, *Aquatic Resources*, this measure decreases the rate of down-ramping by changing unit loads on the associated powerhouses. Gradually decreasing flows from managed spills at Lower Bucks Lake and Grizzly Forebay dams would protect the breeding FYLF population in the NFFR downstream of the project by reducing the likelihood that FYLF egg masses would be stranded due to fluctuations in flows. Further, licensees would not schedule extended outages more than 2 weeks long at Bucks and Grizzly Powerhouses during April through July to avoid potential effects to breeding or rearing FYLF in the NFFR resulting from spills in Grizzly Creek. In addition, recession

rates for Grizzly Creek would be coordinated with the Rock Creek-Cresta Project downstream in the North Fork Feather River to minimize the risk for stranding FYLF egg masses in the mainstem NFFR.

In addition, rapid flow fluctuations in Bucks and Grizzly Creeks, as well as in the NFFR downstream of the project, have the potential to affect water temperatures in reaches downstream of the project area with FYLF. As discussed above, the FYLF breeding period is triggered by water temperatures warming to 10°C following winter runoff and is typically initiated between April and June. The optimal tadpole rearing temperature is near or above 20°C. Changes in water temperature during the breeding and tadpole development periods can affect the timing of breeding, development of egg masses, and growth and development of tadpoles, all of which have the potential to reduce reproductive success. As discussed in section 3.3.3, *Cumulative Effects*, the results of water temperature modeling suggest that the proposed flows would have minimal effects on water temperatures in the NFFR downstream of the Grizzly Creek confluence where FYLF occur. This is due to the relatively large volume of water in the NFFR compared to flow from the project area streams, which provides a buffer from any substantive change in water temperature due to inflow from project reaches.

American bullfrog predation and competition is a primary cause of FYLF decline and range contraction in California. Bullfrogs are not currently found at the project but are considered an AIS of concern due to their potential to be introduced. The licensees propose conducting surveys for AIS (WR-4) at the project to document any future colonization of the project by American bullfrogs. If bullfrogs are detected at the project, the licensees would immediately consult with Forest Service, FWS, Water Board, and California DFW to develop and implement an appropriate plan of action, including control measures. This effort would minimize their adverse effects on FYLFs if their distribution changes and they are found at the project. Employees would also be trained to report bullfrogs observed at the project (GEN-1).

The licensees also propose monitoring FYLF at five index sites at the project, each of which would be surveyed every 5 years (AR-2). The survey protocols involve standard VES and focus on detecting adults during the breeding season. The purpose of monitoring is to document any changes in FYLF distribution resulting in colonization of the project area. If the species is documented on project lands, additional surveys would be conducted at the site where the species was observed during likely breeding, rearing and metamorphosis time frames. However, this measure does not describe specific management actions to be taken if FYLF are found in the project area and appears to have no clear connection to future license conditions (i.e., it does not contain evaluation criteria that could lead to changes in operations that would be enforceable under any new license issued for the project). In addition, this monitoring measure is not specifically designed to isolate project effects. Without this element, implementation of the plan would not necessarily benefit FYLF and there does not appear to be a project-related need for monitoring. Employees would be trained to report any FYLF observed in the project area (GEN-1).

Overall, the factors limiting the presence of FYLF in project area streams, including physical habitat features and stream temperatures, would not be affected by project operations. Moreover, as discussed in section 3.3.2.3, *Cumulative Effects*, we do not expect the proposed project to have substantial downstream effects on water temperature or flows to the NFFR. Therefore, we do not anticipate that project operations would adversely affect FYLFs or their habitat in the project area or downstream of the project in the NFFR.

Other Special-status Amphibians and Aquatic Reptiles

Cascades frog and western pond turtle are special-status species that potentially occur in the project area based on historical records and the presence of suitable habitat. The licensees conducted focused surveys for these species but did not document them on project lands. The licensees propose that in order to minimize potential effects of project operations on these species and their habitat, they would implement several measures discussed above for both terrestrial and aquatic resources, including the Integrated Vegetation Management Plan and seven operational measures affecting instream flows, reservoirs, and diversions (WR-1, WR-2, WR-4, WR-5, WR-6, WR-8, and WR-9). Comprehensive surveys for AIS would be conducted to document colonization of the project area by American bullfrogs, which are known to limit the distribution and abundance of native amphibian species and western pond turtle. Bullfrogs are not currently found in the project area but are considered an AIS of concern due to their potential to be introduced.

During annual employee environmental awareness training, project staff would be taught to report any new populations of special-status species or AIS observed incidentally during the performance of their work. This measure is consistent with Forest Service preliminary 4(e) condition 27, FWS 10(j) recommendation 1, and California DFW 10(j) recommendation 1 and would be included as a mandatory condition in any license issued for the project.

Our Analysis

Project operations and maintenance activities would have no effect on Cascades frog or western pond turtle because these species are not known to occur and are not likely to occur within the project area. The licensees did not detect any evidence of Cascades frog or western pond turtle during focused surveys conducted in 2015 and 2016. The Cascades frog is not likely to occur in the project area because it is outside the species' current distribution. The southernmost extent of its range is 30 miles north of the project area near Mt. Lassen. The project area contains suitable basking habitat for western pond turtle in Grizzly Forebay and Lower Bucks Lake (downed logs and exposed banks). However, the nearest documented occurrences of this species are 10 miles to the southwest. The proposed measures, however, would help protect these species if they should inhabit the project area in the future.

Based on the lack of documented occurrences of these species in the project area and the licensees' proposed measures to avoid or minimize effects on terrestrial and aquatic resources, the project would have no effect on Cascades frog or western pond turtle.

3.3.3.3 Cumulative Effects

Foothill Yellow-legged Frog

The project has the potential to cumulatively affect FYLF downstream of the project. FYLF occur on the NFFR approximately 1.5 miles downstream of the confluence with Grizzly Creek. This location is the furthest upstream a FYLF has been detected on the NFFR during several years of surveys.

Water temperature monitoring and model results indicate that temperatures in the NFFR are not substantially altered by inflow from stream reaches in the project area; therefore, project operations that influence water temperatures in Milk Ranch, Bucks, or Grizzly Creeks have no cumulative effect on the NFFR downstream of the Grizzly Creek confluence. This is due to the relatively large volume of water in the NFFR compared to flow from the project area streams. The larger volume of flow in the NFFR provides a buffer from any substantive change in water temperature due to inflow from project reaches.

Project operations do not contribute to deleterious changes in water temperature in the NFFR, and continued operation would result in small or no change in flows and water temperature in stream reaches in the project area. Additionally, WR-6 would down-ramp controllable spills from Grizzly Forebay. With implementation of this measure, flows released from the Grizzly Forebay would not directly affect habitat conditions in the NFFR downstream of the Grizzly Creek confluence. Since the project would not result in substantial water temperature or flow effects to the NFFR, the project would not contribute to negative cumulative effects on FYLF known to occur along the NFFR.

Vegetation

The project has the potential to cumulatively affect vegetation resources. The mechanisms for cumulative effects to vegetation include the PNF's efforts to reforest areas burned in both the Storrie (2000) and Chips (2012) fires and treat invasive plants in areas affected by the Storrie and Rich (2008) wildfires, including areas within the watershed of the project. In addition, PG&E's Herbicide Vegetation Management Plan for the PNF (PG&E, 2013) provides guidelines to control unwanted vegetation with herbicides on PNF lands within transmission lines rights-of-way, including the Grizzly Bucks Creek Tap 115-kV, while providing for the protection and maintenance of forest resources.

PNF's Storrie and Chips Fire Reforestation Project will reforest areas burned in both the Storrie (2000) and Chips (2012) fires. The area burned by the Storrie Fire is located (1) on the north-east side of NFFR and across Highway 70 from Bucks

Powerhouse, (2) less than 1 mile north of Three Lakes, and (3) about 6 miles north of Bucks Lake. The area burned by the Chips Fire is entirely on the northeast side of the NFFR, and the southern extent of the fire perimeter is about 8 miles north of Bucks Lake. Neither of these fires affected land within the project boundary. A small portion of the Milk Ranch watershed is located within the Storrie Fire boundary. The goal of reforestation is to provide future habitat and a seed source. The project would not contribute to negative cumulative effects to vegetation in the project area.

PNF's Storrie and Rich Fire Areas Invasive Plant Treatment Project treats priority invasive plant infestations annually using a combination of manual, mechanical, cultural, and chemical methods on lands administered by the PNF in the watersheds affected by the Storrie and Rich (2008) wildfires, including areas within the watershed of the project. The Rich Fire occurred about 20 miles west of the town of Quincy in the PNF in the Feather River Canyon. The invasive plant treatment action would not have any adverse cumulative effect. PNF's project would maintain and may enhance biological resources at the project by reducing the potential for the spread of invasive plant species into the recently burned area adjacent to the project that could potentially spread into the project area.

The licensees' Herbicide Vegetation Management Program provides guidelines to control unwanted vegetation with herbicides on PNF lands within transmission lines rights-of-way, including the Grizzly Bucks Creek Tap 115-kV Transmission Line, while providing for the protection and maintenance of forest resources. It is anticipated that the licensees and the PNF would implement the Integrated Vegetation Management Plan (TR-1) in the vicinity of the project. Therefore, the proposed action in combination with actions taken by the licensees as part of this project would continue to protect vegetation resources.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

As described in section 1.3.3, *Compliance with the Endangered Species Act*, the SNYLF and CRLF are the only two federally listed species that are potentially found in the project area.³⁴ This section describes the status, habitat requirements, and likelihood of occurrence for each of these species.

³⁴ The threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) was evaluated as part of the relicensing studies. As of 2014, however, FWS (2014) no longer considers Plumas County to be part of the range of the beetle. Therefore, this species is not considered further in this draft EIS.

Sierra Nevada Yellow-legged Frog

FWS listed the SNYLF as an endangered species under the ESA in 2014 and designated critical habitat in 2016; it is also listed as a State threatened species. This species is found in lakes, ponds, wet meadows and streams above 4,500 feet in elevation and rarely co-occurs with fish populations. Perennial lakes and ponds with shallow shoreline areas and streams with backwater areas and low-velocity flows provide suitable breeding habitat. Because of their multi-year tadpole stage, permanent water is required for successful breeding. Breeding activity begins soon after ice-melt in spring, ranging from April at lower elevations to June and July in higher elevations (AmphibiaWeb, 2018). Eggs are deposited underwater in clusters attached to rocks, gravel, vegetation, or under banks (AmphibiaWeb, 2018). Throughout its range, introduced fish populations, disease, and habitat loss and degradation are the primary threats to this species.

Critical habitat (subunit 1B: Bean Creek) encompasses portions of the Bucks Creek project area, including Bucks Lake, Lower Bucks Lake, Thompson Lake, Bucks Creek downstream of Lower Bucks Lake, Haskins Creek, Middle Fork Mill Creek, and Mill Creek (figure 3-31).

FWS (2016) outlined Primary Constituent Elements (PCEs), which are physical and biological features essential to the conservation of the SNYLF. These include aquatic habitat for breeding and rearing, which consists of permanent water bodies, or those that are either hydrologically connected with or close to permanent water bodies, including lakes, streams, rivers, tarns, perennial creeks (or permanent plunge pools within intermittent creeks), pools (such as a body of impounded water contained above a natural dam), and other forms of aquatic habitat as defined by FWS. This habitat must:

- For lakes, be of sufficient depth not to freeze solid during the winter
- Maintain a natural flow pattern, including periodic flooding
- Be free of introduced predators
- Maintain water during the entire tadpole growth phase (minimum of 2 years)
- Contain bank and pool substrates consisting of varying percentages of soil or silt, sand, gravel, cobble, rock, and boulders
- Contain shallower lake microhabitat with solar exposure
- Contain open gravel banks and rocks projecting above or just beneath the surface of the water
- Contain aquatic refugia, including pools with overhanging banks, and logs, rocks, or vegetation to provide cover from predators
- Contain sufficient food resources to provide for tadpole growth and development

FWS has also described PCEs for overwintering aquatic habitat and for upland areas. Overwintering aquatic habitat has the same characteristics as breeding habitat but also includes refugia where the microhabitat features protect hibernating life stages from freezing and connectivity to breeding habitat (i.e., via streams, stream reaches, or wet

meadows). Upland areas consist of: (a) land that extends up to 82 feet from the bank of a stream or the entire contiguous area between systems of ponds, reservoirs and/or meadows; and (b) land surrounding or adjacent to breeding or overwintering aquatic sites that provide for the natural hydrologic regime (water quality and quantity) (FWS, 2016).

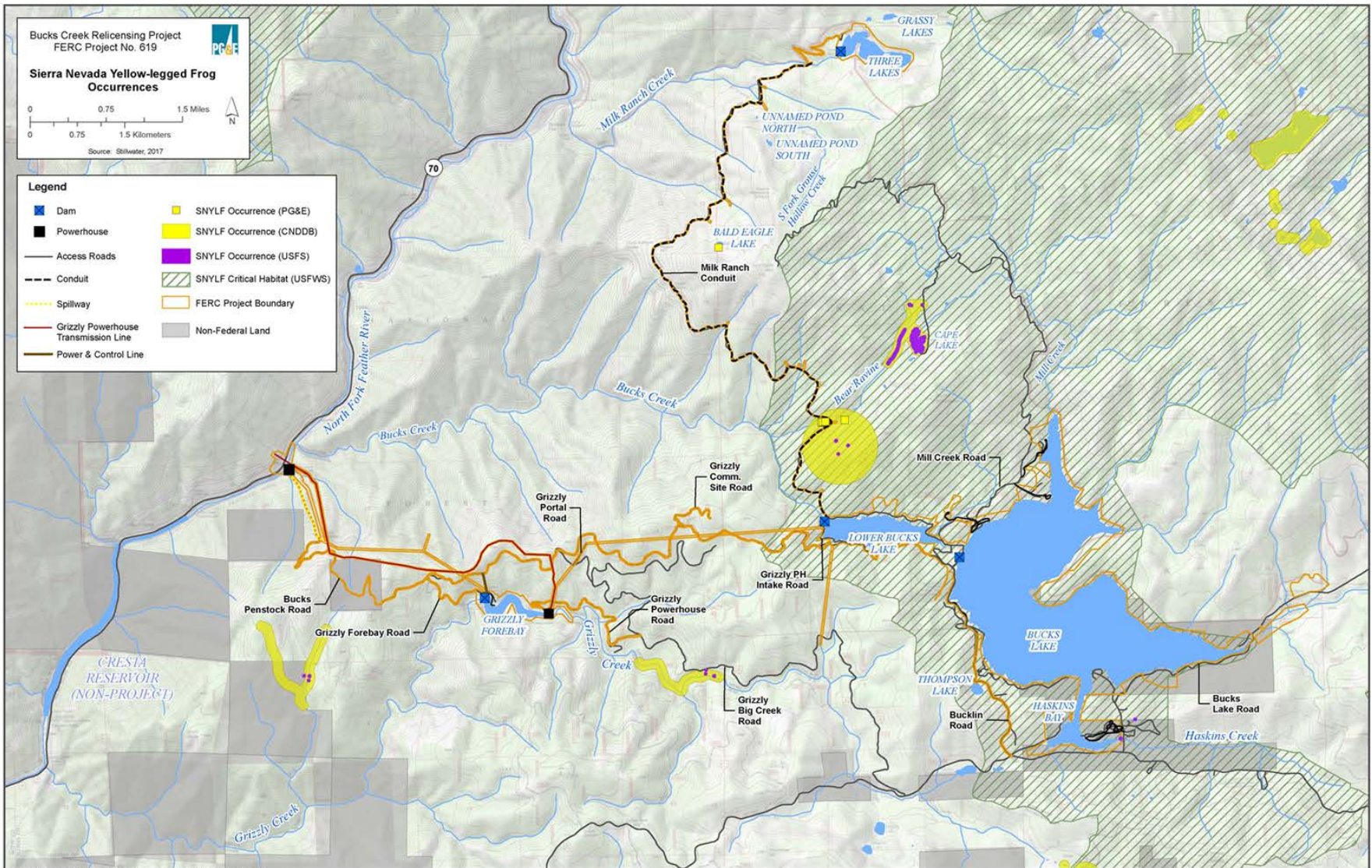


Figure 3-31. Documented Sierra Nevada yellow-legged frog occurrences in the vicinity of the Bucks Creek Project (Source: PG&E and City, 2018k).

The licensees conducted field surveys for SNYLF in 2015 and 2016, but did not observe this species, although suitable habitat exists at several locations in the project area (PG&E and City, 2016l). The licensees conducted supplemental surveys in 2017 and found three frogs in Bear Ravine (two adults and one subadult) (PG&E and City, 2018c). In addition to these observations, there is one historical record of this species in the project area at Bald Eagle Lake in 2002 (one adult). Other recent surveys found SNYLF in the Cape Lake Area (including the headwaters of Bear Ravine, 0.8 mile upstream of the Milk Ranch Conduit Diversion) in 1994, each year from 2004-2009, and in 2013 and 2016. Locations of documented SNYLF occurrences in the vicinity of the Bucks Creek project area are shown in Figure 3-31.

California Red-legged Frog

FWS listed the CRLF as a threatened species under the ESA in 1996 and designated critical habitat in 2010. It is also listed as a California species of special concern. This aquatic frog is found in ponds or along stream edges with ample emergent vegetation within humid forests, woodlands, grasslands, and coastal scrub habitats from sea level to 5,000 feet. This species requires calm or slow-moving aquatic habitats, which may be permanent or ephemeral, for breeding. Throughout its range, bullfrogs and habitat loss, degradation, and modification are the primary threats to this species.

The licensees conducted field surveys in 2015 and 2016 using FWS's *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (2005) but did not observe this species (PG&E and City, 2018c). No suitable habitat exists within the Bucks Creek project area. The nearest critical habitat unit is more than 8 miles from the project area, and the nearest documented occurrence is 12 miles away.

3.3.4.2 Environmental Effects

Sierra Nevada Yellow-legged Frog

Project operations and maintenance activities, recreational use, and management of reservoirs and diversions have the potential to affect the SNYLF and its habitat. Most streams in the project area do not provide suitable habitat for breeding SNYLF due to the presence of predatory fish and the limited number of pools and other backwater areas with low-velocity flows. However, the licensees conducted surveys in 2017 and found SNYLF in Bear Ravine (PG&E and City, 2018c). In collaboration with the resource agencies, the licensees have identified additional sites in the project area with suitable habitat that have the potential to be affected by project activities. These sites would be monitored during the term of the new license to determine if frogs are present.

To minimize the effects of project operations on the frog and its habitat, the licensees propose to implement three general measures (GEN-1, GEN-2, and GEN-3), discussed above; the Integrated Vegetation Management Plan (PG&E and City, 2018i), also discussed above; the SNYLF Management Plan (PG&E and City, 2018k); operational measures affecting instream and channel maintenance flows, diversions and

spill management; and an Aquatic Resources Monitoring Plan (PG&E and City, 2018g). Protection measures focus on activities performed within or adjacent to aquatic features in the project area.

The SNYLF Management Plan contains specific protection measures intended to avoid or minimize potential effects of O&M activities on SNYLF:

- If SNYLF are found during project O&M activities, the licensees would contact the resource agencies and stop all activities in the surrounding area that may result in take (e.g., harassment, injury, or death).
- Buffers and limited operating periods would apply to project activities when they occur within or adjacent to potentially suitable SNYLF habitat within designated critical habitat. For potentially suitable habitat that occurs outside of critical habitat, the licensees would follow alternative protocols (FWS, 2014).
- Protection measures inside critical habitat include:
 - Surveys for frogs would be conducted prior to maintenance activities or mechanical vegetation removal.
 - Decontamination protocols to minimize the spread of chytrid³⁵ within the project area.
 - Restrictions on the use and application of herbicides and pesticides.
 - Instream work would be limited to the active period for the frog (April 16 to October 31), when the presence of frogs is more easily detected and tadpoles, subadults, and adult frogs are able to move away from potentially harmful activities.

Annual environmental training for project staff and recreation contractors would include a description of SNYLF and their habitat, as well as the protection measures outlined in this Plan.

The SNYLF Management Plan includes monitoring activities to provide information on the occurrence and distribution of the species at locations that may be affected by project O&M activities and recreation sites. Surveys would take place at eight locations within the project area that contain suitable habitat and are potentially affected by project activities: (1) Bear Ravine, (2) South Fork Grouse Hollow, (3) Grizzly Creek (upstream and downstream of Grizzly Forebay), and several sites upstream

³⁵ Chytrid is a major contributing factor in the dramatic decline in amphibian populations worldwide and has significantly reduced or extirpated many populations of SNYLF in California (Briggs et al., 2005). The control and remediation of the disease is a crucial factor in the potential recovery of the species.

of Bucks Lake, (4) Haskins Creek, (5) Bucks Creek, (6) Right Hand Branch Mill Creek, (7) Middle Fork Mill Creek, and (8) Mill Creek. Monitoring frequency would depend on whether locations: (1) were known to be occupied at the time this plan was developed in 2018, (2) were historically occupied, or (3) are in designated critical habitat. Monitoring data would be used to implement buffers and limited operating periods and would be evaluated by the resource agencies over the course of the new license term to determine if any additional protection measures are needed.

In addition, monitoring for American bullfrog, an invasive species detrimental to native amphibian populations, would be conducted concurrently with SNYLF monitoring, and would include additional sites along project reservoir shorelines. The licensees' proposed plan is consistent with Forest Service preliminary 4(e) condition 42, Water Board preliminary condition 12, FWS 10(j) recommendation 13, and California DFW 10(j) recommendation 15.

The licensees also propose several measures that would maintain or increase instream flows in Bear Ravine, which is occupied critical habitat, and several sites with similar habitat. The licensees propose a new measure to cease diversion of flows from Bear Ravine into Milk Ranch Conduit, which would increase instream flows in Bear Ravine to the unimpaired flows year-round (WR-2). The licensees perform periodic maintenance at the diversion structure (sediment removal and vegetation management). They propose to cap the diversion and screen air vents to prevent entrainment of frogs and leave the existing structure in place. They also would monitor the structure and adjacent hillslope for signs of erosion and would consult with FWS and other resource agencies if non-routine maintenance is required. This measure is consistent with Forest Service preliminary 4(e) condition 32, Water Board preliminary condition 1, FWS 10(j) recommendation 3, and California DFW 10(j) recommendation 6.

The licensees propose to leave six inoperable diversions along Milk Ranch Conduit in place (WR-8). The structures no longer divert water and would be left in place to permit unimpaired flows below each diversion year-round. This measure is consistent with Forest Service preliminary 4(e) condition 38, Water Board preliminary condition 19, FWS 10(j) recommendation 8, and California DFW 10(j) recommendation 11.

The licensees propose to cease diversion of flows from Milk Ranch Conduit Diversions No. 1 and 2 during Wet water years (WR-9). This measure is consistent with Forest Service preliminary 4(e) condition 33, Water Board preliminary condition 3, FWS 10(j) recommendation 9, and California DFW 10(j) recommendation 8.

Measure WR-1 would implement minimum instream flows. This measure would apply to Bucks Creek below Bucks Lake and Lower Bucks Lake, Grizzly Creek below Grizzly Forebay, Milk Ranch Creek below Three Lakes, and the tributaries downstream of Milk Ranch Conduit diversions No. 1 on Milk Ranch Creek and No. 3 on South Fork Grouse Hollow Creek. The licensees' proposed minimum instream flows are consistent with Forest Service preliminary 4(e) condition 31, FWS 10(j) recommendation 2, and

California DFW 10(j) recommendation 5. As discussed in section 3.3.2.2, the licensees agreed to minor modifications to their proposed language in WR-1 and defer to the Forest Service in its preliminary 4(e) condition 31. The Water Board, through preliminary condition 1, also supports this measure with the modifications described in section 3.3.2.2.

The licensees also propose to implement channel maintenance flows (WR-4) in Bucks Creek downstream of Lower Bucks Lake and Grizzly Creek downstream of Grizzly Forebay. This measure is consistent with Forest Service preliminary 4(e) condition 34, FWS 10(j) recommendation 10, and California DFW 10(j) recommendation 9. This measure is a modification of an existing license condition.

The licensees propose a new measure to modify spill management at Grizzly Forebay and Lower Bucks Lake (WR-6). The primary objective of this measure is to constrain flow fluctuations so that spills would be ramped down to be more protective of aquatic species in Bucks Creek, Grizzly Creek, and the NFFR downstream of the project area. This measure is consistent with Forest Service preliminary 4(e) condition 35, Water Board preliminary condition 7, FWS 10(j) recommendation 7, and California DFW 10(j) recommendation 10.

The licensees propose developing an AIS management plan (AR-4) within 1 year of license issuance, including measures to monitor and control American bullfrog distribution in the project area. Public recreation, vehicular traffic, and project O&M activities have the potential to introduce and spread bullfrogs into the project area. The proposed measures are designed to minimize the potential for invasive species infestations in the project area and include (1) public education to reduce the potential for introducing AIS into the project area, (2) BMPs to minimize and prevent the introduction and spread of AIS, (3) annual employee training in species identification and BMPs, (4) monitoring to detect occurrences early, and (5) control and management measures to be developed in consultation with the Forest Service, FWS, Water Board, and California DFW. Implementing the AIS plan would be required by Forest Service preliminary 4(e) condition 44 and is consistent with FWS 10(j) recommendation 14 and California DFW 10(j) recommendation 17.

During annual employee environmental awareness training (GEN-1), project staff would be taught to report any observations of SNYLF or AIS observed incidentally during the performance of their work. This measure is consistent with Forest Service preliminary 4(e) condition 27, FWS 10(j) recommendation 1, and California DFW 10(j) recommendation 1. Results of monitoring and O&M plans for the upcoming year would be reviewed at the annual consultation meeting with the Forest Service (GEN-2). Forest Service preliminary 4(e) condition 1 would require implementation of this measure. An annual ecological consultation meeting with all of the resource agencies would be held to review monitoring results from the previous year, and monitoring plans and any changes in license activities for the upcoming year. This measure is consistent with Forest

Service preliminary 4(e) condition 2, FWS preliminary 10(a) recommendation 1, and California DFW 10(j) recommendation 2.

Our Analysis

The SNYLF population in Bear Ravine is one of only five known populations on the PNF and the only known population within the Bucks Creek project area. FWS designated the entire Bear Ravine drainage critical habitat for the species. As one of the few remaining, isolated populations of the frog in critical habitat subunit 1B, this population may be essential to the recovery of the species.

Project operations, including diversions, minimum instream flows, channel maintenance flows and spill management have the potential to affect SNYLF and their critical habitat. These operations may affect water velocity, water levels, stream temperature, and channel morphology in stream corridors in the project area.

Diversions at Bear Ravine and other sites in the project area with potentially suitable habitat for the frog have the potential to entrain frogs and reduce habitat connectivity downstream of the diversions during lower flow periods. In Bear Ravine, current flows are insufficient to provide habitat connectivity downstream of the diversion during lower flow periods. The licensees propose to cease diversion of flows from Bear Ravine into Milk Ranch Conduit, which would increase year-round instream flows in Bear Ravine.³⁶ The amount of flow diverted at this location varies seasonally, but for most of the year, the flow is significantly reduced, resulting in little to no downstream flow. This measure would enhance habitat for SNYLF in Bear Ravine by increasing connectivity between ponds and other microhabitats preferred by the frog and increasing availability of inundated areas during drier months. In addition, this measure is expected to eliminate potential entrainment of frogs into the Milk Ranch Conduit and potential effects of project operations and maintenance on SNYLF in Bear Ravine.

In addition, the licensees propose similar measures to maintain or increase instream flows to protect and potentially enhance suitable habitat in other stream corridors in the project area. The licensees propose to leave six inoperable diversions along Milk Ranch Conduit in place (WR-8). By leaving the diversions in place, the current channel and riparian conditions would be maintained. This measure would contribute to maintaining existing suitable habitat for SNYLF.

The licensees propose to cease diversion of flows from Milk Ranch Conduit Diversions No. 1 and 2 during Wet water years (WR-9). Currently, tributaries

³⁶ The intake diversion pipe transports approximately 8 cfs to the conduit. The actual amount of water transported varies, because the capacity of the conduit is less than capacity of all of the diversions combined. Flow in the drainage can be as high as 45 cfs, as was evidenced by scour along the banks (information provided during October 16, 2018 environmental site inspection).

downstream of the Milk Ranch Conduit receive instream flows only when the diversions are overflowing. This measure returns all spring and summer flows from two of the largest diverted tributaries (Milk Ranch Creek and North Fork Grouse Hollow Creek) to their stream of origin during Wet water years. It is intended to enhance seasonal aquatic and year-round riparian resources by extending the duration and magnitude of wetted channel conditions downstream of the diversions in wetter years and seasons, and also increasing the frequency and magnitude of flows that would flush fine sediment accumulations out of the channel. In the absence of this measure, water would be spilled at Lower Bucks Lake and would not be used for power generation. FWS commented that this measure would protect and enhance potential SNYLF habitat that has not been surveyed, but is similar to occupied habitat in Bear Ravine.

Minimum instream flows (WR-1) are intended to increase the amount of available habitat for fish and other aquatic organisms relative to the flows that were implemented in 2006, and are described in detail in section 3.3.2, *Aquatic Resources*. Releases from lower Bucks Lake into Bucks Creek would vary seasonally and by water year type and would be up to 9 cfs higher than existing conditions. Minimum flow releases from Grizzly Forebay into Grizzly Creek below Grizzly Forebay Dam would also vary seasonally by water year type and would be up to 9 cfs higher than existing conditions. Currently, there are no minimum instream flow releases from Bucks Lake into Bucks Creek or into Milk Ranch Creek or its tributaries. Under WR-1, the licensees would release 3 cfs into Bucks Creek (immediately below the dam), up to 2 cfs into Milk Ranch Creek below Three Lakes and at Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1, and up to 0.5 cfs at South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3.

These minimum instream flows would provide additional water in these affected stream reaches and would be most noticeable immediately downstream of the release points in each stream. While the proposed flows are likely to enhance water levels and the availability of pools in project area streams, they do not occur in stream reaches that currently support SNYLF. However, several of the streams reaches that would receive increased instream flows under WR-1 have been identified by FWS as containing suitable habitat and would be surveyed periodically for frogs under the SNYLF Management Plan, including South Fork Grouse Hollow, Grizzly Creek below Grizzly Forebay, and Bucks Creek below Bucks Lake and Lower Bucks Lake.

The periodic release of channel maintenance flows higher than minimum requirements (WR-4) is intended to improve stream channel-related resources, including riparian habitat, by providing periodic scour and vegetation recruitment events. Channel maintenance flows are not expected to alter stream temperature regimes in the project area. While the proposed flows may alter stream corridors in the project area by redistributing spawning gravels and large woody material, they are unlikely to create the habitat conditions necessary to support breeding SNYLF, such as slow-moving, backwater areas for egg laying and tadpole rearing.

Rapid flow fluctuations in Bucks and Grizzly Creeks, as well as in the NFFR downstream of the project, have the potential to affect aquatic resources in reaches downstream of the project area. Unnaturally high flows can dislodge egg masses and wash tadpoles and adults downstream into unsuitable habitat. Pulse flows can rapidly dewater habitat as flows recede and can kill eggs and tadpoles, which are vulnerable to stranding and desiccation. The licensees propose to modify spill management (WR-6) to protect aquatic resources, including breeding and rearing amphibians, downstream of the project area. Since SNYLF have not been detected downstream of the project area and are not expected to occur there, because this area is less than 4,500 feet in elevation, this measure would have no effect on SNYLF. Project O&M activities, including construction and maintenance of infrastructure, roads, and recreation sites, vegetation and fuels management, pesticide use, and erosion control, have the potential to affect the SNYLF and its habitat. The SNYLF Management Plan provides general protection measures related to these activities, described above. These measures would avoid or minimize the effects of O&M activities on the frog and its critical habitat in the project area by protecting water quality, preventing vegetation removal or ground disturbance adjacent to areas where frogs may occur, and limiting the use of pesticides near critical habitat. Limited operating periods, buffers around critical habitat and other procedures (e.g., surveys for frogs prior to starting O&M activities) would reduce the likelihood that O&M activities would result in take (i.e., harassment, injury or death) of individual frogs. Decontamination protocols would avoid or minimize the spread of chytrid fungus within the project area. Any changes in O&M activities for the upcoming year that may affect the SNYLF or its habitat would be reviewed at the annual FS consultation meeting (GEN-2) and interagency ecological consultation group meeting (GEN-3).

Under the SNYLF Management Plan, the licensees would periodically survey for frogs in Bear Ravine and other locations with suitable habitat in the project area. If frogs are detected at additional locations, the Forest Service and other resource agencies would be consulted to determine if additional measures are necessary to protect the species. Monitoring results would be reviewed at the annual NFS consultation meeting (GEN-2) and interagency ecological consultation group meeting (GEN-3).

The absence of SNYLF from otherwise suitable habitat in the project area is presumed to be largely due to the presence of predatory fish, such as rainbow trout, brook trout, and brown trout. Project reservoirs with introduced fish populations (e.g., rainbow trout, brown trout, brook trout, etc.) and/or continued fish stocking are considered to have low suitability, and the SNYLF Management Plan does not address these sites.

American bullfrog predation and competition is a primary cause of the decline of native amphibian species in California. Surveys for bullfrogs would be conducted concurrently with SNYLF surveys and would also be conducted as part of AIS surveys (AR-2). Employees would be trained to report any bullfrogs or SNYLFs observed in the project area (GEN-1).

The proposed PM&E measures have the potential to affect several of the PCEs for SNYLF critical habitat. Measures to cease operation of diversions would reestablish a more natural flow pattern, including periodic flooding, in Bear Ravine and several other drainages. Ceasing operation of diversions may also enhance aquatic refugia by increasing the seasonal availability of pools and connectivity among pools in these drainages. The AIS surveys and proposed AIS management plan would reduce the risk that bullfrogs would colonize the project area. No measures are proposed to reduce the presence of predatory fish in the project area. Project area reservoirs would continue to be stocked with trout, which are a limiting factor in the distribution of SNYLF, and as such, are not considered suitable habitat.

Evidence of SNYLF breeding (i.e., tadpoles or egg masses) has not been found in the project area. The adult and subadult frogs found in Bear Ravine in 2017 were assumed to be using the area as post-breeding dispersal and/or foraging habitat, and not for breeding (PG&E and City, 2018c). Breeding may take place in the headwaters of Bear Ravine or in nearby Cape Lake. These sites are not in the project area and are not affected by project operations. Therefore, project operations would likely have little effect on PCEs related to egg laying and tadpole rearing.

Project operations also have the potential to affect SNYLF and its habitat by altering water temperatures within and downstream of the project area. As discussed in section 3.3.2, *Aquatic Resources*, we do not anticipate that the proposed instream flows (WR-1) or channel maintenance flows (WR-4) would alter the existing water temperature regimes in the project area. The licensees propose to modify spill management (WR-6) to protect aquatic resources downstream of the project area. As discussed in section 3.3.3.3, *Cumulative Effects*, we do not expect project operations, including modified spill management (WR-6), to have substantial effects on water temperature downstream of the project area. SNYLF have not been detected downstream of the project area and are not expected to occur there, because this area is less than 4,500 feet in elevation, which is below the range of the species. No critical habitat has been identified downstream of the project area. Therefore, downstream effects of the project on water temperature would not affect SNYLF or its habitat.

With the proposed measures in place, project operations may affect, but are unlikely to adversely affect SNYLF and its critical habitat. The proposed measures to increase instream flows in Bear Ravine and other stream corridors in the project area, eliminate potential entrainment of frogs into the Milk Ranch Conduit, and eliminate potential effects of project O&M on SNYLF in Bear Ravine, may benefit the frog and its critical habitat. Project operations have a low likelihood of causing adverse effects to SNYLF or its habitat.

California Red-legged Frog

CRLF are not known to occur within the project area. The licensees did not detect any evidence of this species during focused surveys conducted in 2015 and 2016;

however, they propose to implement measures to protect vegetation, special-status plants, riparian and wetland areas, fish, and special-status amphibian species (SNYLF and FYLF).

The licensees propose to develop an AIS plan for the project area that would include monitoring AIS (AR-2). Implementing the AIS plan would be required by Forest Service preliminary 4(e) condition 44 and is consistent with FWS 10(j) recommendation 14 and California DFW 10(j) recommendation 17. Project staff would be trained to report any new populations of CRLF or AIS observed incidentally during the performance of their work (GEN-1). This measure is prescribed by Forest Service preliminary 4(e) condition 27 and is consistent with FWS 10(j) recommendation 1 and California DFW 10(j) recommendation 1.

Our Analysis

The CRLF has not been documented in the project area and is not likely to occur due to the lack of suitable habitat. The closest known population is more than 8 miles away. Comprehensive surveys for AIS would be conducted to document colonization of the project area by American bullfrog (AR-2), which is one of the primary factors limiting the distribution and abundance of CRLF. Bullfrogs are not currently found in the project area, but are considered an AIS of concern due to their potential to be introduced. Project employees would be trained identify and report any CRLFs observed in the project area and any project activities directly affecting these sensitive areas (GEN-1). In addition, employees would receive training in identification of AIS, including American bullfrog.

As discussed in section 3.3.2, *Aquatic Resources*, we do not expect the project to have substantial effects on water temperature in the project area. Similarly, as discussed in section 3.3.2.3, *Cumulative Effects*, we do not expect the project to have substantial downstream effects on water temperature or flows to the NFFR.

Based on a lack of documented occurrence of this species on project land and the licensees' proposed measures to avoid or minimize effects on terrestrial and aquatic resources, we conclude the project would have no effect on CRLF.

3.3.4.3 Cumulative Effects

Sierra Nevada Yellow-legged Frog

The project has the potential to cumulatively affect SNYLF or its critical habitat. The primary mechanism for a cumulative effect of the project on aquatic resources is alteration of water temperature downstream of the project area.

Supplemental relicensing surveys conducted in 2017 documented SNYLF in the project area. Three frogs were found in Bear Ravine (two adults and one subadult) (PG&E and City, 2018c). In addition to these observations, there is one historical record of this species in the project area at Bald Eagle Lake in 2002 (one adult). Other recent

surveys found SNYLF in the Cape Lake Area (including the headwaters of Bear Ravine, 0.8 mile upstream of the Milk Ranch Conduit Diversion) in 1994, each year from 2004-2009, and in 2013 and 2016. No frogs have been documented downstream of the project area.

Critical habitat (subunit 1B: Bean Creek) encompasses portions of the Bucks Creek project area, including Bucks Lake, Lower Bucks Lake, Thompson Lake, Bucks Creek downstream of Lower Bucks Lake, Haskins Creek, Middle Fork Mill Creek, and Mill Creek. No critical habitat has been designated in the NFFR downstream of the project area.

Since no SNYLF have been documented downstream of the project area, and no critical habitat has been identified in the NFFR downstream of the project area, the project would not contribute to negative cumulative effects on SNYLF or its critical habitat.

3.3.5 Recreation Resources

3.3.5.1 Affected Environment

Regional Recreation Resources

The project is located in the Sierra Nevada Mountains, in Plumas County, primarily within the PNF. The PNF includes about 1,146,000 acres and provides a wide variety of recreational opportunities to over 1 million visitors per year. Recreational activities on the forest include camping, fishing, hunting, picnicking, OHV trail use, mountain biking, waterskiing, whitewater boating; snow skiing, snowmobiling, and trail use of more than 300 miles of hiking trails, including the Pacific Crest Trail (PCT).

In the project vicinity, extending from the town of Beckwourth to the east, Lake Almanor to the north, and Lake Oroville to the southwest, recreation areas include Lake Oroville, Lake Almanor and Little Grass Valley Reservoir, Feather Falls National Scenic Area, Plumas-Eureka State Park, Lakes Basin Recreation Area, Sierra Buttes Recreation Area, and the Middle Fork Feather River Wild and Scenic River.

Lake Almanor, Lake Oroville, and Little Grass Valley Reservoir provide extensive power boating opportunities as well as developed campgrounds and day use areas in both a rural forested and a developed environment. The Middle Fork Feather River Wild and Scenic River offers opportunities for whitewater boating, fishing and hiking in a remote natural setting. The Plumas-Eureka State Park, and the Lakes Basin and Sierra Buttes recreation areas offer hiking and other dispersed use recreation activities during the summer, and skiing and snowmobiling opportunities during the winter.

Project Recreation Resources and Facilities

The project includes four primary recreational areas, all of which are based around the reservoirs: (1) Bucks Lake, (2) Lower Bucks Lake, (3) Three Lakes, and (4) Grizzly

Forebay (figure 3-32). The recreation sites associated with the project are about 17 miles west of Quincy along the Oroville-Quincy Highway (also known as Bucks Lake Road). Access to the project from population centers is from the east or west along the Bucks Lake Road. Project recreation facilities are along the secondary roads: Bucklin Road, Mill Creek Road, Three Lakes Road, Bucks Penstock Road, and Grizzly Big Creek Road accessed from the Bucks Lake Road. Plumas County maintains the Bucks Lake Road, except during the winter, when visitors can use either snowmobiles or skis for access. Secondary roads to the project recreation facilities are also unmaintained during the winter. The county plows and reopens the road to highway vehicles when the weather warms, typically in late spring.

Table 3-28 lists the project and non-project recreation facilities available in the project boundary. It also shows the land ownership and management responsibility for each of the sites.

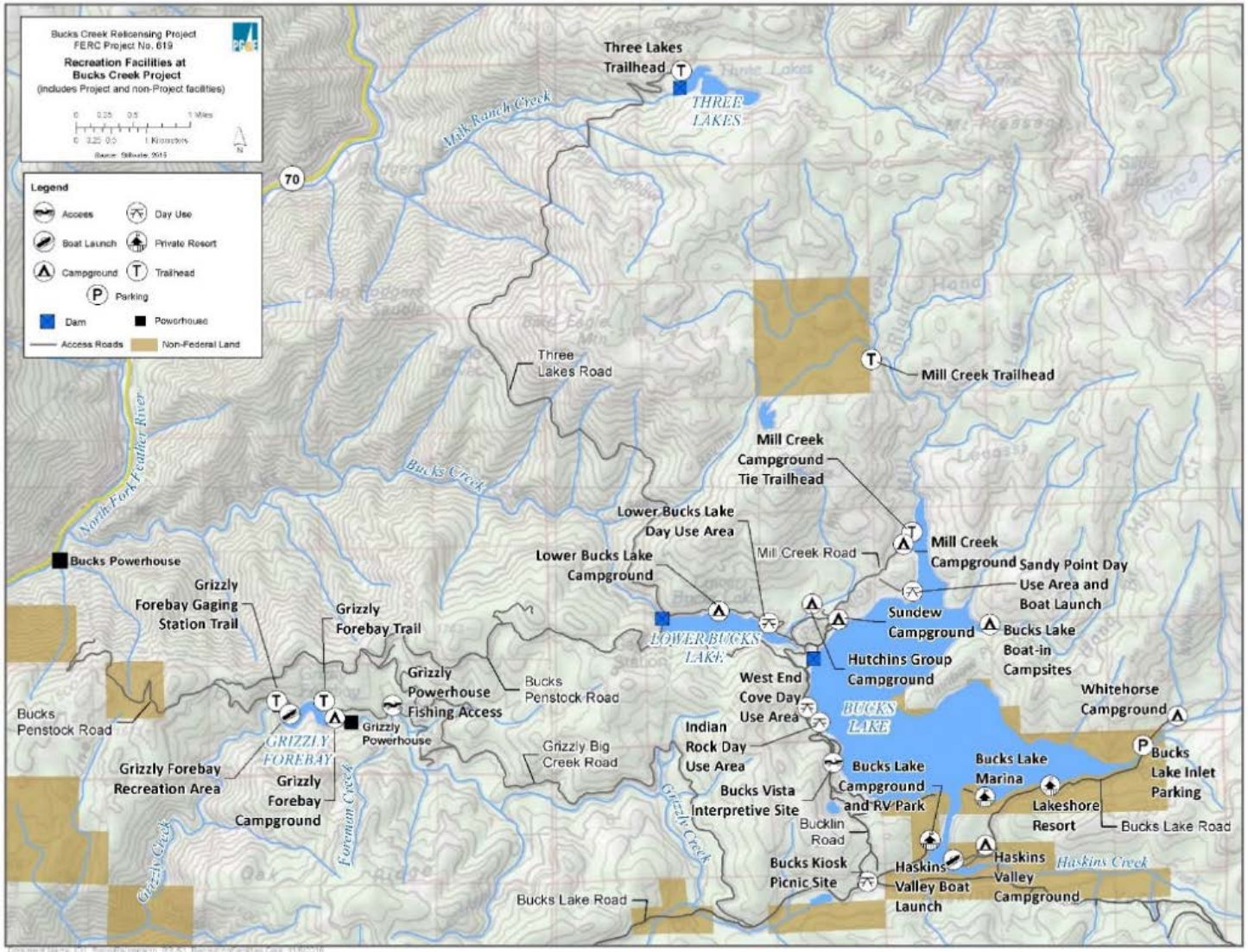


Figure 3-32. Project and non-project recreation facilities at Bucks Creek Hydroelectric Project (Source: PG&E and City, 2018h).

Table 3-28. Project recreation facilities and management responsibility at Bucks Creek Hydroelectric Project (Source: PG&E and City, 2016a, as modified by staff).

Recreation Facility	Capacity	Land Owner / Management Responsibility
Bucks Lake		
Haskins Valley Boat Launch	5 parking spaces (single vehicle)	PG&E / PG&E
Haskins Valley Campground	65 guest campsites 2 host campsites	PG&E / PG&E
Hutchins Group Campground ¹	3 group campsites 1 host campsite	NFS Land / Forest Service
Indian Rock Day Use Area	2 picnic sites 8 parking spaces	NFS Land / PG&E
Mill Creek Campground ¹	10 guest campsites 1 host campsite	NFS Land / Forest Service
Sandy Point Boat Launch	30 parking spaces (vehicle w/ trailer)	NFS Land / Forest Service
Sandy Point Day Use Area	30 picnic sites 1 host campsite 22 parking spaces	NFS Land / Forest Service
Sundew Campground ¹	22 guest campsites 1 host campsite	NFS Land / Forest Service
West End Cove Day Use Area	3 picnic sites 6 parking spaces (single vehicle)	NFS Land / PG&E
Lower Bucks Lake		
Lower Bucks Lake Campground and Day Use Area ¹	7 campsites	NFS Land / Forest Service

Recreation Facility	Capacity	Land Owner / Management Responsibility
Grizzly Forebay		
Grizzly Forebay Campground	7 campsites	NFS Land / PG&E
Grizzly Forebay Trail	0.77 mile	NFS Land / PG&E
Grizzly Forebay Gaging Station Trail	675 feet	NFS Land / PG&E
Grizzly Forebay Recreation Area	12 parking spaces (single vehicle)	NFS Land / PG&E
Grizzly Powerhouse Fishing Access	10 parking spaces	NFS Land / PG&E
Three Lakes		
Three Lakes Trailhead	9 parking spaces 1 mile of trail	NFS Land / PG&E

¹ The Forest Service contracts with a concessionaire to operate the Hutchins, Sundew and Mill Creek Campgrounds, the Sandy Point Day Use Area, and the Lower Bucks Lake Campground and Day Use Area.

Bucks Lake

The majority of the Bucks Lake shoreline is situated within the PNF. The Forest Service's recreation opportunity spectrum (ROS) management classification for Bucks Lake is Rural for the southern and southwestern shorelines, and Roaded Natural for the northwestern shoreline (Forest Service, 1998b). A narrow band of the eastern shoreline, up to the Bucks Lake Wilderness boundary, is also Roaded Natural. The Bucks Lake Wilderness Area adjacent to Bucks Lake is classified as Primitive ROS.³⁷

³⁷ Rural ROS areas are substantially modified natural environments, where sights and sounds of man are evident. Roaded Natural ROS areas are predominantly natural environments where resource modification and utilization practices are evident, and the sights and sounds of man is moderate and in harmony with the natural environment. Primitive ROS areas are essentially unmodified natural environments of 5,000 acres or more that is at least 3 miles from all motorized use and provides significant opportunity to be part of the natural environment.

Bucks Lake is about 5 miles long and 1 mile wide, with a water surface area of approximately 1,827 acres, and creates 14 miles of shoreline at the normal maximum water surface elevation of approximately 5,157 feet. The reservoir level is managed under an MOU between the licensees and Forest Service (PG&E, 1998). Except in Dry water years, Bucks Lake may not be drawn down from June 1 through September 1 more than 15 feet below the water surface elevation occurring on June 1, and at no time drawn below 5,100 feet elevation. In Dry water years, the minimum water surface elevation is 5,080 feet and is not to be reached prior to September 1. In all water year types, the reservoir has boating access via at least one of the existing boat launches between Memorial Day and Labor Day, the peak recreation season.

Project recreation facilities at Bucks Lake include family and group campgrounds, day use areas, and boat launches located on NFS land within the project boundary. Facilities are typically open from Memorial Day weekend through Labor Day weekend, and some services are available year-round at the two commercial resorts at Bucks Lake. Most project recreation facilities are along the western and southern shorelines. The eastern shoreline, which accounts for about one-quarter of the entire shoreline, abuts the Bucks Lake Wilderness Area and is undeveloped, except for the non-project Mill Creek Trail, which provides access into the wilderness, and five campsites at Bucks Lake Boat-In Campground, a non-project facility developed and maintained by the Forest Service.

Non-project recreation facilities and commercial resorts at Bucks Lake provide additional camping areas, lodging, cabin rentals, groceries, restaurants, boat rentals, and gasoline. These include three Forest Service-operated campgrounds: (1) Bucks Lake Boat-In Campground, on the northeast shoreline of Bucks Lake; (2) Whitehorse Campground, located along Bucks Creek approximately 3/4 mile upstream of Bucks Lake; and (3) Grizzly Creek Campground, located along Oroville-Quincy Highway approximately 3/4 mile west of Haskins Bay. Private residences and commercial resorts have been developed along the western and southern shoreline of Bucks Lake, and are authorized under special use permits from the Forest Service or leases from the licensees.

Lower Bucks Lake

Lower Bucks Lake is immediately west of Bucks Lake, is entirely on NFS land, and is mostly undeveloped, except for one public campground and two private camps. The Forest Service's ROS classification for Lower Bucks Lake is Roaded Natural (Forest Service, 1988b).

Lower Bucks Lake is about 1.1 miles long and 1,200 feet wide, with a water surface area of 136 acres, and creates approximately 2.7 miles of shoreline at the normal maximum water surface elevation of approximately 5,022 feet. The reservoir level is managed under an MOU between the licensees and Forest Service (PG&E, 1998), which specifies the minimum pool elevation of Lower Bucks Lake as 4,966 feet.

The Lower Bucks Lake Campground and Day Use Area is a project recreation facility on the northern shore. The facilities are typically open from Memorial Day

weekend through Labor Day weekend. The Lower Bucks Lake Campground and Day Use Area includes seven family campsites located along the shoreline, and a day use area with an informal swimming area, shoreline access for hand launching small motorized and non-motorized boats, and a restroom. The day use area is located in the middle of the campsites along the length of the shoreline and provides the only restroom facilities for the campground. The PNF operates and maintains these facilities under the terms of a special use permit issued to a concessionaire.

Two non-project private camps are operated under special use authorizations from the Forest Service. A Boy Scouts of America camp on the northern shore has three cabins, each with six to eight beds, and a dining hall. The Mormon Trail Organizational Camp on the southern shore can accommodate up to 230 people at one time.

Grizzly Forebay

Grizzly Forebay is entirely on NFS land about 5 miles west of Bucks Lake. The Forest Service's ROS classification for the Grizzly Forebay area is Roaded Natural (Forest Service, 1988b). Grizzly Forebay is about 1 mile long and 400 feet wide, with a water surface area of 38 acres, and creates approximately 1.75 miles of shoreline at the normal maximum water surface elevation of approximately 4,319 feet. The minimum pool elevation of Grizzly Forebay is 4,303 feet.

Project recreation facilities at Grizzly Forebay include a campground, day use area, trails, and a small boat launch. The licensees operate and maintain these recreation facilities, which are typically open from Memorial Day weekend through Labor Day weekend. The access roads to Grizzly Forebay are not plowed during the winter, limiting year-round access.

The Grizzly Forebay Campground consists of seven campsites, with tables and fire rings and a single vault toilet located along the north shore of the forebay. The campground is accessed by the 0.77-mile-long shoreline trail from the Grizzly Forebay Recreation Area, or by watercraft from the boat launch. The Grizzly Forebay Recreation Area (day use area) is located on the north shore near the west end of the forebay, and includes parking for 12 vehicles, a restroom, and small boat launch suitable for launching car-top or small trailered boats. The Grizzly Forebay Recreation Area also include two trailheads; the Grizzly Shoreline Trail extends 0.75 miles on the north shoreline to access the Grizzly Forebay Campground, and the Grizzly Creek Gaging Station Trail extends 675-foot-long to provide access to Grizzly creek downstream of dam.

Additional public access is provided at the Grizzly Powerhouse Fishing Access site. Parking for the fishing access site is a gravel-surfaced area near the Grizzly Powerhouse Road gate. Anglers and other visitors walk past the gate for approximately 0.75 mile to reach the forebay.

Three Lakes

Three Lakes is located on NFS land about 6 miles north of Bucks Lake. Middle Lake and Upper Lake are located within the Bucks Lake Wilderness Area and are classified in the Primitive ROS category. Lower Lake is outside of the wilderness boundary and is in the Roaded Natural ROS classification.

The three waterbodies are almost equally sized and form a chain about 0.75 mile long and 0.25 mile wide. At normal maximum water surface elevation of approximately 6,078 feet, shorelines of the 40-acre lakes are suitable for primitive recreational activities, including camping, fishing and hiking.

The lakes are accessed from the Three Lakes Road, originating at the upstream end of Lower Bucks Lake. The road is a 10.3-mile-long single-lane road that is best suited for high ground clearance and four-wheel-drive vehicles.

Recreation facilities at this site include a native surfaced parking area for approximately nine vehicles, a trailhead to access the PCT, and an approximately 1 mile trail extending along the north shore of the Three Lakes. Restroom facilities are currently not available at this site.

The trailhead is a project facility, operated and maintained by the Forest Service. The licensees previously provided maintenance support at this recreation area, including replacing a bridge on the Three Lakes Shoreline Trail, and installing a vault toilet.

Recreation Use

Recreational opportunities are available year-round within the Bucks Lake project boundary; however, the majority of recreational use occurs during the peak season from Memorial Day to Labor Day when visitors participate in boating, water sports, fishing, swimming, camping, and picnicking (PG&E and City, 2013). Winter recreation activities include cross-country skiing, sledding, and snowmobiling.

The licensees conducted studies of recreation resources in the area to provide information sufficient to determine the potential effects of the project. These studies included: Recreational Facilities and Use (RR-S1: PG&E and City, 2016w, x, z, and aa; PG&E et al., 2016y); Whitewater Boating and Fishing Flow Assessment (RR-S2: PG&E and City, 2016d); and Reservoir Level Assessment (RR-S3: PG&E and City, 2016o).

Camping

Camping is the dominant activity for recreation visitors during the peak season, representing the primary activity for 44 percent of all visitors surveyed. During the non-peak season, camping was the primary activity for 13 percent of all visitors surveyed. Table 3-29 identifies the use and occupancy levels at each of the project recreation facilities during peak and non-peak periods.

Day-Use Areas

Visitors and residents use day-use areas for boating, fishing, trail access, picnicking, nature viewing, and swimming. Table 3-30 identifies the estimated recreation-days for each of the day-use areas within the project boundary.

Table 3-29. Estimated campsite use and occupancy, May 16 through October 31, 2015 (Source: PG&E and City, 2016z, as modified by staff).

Campground/ Number of Campsites	Peak Season Occupancy and Use (Memorial Day to Labor Day ^a)		Non-Peak Season Occupancy and Use (Mid-May to Memorial Day and Labor Day to End of October ^a)		Total Estimated Annual Visits (Recreation- Days ^b)
	Average Occupancy (%)	Visits (Recreation- Days ^b)	Average Occupancy (%)	Estimated Annual Visits (Recreation-Days ^b)	
Haskins Valley/65	58	16,323	6	922	17,245
Hutchins Group/3	64	4,166	15	542	4,708
Mill Creek/10	92	3,981	64	1,572	5,553
Sundew/22	78	7,375	33	1,762	9,137
Lower Bucks Lake/7	72	2,189	27	453	2,642
Grizzly Forebay/7	17	504	2	30	534
All campgrounds	--	34,538	--	5,281	39,819

^a Peak season consists of 108 days and non-peak season consists of 61 days; including weekdays, weekends, and holidays

^b The number of recreation visitors and recreation-days is estimated from campsite occupancy counts and assumes an average party size of four people per family campground site and 20 people at the Hutchins Group Campground. One recreation-day is a single visit by a single person for recreational purposes during any portion of a 24-hour period.

Table 3-30. Estimated day-use area recreation-days, May 16 through October 31, 2015
(Source: PG&E and City, 2016z, as modified by staff).

Day Use Area	Peak Season^a Estimated Annual Visits (Recreation-days)	Non-peak^a Season Estimated Annual Visits (Recreation-days)	Total Estimated Annual Visits (Recreation- days)
Bucks Lake			
Bucks Inlet Trailhead	2,660	689	3,349
Indian Rock Day Use Area	3,512	629	4,141
Sandy Point Day Use Area	9,036	809	9,845
West End Cove Day Use Area	2,080	569	2,649
Lower Bucks Lake			
Lower Bucks Lake	1,074	231	1,305
Grizzly Forebay			
Grizzly Forebay Recreation	1,551	337	1,888
Three Lakes			
Three Lakes Trailhead	240	163	403
All Day Use Areas	20,153	3,427	23,580

^a Peak season consists of 108 days and non-peak season consists of 61 days.

Reservoir Boating

Bucks Lake is the primary waterbody used for recreational boating at the project. Plumas County Sheriff oversees boating safety and watercraft on all waters in Plumas County (PG&E, 2007). All types of motorized and non-motorized boating are permitted on Bucks Lake, except the use of houseboats (PG&E, 2007). Motorized boats on Lower Bucks Lake are restricted to less than 15-hp motors (Plumas County Code of Ordinances, Title 10, Chapter 1, Section 10-1.2[e]) and motorized boats on Grizzly Lake are restricted to less than 10-hp motors (Plumas County Code of Ordinances, Title 10, Chapter 1, Section 10-1.2[b]).

During the peak season of June, July, and August, an average of 38.3 boats at one time was observed on Bucks Lake (PG&E and City, 2016x). Almost half of the average number of observed boats during the peak season consisted of high-speed powerboats. During non-peak season, the number of watercraft was almost evenly distributed between high-speed powerboats, low-speed powerboats, pontoon boats, and non-motorized

watercraft, such as canoes and kayaks. A conservative estimate of boating density of 28.9 acres per boat is based on the highest number of observed boats during the study period (54 boats) and the average water surface area (1,559 acres) in a Critically Dry water year type.

Most boats used on Lower Bucks Lake and Grizzly Forebay are low-speed power boats and non-motorized boats such as canoes and kayaks used for fishing.

Whitewater Boating

No whitewater boating occurs in the bypassed reaches of Milk Ranch and Bucks Creeks under current conditions, primarily because of the high gradient. Typical steep creeks in northern California that are navigable have descending gradients ranging from 100 to 400 feet per mile (PG&E and City, 2016d). Milk Ranch and Buck Creeks have an average descent gradient of 1,000 and 450 feet per mile, respectively. Additional characteristics of these creeks, such as large boulder drops, accumulations of woody debris, and steep canyon side slopes that limit portaging opportunities define them as non-navigable by boaters (TM-04; PG&E and City, 2016d).

Relicensing studies determined that it may be possible for experts to boat Grizzly Creek using kayaks, based on the average stream gradient of 405 feet per mile, and an evaluation of the terrain and stream conditions. Local kayakers indicate that the primary challenge for paddling Grizzly Creek has been access at the right time because most of the roads to Grizzly Forebay are snow covered and inaccessible when Grizzly Forebay spills during the spring (PG&E and City, 2016d). An additional challenge to boating this reach is having real-time knowledge of suitable flows.

Boaters surveyed for the project study identified 35 other steep stream reaches in northern California that are accessible to expert boaters which would provide a steep creek boating experience similar to Grizzly Creek (PG&E and City, 2016d).

Fishing

Fishing is the primary recreational use at Lower Bucks Lake and Grizzly Forebay. Lower Bucks Lake and Grizzly Forebay support self-sustaining populations of rainbow and brown trout (Harris, 2003). Fishing is a minor recreational activity on Bucks Lake during the peak season due to the dominance of power and non-power boating activities; however, fishing becomes a more dominant recreational activity on Bucks Lake during the non-peak season. Bucks Lake fisheries are dominated by populations of Lahontan redbreast, rainbow trout, and brown trout, with smaller numbers of kokanee, brook trout, and lake trout. Bucks Lake is planted with catchable rainbow trout, brown trout, and brook trout to augment naturally spawning populations (PG&E and City, 2016a).

Residents from local communities within a 2-hour drive of the project account for the majority of fishing and camping that occurs at these two reservoirs. Lower Bucks Lake and Grizzly Forebay are unique in the region because they tend to have cold water

that supports salmonids through the summer season, while other reservoirs, including Bucks Lake, tend to warm during this period (Ojai, 2002).

Fishing opportunities exist in the bypassed reaches; however, only a small percentage of anglers who fish in streams near the project are interested in fishing in the bypassed reaches because the creeks are located in steep rugged terrain and only accessible from a road by overland cross-country hiking (PG&E and City, 2018a).

Trails

There are few hiking trails within, or adjacent to, the project boundary and most are non-project trails. The Hutchins Group Campground trail is a 0.2-mile non-project trail that connects the Hutchins Group Campground with Lower Bucks Lake. The Mill Creek Tie Trail is a 0.3-mile-long non-project trail that connects the Mill Creek Campground with the Mill Creek Trail (also a non-project trail). The non-project Mill Creek Trail runs along the east side of Bucks Lake, along the approximate boundary of the Bucks Lake Wilderness Area. The Mill Creek Trail connects the Bucks Creek area at the southeast with the Mill Creek area in the north. The Mill Creek Trail includes junctions to other trails that enter into the interior of the Bucks Lake Wilderness Area. The Grizzly Forebay has two project trails; the Grizzly Forebay Trail is 0.77 mile long and provides access along the north shoreline of the Forebay, the Grizzly Forebay Gaging Station Trail is 675 feet long and provides access to the gaging station in Grizzly Creek below the dam. The Three Lakes Trail is 1-mile-long project trail and provides access along the north shoreline of the Three Lakes. The PCT Tie Trail is a short non-project trail, approximately a half mile long that connects the Three Lakes parking area to the PCT.

Winter Recreation

Winter recreational activities in the Bucks Lake vicinity include cross-country skiing, sledding, and snowmobiling on over 100 miles of groomed snowmobile trails. Residents partake in winter recreation activities near the project at a level greater than visitors. Forty-two percent of residents prefer the winter season for their non-peak use of the area. Only 20 percent of visitors prefer the winter season for their non-peak use of the area (TM-31: PG&E and City, 2016aa.).

Projected Recreation Demand

Demand for recreation activities at the project is expected to closely mirror state-wide demand. At the state-wide level, walking, picnicking, swimming, developed camping, and scenery and wildlife viewing, will continue to have the highest demand (PG&E and City, 2018a).

Population growth in northern California over the next 20 years will be the most determinant factor influencing future project recreation use. The licensees evaluated zip code information obtained from visitors to project recreation sites to determine the

recreation users' county of origin, and then a project recreation visitor use growth rate was calculated by weighting the county population growth rates by the percentage of recreation visitors using the project recreation facilities from each county (PG&E and City, 2018a). Based on the weighted average recreation visitor use growth rate of 17.96 percent (PG&E and City, 2018a, table E.7.7.1-13) and project visitor user estimates from 2014 and 2015, the annual project visitor use is anticipated to increase to about 86,000 recreation-days by 2036, from approximately 23,000 recreation days in 2015.

3.3.5.2 Environmental Effects

The following section describes the effects of the licensees' proposed measures, agency preliminary terms and conditions, and recommendations from agencies and other entities that are intended to address recreation-related project effects. We also analyze the effects of measures that are intended to address project effects on other resources, but which also may affect recreation resources.

Recreation Management Plan

During the relicensing studies, the licensees determined that many of the project recreation facilities require maintenance to meet existing visitor needs, have reached the end of their serviceable life, and do not meet current accessibility guidelines. Existing facilities cannot provide the capacity to meet anticipated increases in recreation demand during the next license period. To address these issues, the licensees conducted assessments of recreational use and demand that:

- identified the maintenance, replacement, and capital improvement needs for all project recreation facilities,
- described the operations and maintenance responsibilities for all project recreation facilities,
- evaluated administrative changes in the recreation fee cost recovery process, and
- estimated future recreation demand relative to planned facility capacity.

Based on the results of the assessment, the licensees consulted with the Forest Service and other agencies to develop a Recreation Management Plan (RR-1) (PG&E and City, 2018h) that would identify existing recreation facilities and amenities, define a schedule for all planned actions related to recreation developments, describe the O&M responsibilities for project recreation facilities, and describe a consultation and monitoring plan to be implemented throughout the term of the license.

The licensees propose to revise the Recreation Management Plan to address their agreement with the Forest Service, filed on May 14, 2019. The revised Recreation Management Plan is consistent with Forest Service revised preliminary 4(e) condition 55.

Each of these plan elements are analyzed below.

Recreation Facility Replacement and Maintenance

The licensees propose to reconstruct the facilities that have reached the end of their serviceable life during the first 10 years of the new project license, and to reconstruct all facilities one time during the new license term. The licensees would also be responsible for all maintenance, repair, and capital improvements to project facilities through the license term. The Recreation Management Plan specifies that the licensees would implement the following modifications to existing recreation facilities over the next license term:

- Bucks Lake Inlet Parking: Replace existing signage and add signage directing users how to park to maximize the capacity of the existing space.
- Grizzly Forebay Campground: Replace site amenities and treat vegetation to reduce fuel loading.
- Grizzly Forebay Recreation Area and Gaging Station Trail: Construct two accessible parking spaces, install signage, and replace restroom in the recreation area. Maintain and improve trail for users.
- Haskins Valley Boat Launch: Reconstruct the boat ramp to be consistent with California Department of Boating and Waterways standards for a single lane ramp.
- Haskins Valley Campground: Reconstruct campground, including the water system, convert five existing campsites to an amphitheater for interpretive and educational programs, construct five additional single-family campsites and vault restroom, and provide one electrical hook-up at each of about 20 campsites.
- Hutchins Group Campground: Reconstruct group campground including the water system and amphitheater. Expand areas for parking, increase overnight capacity where conditions allow. Perform trail maintenance and install signage on the trail between Hutchins Campground and Lower Bucks Lake.
- Indian Rock Day Use Area: Reconstruct day use area (replace picnic tables and restroom) and formalize trails.
- Lower Bucks Lake Campground: Relocate the existing campsites to a new location above the road and away from the shoreline. Construct 15 family campsites (six people-at-one-time (PAOT) per site) and one host site. Provide site markers, tables, tent pads, fire rings, and wildlife-resistant food storage, potable water supply, and restrooms. Install electrical hookup at three to four sites. Treat vegetation to reduce fuel loading within and immediately adjacent to the campground. Eliminate overnight use at existing campsite numbers 1 and 2 and restore site. Convert existing campsite numbers 3 and 4 to two or three family campsites (six PAOT per site). Convert existing campsite numbers 5 and 6 to a day use area (with seven picnic sites, parking for seven

vehicles, and shoreline access for hand launching watercraft). Convert existing campsite number 7 to a multi-family campsite (12 to 18 PAOT per site). Install three vault restrooms along Forest Road 24N24 to serve the day use area and each of the two multi-family campsites.

- Lower Bucks Lake Day Use Area: Replace vault toilet. Construct a paved parking area for vehicles, with barriers to prevent vehicle access to the shoreline. Construct seven picnic sites with tables and fire grills. Construct a surfaced boat launch for launching car top and small trailered watercraft. Install site signage and information boards.
- Mill Creek Campground: Reconfigure existing campground layout and provide additional overnight capacity. Reconstruct the water system and replace facility amenities. Perform trail maintenance and install signage on the tie-trail between the campground and the non-project Mill Creek Trail.
- Sandy Point Day Use Area and Boat Launch: Replace facility amenities and reconstruct the water system. Construct a double-lane boat launch with courtesy dock. Install signage in conjunction with the construction of the new Bucks Lake shoreline trail.
- Sundew Campground: Reconfigure existing campground layout and provide up to two additional multi-family campsites (12 to 18 PAOT per site). Replace facility amenities and reconstruct the water system. Install signage in conjunction with the construction of the new Bucks Lake shoreline trail.
- West End Cove Day Use Area: Replace facility amenities, construct shoreline access trail and fishing pier, and construct six additional paved parking spaces.

The licensees also propose to construct two new project recreation facilities over the next license term to meet projected recreation demand:

- Bucks Lake Boat-In Campground: Construct up to five family campsites (six PAOT per site) with site markers, tables, tent pads, fire rings, wildlife-resistant food storage, and one Forest Service-approved vault toilet at the current site number 1. Formalize and harden access routes connecting the shoreline, campsites, and other campground amenities. Install entrance sign and information boards. Concurrent with campground site development, remove all amenities from existing site numbers 2 and 3, restore the sites, and post “no camping” signs to discourage overnight use. The Forest Service proposes sites 4 and 5 would remain under operational control and maintenance by the Forest Service and would not be a project recreation site (revised preliminary 4(e) condition 55).
- Bucks Lake Shoreline Trail: Construct a new trail between Sundew and Mill Creek campgrounds to accommodate pedestrian and bicycle use. Include a parking area near the entrance to Sundew Campground.

The licensees also propose to prepare a recreation site occupancy monitoring plan to determine recreation site use and demand over time. The information would be used to identify when recreation use thresholds are exceeded, and increases in site capacity are needed.

Our Analysis

The licensees conducted a condition assessment of the project recreation facilities and identified all maintenance and reconstruction needs to bring the facilities up to current user needs and accessibility standards (PG&E and City, 2016w). This assessment provides the basis for the facility improvements proposed in the Recreation Management Plan to be implemented during the next license term. In general, existing project recreation facilities would be reconstructed to provide the same amenities, services, and visitor comfort they were originally intended to provide while ensuring that facilities are consistent with applicable federal and state guidelines.

The licensees determined the following project recreation facilities have reached the end of their serviceable life and should be reconstructed:

- Haskins Valley Boat Launch
- Hutchins Group Campground
- Mill Creek Campground
- Lower Bucks Lake Campground (relocating the campground)

Continued recreation use at these project facilities without any reconstruction would: (1) further degrade the condition of the infrastructure; (2) increase public health and safety concerns; (3) not provide accessible facilities; and (4) not meet visitor needs and expectations. The licensees propose to reconstruct the above listed facilities over the first 10 years of a new project license and reconstruct all project facilities one time during the license term. The licensees would also be responsible for all maintenance and accessibility needs at project facilities through the license term.

The redesign of existing facilities would include objectives such as incorporating measures to address any recreation-related affects to environmental resources, increasing capacity, or redirecting recreational use. For facilities located on NFS land, the licensees would meet with the Forest Service to review the design and functionality of the facility based on current use patterns. Reasonable modifications would be made to the facility design to address its functionality in light of current and projected future use, and consistency with current design standards.

Bucks Lake Boat-In Campground

The licensees' proposal is to remove the amenities and rehabilitate existing sites 2 and 3, and create up to five family campsites at existing site number 1, which would become a project recreation site. The Forest Service would continue to operate and manage existing sites 4 and 5 as non-project recreation facilities (PG&E and City, 2018e,

Forest Service revised preliminary 4(e) condition 55). A vault toilet would be provided at this site. Boat-In site number 1 is approximately 4 acres, which would provide 0.8 acre of space around each proposed site, thus providing adequate screening and privacy between campers and retaining the dispersed and primitive character of the area.

Retaining existing sites 4 and 5 (Forest Service 4e condition), under the operational control and maintenance of the Forest Service, would benefit recreation users by providing a remote campground setting that is not available elsewhere within the project boundary. The sites would help meet the needs of the dispersed recreation camper, add to the current peak weekend campground capacity, and address the increase in recreational demand over the long term.

Tribal representatives expressed concern about the potential harm to known and unknown sensitive cultural features in the area of existing site numbers 4 and 5 with their continued use. The Bucks Lake Homeowners Association also expressed concern about wildfires potentially starting from dispersed site numbers 4 and 5 that could be difficult to access and suppress. Dispersed site numbers 4 and 5 are visible to camp hosts stationed at Sandy Point, who can monitor these sites.

Bucks Lake Shoreline Trail

The licensees propose to construct a new shoreline trail between Sundew and Mill Creek Campgrounds and provide parking for trail users near the entrance of the Sundew Campground. The trail would be designed consistent with standards for a Forest Service class 4 trail (Forest Service, 2016) and accommodate pedestrian and bicycle use. The trail would be approximately 1.5 miles long and considered an amenity of the Sandy Point Boat Launch and Day Use Area located midway between the Sundew and Mill Creek Campgrounds.

The PNF Land and Resource Management Plan provides management direction to improve and expand trails to meet demand while reducing costs and protecting resources (Forest Service, 1998b). At the state-wide level, walking, picnicking, and scenery and wildlife viewing continue to be the highest demand recreation activities (PG&E and City, 2018a). In the Forest Service preliminary 4(e) condition letter, they state that the shoreline trail would respond to visitor demand for trails and shoreline access as identified in relicensing studies (PG&E and City, 2016aa).

The Bucks Lake Shoreline Trail would address increased demand for walking and hiking trails, while also providing improved access to the Bucks Lake shoreline. The Bucks Lake Shoreline Trail would benefit recreation users by providing a non-motorized link between three project recreation facilities. This would allow campground users at either end of the trail safe access to the Sandy Point Day Use Area, away from the existing road. The trail would also provide recreation users with improved shoreline access along Bucks Lake for scenery and wildlife viewing.

Recreation Fee Cost Recovery

Licensees are responsible for the long-term maintenance of all project recreation facilities located on licensee-owned and public land within the FERC project boundary. At the Bucks Lake Project, the management of some of the project recreation facilities (Hutchins, Sundew, and Mill Creek Campgrounds; Sandy Point Day Use Area, and Lower Bucks Lake Campground and Day Use Area) is currently administered by the Forest Service. The PNF contracts with a concessionaire. Visitor fees collected by the concessionaire are directed to the Forest Service and limited funding is reinvested in the facilities for long-term maintenance and replacement costs. This administrative approach separates the party with the authority and ability to make necessary facility repairs and improvements (the Forest Service and its concessionaire) from the party responsible for ensuring that the facilities comply with license requirements (the licensees). To address this issue, the licensees are considering whether to take over the responsibility of operating and maintaining project recreation facilities from the Forest Service to ensure that the facilities comply with the standards specified in the new license.

Our Analysis

Any new license issued for the project would require that project recreation facilities are operated and maintained at a level to accommodate existing and projected visitor use. The recreation facilities study (RR-S1) identified deferred maintenance, repairs, and improvements needed at each recreation site to bring it up to current standards (PG&E and City, 2016w, TM-27). The Commission (under 18 CFR § 2.7) allows licensees to charge reasonable user fees to defray the costs they incur in constructing, operating, and maintaining recreation facilities. This would provide a funding source to the licensees to conduct long-term maintenance and improvements. Because the Commission holds licensees responsible for the condition of project recreation facilities, it would be consistent with Commission policy for licensees to have the authority to operate the facilities and collect fees to fund the maintenance of the facilities to comply with license requirements. Having the licensees take over responsibility of managing the project recreation facilities from the Forest Service would provide the licensees with the ability to collect reasonable user fees commensurate with the operating and long-term maintenance cost of providing the recreational facilities to the public. This approach would ensure that there is funding available to the licensees to make decisions regarding the maintenance and improvements of recreation facilities to meet recreation user demand and preferences for amenities.

Future Recreation Demand and Facility Capacity

The licensees conducted studies to identify existing use of the current recreation facilities, relative to the capacity of the facilities (PG&E and City, 2016z, TM-30). The licensees propose to maintain and renovate existing campgrounds; however, the capacity of the facilities would remain unchanged over the term of the license. The percent capacity of project campgrounds on weekends during the 2015 recreation season is listed

in table 3-31 below. The Mill Creek Campground had the highest level of occupancy on the weekends at 97 percent, while the Grizzly Forebay Campground had the lowest occupancy at 14 percent.

The Forest Service has not requested any change in the capacity of the existing project campgrounds. However, Forest Service preliminary 4(e) condition 55 specifies the preparation of a recreation site occupancy monitoring plan to determine recreation site use and demand over time. The information would be used to identify when recreation use thresholds are exceeded, and increases in site capacity are needed.

Our Analysis

Providing recreation facilities with sufficient capacity for future recreational use is necessary to ensure adequate and safe access to project land and water. Current occupancy at four of the project's seven campgrounds on weekends during the peak season is greater than 83 percent, with one campground at 97 percent. These four campgrounds provide 37 percent of the available campsites in the project boundary. The occupancy of the Haskins Valley Campground is 68 percent, and this campground provides 57 percent of the available campsites in the project boundary (PG&E and City, 2016z, TM-30).

The demand for recreation in the project boundary is estimated to increase by 18 percent from 2016 to 2036 (PG&E and City, 2018a). This projection is based on the estimated population changes in the California and Nevada counties where most recreation users originate. The projected increase in demand would increase the weekend peak season occupancy of existing recreation facilities to the level shown in table 3-31. Occupancy of four of the project's seven campgrounds that provide 37 percent of all the campsites in the project boundary would be above 98 percent. The Haskins Valley Campground, which provides 57 percent of the project's campground capacity, would increase to 80 percent occupancy. The addition of the Bucks Lake Boat-In Campground would add up to five campsites to the total number of project campsites available in the project boundary. However, that addition would not significantly reduce the overall occupancy level of campsites within the project boundary. Campground capacity on the weekend during peak season in 2036 would be insufficient to meet the expected demand at four of the project's seven campgrounds.

Prioritizing additions or improvements to recreational facilities such as campgrounds would support high demand recreational activities. If estimated increases in recreation demand occur as anticipated, then additional recreation facilities would be needed within the next 20 years. The preparation of a recreation site occupancy monitoring plan would provide the information necessary to determine whether and where additional capacity is needed at campgrounds, day use areas, and fishing access to meet project demand.

Table 3-31. Existing and projected future weekend campground percent capacity
(Source: PG&E and City, 2016z, TM-30, as modified by staff).

Campground	# of Sites	% Capacity, Weekday, Peak Season (2015)	% Capacity, Holiday, Peak Season (2015)	% Capacity, Weekend, Peak Season (2015)	Projected % Capacity, Weekend, Peak Season (2036)
Haskins Valley	65	43	74	68	80
Hutchins Group	3	39	83	83	98
Mill Creek	10	92	80	97	114
Sundew	22	75	55	85	100
Lower Bucks Lake	7	50	86	88	104
Grizzly Forebay	7	11	36	14	17

Reservoir-level Dependent Recreation Opportunities

Participants in scoping identified effects of project operation on the quality and availability of reservoir level-dependent recreation opportunities as a recreation issue that should be analyzed in the EIS. During public meetings, stakeholders requested additional information about how reservoir levels affect boat launch availability and boating use (e.g., available water surface area, presence of obstacles) at Bucks Lake. Project operations have the potential to affect Bucks Lake reservoir levels. Low water levels can reduce boating opportunities when boat ramps do not extend to low water levels, and areas of the reservoir become too shallow for safe boating.

Crowding and conflicting uses can reduce the quality and availability of reservoir-based recreation activities. The licensees conducted studies of watercraft use on project reservoirs and surveyed recreation users to identify levels of satisfaction, user conflicts, and perceived crowding (PG&E and City, 2016x, z, and aa). Studies were also completed to compare reservoir operating levels relative to the extent and location of existing boat launches. The licensees have not proposed any measures that would change the existing recreational use of or access to project reservoirs, or the seasonal surface elevations of Bucks Lake. Neither have stakeholders proposed any measures that would change the existing quality or availability of recreational use of project reservoirs.

Our Analysis

To address concerns about potential crowding and conflicts, the licensees conducted a study to identify the types of watercraft used on project reservoirs and the recreation activities of the people in those watercraft (e.g., fishing, waterskiing; PG&E and City, 2016x, TM-28). Additional studies were conducted to evaluate seasonal lake level data relative to existing boat ramp specifications (PG&E and City, 2016o TM-16), and to identify the location, amount, and types of recreational use along project reservoir shorelines (PG&E and City, 2016z, TM-30).

The Bucks Lake watercraft study results identified a peak use of 54 watercraft on the lake on a Saturday during the peak recreation season, with an average of 38 boats across all weekend sample days during the peak season. Approximately half of the watercraft present on Bucks Lake during the recreation season are high-speed power boats. At normal maximum summer pool, Bucks Lake has a surface area of 1,827 acres. On peak weekends, the average spatial distribution of watercraft is approximately 33.8 acres of area per boat. On average over the peak recreation season, the weekend spatial distribution is approximately 47.7 acres per boat.

The recommended safe boating density thresholds vary for different types of boating activity, configuration and size of the water bodies, and policies of water surface management agencies. Average boat density standards range from about 1 acre per vessel for non-motorized boating to 20 acres per vessel for high-speed motorized boating uses, such as waterskiing (Warren and Rea, 1989; BOR, 1977). For Bucks Lake, the appropriate boating density standard would be 20 acres per boat. The observed boating density on Bucks Lake is 33.8 acres per boat, which is 69 percent higher (less dense) than the boating density standard. Therefore, the observed boating use on Bucks Lake appears to be well within safe boating standards.

There are four boat launches on Bucks Lake: two commercial ramps (at Lakeshore Resort and Bucks Marina), one ramp managed by PG&E at Haskins Valley, and one ramp managed by the Forest Service at Sandy Point. The Lakeshore Resort and Bucks Marina ramps are generally closed outside of the peak recreation season and the Haskins Valley ramp is closed when the Haskins Valley Campground is closed, whereas the Sandy Point ramp remains open and available to the public throughout the entire recreation season.

The Haskins Valley ramp has the lowest minimum elevation and can be used at the lower lake levels than the other ramps. However, this ramp is in poor condition with uneven and broken concrete (PG&E et al., 2016o, TM-16). The Sandy Point ramp is in good condition; however, sediment accumulations greater than 4 inches at the lower end of the ramp restricts its use at lower lake levels (PG&E et al., 2016o, TM-16).

During the peak recreation season, boat ramps are available at numerous locations around the lake. However, at other times of the year and when lake level is low, only one or two boat ramps may be useable (Haskins Valley and Sandy Point). Both of these

ramps have functional deficiencies that may influence a recreational user's decision not to boat. One ramp has uneven and broken concrete, while the other has sediment accumulations.

Watercraft usage at Lower Bucks Lake is less common than at Bucks Lake and consists primarily of non-powered boats. Boating use at Grizzly Forebay is also less common than at Lower Bucks Lake and consists primarily of non-powered watercraft.

Visitor surveys conducted to determine user satisfaction with the reservoir level of Bucks Lake showed that 71 percent of respondents were either satisfied or very satisfied with water levels of Buck Lake. Additional surveys determined that approximately 90 percent of all recreation visitors to Bucks Lake did not identify any conflicts with other users, including between watercraft users. Recreating visitors and residents were asked to rank their perception of crowding on Bucks Lake on a scale from 1 to 9, where 1 represents not crowded and 9 represents extremely crowded. Results show that 59 percent of recreationists responded with a value under 3 (slightly crowded), and 84 percent of recreationists responded with a value under 5 (moderately crowded). The highest responses regarding crowding occurred on holiday weekends.

Recreation users identified fewer conflicts with other users and perceived less crowding at Lower Bucks Lake, Grizzly Forebay, and Three Lakes, than at Bucks Lake.

Reservoir levels do not appear to be affecting the quality and availability of recreation on the Lower Bucks Lake and Grizzly Forebay. The number of boaters on these reservoirs is fairly small and generally using non-powered watercraft that can be easily launched from the shoreline. The reservoir levels during the peak recreation season at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay do not appear to affect boaters' use of the lakes, as reservoir levels generally remain sufficiently high for all uses, except in Critically Dry years. Visitor surveys taken during the peak recreation season at Bucks Lake indicate a high level of recreation satisfaction (PG&E and City, 2016aa, TM-31). Low reservoir levels on Bucks Lake that generally occur outside of the peak recreation season may influence boaters' use of the lake. Low water levels can prevent boaters from accessing shallow inlet areas along the lakeshore, and also limit launch access. Having safe boat launches available at Bucks Lake during low water levels and off-peak recreation periods may provide more opportunities for the public to use project resources than they are currently.

The licensees' study of recreation use at day use areas identified that the occupancy of picnic tables is significantly lower than the occupancy of the adjacent parking area (PG&E and City, 2016z, TM-30). This may indicate there is a lack of parking available at day use areas. The licensees have not proposed to change the capacity of the facilities at day use areas. However, evaluating the availability of parking as part of the recreation site occupancy monitoring plan would provide data needed to ensure that there is adequate access to the facilities.

Whitewater Boating Opportunities in Bypassed Reaches

Project operations could affect whitewater boating opportunities in project bypassed reaches.

To address this concern, the licensees met with boaters to design and conduct a whitewater boating study. Participants determined that Milk Ranch and Bucks creeks bypassed reaches are not navigable under any flow conditions with the equipment and skills that are standard today due to topographic constraints and boulders, large woody debris, and dense vegetation which create safety and navigation hazards (PG&E and City, 2016d, TM-04). The licensees conducted a whitewater boating study in the 6.7-mile Grizzly Creek bypassed reach with a team of five expert boaters in October 2016 with a target spill over Grizzly Forebay Dam of about 120 cfs. It took two days to complete the descent, including boating and portage. The boaters described the descent as moderately acceptable for wilderness Class V boating, with highly acceptable whitewater challenge and wilderness setting (PG&E et al., 2016gg, TM-41). Overall, the boaters estimated that the recommended range of boatable flows is from 150 to 200 cfs in the reach above Wildcat Creek, and 300 to 400 cfs in the reach downstream of Wildcat Creek. On a scale of 1 (low quality) to 5 (high quality), the boaters rated the overall quality of the descent as 2.75, slightly below the average quality of other steep creeks in California (PG&E et al., 2016gg, TM-41). The boaters stated that better flow information would be necessary before planning any future trips down this reach.

The licensees propose to provide real-time flow gaging information for Grizzly Creek below Grizzly Forebay Dam.

Our Analysis

Based on the whitewater boating study described above, the Grizzly Creek bypassed reach provides recreational boating opportunities for expert boaters under ideal conditions. However, flows suitable for boating occur only during the late fall or early spring, when roads to the reach are generally snow covered, making the reach inaccessible to boaters.

Boaters surveyed for the project study identified other stream reaches in the region with similar characteristics that are available for expert boaters (PG&E and City, 2016d, TM-04). Expert boaters who completed the descent of Grizzly Creek rated it slightly below the average quality of other steep creeks in California (PG&E et al., 2016gg, TM-41). The surveyed boaters would consider paddling this reach again; however, real-time flow information would be necessary for them to evaluate and plan whether the flows are acceptable at times the reach is accessible (PG&E et al., 2016gg, TM-41).

The licensees' proposal to provide real-time flow information for Grizzly Creek below Grizzly Forebay Dam would allow experienced recreational boaters to evaluate whether it is feasible to boat in the Grizzly Creek bypassed reach. This proposal is consistent with the recommendation of American Whitewater.

Informal Recreation along Reservoir Shorelines

If left unmanaged, recreational activities that occur in natural areas outside of developed recreation sites could result in damage to sensitive vegetation, erosion of shoreline features, deposition of trash, and disturbance to cultural features or protected wildlife.

The licensees do not currently manage informal and dispersed recreational use along the project shorelines and bypassed reaches. The licensees' existing SMP (PG&E, 2007) addresses Bucks Lake only, and states that the shoreline of the lake below the FERC project boundary is open to the public for boating, fishing, and general recreation, pursuant to applicable county, state, and federal laws. The licensees propose to revise and update the SMP to address all project shorelines, consistent with Forest Service preliminary 4(e) condition 56.

Our Analysis

Participants in scoping identified informal recreation along reservoir shorelines and bypassed reaches as an issue that should be analyzed in the EIS. To address this concern, the licensees assessed informal dispersed use (PG&E and City, 2016z, TM-30). Based on the study results, dispersed recreation use occurs at only two locations within the project boundary; the south shore of Lower Bucks Lake near the dam, and at Bucks Lake near the spillway. Only day use dispersed recreation occurs at Bucks Lake near the spillway, as no camping is allowed at that location. A third dispersed use area is outside of the project boundary along a non-project reach of upper Grizzly Creek. Observations were also conducted at public access points near each of the three bypassed reaches. These sites were visited on 20-24 days during the recreation season. Recreation use was observed on only 3-4 days at each of the identified dispersed sites, and no recreational use was observed at the bypassed reaches.

The licensees also evaluated recreational use effects to natural areas adjacent to the existing project recreation sites (PG&E et al., 2016y). Results of the study identified that there are numerous informal user-created trails between established recreation sites and the shoreline, and recreational use along the shoreline adjacent to established recreation sites. The compacted soils and limited vegetation establishment indicate that the trails are moderately to heavily used, but there is no indication that trail use is causing soil erosion. Some litter was observed in areas adjacent to the established recreation sites.

The current SMP does not address informal recreation outside of established recreation sites. Incorporating specific measures into the revised SMP to guide management of informal recreation along project shorelines would limit the establishment of informal user-created trails and help to protect soils, water quality, vegetation, wildlife, aesthetics, and cultural resources from unintentional damage. Coordination with PNF management goals for each reservoir (discussed below in section 3.3.6.1), would be an important element in the success of the plan.

3.3.6 Land Use and Aesthetics

3.3.6.1 Affected Environment

Land Management Plans

The Bucks Creek Project is located in Plumas County, in the northern portion of the Sierra Nevada mountain range. Approximately 65 percent of the land in Plumas County is owned and managed by the Forest Service, with the remainder in private ownership (Plumas County 1988, as amended 2004). Natural resources (forestry, grazing, and mining) dominate the use of land within the county, with agriculture, recreation, and residential and commercial uses a smaller percentage.

Operation and management of the project is subject to both Plumas County and PNF management plans and policies, as well as FERC requirements. The Forest Service manages natural resources on these lands to provide wildlife habitat, timber, forage, and recreational opportunities. Development and activities on private land within Plumas County are subject to the provisions contained in the Plumas County General Plan (Plumas County 1988, amended 2004). The General Plan includes policies, objectives, principles and standards that guide land use decisions within the County. The General Plan Designation map shows that nearly the entire county is designated “Timber Resource Land,” reflecting the forested nature of the County, with intermittent private parcels designated “Limited Access Rural Residential.” Within the project vicinity, most privately owned parcels are in the immediate vicinity of the Bucks Lake, where the General Plan designations are identified as: (1) Resort and Recreation; (2) Limited Access Rural Residential; and (3) Secondary Suburban Residential.

The PNF manages all public land under its jurisdiction in accordance with the PNF Land and Resource Management Plan (LRMP) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) (Forest Service, 1988, as amended in 2004 and 2007). The PNF LRMP encourages full development of hydroelectric resources, as long as other resources and uses are not unacceptably impaired.

The project facilities are situated within three management areas established by the PNF LRMP: (1) Grizzly Forebay and Bucks Creek Powerhouse are located in the Grizzly Dome Management Area (Management Area 2); (2) Bucks Lake and Lower Bucks Lake are within the Bucks Management Area (Management Area 5); and (3) Three Lakes is within the North Fork Management Area (Management Area 19). The PNF LRMP includes management direction for various resources associated with each management area. The LRMP management direction for these areas that is relevant to the project is summarized in table 3-32.

The Forest Service has authorized commercial resorts and private organization camps to operate on NFS land at Bucks Lake and Lower Bucks Lake. The Forest Service has also authorized construction and use of private homes on NFS land near Bucks Lake.

Table 3-32. Plumas National Forest management direction applicable to the project
(Source: PG&E and City, 2016a, as modified by staff).

Management Area	General Management Direction
Forest-wide	<p>Recreation:</p> <ul style="list-style-type: none"> • Provide for a variety of forest-related recreation, and coordinate recreation with other resource use through the Recreation Opportunity Spectrum. • Encourage growth of privately-operated facilities serving public needs. • Improve and expand developed facilities and trails to meet demand while reducing unit costs and protecting other resources. • Minimize conflicts between various recreational users. • Manage selected unroaded areas to provide for semi-primitive opportunities. <p>Visual Resources:</p> <ul style="list-style-type: none"> • Maintain high visual quality on land not committed to timber or commodity production, or readily apparent from recreational developments, major travel routes, and other high use areas. <p>Water:</p> <ul style="list-style-type: none"> • Maintain and improve water quality to protect beneficial uses and meet or exceed State objectives. <p>Energy:</p> <ul style="list-style-type: none"> • Facilitate permitting of hydroelectric and other new energy development that reasonably protects all resources. <p>Lands:</p> <ul style="list-style-type: none"> • Authorize non-federal use of PNF land only if compatible with Management Area direction, use of other land is not feasible, conditions of issuance will mitigate significant environmental effects, and the public interest is protected. <p>Facilities:</p> <ul style="list-style-type: none"> • Provide roads and trails necessary to achieve other goals.

Management Area	General Management Direction
Grizzly Dome Management Area	Visual Resources: <ul style="list-style-type: none"> • Maintain pleasing visual corridors. Facilities: <ul style="list-style-type: none"> • Upgrade forest arterials and collectors.
Bucks Management Area	Recreation: <ul style="list-style-type: none"> • Provide for dispersed recreation. • Improve and expand trails to meet demand. • Provide developed recreation facilities and programs to meet demand. • Reduce conflicts between recreationists. • Encourage privately-operated public recreation. Visual Resources: <ul style="list-style-type: none"> • Maintain pleasing visual corridors. Water: <ul style="list-style-type: none"> • Maintain Bucks Lake water quality. Facilities: <ul style="list-style-type: none"> • Provide cost-efficient support facilities.
North Fork Management Area	Recreation: <ul style="list-style-type: none"> • Improve and expand trail system • Provide developed recreation facilities and programs to meet demand. • Provide for semi-primitive recreation. • Provide for dispersed recreation. Visual Resources: <ul style="list-style-type: none"> • Maintain pleasing visual corridors. Water <ul style="list-style-type: none"> • Protect water quality.

Land Use and Management in the Project Boundary

Within the current FERC project boundary, land ownership consists of National Forest Land (1,539.5 acres), PG&E-owned land (1,601.2 acres), and private land (7.5 acres).

Private land within the FERC project boundary, not owned by the licensees, is limited to a parcel west of Grizzly Forebay. This parcel is bisected by Bucks Penstock Road (Forest Service Road 24N34), providing access to the Grizzly Forebay Tunnel, spillway and the Grizzly Powerhouse Transmission Line, Bucks Creek penstock, vent stacks, and penstock valve house. Easements established with the private landowner allow the use of this road and land for project purposes.

Land use within the FERC project boundary is focused on hydropower generation and recreation, both of which are managed in accordance with the articles and conditions outlined in the project license, associated management plans, and various special use permits and Memoranda of Agreements (MOA) between the licensees and the PNF.

The licensees developed a SMP that addresses non-project use and occupancy of shoreland adjacent to Bucks Lake (PG&E, 2007). The Bucks Lake SMP was reviewed for adequacy in consultation with various local, state, and federal agencies, Bucks Lake residents, and commercial resort owners, and approved by FERC in 2014. To ensure that conflicts do not arise as public use increases, all private uses of the Bucks Lake shoreline must be authorized by the licensees, in accordance with the provisions outlined in the SMP. Shoreline development at Bucks Lake is permitted when it is consistent with the SMP and all other applicable local, state, and federal regulations. The licensees are revising the SMP to address all shorelines within the project boundary, not just Bucks Lake, and guide the use, occupancy, and management of shoreline resources. The revised SMP will be filed with the Commission by July 31, 2019.

The SMP contains rules and regulations pertaining to all uses along the Bucks Lake shoreline and includes measures specific to: public recreation use; docks and buoys; shoreline alteration, cutting and filling; erosion protection and rip rap; log booms, vehicle restrictions; camping/boating restrictions; landscaping; burning; commercial development, project recreation development; and trash management. In addition, the SMP contains residential use and regulations, dock/buoy license agreements and consent forms, and a Natural Hazard Safety Plan.

Specially Designated Areas

National Wild and Scenic River System and State Protected River Segments

The project is not located on any rivers that have been identified as eligible or suitable for inclusion in the National Wild and Scenic Rivers system. The project is also not located within or adjacent to any rivers or streams that are designated as protected by the State of California.

National Trails System

The PCT was designated as a National Scenic Trail in 1968. It traverses the upper elevations of the project's watershed but does not enter into the FERC project boundary. At its closest point, the PCT is approximately 0.25 mile north of Three Lakes. The PCT can be accessed from the Three Lakes area by a 0.5-mile-long trail that connects the Three Lakes Trail to the PCT.

Scenic Byways / Highways

Highway 70 is located across the North Fork Feather River from the Bucks Creek Powerhouse. The Forest Service designated Highway 70 as a National Forest Scenic Byway (Forest Service, undated); however, it is not included on the Federal Highway Administration's list of National Scenic Byways (USDOT FHA, undated). Highway 70 is eligible for designation as a State Scenic Highway but has not been designated as such by the California Scenic Highway System (CDOT, 2011).

Wilderness Areas

The Bucks Lake Wilderness Area is located immediately east of Bucks Lake and adjacent to the project boundary. The Bucks Lake Wilderness Area was established by the California Wilderness Act of 1984 and encompasses approximately 21,000 acres managed by the PNF. The eastern two lakes of the Three Lakes area are within the Bucks Lakes Wilderness Area, although the impoundment and use of the Three Lakes for hydroelectric development predates the wilderness designation. The Forest Service manages the two eastern lakes under the primitive Recreation Opportunity Spectrum (ROS) classification, and the area within the wilderness is undeveloped.

The Three Lakes Trailhead is located outside the wilderness boundary and provides parking for hikers accessing the Bucks Lake Wilderness Area from the Three Lakes area. The non-project Mill Creek Trail provides access to the Bucks Lake Wilderness Area from the Bucks Lake area.

Road Management

There are 10 National Forest System roads within the project boundary. Two of the roads (Mill Creek Road, 24N33 and Grizzly Forebay Road, 24N34A) are paved and suitable for travel in a standard passenger vehicle. The other eight roads are unpaved single lane roads best suited to high clearance vehicles. Four of the project roads are gated to prohibit access by the general public. Additional roads are associated with project recreation facilities and provide access to recreation sites adjacent to Bucks Lake, Lower Bucks Lake, Three Lakes, and Grizzly Forebay. There are also many Forest Service roads throughout the Bucks Lake region that are used for resource development, are not solely used for project access, or are multi-purpose roads that access facilities, or areas, unrelated to the project.

Although the licensees are responsible for the maintenance of the roads within the project boundary, the cost of the maintenance is shared between the Forest Service and the licensees based on an agreed percent for each road. An evaluation of the 25.1 miles of project operations roads within the project boundary, identified 79 percent were in good condition with only minor rutting, potholing, and slope instability. The remaining 21 percent were classified in fair condition, with excessive rutting, potholing, ponding, roadway deterioration, or slope instability. In most cases, the defects were localized and primarily related to inadequate maintenance as opposed to poor road design. There is a total of 5.2 miles of project roads within the project boundary, for recreational access; 52 percent of these roads were in good condition, 40 percent in fair condition, and eight percent were found to be in poor condition.

Aesthetic Resources

The PNF LRMP (Forest Service, 1998b, as amended in 2004 and 2007) established visual quality objectives (VQOs) for the project vicinity. VQOs provide specific criteria to assess the potential effects of the project facilities, operation, or maintenance on aesthetic resources within the project vicinity.

Three VQO categories are designated within the project vicinity: preservation, retention, and partial retention. The preservation VQO is a natural condition category where only ecological change is allowed. The retention VQO category allows for modification of the landscape but limits the modifications to activities that are not evident to the casual forest visitor. The partial retention VQO category allows for greater modification than retention, where activities may be evident to the casual forest visitor but must remain subordinate to the characteristic landscape.

Bucks Lake Wilderness Area, which includes the upper two lakes of the Three Lakes area and the north side of Milk Ranch Creek downstream of Three Lakes, are situated within land with the preservation VQO designation. Bucks Lake, Lower Bucks Lake, the recreation areas and primary travel corridors adjacent to these lakes, and the NFFR corridor are within the retention VQO designation. Grizzly Forebay, the lower lake of the Three Lakes area, and the Three Lakes road between Bucks Lake and Three Lakes are within the partial retention VQO designation.

Constructed project features and developed recreation facilities at Bucks Lake and Lower Bucks Lake are within the retention VQO. Constructed project features and developed recreation facilities at Grizzly Forebay and Three Lakes are within the partial retention VQO. There are no project features or recreational developments within the preservation VQO.

The existing project features (dams, powerhouses, transmission lines, recreation sites, etc.) do not meet the retention and partial retention VQO criteria due to the size of the developed structures and their placement within the natural landscape. However, the Bucks Development was completed in 1928 before the Forest Service established VQOs for the project vicinity (Forest Service, 1974 and 1995). The presence and size of the

Bucks Creek project structures were included as part of the original VQO assessment process and resulted in the project structures being identified as consistent with VQOs. Visual considerations were part of planning for the more contemporary Grizzly Development (completed in 1998) and mitigation measures were implemented to address identified issues and ensure it was consistent with established VQOs.

The California Scenic Highway System identifies Highway 70 as “Eligible” for designation as a state scenic highway (CDOT, 2011). The Plumas County General Plan (Plumas County 1988, amended 2004) identifies Highway 70 and the Feather River Canyon as a “Scenic Area”. However, designations by the state and county only provide general guidance on maintaining the scenic quality of the highway corridor.

3.3.6.2 Environmental Effects

Land Use

Project Boundary

Commission regulations require including within the project boundary only those lands necessary to operate and maintain the project and for other project purposes, such as recreation, or for the protection or mitigation of environmental resources (18 CFR 4.41[h][2]). The licensees propose project boundary changes to: (1) include land necessary for current and future operation, maintenance, and recreation development; (2) remove land not required for O&M or any other project purpose; and (3) reduce the shoreline buffer of project impoundments where project infrastructure and recreation facilities are not located along the shoreline. The licensees proposed changes would result in the net removal of 331.3 acres from within the project boundary. NFS land would be reduced by 223.5 acres, PG&E-owned land would be reduced by 108.5 acres, and private land would increase by 0.7 acre.

Our Analysis

The licensees propose to modify the project boundary to include recreation access roads, trails, campground features, and operations and maintenance facilities currently outside the project boundary. Existing roads that would be included in the modified project boundary are those primarily used to access existing project campgrounds. This modification would clearly identify that the licensees are responsible for maintaining roads associated with the recreation site. Trails associated with existing project recreational features would also be included in the project boundary. These trails are established features of existing recreation sites and including them in the project boundary ensures the licensees are responsible for maintaining them. Other additions to the project boundary would include land to fully encompass, or to provide for the relocation of, existing campgrounds, or to encompass existing operations and maintenance sites. Fully encompassing recreation sites and O&M facilities within the project boundary ensures the licensees are responsible for protecting resources and

maintaining these sites as defined in the license. The proposed additions to the project boundary would provide land necessary to operate and maintain the project.

Areas that would be removed from the project boundary include land that is: (1) not necessary for existing or proposed recreation features; (2) is not used to mitigate project effects; and (3) is not required for the operation or maintenance of the project. Land adjacent to the reservoir shorelines would be reduced to a specified horizontal distance from the high water level, unless additional land is needed to enclose adjacent project features. Other reductions in the project boundary would occur in areas away from the reservoirs that are not being used for project facilities or recreation sites. Such lands are not affected by the project and therefore do not require that the licensees be responsible for protecting the resources in these areas. Table 3-33 presents a detailed summary of all the proposed boundary changes.

Table 3-33. Analysis of proposed project boundary changes (Source: staff).

Changes to the Project Boundary	Rationale and Analysis
Buck Lakes Area	
Additions to the Project Boundary	
Modify the FERC project boundary at Mill Creek Campground to include the existing water system infrastructure.	The water system is an essential facility for the operation of a project recreation feature, the Mill Creek Campground. This change adds land that encompasses an essential infrastructure feature that supports a project recreation facility.
Modify the FERC project boundary at Mill Creek Campground to include the Mill Creek Tie Trail with a 12.5-foot buffer on each side of the centerline of the trail.	The Mill Creek Campground Tie Trail is an existing project recreation feature. This change adds land that encompasses a project recreation feature.
Modify the FERC project boundary at Hutchins Group Campground to include the Hutchins Group Campground Trail with a 12.5-foot buffer on each side of the centerline of the trail.	The Hutchins Group Campground Trail is an existing project recreation feature. This change adds land that encompasses a project recreation feature.

Changes to the Project Boundary	Rationale and Analysis
<p>Modify the FERC project boundary at all project recreation facilities (Mill Creek Campground, Hutchins Group Campground, Sandy Point Day Use Area, Haskins Valley Campground, Sundew Campground, Indian Rock Day Use Area, West End Cove Day Use Area, Lower Bucks Campground, Three Lakes Trailhead Parking Lot, and the Grizzly Forebay Recreation Area parking lot) to include their access roads.</p>	<p>The roads are project-specific features that are needed to provide public access to recreational sites that are part of the project and already included in the project boundary. This change adds land that encompasses roads that exclusively provide access to project-related recreation facilities.</p>
<p>Modify the FERC project boundary along the east edge of the Haskins Valley Campground to include all campground facilities, extending the project boundary eastward to the edge of Bucklin Road.</p>	<p>The existing Haskins Valley Campground is not entirely within the project boundary. This change adds land to fully encompass an existing project recreation facility.</p>
<p>Modify the FERC project boundary at Bucks Lake areas that are outside of existing project facilities and recreation areas to include land along the shoreline to create a 25-foot horizontal buffer from the maximum water surface elevation where the existing project boundary is less than a 25-foot horizontal buffer from the maximum water surface elevation.</p>	<p>Some segments of the existing project boundary along the shoreline of Bucks Lake are below the maximum water surface elevation. This change adds land that is affected by the project and is required for the O&M of the project.</p>
<p>Modify the FERC project boundary at Bucks Lake to include land at Bucks Creek Inlet for roadside parking for shoreline access.</p>	<p>The roadside parking area is primarily used for recreational access to the Bucks Lake shoreline from the non-project Mill Creek Trail. This change adds land to fully encompass a facility that primarily supports access to existing project recreation features.</p>
<p>Removals from the Project Boundary</p>	
<p>Modify the FERC project boundary along the west shore of Bucks Lake between Indian Rock Day Use Area and the Dam Spillway Access Road to remove land west of Bucklin Road.</p>	<p>This change removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.</p>

Changes to the Project Boundary	Rationale and Analysis
Modify the FERC project boundary on the west side of Bucks Lake to remove Bucklin Road from the project boundary.	Bucklin Road provides access to both project and non-project recreation features, and also recreation and residential cabins along Bucks Lake. This change removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.
Modify the FERC project boundary at Bucks Lake for areas outside of the existing project facilities and recreation areas to remove land along the shoreline beyond a 25-foot horizontal buffer from the maximum water surface elevation.	This change removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.
Modify the FERC project boundary at the Whitehorse Campground expansion area and the eastern Bucks Inlet expansion area to remove them from the project boundary.	This change removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.
Modify the FERC project boundary on the west side of Bucks Lake to remove land around the Bucks Lake Dam Water Supply Line and Diversion.	There isn't sufficient information about the existing and proposed use of this water supply line and diversion to allow staff to make a decision regarding whether the land surrounding this facility should be removed from the project boundary.

Lower Bucks Lake Area

Additions to the Project Boundary

Modify the FERC project boundary at Lower Bucks Lake to include land along the south shoreline of Lower Bucks Lake to create a 25-foot horizontal buffer from the maximum water surface elevation where the existing project boundary is less than this.	Segments of the existing project boundary along the south shoreline of Lower Bucks Lake are below the maximum water surface elevation. This change adds land that is affected by the project and is required for the O&M of the project.
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Changes to the Project Boundary**Rationale and Analysis**

Removals from the Project Boundary

Modify the FERC project boundary at Lower Bucks Lake to remove land along the south shoreline of Lower Bucks Lake beyond a 25-foot horizontal buffer from the maximum water surface elevation.

This change removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.

Modify the FERC project boundary at Lower Bucks Lake to remove land along the north shoreline of Lower Bucks Lake beyond a 40-foot buffer north of the Three Lakes Road, with the exception of the area for the future relocation of the Lower Bucks Lake Campground.

This change removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.

Three Lakes Area

Additions to the Project Boundary

Modify the FERC project boundary near the Upper Lake of the Three Lakes to include the Three Lakes Trail with a 12.5-foot buffer on each side of the centerline of the trail.

The Three Lakes Trail is an existing project recreation feature. This change adds land that encompasses a project recreation feature.

Modify the FERC project boundary at the Milk Ranch Conduit Road helipad to include the entire helipad use area, maintenance buffer, and access.

The Milk Ranch Conduit Road helipad and adjacent use area is a facility that is necessary to operate and maintain the project. This change adds land that encompasses an existing facility that is used primarily for project operations.

Removals from the Project Boundary

Modify the FERC project boundary at Three Lakes to remove the Upper Lake from the project boundary.

The lake is not hydrologically influenced by the project and is located entirely within a Wilderness Area. This change removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.

Changes to the Project Boundary**Rationale and Analysis**

Modify the FERC project boundary at Lower and Middle Lakes of the Three Lakes to remove land on the north side of the Three Lakes Trail beyond the 12.5-foot buffer from the centerline of the trail.

The Three Lakes Trail is an existing project recreation feature adjacent to the shoreline of the lakes. The hydrology of the Lower and Middle Lakes is influenced by operation of the project and thus these lakes are included in the project boundary. This change removes land (upslope from the trail) that is not required for the operation or maintenance of the recreation feature.

Grizzly Forebay Area

Additions to the Project Boundary

Modify the FERC project boundary at the intersection of Bucks Penstock Road and Grizzly Big Creek Road to include the staging area

The staging area at the intersection of Bucks Penstock Road and Grizzly Big Creek Road is necessary to operate and maintain the project. This change adds land that encompasses an existing facility that is used primarily for project operations.

Modify the FERC project boundary at the Bucks Communication Tower helipad to include the entire helipad use area, maintenance buffer, and access.

The Bucks Communication Tower helipad and adjacent use area is a facility needed to operate and maintain the project. This change adds land that encompasses an existing facility that is used primarily for project operations.

Modify the FERC project boundary at Grizzly Forebay to include the Grizzly Forebay Gaging Station Trail with a 12.5-foot buffer on each side of the centerline of the trail.

The Grizzly Forebay Gaging Station Trail is an existing project recreation feature. This change adds land that encompasses a project recreation feature.

Modify the FERC project boundary at Grizzly Forebay Campground to include all campground facilities.

The existing Grizzly Forebay Campground is not entirely within the project boundary. This change adds land to completely encompass an existing project recreation facility.

Changes to the Project Boundary

Rationale and Analysis

Removals from the Project Boundary

Modify the FERC project boundary at Grizzly Forebay to remove land along the south shoreline of Grizzly Forebay beyond a 25-foot horizontal buffer from the maximum water surface elevation.

Removes land that is: (1) not affected by the project; (2) is not part of a project recreation feature; (3) is not used for the mitigation of project effects; and (4) is not required for O&M of the project.

The proposed Bucks Lake Shoreline Trail would be constructed adjacent to the shoreline between Sundew and Mill Creek Campgrounds. The trail would be designed to accommodate pedestrian and bicycle use. The existing project boundary is relatively close to the shoreline in several locations along this trail route, and it is likely that trail design standards and environmental protection measures would require that the trail be aligned upslope of sensitive shoreline and riparian vegetation, and thus, upslope (and outside) of the project boundary. The trail is proposed as one of the licensees' recreation facilities that support public access to the project. Including this trail in the project boundary would ensure that the licensees have the authority to manage and protect resources along the trail and maintain the trail to standards required by the license.

Transportation Management Plan

Project roads provide access necessary for operating and maintaining project infrastructure as well as access for public recreation at developed recreation sites and for dispersed recreation activities. Proper road maintenance is necessary for public safety and to protect natural and cultural resources. Most project roads are on NFS land. The licensees would manage the project roads under the proposed Transportation Management Plan (LU-1). Forest Service preliminary 4(e) condition 18 specifies the sharing of road maintenance costs commensurate with the licensees' use and project-related use, and 4(e) condition 59 specifies implementation of the transportation management plan on NFS land.

Our Analysis

The proposed Transportation Management Plan provides guidance to rehabilitate and maintain project roads and general use roads. Project roads are predominately used to access the project for project-related purposes and are within the FERC project boundary. General use roads are used predominately for non-project purposes and are generally outside of the FERC project boundary. The plan identifies project roads for operation, maintenance, and recreation use. It describes: short- and long-term road maintenance measures, rehabilitation actions to bring roads up to current standards, measures to protect sensitive resources, an implementation schedule, and specifies reporting and consultation requirements with the Forest Service. A road maintenance

agreement between the licensees and the Forest Service addresses the shared maintenance responsibilities and funding.

The scope of the Transportation Management Plan (PG&E and City, 2018f) and the separate road maintenance agreement (Forest Service, 1988) addresses every aspect of road maintenance and identifies consultation and approvals needed from the Forest Service. Implementing the plan, as the licensees propose and the Forest Service specifies, would address most maintenance deficiencies on project roads within the first 5 years of license issuance, and address other maintenance activities on project roads within 15 years of license issuance. These actions would help ensure safe public access to project lands and waters, contribute to the protection of natural and environmental resources in the project boundary and reflect the licensees' responsibility for maintaining project roads for operation, maintenance, and recreation.

Wilderness Areas

Middle Lake and Upper Lake of the Three Lakes area are within the Bucks Lake Wilderness Area. The water surface elevation of the Middle Lake is affected by the operation of the project, but Upper Lake is not. The licensees propose to modify the project boundary to remove Upper Lake from the project boundary. The Three Lakes recreation site and trailhead is outside of the Wilderness Area; however, the Three Lakes Trail extends into the Wilderness Area adjacent to Middle and Upper Lakes. The licensees would continue to maintain the Three Lakes Trail for recreational users.

Our Analysis

The impoundment and use of Three Lakes for hydroelectric purposes predates the designation of the Bucks Lake Wilderness Area. Use of Middle and Lower Lakes for the hydroelectric project would continue. Removing Upper Lake from the project boundary would remove land that is not affected by or required for operation of the project. The proposed change to the FERC project boundary would not affect the Wilderness Area or alter the Wilderness Area boundary. The FERC project boundary would remain encompassing the Three Lakes Trail upstream of Middle Lake, extending into the Wilderness Area to the point of termination of the trail adjacent to Upper Lake. Therefore, licensees would continue to be responsible for maintenance of the Three Lakes Trail.

Fire Prevention and Response Plan

Project O&M, and recreational use of the project facilities has the potential to increase the risk of wildland fire occurrence. The licensees propose to implement a Fire Prevention and Response Plan (LU-2) developed in consultation with the Forest Service. Forest Service preliminary 4(e) condition 61 specifies that the licensees implement the fire plan for locations on or directly affecting NFS land.

Our Analysis

All wildfires that potentially occur in the vicinity (whether project related or not) may threaten project infrastructure. The licensees' proposed fire plan would provide general fire prevention and protection measures for the project, specific fire prevention and protection measures for project operations and maintenance activities, fire prevention requirements for tool and equipment use, fire safety at project recreation sites, fire reporting procedures and requirements, fire control procedures and facilities, and the investigation of project-related fires. The plan is consistent with applicable laws and regulations, identifies fire suppression equipment required for at all project facilities and in project vehicles, and identifies helicopter access points and the use of project reservoirs as a source of water for suppression activities. The plan would be reviewed in consultation with the Forest Service and applicable State agencies and revised as necessary with Commission approval.

Implementing the plan would help minimize project-related wildland fires and fires that occur near project facilities. The plan would protect the licensees' hydropower assets and environmental resources on project land and adjacent non-project land. Reporting and consultation requirements would allow the licensees to incorporate lessons learned from experiences and accommodate plan changes with Commission approval, over the license term.

Shoreline Management Plan

The licensees, in consultation with the Forest Service, previously developed and implemented a SMP (PG&E, 2007). After a review of the plan by the licensees in 2014 (PG&E, 2014), it was determined to be adequate. The review of the SMP was subsequently reviewed by agencies and submitted to FERC on November 5, 2014. Forest Service preliminary 4(e) condition 56 specifies that the licensees revise the Bucks Lake SMP to be consistent with other management and monitoring plans submitted in support of a new license.

Based on a review of the current SMP in 2018, the licensees determined that there is a need to revise the Plan to incorporate all lakes within the Bucks Creek-Grizzly Project (LU-3). The licensees began the process of updating the plan in 2018 and intend to submit a revised SMP to the Forest Service, FWS, California DFW, Plumas County Department of Public Works, Plumas County Sheriff's Department, PNF, and Bucks Lake Homeowners by July 31, 2019.

Our Analysis

A SMP is intended to address shoreline uses, occupancy, and provide guidance for the management of shoreline resources within the FERC project boundary. The licensees have recognized that the existing SMP is geographically too limited and does not provide the framework needed to control non-project use or manage public use of project shorelands. The Forest Service preliminary 4(e) condition recognizes the need to update

the existing SMP. Updating the SMP would protect all project shorelands with standards to minimize resource damage that may occur as water and shoreline-based recreational use increases during the term of the license.

Aesthetic Resources

Aesthetics

The licensees do not propose any measures to modify the Bucks Creek facilities to be consistent with VQOs that were put in place after the project was constructed. Options to modify project facilities to minimize the visual effect on the landscape are limited due to their size and contrast against the natural environment. Color is one element that can be used to blend features to the adjacent landscape for features that can be painted. The licensees propose to consult with the Forest Service prior to painting the exterior of any existing or new facilities as part of regular maintenance or during initial construction. This proposal is consistent with Forest Service preliminary 4(e) condition 57.

Our Analysis

Participants during scoping identified the environmental effects of the project's features, operation, and maintenance on the surrounding landscape as an issue that should be analyzed in the EIS. To provide the information needed for the analysis, the licensees conducted a Visual Quality Assessment using the Forest Service Visual Management System (PG&E and City, 2016c). The study focused on the compatibility of views of the project from key observation points and the project's compatibility with established VQOs for each area. The study did not identify additional measures that could be used to meet the VQOs or minimize the project's presence in the landscape. No specific concerns were identified related to any of the key observation points. Based on the study results and consultation with the agencies, the licensees propose to consult with the Forest Service prior to painting the exterior of project facilities to minimize their visual effect (LU-4).

Large civil structures within a natural landscape have a visual effect with limited opportunities for mitigating or reducing the effect. The use of paint and color to modify the visual appearance of the project features can help minimize the appearance of the project facilities on the landscape. The licensees' proposal, consistent with Forest Service preliminary 4(e) condition 57 requiring consultation before painting the exterior of project facilities, is a reasonable approach to identifying and implementing improvements to project features that can reduce the visual quality effect of the project facilities on the natural landscape.

3.3.7 Cultural Resources

3.3.7.1 Affected Environment

Section 106

Section 106 of the National Historic Preservation Act (NHPA, 36 CFR Part 800) requires the Commission take into account the effects of licensing a hydropower project on any historic properties and allow the Advisory Council on Historic Preservation (Advisory Council) a reasonable opportunity to comment if any adverse effects on historic properties are identified within the project's Area of Potential Effects (APE). Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. In this document, the term "cultural resources" also means resources of an age (generally, 50 years or older) but that have not been evaluated for eligibility in the National Register.

Consultation with SHPO, Native American Tribes and Other Interested Parties

Under Section 106 (36 CFR 800.16[f]) of the NHPA, consultation is defined as the process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 process. The licensees initiated consultation with the development of a Cultural Resources Work Group (CRWG) in 2014, and relicensing studies included numerous consultation efforts to engage Native American Tribes, Native American organizations and individuals, SHPO, the Forest Service, and other interested parties. The record of consultation is included in Attachment D of the HPMP (PG&E, 2018). The six Native American Tribes or organizations whose members were indigenous to the area in and around the project that were consulted include the Maidu Summit Consortium, Greenville Rancheria, Mooretown Rancheria of Maidu Indians, Susanville Indian Rancheria, Enterprise Rancheria, and the Roundhouse Council.

If existing or potential adverse effects are identified to historic properties, a HPMP is developed to establish protocols to avoid, reduce, or mitigate for potential effects to historic properties over the term of the license.

Commission Staff would execute a PA with the SHPO (if the Advisory Council on Historic Preservation chooses not to participate) to implement a final HPMP upon license issuance.

Identification of the Area of Potential Effects

Under 36 CFR Part 800, the APE is defined as "the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties" (36 CFR 800.16[d]). During the relicensing studies, the licensees developed three separate APEs for cultural resources in consultation with FERC, the SHPO, and stakeholders. These address historic-period built environment resources, historic and prehistoric archaeological resources, and traditional cultural properties (TCPs)/tribal

resources in the APE. This was done because each of the cultural resource types require different kinds of study and analysis in relation to their respective APE. The APE for each of the three cultural resource types is discussed in the next sections.

Historic-Period Built Environment Resources APE

The APE for the historic-period built environment aligns with the FERC project boundary, since most project activities that have the potential to directly or indirectly affect historic-period built environment properties are limited to this geographic area. The exception to this definition is the inclusion of historic-period built environment resources along the south and west shores of Bucks Lake, where four residential housing tracts flank the lake. These housing tracts are located both inside and outside the FERC project boundary. Since the housing tracts are in physical and functional relation to Bucks Lake and have the potential to be affected by project activities, the APE boundary was augmented to include the residential tracts in their entirety.

Prehistoric and Historic-period Archaeological Resources APE

The APE for archaeological resources also aligns with the FERC project boundary but is expanded to include individual recreation facilities and project roads. This enlarged APE accounts for potential effects from activities whose distance from those facilities is neither easily managed nor predicted. For example, campground areas have defined boundaries but campground users may engage in activities that affect archaeological resources beyond the campground boundaries. To account for this, the APE includes an additional 100-foot buffer around the current boundaries of individual recreation facilities (i.e., campgrounds, day-use areas, etc.) and an additional 30-foot buffer along both sides of centerline of all project roads.

Traditional Cultural Properties / Tribal Resources APE

The APE for TCPs is defined in the same way as that for prehistoric and historic archaeological resources—to align with the FERC project boundary, 100 feet around the extant boundary of individual recreation facilities (i.e., campgrounds, day-use areas, etc.), and 30 feet on either side of centerline for all project roads.

Cultural History Overview

In the sections that follow, numerous documents are referenced that were included in the licensees' final license application and non-public technical studies. Unless otherwise indicated, we cite the final license application as the source of this information (PG&E and City 2016a, 2018a, and 2018b).

Prehistory

The cultural chronology for northern interior California traditionally relies on archaeological data from various areas, however, for this project, the chronologies established by Kowta (1988) for the Feather River Uplands are most pertinent. Kowta

presents a chronology for Plumas and Butte counties that includes the Feather River Uplands: the Western Pluvial Lakes Tradition, dating from 11000–8000 before present (BP); the Great Basin Archaic/California Millingstone Horizon, dating from 8000–5000 BP; the Martis Tradition, dating from 4500–1500 BP; and Prehistoric Maidu, dating from 1500–100 BP.

The Western Pluvial Lakes Tradition is primarily characterized by Great Basin Stemmed Series projectile points and is associated with sites at Lake Davis, Eagle Lake, and Bucks Lake (Peak & Associates, 1983). It is believed that the Feather River Uplands were sparsely occupied at this time and were marginal to other areas located to the east and west.

The Great Basin Archaic/California Millingstone Horizon is characterized by two different cultural patterns in the area. The Pinto Complex, which was adapted to desert conditions, emerged in the Great Basin and the Millingstone Horizon emerged in California. Kowta suggests that Hokan speakers were “bearers” of the “Milling Stone Horizon,” and that they occupied and exploited the foothills of the Central Valley and other areas across California at this time.

The Martis Tradition highlights similarities among artifacts recovered from sites in the area, such as Bucks Lake, and artifacts recovered from Martis Complex sites in the Lake Tahoe area. Early Martis (4500–3000 BP) is believed to have experienced a warming trend that allowed oaks to expand into upland areas previously occupied by conifers. This climatic change increased the productivity of upland areas and facilitated the expansion of Native Americans into these areas. The Late Martis (3000–1500 BP), was characterized by a cool-wet period that pushed oaks to lower elevations and increased interaction between regional populations, while also intensifying exploitation of certain resources, such as acorns.

Artifacts dating after 1500 BP in the Feather River Uplands differ from both Martis Complex artifacts and those found at this time in the Lake Tahoe area. This is thought to signal the arrival of Maidu-speaking people in the Feather River Uplands around 1500 BP. Archaeological evidence suggests that a population from the Sacramento Valley expanded into the Feather River Uplands between 1500 BP and 1000 BP. Proto-Maiduan populations may have settled in the foothills of the Sierra Nevada, eventually expanding to current Plumas County. It is suggested that the eastward movement of Maidu groups brought them as far east as Honey Lake Valley southeast of Susanville, California about 350 BP. Detailed information about archaeological assemblages is provided in PG&E and City (2016t).

Ethnographic Background

Mountain Maidu and Konkow languages are both within the Maiduan family of languages, which are classified as California Penutian. Mountain, or Northeastern Maidu, was spoken between Lassen Peak and Quincy, likely with a dialect for each major settlement area. Konkow was spoken on the lower Feather River up to the Rich Bar area,

as well as in the Sacramento Valley adjacent to Oroville, California. Southern Maidu were called Nisenan or Nishinam. The combined population of Maidu and Konkow people prior to EuroAmerican contact was approximately 6,000 people.

Both groups were politically organized into autonomous units or “village communities” composed of three to five adjacent villages. Affiliated villages joined together for ceremonial performances and other activities. The central village was home to the kum--a semi-subterranean earth-covered lodge that served as a ceremonial assembly chamber and the leader’s residence. Leaders were chosen by a shaman for their “maturity, wealth, ability, and generosity” and served as advisors and spokesmen.

For the Mountain Maidu, people with permanent villages in a single valley constituted a village community, and often spoke a dialect separate from the neighbors.

Both public and private property was recognized. The village community held hunting and gathering territories in common. Certain families did own patrilineally inherited parcels such as fishing holes and deer fence locations. An individual’s possessions were also owned, such as hunting, fishing, cooking, gathering equipment, and canoes. Little was inherited since possessions were often burned at death.

A large variety of plant and animal resources were available to the Mountain Maidu and Konkow, including fish, game, nuts, berries, and seeds. Many resources had multiple uses for subsistence, religious uses, medicinal properties, and as raw materials for construction and fabrication.

Valleys with permanent villages often contained rich marshlands that supported waterfowl. Villages that were situated on larger rivers placed great importance upon riverine resources like salmon, lamprey eel, and other fish. Salmon were particularly important in the lower waterways, caught using salmon gigs, spears, and bag-and-seine nets.

High elevation portions of the Mountain Maidu territory such as Bucks Valley were of seasonal importance. Snow melt created lush meadows and consistent stream flows in the summer months. These areas were accessed for clover and for seeds from plants like wild oats, lupine, and mule-ear. Adjacent areas served as hunting grounds. Konkow people also left their ridge-top homes in summer, traveling to higher elevations for deer hunting and the collection of mountain flora.

Virtually all animal species were hunted, with the exception of coyotes, dogs, and wolves. Hunting was of special importance to the Mountain Maidu, who were expert hunters and made use of hunting dogs. Mule and black-tailed deer were abundant and were hunted either individually or through communal deer drives. Squirrels, rabbits, porcupines, and elk were shot with arrows. Quails, geese, pigeons, and ducks were also taken. Grizzly bears were hunted for their hides, which were used in rituals.

Mountain Maidu winter settlements were confined to the warmer, less snowy locations in Susanville and Big Meadows (now Lake Almanor), as well as Indian, Butte, Red Clover, Genesee, and American valleys, with the latter in the Quincy area being the

nearest to Bucks Valley. Due to the marshy nature of the land, villages were placed at the edges of the valleys. In the warmer valleys where they overwintered, stored foods were essential for winter survival.

At lower elevations in the foothills, Konkow settlement concentrated in the Oroville vicinity and adjacent areas to the north and east, including along the North Fork Feather River. Year-round settlements were placed on ridges above the rivers and streams in these lower elevations. Housing during the summer was near hunting and gathering areas.

Relations between villages and other Maidu or Konkow groups were cemented by visiting and meeting for gambling games and ceremonial activities. Bucks Valley was ideally situated to host such interactions, as the Konkow moved uphill to their easternmost territory, abutting Mountain Maidu lands. It is known that both groups visited Bucks Valley for the seed resources and the adjacent hunting grounds, and that they enjoyed social activities such as gambling.

Trade took place between the Konkow and Maidu, the Konkow and Wintun, and the Maidu and the Paiute. Feuding occasionally took place between village communities, but warfare was reserved for more serious disputes between the Konkow and the Yana, and between the Maidu and the Washoe and Achumawi.

Ethnohistory of Buck's Valley and Vicinity

Ethnohistory for both Mountain Maidu and Konkow groups is presented here, as their contact experiences with EuroAmerican ranchers, explorers, and settlers were different in tenor, timing, and the severity of impact. This is a broad-brush context for the events that affected Native people who frequented Bucks Valley. More in-depth information is presented in the licensees' HPMP (PG&E, 2018) and TCP Study (PGE and City, 2016r), including references to the original source material.

Although Spanish explorer Gabriel Moraga explored the lower reaches of the Feather River in 1808, as did Arguello in 1820, most of the Native contact with EuroAmericans took place at lower elevations among the Nisenan. Although there had been earlier trapping parties regionally, the penetration of John Work's brigade of the Hudson's Bay Company into the Feather River region is the first documented account of contact with foothill Maidu people. Work's visit in 1833 had a profound effect upon all of the Maidu groups as they introduced a deadly epidemic that would decimate Native American populations.

Bucks Valley (now Bucks Lake) is situated on the approximate Konkow/Mountain Maidu boundary, and was recalled by people from both groups during the interviews conducted for the relicensing. Once a high mountain meadow, the area aboriginally served as a hunting and gathering hinterland, likely visited only in summer prior to historic times. For such a remote area, it was a nexus of activity during the early exploration/emigration period and the Gold Rush era.

The discovery of gold deposits along the East Branch of the North Fork Feather River in 1850 prompted a rush to the area, and the foundation of numerous mining camps--the most notable at Rich Bar, located 8 miles north of Bucks Valley. As miners took over river village sites and either disrupted or destroyed fishing, the hunting areas (such as the Buck's Valley vicinity) may have taken on an exaggerated importance.

In 1850, Bucks Valley was claimed by Horace "Buck" Bucklin, Jesse Healy, and Francis Walker (Lawson, 2008:15). Bucks Ranch soon became a supply center for these scattered camps, and by 1851 it was already a popular stop to procure goods, drinks, and lodgings (Lawson, 2008:7).

By 1851, the pack trail that already led past Bucks Ranch east into Meadow Valley was being used as part of the Beckwourth Emigrant Trail, bringing thousands of emigrants westward through the northern Sierra Nevada Mountains. It passed through Bucks Valley on route to Bidwell's Bar beginning in 1851 (Lawson, 2008:14). In 1854 alone, 700 sheep, 12,000 cattle, 500 mules and horses, and 1,200 people used this trail. Maidu laborers later constructed the Quincy wagon road and stage route in the 1850s. The workers wore white armbands to identify them as "tame Indians" to prevent their removal to the reservation.

As the ranches and settlements grew, Indian men became laborers, and their traditional hunting, gathering, and fishing activities were curtailed and their cultural practices suppressed. One of the places where Indian people found work was Bucks Valley (Bucks Ranch in particular), and the nearby Meadow Valley. The concentration of Indian people in this region was likely a combination of work availability and the valley's place in the earlier subsistence round. By the close of the 1860s, Bucks Ranch was owned by William Wagner and Julia Haley. One of the jobs the Indians had was to carry the mail from Bucks Ranch to Quincy on skis. The earliest census in which Indians living in Mineral Township (Bucks Valley vicinity) were enumerated was in 1880. Forty-seven Indians were reported. Dunn (1962) suggests that an autonomous group lived at Bucks, at least at that early date.

Other groups continued to visit. In the late 1800s, Konkow people from Feather Falls would come up to Bucks Valley for 1 or 2 weeks. In one respect, Bucks Valley may have assumed more importance after 1869. A miner introduced native trout into the creeks of Bucks Valley. Prior to this, both Bucks Creek and Haskins Creek did not have trout because of the high falls between the valley and the river. One source noted that "[a] little later the Indians who came to Bucks Valley to get their winter supply of grasshoppers noticed the trout and began to catch them". This further suggests that traditional subsistence resources were still being taken.

Records from the files at the Plumas County Museum include references to the Edwards family, Frazier family, and the Kennedy family as associated with Bucks Ranch. The Edwards family was Konkow according to numerous sources. The Wagner family was also associated with Bucks Ranch and the neighboring Meadow Valley area. Meadow Valley was the nearest census-taking point. Though the occupation of the men

in these families is listed as “laborer,” the census also notes that all of the children of these families could read and write. These families appear to have remained associated with the area through the mid-1920s.

Meadow Valley had an active village from the 1860s through the late 1880s. Verbinia Hall remembered some of the Indian people who worked for her grandfather, Thomas Hughes. Maidu women named Fannie and Pini did the hotel laundry and Pini was also a laundress for the Harris, Porter, and Hall families. A Maidu man named Old Doc did the gardening. Other Native families living in Meadow Valley in 1920 include Sarah Groves and her children and John Kennedy, a boarder in her household.

Bruce Bidwell of Greenville recalls that haying was the most common seasonal occupation for Indian men. In the late 1880s, the greatly respected shaman, Jack Elam, spent the haying season in Meadow Valley. He made his camp along with his wife and sister in a traditional conical bark house. While Jack worked at haying, the women did laundry at the hotel, collected basketry materials, and made baskets. Hotel guests would watch them weave, and sometimes buy the baskets.

A newspaper article confirms that some or all of these families were at Bucks Valley into the 20th century. The article reports that an Indian meeting in Quincy brought “old time delegations from far and wide,” specifically mentioning Meadow Valley and Bucks Ranch (Plumas National Bulletin December 20, 1917).

Exploration, Settlement, Hydroelectric Development, and Recreation

Exploration and Settlement

Exploration of the Feather River in the project vicinity did not begin until the early 1800s. In 1820, Captain Luis Arguëllo led a Spanish expedition along the Feather River. He named the river El Rio de las Plumas, River of Feathers, because of the large number of feathers he observed floating down it. James Beckwith discovered Beckwourth Pass in 1851, the lowest pass across the Sierra Nevada. This pass was used by miners and other immigrants traveling to California along the Beckwourth Trail.

The higher elevations of the Sierra Nevada were some of the last areas to be explored for gold, attracting miners in the 1850s. Gold mining drew other settlers to the area, and a variety of businesses continued to expand through the late 1800s and into the early 1900s.

The construction of the Western Pacific Railroad in 1907 led the commercial timber industry into area, which emerged as the primary economic force in the county. Prior to the railroad infrastructure, lumber was only milled for local use (i.e., mines, etc.). The railroad opened the forests to commercial export, contributing to the growth and prosperity of Plumas County. Construction of the railroad up the Feather River Canyon brought tourism to the area. Resorts and lodges along the “Feather River Route” were developed to accommodate fishermen, hikers, and sightseers.

The Feather River Highway was completed through the Feather River Canyon from Oroville to Quincy on August 14, 1937. This was the first year-round automobile access route linking Plumas County with the Sacramento Valley. First designated as Route 24, its name was later changed to State Route 40A and finally to State Route 70.

Hydroelectric Development

Bucks Ranch was established in the APE by the mid-nineteenth century, acting as a supply outpost, waystation, and agricultural enclave. By 1925, the ranch sprawled across the valley and served as a key supply outpost amidst the wilderness and extraction-based economy of Plumas County. Simultaneously, a number of early surveys established the Feather River as one of the state's most lucrative potential energy generation sources. By the early 1920s, Golden Feather Power Project petitioned the Federal Power Commission (FPC) to divert Bucks and Grizzly Creeks, with a 13,500-hp power plant at the mouth of Bucks Creek. The first proposal, which included no storage reservoir, was eliminated in fairly short order, but a second proposal, FPC Project 249 submitted by civil engineer Lars R. Jorgensen, was sweeping in scope and sought to use the flows of Bucks Creek to divert water to the Middle and South Forks of the Feather River, powering an ultimate project that included 260 MW. Although the FPC also rejected Jorgensen's plan, by 1923 he re-applied for an adapted Bucks Creek Development with a diversion and storage flowing through a powerhouse at the mouth of Bucks Creek.

In June of 1925, the FPC issued a license for construction and operation of the project to the Feather River Power Company, with an initial term expiring in 1968. The project included nine primary components: Three Lakes Reservoir and Dam; the Milk Ranch Conduit; Bucks Lake and Dam; Lower Bucks Lake and Dam; Tunnel No. 1 (alternately Grizzly Forebay Tunnel); Tunnel No. 2 (alternately Grizzly Creek Tunnel / Lower Bucks Lake Tunnel); Grizzly Creek Forebay and Dam; the Bucks Creek Powerhouse Penstocks; and the Bucks Creek Powerhouse, including an associated switchyard. In addition, the system included a construction and operation transportation system, together with a spur track from the main line of the Western Pacific Railroad, an incline, narrow gauge railroad, and several access roads.

By 1928, the project was complete and Great Western Power acquired and incorporated the Bucks development into the company's existing Feather River developments. Despite this increased regional dominance, by 1930 Great Western Power fell victim to escalating consolidation, and the company was acquired by PG&E.

Recreational Activity and Residential Growth

Following development of the project, recreational and residential growth occurred in the 1930s with a series of small-scale developments on both project land and adjacent land managed by the Forest Service, most notably around the shores of Bucks Lake. The high mountain reservoirs developed for water storage have been recreational enclaves for generations of Californians, beginning with resorts around Bucks Lake, and

evolving into residential tracts along the lakeshore and long-term seasonal communities. The 1960s development of a recreational program shifted from the initial resort and residential focus to emphasis on the development of public amenities including campgrounds, day use areas, boat launches, and other small-scale access facilities. This shift was in keeping with trends across the utility industry and the Forest Service, as public policy largely abandoned intensive long-term leases and private construction in favor of managed public facilities.

Cultural Resource Investigations

Archaeological Resources

The licensees' prehistoric, ethnographic, and historic background research focused on several regional gray literature titles centering around sites at Rainbow Point and on Makoto Kowta's *Prehistory of Plumas and Butte County* (Kowta, 1988). Background research for historic-period archaeological resources included historic maps, aerial photographs and publications. Repositories and information consulted as part of the background research included the following: California State University, Chico, Merriam Library Special Collections; PG&E's Historic Photograph Archives, San Francisco; PG&E's Project Archives, Brisbane, California; Plumas County Historical Society; Plumas County Museum; the PNF's Mount Hough Ranger District Office and Supervisor's Office; California State Library, California History Room; aerial photographs; and published and gray literature (i.e., unpublished agency and compliance reports). Since 1970, 48 studies have been conducted within and near the APE and numerous resources were identified as a result. The studies identified during the research undertaken for the relicensing effort are listed in PG&E and City (2016r, s, and t) that were compiled for the relicensing.

Table 3-34 lists all 66 of the archaeological sites identified in the archaeological APE. Of the 66 sites, 10 are eligible for the National Register, 21 are ineligible, and the remaining 35 are unevaluated. The licensees' HPMP indicates that the unevaluated sites would be protected as National Register-eligible pending evaluation (PG&E, 2018).

Traditional Cultural Properties

Traditional Cultural Property investigations included reviewing primary and secondary sources about the Native use of the project vicinity and consultation with interested federally recognized tribes, non-federally recognized tribes, interested persons and parties, and practitioners of traditional life-ways. The following repositories were visited for published and unpublished information about the Konkow and Mountain Maidu: Merriam Library, California State University (CSU) Chico (Hill and Rathbun Ethnographic Collections); Plumas County Museum, Quincy; University of California Berkeley Bancroft Library (online electronic collection); the California State Archives (Riddell Maidu Collection); California Room, California State Library, Sacramento; John Hudson Journals, Grace Hudson Museum, Ukiah; 1928 Tribal Roll Applications, a copy

of which are stored at the Greenville Rancheria Cultural Resources Office; Theodoratus Library in El Dorado Hills; PNF Supervisor's Office; and Mount Hough Ranger District in Quincy. The licensees' Technical Memorandum 19 (PG&E and City, 2016r) contains all research citations supporting this section.

Native American Tribes that may attach religious and cultural significance to historic properties within the APE or the project vicinity include the Concow Maidu Tribe of Mooretown Rancheria; Estom Yumeka Tribe of Enterprise Rancheria; Greenville Rancheria; Mechoopda Indian Tribe of Chico Rancheria; Susanville Indian Rancheria; Tyme Maidu Tribe of Berry Creek Rancheria; and Washoe Tribe of Nevada and California. All of the above Tribes deferred to Greenville Rancheria as the group of people most closely associated with the project vicinity.

The Maidu Summit Consortium (MSC) is a tribal organization recognized by the PNF that attaches religious and cultural significance to historic properties within the APE or the project vicinity. The MSC consists of representatives of the following: Greenville Rancheria; Maidu Cultural and Development Group; Maiduk We'ye; Mountain Maidu Preservation Association; Roundhouse Council; Susanville Indian Rancheria; Tasman Kojom Foundation; Tsi-Akim Maidu; and United Maidu Nation. The MSC helped identify elders whose families had ties to the project vicinity.

Table 3-34. Archaeological sites within the APE (Sources: PG&E and City, 2016s; PG&E, 2018, as modified by staff).

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
P-32-000028	CA-PLU-28		Prehistoric	Habitation, Food Processing, Manufacturing	Unevaluated
P-32-000111	CA-PLU-111	05-11-56-674	Prehistoric	Artifact Scatter	Unevaluated
P-32-000112	CA-PLU-112	05-11-56-838	Prehistoric	Artifact Scatter	Unevaluated
P-32-000113	CA-PLU-113		Prehistoric	Habitation, Food Processing, Manufacturing	Eligible
P-32-000114	CA-PLU-114		Prehistoric	Habitation, Food Processing, Manufacturing	Eligible
P-32-000115	CA-PLU-115	05-11-54-2	Prehistoric	Habitation, Food Processing, Manufacturing	Eligible
P-32-000116	CA-PLU-116		Prehistoric	Campsite	Unevaluated
P-32-000117	CA-PLU-117		Prehistoric	Habitation, Food Processing, Manufacturing	Eligible

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
P-32-000118	CA-PLU-118	05-11-54-4	Prehistoric	Ephemeral Campsite	Unevaluated
P-32-000119	CA-PLU-119/H		Multicomponent	Prehistoric Artifact Scatter; Historic-period Debris from the Original Bucks Lake Hotel and Store.	Unevaluated
P-32-000736	CA-PLU-736H	05-11-56-307	Historic	Dry-laid rock retaining wall	Ineligible
P-32-000956	CA-PLU-956/H	05-11-54-149	Multicomponent	Prehistoric Habitation and Food Processing; Historic-period Domestic Refuse	Eligible
P-32-001011	CA-PLU-1011		Prehistoric	Bedrock Milling Features and Lithic Scatter	Unevaluated
P-32-001012	CA-PLU-1012H		Historic	Historic-period Features of Unknown Association, or Function	Ineligible

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
P-32-001013	CA-PLU-1013H		Historic	Historic-Period Foundation and Refuse Scatter	Eligible
P-32-001015	CA-PLU-1015		Prehistoric	Habitation, Food Processing, Manufacturing	Eligible
P-32-001119	CA-PLU-1119	05-11-54-637	Prehistoric	Lithic Scatter	Unevaluated
P-32-001120	CA-PLU-1120	05-11-54-41	Prehistoric	Bedrock Milling Station	Ineligible
P-32-001121	CA-PLU-1121	05-11-56-638	Prehistoric	Bedrock Milling Feature	Unevaluated
P-32-001122	CA-PLU-1122H	05-11-54-639	Historic	Ditch	Ineligible
P-32-001635	CA-PLU-1635H		Historic	Beckwourth Trail—Trail meanders in and out of the APE in Various Places	Unevaluated
P-32-002440	CA-PLU-2440/H	05-11-54-296	Multicomponent	Prehistoric Habitation and Tool Manufacture;	Unevaluated

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
				Historic Camping Refuse	
P-32-002826	CA-PLU_2826H	05-11-54-28	Historic	Segment of Bucks Narrow Gauge Railroad	Unevaluated
P-32-004254	CA-PLU-4254H	05-11-54-278	Historic	Historic-period Homestead Remains	Unevaluated
P-32-004256	CA-PLU-4256/H	05-11-54-524	Multicomponent	Bedrock Mortar Feature and Historic-Period Granite Lined Pond	Ineligible
P-32-004914	CA-PLU-4914		Prehistoric	Single Cup Bedrock Mortar Feature	Ineligible
P-32-004915	CA-PLU-4915	05-11-56-891	Prehistoric	Habitation, Food Processing, and Manufacturing	Eligible
P-32-004916	CA-PLU-4916/H	05-11-56-894	Multicomponent	Prehistoric and/or Historic-Period Petroglyphs	Eligible
P-32-004917	CA-PLU-4917/H	05-11-56-895	Multicomponent	Bedrock Milling Features and	Ineligible

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
				Associated Artifacts; Historic Period Can Scatter	
P-32-004918	CA-PLU-4918	05-11-56-897	Prehistoric	Bedrock Milling Features and Lithic Scatter	Eligible
	CA-PLU-3883H	05-11-56-785	Historic	Fieldstone Retaining Wall Holding up a Terrace	Ineligible
	CA-PLU-3884H	05-11-56-786	Historic	Refuse Dump	Ineligible
		05-11-56-626	Historic	Dam Tender's cabin and archaeological site	Ineligible
		05-11-56-662	Multicomponent	Prehistoric Lithic Scatter; Historic-period Can Dump	Unevaluated
		05-11-56-680	Historic	Refuse	Unevaluated

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
		05-11-56-681	Historic	Cabin and Associated Refuse	Unevaluated
		05-11-56-682	Historic	Mining Adit	Ineligible
		05-11-56-683	Historic	Refuse	Unevaluated
		05-11-56-684	Multicomponent	Prehistoric Flaked Tool & Quartz Crystal; Historic-Period Personal Refuse	Unevaluated
		05-11-56-686	Historic	Can Scatter	Unevaluated
		05-11-56-687	Historic	Mining/Work Camp Remains	Unevaluated
		05-11-56-688	Historic	Mining/Work Camp Remains	Unevaluated
		05-11-56-689	Historic	Mining Landscape and Associated Refuse	Unevaluated
		05-11-56-690	Historic	Industrial Debris and Possible	Unevaluated

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
				Mining Landscape	
		05-11-56-691	Historic	Personal Refuse	Unevaluated
		05-11-56-692	Historic	Refuse Scatter	Unevaluated
		05-11-56-693	Historic	Refuse Dump	Unevaluated
		05-11-56-718	Historic	Road	Unevaluated
		05-11-56-733	Historic	Habitation Remains and Debris	Unevaluated
		05-11-56-854	Historic	Mining Landscape	Ineligible
		05-11-56-855	Prehistoric	Bedrock Mortars	Unevaluated
		05-11-56-856	Historic	Water Conveyance System	Ineligible
		05-11-56-857	Historic	Mining Landscape	Ineligible

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
		05-11-56-858	Historic	Mining Prospect Pits	Ineligible
		05-11-56-859	Historic	Refuse	Unevaluated
		05-11-56-860	Historic	Mining Complex	Unevaluated
		05-11-56-861	Historic	Earthen Ditch	Ineligible
		05-11-56-862	Historic	Mining Prospect Pits	Ineligible
		05-11-56-863	Prehistoric	Bedrock Milling Feature	Ineligible
		05-11-56-890	Historic	Mining Landscape	Ineligible
		05-11-56-892	Historic	Mining Complex	Ineligible
		05-11-56-893	Historic	Mining Prospect Pits	Ineligible
		05-11-56-896	Prehistoric	Bedrock Milling Feature	Unevaluated
		05-11-56-898	Historic	Fieldstone and Mortar Terrace	Unevaluated

Primary Number	Trinomial	Forest Service Number	Period	Description	National Register Status
Temp: SBL-001			Prehistoric	Bedrock Mortar	Unevaluated
Temp TLF-001			Prehistoric	Bedrock Milling Feature	Unevaluated

Twenty-seven individuals (20 Native American individuals and institutions and seven interested individuals) were consulted as a part the licensees' study. Twelve interviews were conducted between April and July 2015. Native American consultation (20 contacts) included meetings, emails, phone interviews (eight individuals), face-to-face interviews (12 individuals), and a field trip by boat through the Bucks Lake portion of the APE. Twelve Maidu consultants participated in these interviews, either by phone or in person. A number of other contacts were pursued, such as informational meetings or phone calls with Forest Service staff, contacts with other anthropologists, and a research session with the Plumas County Museum Director.

The TCP study (PG&E and City, 2016r) conducted for the project identified 11 ethnographic/ethnohistoric sites including one summer village, one petroglyph site, a set of three interconnected Indian trails, one worshipping ground, one summer hunting area, two different gathering areas, a meeting area, a potential historic grave area, and two place names within the APE that are of potential importance to the local Maidu peoples. These resources were evaluated for National Register eligibility and are listed in table 3-35. One of the sites within the APE (Summer Gathering Area) was determined eligible for the National Register. There are other known traditional cultural resources that have not been located because of a lack of locational information and/or inundation. The licensees would treat these resources as historic properties pending further documentation and they are as follows: Bucks Valley Summer Camp; Petroglyph Area; Worshipping Grounds; and Gathering Area at Bucks Powerhouse.

Table 3-35. TCPs identified within the APE (Source: PG&E and City, 2016r; PG&E, 2018; as modified by staff).

Site Name	Resource Type	Description	National Register Evaluation	SHPO Concurrence⁴
Bucks Valley	Summer camp location with roundhouse	Location inundated; exact location not confirmed	Treat as Historic Property pending documentation; place name Bucks Valley not eligible	No concurrence requested to date, not located
Petroglyph Area	Sacred Site	Location inundated; general location known	Treat as Historic Property pending documentation	No concurrence requested to date, not located
Indian Trails	Trails	Trails tying Bucks Valley to North Fork, east, and west	Not Eligible	Yes
Worshipping Grounds	Sacred Site	Location may be inundated	Treat as Historic Property pending documentation	No concurrence requested to date, not located
Summer Hunting Grounds	Resource Procurement	General location only	Not Eligible	Yes
Rainbow Point	Archaeological Site	On point, partially exposed	Not Eligible as TCP-eligibility based on archaeology	Yes
Summer Gathering Bucks Valley	Resource Procurement	Various locations in valley, on ridges, some inundated	Extant areas eligible, inundated areas not eligible	Yes
Gathering Area, Bucks Powerhouse	Resource Procurement	Wild onion field near powerhouse	Treat as Historic Property pending documentation	No concurrence requested to date, not located

Site Name	Resource Type	Description	National Register Evaluation	SHPO Concurrence⁴
Historic Graves	Cemetery	Report of graves here unsubstantiated	Not Eligible	Yes
Three Lakes	Place Name	Place name only	Not Eligible	Yes
Feather River	Resource Procurement / Place Name	General area only	Not Eligible	Yes
Three Lakes Village	Village with Roundhouse	Between Belding and Three Lakes; timbers standing	Not evaluated, found to be outside of APE	No concurrence requested, not in APE

Architectural Resources

An investigation of built/architectural resources was required by Study Description CR-S1 and detailed in Technical Memorandum 20 (PG&E and City, 2014s), Assess Historic-period Properties. The investigations included research, intensive-level survey, and inventory of all buildings, structures, and objects within the project APE over 45 years of age.

Twenty-two historic period resources were documented during the survey, many of which were multi-component. Ten resources were recommended eligible for listing in the National Register. Of these, nine resources contribute to the Bucks Creek Hydroelectric Project Historic District, which is eligible for listing under Criteria A and C, with a period of significance of 1925–1928. Specifically, they are the Three Lakes Dam, Milk Ranch Conduit, Bucks Lake Dam, Lower Bucks Lake Dam, Tunnel No. 2, Grizzly Forebay Dam, Grizzly Forebay Tunnel, Bucks Creek Powerhouse Penstock, and Bucks Creek Powerhouse. Additionally, the Bucks Creek Powerhouse Penstock was evaluated as individually eligible for listing under Criterion C, with a period of significance of 1925–1928. The tenth eligible resource is the Feather River Highway Historic District, a 48-mile-long linear resource of which approximately 0.3 mile is located within the project APE; the Federal Highway Administration determined the district eligible for listing under Criterion A³⁸ and C,³⁹ with a period of significance of 1928 – 1937 (PG&E and City, 2016s).⁴⁰

The remaining twelve resources were recommended ineligible for listing in the National Register, specifically the Bucks Transmission Yard, Bucks Creek Incline Railway, Service Garage, Bucks Lake Marina, Bucks Lake RV Park, Lakeshore Resort, Haskins Valley Campground, the PG&E Subdivisions Nos. 1, 2, and 3, the Bucks Lake Recreation Residence Tract, and the Bucks Lake Lodge and Cabins.

³⁸ National Register criterion A applies to properties that are associated with events that have made a significant contribution to the broad patterns of our history.

³⁹ National Register criterion C applies to properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

⁴⁰ The period of significance for the Feather River Highway Historic District is not specifically defined in TM-20 or the HPMP (PG&E, 2018). In TM-20, the period of construction is variously listed as 1928–1937 or 1928–1932 (see TM-20 pages 8, 3-2, and 4-12). The HPMP lists the construction date as 1928–1937.

The licensees, as the Commission's designee, made determinations of eligibility in accordance with the paragraphs above. All determinations of eligibility were concurred upon by the California SHPO.

3.3.7.2 Environmental Effects

Under 36 CFR Part 800, an effect on an historic property occurs when an undertaking alters the characteristics that qualify the property for inclusion in the National Register (800.16[i]). On-going hydropower project operations and maintenance and recreation activities, as well as proposed improvements and expansion of some recreation facilities, have the potential to adversely affect cultural resources as a result of soil disturbance, vegetation management, or erosion. Trampling and looting that are sometimes associated with recreation access also have the potential to damage cultural resources. The licensees propose to implement an HPMP (CR-31) to avoid, reduce, or minimize any adverse effects to cultural resources within the APE. To meet section 106 requirements, the Commission intends to execute a PA with the California SHPO for the project to protect historic properties that would be affected by project construction and operation. The terms of the PA would require the licensees to implement an approved HPMP within six months after license issuance.

Our Analysis

As shown above in table 3-34, there are 10 National Register eligible archaeological sites and 35 unevaluated archaeological sites within the APE. Additionally, there are four ineligible prehistoric archaeological resources within the APE that are important to the Tribes whose ancestors may have used them.

There is one National Register eligible TCP within the APE, and six unevaluated TCPs. Three other TCPs within the APE are inundated and for this reason, documentation is pending.

Ten National Register eligible architectural resources are located within the APE. Nine of these are within and contribute to the Bucks Creek Hydroelectric Project Historic District. The tenth is the Feather River Highway Historic District, a 48-mile linear resource of which approximately 0.3 mile is located within the project APE.

During relicensing studies (PG&E and City, 2016r, TM-19; PG&E and City, 2016s, TM-20; and PG&E and City, 2016t, TM-24), the licensees identified regular reservoir fluctuations; vegetation management and hazard tree removal; road maintenance, use, and construction; and emergency repairs as specific actions that have the potential to affect cultural resources. Erosion from wave action and culvert run-off was specifically called out as having an adverse effect on some archaeological sites.

To protect cultural resources in the APE, the licensees propose to implement an HPMP. The HPMP outlines the protection measures, management and consultation protocols and education and outreach methods needed to protect and preserve National Register eligible, unevaluated, and ineligible prehistoric archaeological sites, TCPs, and

architectural sites within the APE. In addition, the HPMP includes guidance for inventory and evaluation methods to ensure that newly identified archaeological resources are evaluated for the National Register, are protected pending evaluation, or are protected if found to be ineligible. The HPMP also defines implementation protocols, including annual reporting and project personnel training, and outlines the procedures to follow in the event of the discovery of human remains on both federal public (PNF) and private land.

With regard to National Register eligible or listed Architectural Resources, the HPMP provides a framework for addressing the full range of activities that would be part of on-going project operations and maintenance and new environmental measures within the new license period by defining two levels of activities:

“Exempt” activities are routine operations and maintenance activities that have either no potential or a very low potential to affect historic properties due to their nature and scope. Such activities would generally be considered automatically exempt from review or consultation under the requirements of the HPMP. The HPMP includes a finite list of exempt activities.

“Screened” activities are those that may or may not have the potential to affect historic properties depending on the way the activity is designed and implemented. Such activities may be determined either exempt from further review or require consultation. The HPMP includes a list of screened activities, though it also notes that any activity not specified as exempt must be screened. The consultation process for screened activities is defined in the HPMP and mirrors the Section 106 process defined in 36 CFR Part 800.

The HPMP also includes specific measures to address 19 sites where project operations and maintenance or recreation activities are having or have the potential to adversely affect cultural resources. These sites are listed in table 3-35. The table also includes two sites that could not be relocated during relicensing studies, where additional evaluation (and treatment) may be needed.

As discussed in section 3.3.6, *Land Use and Aesthetics*, the licensees propose several changes to project boundaries to ensure that land needed for project operations is encompassed within the project boundary, and that land not required for purposes of project O&M is removed. Changes in the project boundary could affect management jurisdiction for cultural resources within the APE. The FLA indicates that any land excluded from the project boundary – and thus excluded from FERC oversight under the new license – would revert to Forest Service oversight and protection. Through federal management, cultural resources within these lands would continue to be protected under section 106. The licensees are continuing to work with the Forest Service to ensure that appropriate compliance responsibilities, including additional survey of new areas, if needed, are delineated in the HPMP.

Staff review of the HPMP indicates this plan would benefit cultural resources by providing a comprehensive approach to protecting and managing archaeological sites,

TCPs, and architectural sites. It contains broad measures to address current and future project-related activities, as well as specific treatments to address issues that have been identified to date. The Commission's execution of a PA with California SHPO would ensure that the HPMP is implemented as planned.

Table 3-35. Archaeological sites, within the APE that may be affected by project operations, and treatment identified in the HPMP (Source: PG&E and City, 2016t; PG&E, 2018, as modified by staff).

Primary (P-) Trinomial (CA-) Forest Service (05-)	Potential Project Effect(s)	Treatment Identified in the HPMP
P-32-000111 CA-PLU-111 05-11-56-674	Only a small portion of the site is above the waterline, with insufficient material to test or evaluate at time of inventory.	Monitor
P-32-000112 CA-PLU-112 05-11-56-838	Only a small portion of the site is above the waterline, with insufficient material to test or evaluate at time of inventory.	Monitor
P-32-000113 CA-PLU-113	Soil deflation resulting from wave action. Adjacent to active recreational areas and subject to littering, recreation user foot traffic, potential for looting.	Data recovery excavation
P-32-000114 CA-PLU-114	Soil deflation resulting from wave action. Adjacent to active recreational areas and subject to littering, recreation user foot traffic, potential for looting.	Data recovery excavation
P-32-000115 CA-PLU-115 05-11-54-2	Soil deflation resulting from wave action.	Data recovery excavation
P-32-000116 CA-PLU-116	Not relocated.	Monitor area to try to relocate site
P-32-000117 CA-PLU-117	Soil deflation resulting from wave action.	Data recovery excavation
P-32-000118 CA-PLU-118 05-11-54-4	Not relocated.	Monitor area to try to relocate site

Primary (P-) Trinomial (CA-) Forest Service (05-)	Potential Project Effect(s)	Treatment Identified in the HPMP
P-32-000119 CA-PLU-119/H	Only a small portion of the site is above the waterline, with insufficient material to test or evaluate at time of inventory.	Monitor
P-32-000956 CA-PLU-956/H 05-11-54-149	Culvert is draining over the site causing erosion of soil and cultural constituents.	Redirect culvert away from site to eliminate erosion
P-32-001015 CA-PLU-1015	Soil deflation resulting from wave action. Adjacent to active recreational areas and subject to littering, recreation user foot traffic, potential for looting.	Data recovery excavation; protect with educational signage and/or site buffers
P-32-001119 CA-PLU-1119 05-11-54-637	Only a small portion of the site is above the waterline, with insufficient material to test or evaluate at time of inventory.	Monitor
P-32-001635 CA-PLU-1635H	Only a small portion of the site is above the waterline, with insufficient material to test or evaluate at time of inventory.	Monitor
P-32-002440 CA-PLU-2440/H 05-11-54-296	Site is partially submerged at Three Lakes and is potentially subject to wave action. Site is also adjacent to active recreational areas and subject to littering, recreation foot traffic, and potential for looting.	Evaluate for the National Register within 1 year of License issuance and continue to monitor
P-32-004915 CA-PLU-4915 05-11-56-891	Non-Project road intersects the site resulting in disturbances related to erosion and dispersed campaign on the site.	Consult with PNF to address project and non-project effects to site by installing barriers or implementing other appropriate protection measures.

Primary (P-) Trinomial (CA-) Forest Service (05-)	Potential Project Effect(s)	Treatment Identified in the HPMP
P-32-004916 CA-PLU-4916/H 05-11-56-894	Graffiti pecked into rock adjacent to the prehistoric rock art panel.	Avoid
P-32-004918 CA-PLU-4918 05-11-56-897	Soil deflation resulting from wave action.	Data recovery excavation
05-11-56-662	Near day use area—subject to littering, recreational foot traffic, and potential for looting.	Evaluate for the National Register within 1 year of License issuance and continue to monitor.
05-11-56-693	Recreational uses evident on the site and possible looting.	Evaluate for the National Register within 1 year of License issuance and continue to monitor.
Temp: SBL-001	Only a small portion of the site is above the waterline, with insufficient material to test or evaluate at time of inventory.	Monitor
Temp TLF-001	Only a small portion of the site is above the waterline, with insufficient material to test or evaluate at time of inventory.	Monitor

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative the project would continue to operate as it has in the past. None of the licensees' proposed measures or the resource agencies' recommendations and mandatory conditions would be required. The staff-recommended measure to expand the project boundary would not be implemented.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Bucks Creek Project's use of Bucks, Grizzly, and Milk Ranch Creeks, tributaries to the NFFR, for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,⁴¹ the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using the likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EIS for the protection, mitigation, and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for construction, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECT

Table 4-1 summarizes the assumptions and economic information we use in our analysis for the project. This information was provided by the licensees in the license application or estimated by staff. We find that the values provided by the licensees are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs, net investment, estimated future capital investment required to maintain and extend the life of facilities, relicensing costs, normal O&M cost, and Commission fees.

⁴¹ See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

Table 4-1. Staff parameters for economic analysis of the Bucks Creek Project.
 (Source: PG&E and City, 2018a, and California Public Utilities Commission; as modified by staff).

Parameter	Value	Sources
Power value (2018) ^a	\$31.93/MWh	Supplement to Final License Application
Period of analysis	40 years	Staff
Cost of capital	7.68 percent	Supplement to Final License Application
Discount rate ^b	7.68 percent	Supplement to Final License Application
Escalation rate	0.0 percent	Staff
Federal income tax rate	19.14 percent	Supplement to Final License Application
Local income tax rate ^c	8.84 percent	Supplement to Final License Application
Term of financing	20 years	Staff
Insurance	\$331,395	Supplement to Final License Application (Rate applied to Net Investment)
O&M costs (\$2018) ^d	\$3,842,170	Supplement to Final License Application
Net investment	\$74,685,032	Supplement to Final License Application
Cost of preparing license application and conducting studies	\$35,780,000	Supplement to Final License Application

^a Based on annualized average of California Public Utilities Commission Short Run Avoided Costs, seasonal averages.

^b Set equal to cost of capital

^c State tax rate

^d Includes annualized capital expenditures

4.2 COMPARISON OF ALTERNATIVES

4.2.1 No-action Alternative

Under the no-action alternative, the licensees would continue to operate the project under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. The estimated average annual generation of the Bucks Creek Project is 271,000 MWh, valued at about \$8,653,030 (31.93 mills/kWh). The annual cost would be about \$23,531,163 (86.83 mills/kWh) resulting in costs of \$14,878,133 (54.90 mills/kWh) more than the cost of the most likely alternative source of power.

4.2.2 Applicants' Proposal

Under the licensees' proposal, the project would generate an average of 260,243 MWh of electricity annually, valued at about \$8,309,559 (31.93 mills/kWh). The annual cost would be about \$28,655,409 (110.11 mills/kWh) resulting in costs of \$20,345,850 (78.18 mills/kWh) more than the cost of the most likely alternative source of power.

4.2.3 Staff Alternative

This alternative is similar to the licensees' proposal, but with the exception of excluding general measures and the inclusion of certain mandatory measures associated with water quality related recommendations, avian protection plan, and the exclusion of some aquatic resource measures. This alternative would have an average annual generation of 260,243 MWh, and an average annual cost of alternative power of \$8,309,559 (31.93 mills/kWh). The average annual project cost would be \$28,560,835, or about 109.75 mills/kWh. Overall, the project would produce power at a cost that is \$20,251,276, or 77.82 mills/kWh, more than the cost of alternative power.

4.2.4 Staff Alternative with Mandatory Conditions

This alternative is similar to the staff alternative with the exception of incorporating additional aquatic resource monitoring in the licensees' proposed measures as well as Forest Service preliminary 4(e) conditions for special-status species protective measures, in addition to the licensees' general measures. This alternative would have an average annual generation of 260,243 MWh, and an average annual cost of alternative power of \$8,309,559 (31.93 mills/kWh). The average annual project cost would be \$28,672,399, or about 110.18 mills/kWh. Overall, the project would produce power at a cost that is \$20,362,840, or 78.25 mills/kWh, more than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 4-2 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over

a 40-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 4-2. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Bucks Creek Hydroelectric Project (Source: staff).

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
General				
1. Annual Employee Awareness Training (GEN-1)	Licensees, FWS California DFW, Forest Service ^d	\$25,000	\$6,000	\$10,460
2. Annual Consultation with Forest Service (GEN-2)	Licensees, Forest Service ^d	\$0	\$0	\$2,000
3. Establish Ecological Consultation Group and Host Meetings (GEN-3)	Licensees, California DFW, Water Board	\$0	\$30,000	\$30,000
Geology and Soils Resources				
4. Pass Large Woody material at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay Dams (GS-1)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$0	\$0
5. Gravel Augmentation Plan for Bucks and Grizzly Creeks (GS-2)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$28,000	\$28,000

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
Aquatic Resources				
6. Minimum Instream Flow Releases (WR-1)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$120,000	\$22,000	\$299,530
7. Annual Drawdown of Three Lakes (WR-3)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$1,000	\$1,000
8. Channel Maintenance Flows (WR-4)	Staff, licensees, California FW, FWS, Forest Service, ^d Water Board	\$0	\$0	\$1,010
9. Protect Reservoir Operations (WR-5)	Staff, licensees, FWS, Forest Service, ^d Water Board	\$0	\$0	\$0
10. Spill Management at Grizzly Forebay and Lower Bucks Lake (WR-6)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$0	\$6,000
11. Annual Determination of Water-Year Type (WR-7)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$0	\$0

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
12. Expand Notice of Annual Determination of Water-Year Type to Include Notifying the California DFW, FWS, and Water Board, in Addition to the Forest Service and Commission	Staff, Water Board	\$0	\$0	\$0
13. Manage Diversions along Milk Ranch Conduit for Safety and Aesthetics (WR-8)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$75,000	\$0	\$13,370
14. Wet Water Year Milk Ranch Conduit Diversion Nos. 1 & 2 Bypass Flows (WR-9)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$48,000	\$2,000	\$19,330
15. Streamflow and Reservoir Level Gaging Plan (WR-10)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$0	\$0
16. Develop a Drought Management Plan	Staff, Water Board	\$20,000	\$0	\$3,560
17. Fish Stocking (AR-1)	Licensees, California DFW, Forest Service, ^d Water Board	\$0	\$70,000	\$70,000

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
18. Develop a fish stocking plan	Staff	\$5,000	\$70,000	\$70,890
19. Aquatic Resources Monitoring Plan (AR-2) ^e	Licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$82,000	\$82,000
20. Modify the Aquatic Resources Monitoring Plan (AR-2) to Remove: (1) Stream Fish; (2) Three Lakes Brook Trout; (3) Benthic Macroinvertebrates; (4) FYLF; (5) Water Temperature; (6) Water Quality; (7) Large Woody Material; And (8) Riparian Vegetation.	Staff	\$0	\$1,500	\$1,500
21. AIS Management Plan (Ar-4)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$40,000	\$20,000	\$27,130
Terrestrial Resources				
22. Integrated Vegetation Management Plan (TR-1)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$84,000	\$84,000

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
23. Bald Eagle Management Plan (TR-2)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$8,000	\$8,000
24. Limited Operating Period for Breeding Osprey (TR-3)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$5,000	\$5,000
25. Limit Project-Related Activities during the California Spotted Owl and Northern Goshawk Breeding Seasons Within the Vicinity of Active Nests (TR-4)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$8,000	\$8,000
26. Evaluate, and Upgrade if Necessary, Transmission Line for Consistency with APLIC and Implement Other Raptor Protection Measures (TR-5)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$50,000	\$5,000	\$13,910
27. Develop an Avian Protection Plan that Outlines the Design of any Proposed Modifications as a Result of the APLIC Evaluation	Staff	\$5,000	\$0	\$890

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
28. Conduct Periodic Northern Goshawk and California Spotted Owl Nesting Surveys (TR-6)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$0	\$0
29. Limit Project-Related Activities During Willow Flycatcher Breeding Season (TR-7)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$2,000	\$2,000
30. Consult with Bat Biologist Prior to Significant Structural Modifications and Vegetation Management Activities (TR-8)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$4,000	\$4,000
31. Inspect Project Tunnels for Bats Prior to O&M Activities in Winter (TR-9)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$3,000	\$3,000
32. Consult with Bat Biologist Prior to Loud/Vibration Activities Along Three Lakes Road or at Three Lakes Dam (TR-10)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$3,000	\$3,000
33. Special-Status Species (New Construction) ^c	Forest Service ^d	\$0	\$4,000	\$4,000

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
34. Special-Status Species (Annual Review) ^c	Forest Service ^d	\$0	\$500	\$500
Threatened and Endangered Species				
35. Full Natural Flow in Bear Ravine at Milk Ranch Conduit Diversion No. 8 (WR-2)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$740,000	\$74,000	\$277,440
36. SNYLF Management Plan (AR-3)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$144,000	\$144,000
Recreation, Land Use, and Aesthetic Resources				
37. Recreation Management Plan (RR-1)	Staff, licensees, Forest Service, ^d Water Board	\$14,914,000	\$420,000	\$3,078,230
38. Recreation Management Plan Modifications – Bucks Lake Boat-In Campground ^f	Staff, licensees, Forest Service ^d	\$0	\$0	\$0

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
39. Recreation Management Plan Modifications – Recreation Site Occupancy Monitoring	Staff, licensees, Forest Service ^d	\$0	\$20,000	\$20,000
40. Transportation Management Plan (LU-1)	Staff, licensees, Forest Service, ^d Water Board	\$3,809,000	\$128,000	\$806,910
41. Fire Prevention and Response Plan (LU-2)	Staff, licensees, Forest Service ^d	\$200,000	\$20,000	\$55,650
42. Shoreline Management Plan (LU-3)	Staff, licensees, FWS	\$0	\$15,000	\$15,000
43. Bucks Lake SMP Revision	Staff, Forest Service ^d	\$3,000	\$0	\$530
44. Consult with Forest Service Prior to Painting the Exterior of Project Structures (LU-4)	Staff, licensees, Forest Service ^d	\$0	\$0	\$0
45. Hazardous Materials Management Plan (LU-5)	Staff, licensees, California DFW, FWS, Forest Service ^d	\$0	\$0	\$0
46. Erosion Management Plan (LU-6)	Staff, licensees, California DFW, FWS, Forest Service, ^d Water Board	\$0	\$0	\$0

Enhancement/Mitigation Measures	Entities	Capital (2018\$)	Annual Cost^a (2018\$)	Levelized Annual Cost^b (2018\$)
Cultural Resources				
47. Historic Properties Management Plan (CR-1)	Staff, licensees, Forest Service ^d	\$195,000	\$315,000	\$349,760

^a Annual costs typically include operational and maintenance costs and any other costs that occur on a yearly basis.

^b All capital and annual costs are converted to equal annual costs over a 40-year period to give a uniform basis for comparing all costs. Any financed capital costs are evaluated on a 20-year term.

^c Preliminary 4(e) conditions not adopted by staff.

^d Preliminary 4(e) condition.

^e Aquatic Resources Monitoring Plan consists of nine sub-measures. Staff agreed only to one, Gravel Monitoring.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection of, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the Bucks Creek Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative as the preferred option. We recommend this option because: (1) issuance of a new hydropower license by the Commission would allow the licensees to operate the project as an economically beneficial and dependable source of electrical energy for its customers; (2) the 85-MW electric capacity comes from a renewable resource that does not contribute to atmospheric pollution, including greenhouse gases; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the proposed and recommended measures would protect and enhance fish and wildlife resources, and would improve recreation opportunities at the project.

In the following section, we make recommendations as to which environmental measures proposed by the licensees or recommended by agencies and other entities should be included in any license issued for the project.

5.1.1 Measures Proposed by the Licensees

Based on our environmental analysis of the licensees' proposal discussed in section 3 and the costs discussed in section 4, we recommend including the following environmental measures proposed by the licensees in any license issued for the project. Our recommended modifications to the licensees' proposed measure are shown in *bold italic* and parts of measures that we do not recommend are shown in ~~strikeout~~.

General Measures

- ~~Provide annual employee training related to special status species, NNIPs, cultural resources, and reporting procedures (GEN-1).~~
- ~~Consult annually with the Forest Service and other interested agencies regarding license implementation, resource monitoring results, non-routine~~

~~maintenance, and overall coordination of activities occurring on NFS lands (GEN-2).~~

- ~~• Establish an Ecological Consultation Group to annually consult on the implementation of resource management plans and other applicable license conditions (GEN-3).~~

Geology and Soils

- Implement the Erosion Management Plan (LU-6) to minimize future erosion and sedimentation as a result of ground-disturbing activities from routine O&M, emergency actions, and planned projects within the project boundary.

Aquatic Resources

- Allow large woody material to naturally pass over Grizzly Forebay Dam and Lower Bucks Lake Dam during spill events to improve aquatic habitat downstream. Wood at Bucks Lake Spillway would be manually relocated to the Lower Bucks Lake Spillway to protect a road crossing over the spillway (GS-1).
- Implement the Gravel Augmentation Plan (GS-2) to improve trout spawning habitat and populations downstream of Lower Bucks Dam and Grizzly Forebay Dam.
- Provide higher minimum instream flows, by water year type and month, to Bucks Creek below Lower Bucks Lake Dam (ranging from 4 to 15 cfs), and Grizzly Creek below Grizzly Forebay (ranging from 4 to 13 cfs); provide minimum instream flows where none are required under the existing license, by water year type and month, in the following reaches: Bucks Creek below Bucks Lake Dam (3 cfs in all months regardless of water year type), Milk Ranch Creek downstream of Three Lakes (ranging from 0.25 cfs to the unimpaired outflow of the reservoir), Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1 (ranging from 0.25 cfs or the natural inflow, whichever is less, to 2 cfs), and South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 (0.5 cfs or natural inflow, whichever is less) (WR-1).
- Initiate draw down of Three Lakes annually by between August 15 and September 15 to protect aquatic habitat (WR-3).
- Provide channel maintenance flows of increased duration and magnitude to Bucks Creek below Lower Bucks Lake Dam and Grizzly Creek below Grizzly Forebay Dam to protect and enhance riparian and instream habitat (WR-4).
- Manage reservoir operations to maintain the following existing minimum pool elevations to protect and enhance aquatic habitat and recreation

- resources: 4,966 feet at Lower Bucks Lake; 6,050 feet at Lower Lake; 6,057 feet at Middle Lake; 4,303 at Grizzly Forebay; in a Dry or Critically Dry water year type, 5,080 feet at Bucks Lake; and in a Wet or Normal water year type, 5,100 feet at Bucks Lake, and not exceed 15 feet below the water surface elevation as of June 1 between June 1 and September 1 (WR-5).
- Gradually decrease powerhouse load changes during managed spills, and schedule no outages longer than 2 weeks at Bucks and Grizzly Powerhouses during April through July to reduce potential effects of flow fluctuations on fisheries and breeding and rearing FYLF (WR-6).
 - Determine water-year type annually, to be used for the implementation of instream flows (WR-1), channel maintenance flows (WR-4), project reservoir operations (WR-5), and Milk Ranch Conduit bypass flows in Wet water years (WR-9), based on the California DWR forecast to be consistent with other NFFR watershed hydroelectric projects and simplify compliance and operational consistency for instream flows, *with modifications to provide notice to FWS, Water Board, and California DFW, in addition to Forest Service and FERC of the final water year type determination* (WR-7).
 - Leave six inoperable diversions along Milk Ranch Conduit in place to maintain current channel and riparian conditions (WR-8).
 - Allow unimpaired flow at two Milk Ranch Conduit diversions, Milk Ranch Creek (Diversion No. 1) and North Fork Grouse Hollow Creek (Diversion No. 2), during Wet water years rather than seasonally diverting flows into the conduit to enhance seasonal aquatic habitat and year-round riparian resources (WR-9).
 - Implement the Streamflow and Reservoir Level Gaging Plan (WR-10) to document compliance with streamflow and reservoir level requirements.
 - Implement the Hazardous Materials Management Plan (LU-5) that includes standard practices regarding the storage, use, transport, and disposal of hazardous materials to protect water quality.
 - ~~Fund~~ **Implement a** fish stocking by California DFW in *plan for* Bucks Lake, Grizzly Forebay, and Middle and Lower Lakes in each year stocking occurs to improve the recreational fishery (AR-1).
 - Implement the Aquatic Resources Monitoring Plan (AR-2) that includes measures to monitor stream fish populations in Milk Ranch, Bucks, and Grizzly Creeks downstream of Project dams; brook trout in Three Lakes; benthic macroinvertebrates and *FYLF in project affected reaches of Bucks, Grizzly, and Milk Ranch Creeks*; water temperature in downstream portions of Bucks, Grizzly, and Milk Ranch Creeks; water quality in recreational areas of Bucks Lake, Lower Bucks Lake, Grizzly Forebay, Three Lakes, and Bucks

~~Creek downstream of Lower Bucks Lake; stream channel morphology, large woody material, and riparian vegetation in Bucks and Grizzly Creeks below Lower Bucks Lake Dam and Grizzly Dam, respectively, gravel in Bucks Creek downstream of Lower Bucks Lake Dam spillway and in Grizzly Creek downstream of the Grizzly Creek gaging weir to document the maintenance of 37 cubic yards of 0.25- to 2.5-inch diameter gravel at those stream locations any long-term changes in resource conditions in order to facilitate resource management.~~

- Develop an AIS management plan to prevent the introduction and spread of AIS on project land (AR-4).

Terrestrial Resources

- Implement the Integrated Vegetation Management Plan (TR-1) that includes measures to protect special-status plant populations and natural communities on project land.
- Implement the Bald Eagle Management Plan (TR-2) to protect eagles on project land from disturbance.
- Implement a limited operating period during the osprey breeding season (March 15 to August 31). During this period, protective buffers would be established around active osprey nests on project land when conducting potentially disruptive project maintenance activities to protect nesting birds from disturbance (TR-3).
- Implement limited operating periods during the California spotted owl and northern goshawk breeding seasons (March 1 through August 31, and February 15 through August 31, respectively). During this period, 0.25-mile protective buffers would be established around active nests on project lands when conducting project maintenance activities to protect nesting birds from disturbance (TR-4).
- Evaluate, and upgrade if necessary, the project transmission line for consistency with APLIC standards and implement other raptor protection measures. Throughout the term of the new license, ensure all newly installed powerlines, poles, conductors, and other transmission infrastructure conform to current guidelines to minimize or avoid electrocution and collision hazards (TR-5); *develop an avian protection plan that outlines the design of any proposed modifications.*
- Conduct nesting surveys on project land for California spotted owls and northern goshawks the first year following license issuance, then every 7 years thereafter, and establish buffers in which no work would occur around active nests to protect nesting birds from disturbance (TR-6).

- Limit O&M activities on project land during willow flycatcher breeding season within buffer zones around suitable habitat to protect nesting birds from disturbance (TR-7).
- Consult with a bat biologist prior to significant project facility modifications and project-related vegetation management activities to protect maternity colonies composed of approximately 50 bats or more and colonies of any size if composed of special-status bats (TR-8).
- Inspect project tunnels for bats prior to conducting O&M activities in the winter and implement appropriate protective measures or a limited operating period to protect hibernacula supporting special-status bat species or approximately 50 or more non-special-status bats (TR-9).
- Consult with a bat biologist prior to any loud/vibration O&M activities along Three Lakes Road or Three Lakes Dam to protect special-status bat species during the maternity season (TR-10).

Threatened and Endangered Species

- Provide unimpaired flows in Bear Ravine at Milk Ranch Conduit Diversion No. 8 to protect the federally endangered SNYLF and its critical habitat (WR-2).
- Implement the SNYLF Management Plan (AR-3) that includes measures to protect SNYLFs and their suitable habitat that would be implemented during project-related O&M activities in areas above 4,500 feet.

Recreation Resources

- Revise the Recreation Management Plan (RR-1) to reflect the agreement between the licensees and the Forest Service (filed May 14, 2019) that includes measures to address existing and future recreation resource needs within the project boundary.

Land Use and Aesthetics

- Implement the Transportation Management Plan (LU-1) that provides guidance for the rehabilitation and maintenance of project roads.
- Implement the Fire Prevention and Response Plan (LU-2) that includes procedures for fire prevention, reporting, and safe fire practices for project facilities.
- Implement a revised SMP (LU-3) (to be filed with the Commission by July 31, 2019) that would address all shorelines within the project boundary, and guide the use, occupancy, and management of shoreline resources.

- Consult with the Forest Service prior to painting the exterior of project facilities on NFS land, to select a suitable paint color that minimizes the contrast between facilities and their surrounding landscape (LU-4).

Cultural Resources

- Implement a HPMP (CU-1) to protect and preserve historic properties identified in the project area, as well as ongoing inventory and evaluation of cultural resources in the project area.

5.1.2 Additional Measures Recommended by Staff

In addition to the licensees' proposed measures listed above, we recommend including the following staff-recommended measures in any license issued for the Bucks Creek Hydroelectric Project:

- Revise the project boundary to include the area from the proposed location of the Bucks Lake Shoreline Trail to the shoreline of Bucks Lake.
- Develop a drought management plan that defines drought conditions based on available data specific to the project, rather than regional or state-wide proclamations, to ensure modifications to operations during extended low-water periods are only implemented as necessary and in a manner that would protect aquatic resources.

Below, we discuss our rationale for our additional staff recommended measures and modification to the proposed measures.

Changes to the Project Boundary

The existing project boundary includes land that is not required for continued project O&M. The licensees propose to revise the project boundary to: (1) include land necessary for current and future O&M activities, and recreation development; (2) remove land where there are no project-related uses necessary for O&M; and (3) reduce the shoreline buffer of project reservoirs to a horizontal distance ranging from 25 to 40 feet from the maximum water surface elevation, where project infrastructure and recreational facilities are not located along the shoreline. The licensees' proposed changes would remove 331.3 acres from the project boundary. No agencies or stakeholders commented on the proposed boundary changes.

Based on our analysis in section 3.3.6.2, subsection *Project Boundary*, we find that, in general, the licensees' proposed changes to the project boundary reflect land needed to fulfill project purposes, with two exceptions. The licensees propose to construct the Bucks Lake Shoreline Trail between Sundew and Mill Creek Campgrounds. The trail would be designed to accommodate pedestrian and bicycle use. The project boundary is close to the shoreline in some of this area and, because placement of the trail would need to be located upslope of sensitive shoreline and

riparian vegetation, it currently does not include the expected location of the trail. The trail would be part of the licensees' recreation facilities that support public access to the project, and expanding the project boundary to include this land would ensure that the licensees obtain the necessary property rights to maintain the trail and to protect the adjacent resources for the term of the license.

Therefore, we recommend that the project boundary be modified to add the land necessary for development of the new trail, including all land between the trail and the Bucks Lake shoreline, in any new license issued for the project. We estimate extending the project boundary to include this area would have no additional cost.

The licensees also propose to reconstruct and relocate the Lower Bucks Lake Campground. Maps in appendix G2 of Exhibit G of the final license application show the existing and proposed project boundary. Figure G.2-4 shows modifications to the project boundary in the area of the proposed relocated Lower Bucks Lake Campground that are not described elsewhere in the license application. The proposed project boundary should fully encompass the relocated Lower Bucks Lake Campground in order to ensure that the licensees obtain the necessary property rights to maintain the facilities and protect environmental resources within the recreation site.

Therefore, we recommend that the proposed modification to the project boundary for the Lower Bucks Lake Campground be described such that it is clear that the project boundary would encompass the land required for the operation and maintenance of the recreation site.

Drought Management Plan

The Water Board preliminary condition 4 requires the licensees to develop a drought management plan to set a default process to protect beneficial uses of water when water supply dictates that project reservoir minimum pool targets or minimum instream flow requirement cannot be achieved. The plan is to outline thresholds for requests, consultation requirements, timing for requests, public participation and any additional monitoring and reporting required.

Defining drought in the Bucks Creek project area based on local metrics would provide a relevant basis and evaluation criteria for drought management options within Bucks, Grizzly, and Milk Ranch Creeks. As a result, a localized definition of drought would better protect resources susceptible to the effects of project operation during drought conditions. Consequently, we recommend the licensees develop a drought management plan, in consultation with the Forest Service, FWS, the Water Board, and California DFW, to define drought conditions based on available data specific to the proposed project, including current storage in project reservoirs, watershed snowpack and soil moisture conditions, current and projected operating requirements for instream flows and reservoir elevations, weather forecasts, and other project operation limitations. We estimate that the plan with these revisions would have a levelized annual cost of \$3,560, and the benefits to aquatic resources would be worth the cost.

Additional Agency Notice of Determination of Water Year Type

The licensees propose to classify water years into Wet, Normal, Dry, and Critically Dry each year using the California DWR's Bulletin 120 forecast, as discussed in section 3.3.2.2, *Water Year Type Determination*. The licensees propose to notify the Forest Service and the Commission of the final water year type determination within 30 days of making the determination. California DFW 10(j) recommendation 3 recommends, and Forest Service preliminary 4(e) condition 31 specifies, that the licensees should provide notice of final water year type determination to the FWS, Water Board, and California DFW, in addition to the Forest Service and the Commission.

The licensees would use the annual water year type determination to select which minimum instream flow and channel maintenance flow regime would apply for that year. As these flow regimes affect water quantity and aquatic resources in the project area, FWS, Water Board, and California DFW should also be notified of the final water year type determination.

Consequently, we recommend the licensees notify the FWS, Water Board, California DFW, Forest Service, and the Commission of the final water year type determination within 30 days of making the determination, consistent with Forest Service condition 31. We estimate expanding notice of the annual water year type determination would have no additional cost.

Fish Stocking Plan

The applicants propose to fund California DFW's stocking of project lakes (AR-1). The Commission, however, only has jurisdiction over its licensees, and thus, cannot ensure that California DFW would ultimately carry out the fish stocking. Therefore, because the proposed and recommended fish stocking is needed to improve the recreational fishery in Bucks, Grizzly, and Milk Ranch Creeks, we recommend that the licensees assume the ultimate responsibility for the fish stocking by developing and implementing a fish stocking plan rather than simply providing funds to California DFW to do so. We estimate that fish stocking and development of a fish stocking plan would have a levelized annual cost of \$70,890, and the benefits to fishery and recreational resources would be worth the cost.

Modifications to the Aquatic Resources Monitoring Plan (AQ-2)

A number of measures under the staff-recommended alternative would benefit aquatic and riparian habitat in the Bucks Creek Project area (e.g., increased minimum instream flows, LWM and sediment management, controlled drawdowns, and spill recession rates). The habitat benefits are expected to result in improvements to the distribution and abundance of resident salmonids, BMI, and FYLF, and potentially improve angler success. The licensees propose to implement their Aquatic Resources Monitoring Plan (AQ-2) to generally monitor aquatic resource conditions (i.e., water

temperature/water quality, stream fish, Three Lakes brook trout, BMI, FYLF, stream channel morphology, LWM, and riparian vegetation) for the term of any new license issued for the project. However, except for a provision for gravel monitoring in Bucks Creek downstream of Lower Bucks Lake Dam spillway and in Grizzly Creek downstream of the Grizzly Creek gaging weir (to document the maintenance of 37 cubic yards of 0.25- to 2.5-inch diameter gravel at those stream locations), the plan does not include evaluation criteria for monitoring results tied to specific project-related actions or implementation of specific project-related environmental measures. It also does not provide for specific, project-related implementable actions if results of the monitoring show population declines. The monitoring plan also is not designed to isolate the specific effects of project operations or other project-related activities such that the results can distinguish between project-related effects and other non-project beneficial actions or stressors acting on the fish and wildlife populations.

Regarding the plan's provisions for gravel monitoring, there is little data on actual gravel transport rates in the creeks, and modeling gravel transport in steep, high-roughness channels like Grizzly Creek and Bucks Creek is difficult. For this reason, the stream channel morphology monitoring plan included in section 2.7 of the Aquatic Resources Monitoring Plan (AR-2) would be important in providing data on how quickly spawning-sized gravel is moved from the augmentation sites so that additional gravel could be added to maintain the proposed 37-cubic-yards of spawning gravel, as needed. These methods are appropriate to assess the quantity and quality of gravel added to the creeks to determine if additional gravel needs to be added in subsequent years to maintain the 37 cubic yard target as specified in the licensees' Gravel Augmentation Plan (GS-2). The monitoring is also directly related to implementing a proposed gravel augmentation measure, and therefore, would provide a specific, project-related benefit.

Therefore, we recommend implementation of the stream channel morphology component (i.e., the gravel monitoring component) of the proposed Aquatic Resources Monitoring Plan (AR-2), but not the components for monitoring of water temperature/water quality, stream fish, Three Lakes brook trout, BMI, FYLF, LWM, and riparian vegetation. We estimate implementation the *Aquatic Resources Monitoring Plan*, with our recommended modifications, would have a levelized annual cost of \$1,500, and the benefits to aquatic resources would be worth the cost. We recognize, however, that the plan would be required by Forest Service preliminary 4(e) condition 34 and potentially by Water Board preliminary condition 11 and would be included as a mandatory condition in any license issued for the project.

Modifications to Raptor Protection Measures (TR-5)

The licensees propose to evaluate within 2 years of license issuance, and upgrade if necessary, the 4.2-mile-long project transmission line for consistency with APLIC (2006 and 2012) standards and implement other raptor protection measures and ensure all newly installed transmission facilities conform to current guidelines (TR-5). Minor

modifications or retrofits would be completed with 3 years and major repairs within 10 years of license issuance.

As discussed in section 3.3.3.2 (*California Spotted Owl and Northern Goshawk* subsection), implementation of these measures would help avoid or minimize avian mortality from electrocution or collision hazards. The measures would benefit special-status bird species, including the California spotted owl, northern goshawk, bald eagle, and osprey that are known to occur in the project area. The proposal would also help ensure system reliability by minimizing bird-caused outages. The proposal, however, lacks specifics in terms of the modifications that may be needed.

Development of an avian protection plan that outlines the modifications to be made after evaluating the line, after consultation with Forest Service, FWS, and California DFW, including specific designs and specifications, agency comments, and schedule, would benefit special-status species and other bird species. We estimate that developing the plan would have a levelized annual cost of \$890 and the benefits to special-status bird species would be worth the cost.

5.1.3 Measures Not Recommended by Staff

Staff finds that some of the measures recommended by other interested parties would not contribute to the best comprehensive use of the Bucks and Grizzly Creek water resources, do not exhibit sufficient nexus to project environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures.

Annual Training

Implementation of project O&M activities would require interactions between licensees' staff and sensitive resources. To minimize the potential for inadvertent effects, the licensees propose to provide annual environmental training for employees (GEN-1). Forest Service preliminary 4(e) condition 27, FWS 10(j) recommendation 1, and California DFW 10(j) recommendation 1 specify implementation of GEN-1. Some components of this training are identified in resource management plans. For example, the Integrated Vegetation Management Plan includes training licensees' staff to recognize sensitive and non-native invasive plant species. However, the extent of the full training curriculum is not clear. While we agree such training would benefit environmental resources, licensees are expected to train their employees to the extent needed for the licensees to maintain compliance with a license. Therefore, we do not recommend incorporating this measure as part of any license issued for the project. This measure, however, would be required by Forest Service preliminary 4(e) condition 27 and would be included as a mandatory condition in any license issued for the project.

Additional Consultation and Review

The licensees propose to meet annually with the Forest Service to review federally listed and special-status species, assess newly added species occurring on federal land, and, if necessary, consult with agencies to develop and implement protection measures (GEN-2). In addition, the licensees propose to organize an ecological consultation group comprised of various stakeholders and to host meetings at least once per year (GEN-3). Forest Service preliminary 4(e) condition 1 specifies implementation of GEN-2, and the Water Board's preliminary condition 9 states they would most likely require the formation of an ECG, but does not provide an agenda.

Forest Service preliminary 4(e) condition 29 recommends an annual review of special-status species. When a species is added to a special-status list, the licensees would consult with the Forest Service to evaluate if the species or its suitable habitat is likely to occur on Forest Service land within the project boundary. If a species is determined likely to occur on project land, the Forest Service recommends the licensees develop and implement a study plan to assess the effects of the project on the species.

Our analysis in sections 3.3.2.2 and 3.3.3.2 indicates that although we agree that consultation prior to new construction and non-routine maintenance would help protect federally listed species and their habitats over the term of the license, we typically do not include license conditions that require compliance with applicable environmental statutes, such as ESA. If ESA issues arise during the term of the license, either based on new listings or availability of new information, post-licensing procedures developed by the Commission and resource agencies (FERC et al., 2000) provide a framework for identifying issues, information gaps, and need for protection measures. The Commission typically includes in its licenses a standard article providing such protection. If a licensee does not agree to implement needed measures, this license article contains a fish and wildlife reopener provision that could be used to require changes to project facilities or maintenance plans upon Commission motion, or as recommended by the appropriate state and federal fish and wildlife agencies, after notice and opportunity for hearing. This standard reopener retains authority for the Commission to implement any measures that may be needed to protect threatened or endangered species or other fish and wildlife resources over the term of the license issued for the project. Additionally, the licensees' proposed plans include agency review and consultation for reports, prior to Commission approval. Implementation of an annual ecology group meeting would be redundant because there is already a mechanism for agency comment, and it is unclear how the meeting would provide additional benefit to environmental resources in the project area. Although we have no objection to the licensees conducting this agency consultation, the standard license article would provide a similar level of protection as the proposed measure. We find the benefits of an annual consultation meeting and annual review of sensitive species lists are not worth the estimated levelized annual cost of \$46,960. Therefore, we do not recommend including these measures as part of any new license issued for the project. However, we recognize that these annual review and consultation measures are included

in Forest Service's preliminary 4(e) condition 1 and Water Board preliminary 401 condition 9 and would be included as mandatory conditions in any license issued for the project.

Forest Service preliminary 4(e) condition 28 specifies that the licensees prepare and submit a biological evaluation for Forest Service approval before taking actions to construct new project features on NFS land that may affect Forest Service special-status species or their critical habitat on Forest Service land. We agree that consultation prior to new construction and non-routine maintenance would help protect federally listed species and their habitats over the term of the license, but we typically do not include license conditions that require compliance with applicable environmental statutes, such as ESA. If ESA issues arise during the term of the license, either based on new listings or availability of new information, post-licensing procedures developed by the Commission and resource agencies provide a framework for identifying issues, information gaps, and need for protection measures. The Commission typically includes in its licenses a standard license article providing such protection.

5.2 UNAVOIDABLE ADVERSE EFFECTS

The continued operation of the Bucks Creek Hydroelectric Project would result in some temporary minor, unavoidable, adverse effects on soil, geomorphic, water quality, aquatic, and terrestrial resources. Effects on geology and soil resources could include some temporary minor continued erosion associated with project operation, the renovation of recreation facilities, and interruption of sediment transport at project reservoirs. Most of these effects would be reduced by recommended resource enhancement measures, including implementation of the following plans and measures: (1) Erosion Management Plan; (2) Gravel Augmentation Plan; (3) passing large woody material at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay Dams; and (4) Hazardous Materials Management Plan.

Project operations would continue to affect fishery resources. Reservoir storage and manipulation of flow releases for power production would continue to cause fluctuations in creek flow and aquatic habitat downstream of the project, potentially affecting the production of resident fish species. Provision of instream flows, channel maintenance flows, reservoir level management and spill management measures as proposed would mitigate many of these affects. Resident fish species in the project reservoirs may be entrained through the powerhouses and be subjected to stress, injury, and mortality. As discussed in section 3.3.2.2, *Effects of Project Operation on Fish Entrainment*, considering the low number of fish occurring at depth in project reservoirs, it is likely that the number of fish subject to entrainment mortality is relatively low. However, some minor levels of mortality would still be likely to occur.

For terrestrial resources, unavoidable adverse effects could include loss of vegetation and wildlife habitat from construction of project recreation facilities that require permanent removal of vegetation and from project maintenance. Effects on

vegetation and wildlife habitat would be reduced by implementing the Integrated Vegetation Management Plan.

Under the proposed action, the continued operation of the project would adversely affect some archaeological sites. Proposed construction activities, including recreation enhancements, also have the potential for unavoidable adverse effects on cultural resources, particularly in areas that have not yet been surveyed. The implementation of an updated HPMP would ensure proper protection and management of significant cultural resources within the project's APE and would provide satisfactory resolution of any project-related adverse effects.

5.3 SUMMARY OF SECTION 10(j) RECOMMENDATIONS AND 4(e) CONDITIONS

5.3.1 Fish and Wildlife Agency Recommendations

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency will attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. In response to our REA notice (issued August 6, 2018), the following fish and wildlife agencies submitted recommendations for the project: FWS (letter filed October 3, 2018) and California DFW (letter filed October 4, 2018).⁴² We found 24 of the 30 recommendations to be within the scope of 10(j). Table 5-1 lists each of these recommendations and whether they are adopted in the staff alternative. The environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in section 3.3 for each resource area where it applies.

⁴² As shown in table 5-1, FWS filed 22 recommendations on October 3, 2018; California DFW filed 29 recommendations on October 4, 2018. Because several measures were identical between the agencies, we refer to the overall number of recommendations at 30.

Table 5-1. Fish and wildlife agency recommendations for the Bucks Creek Hydroelectric Project (Source: staff).

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
1. Provide annual employee training related to special-status species, NNIPs, cultural resources, and reporting procedures.	FWS, California DFW (Recommendation 1 and 1)	No, not a specific measure to protect fish and wildlife	\$10,460	No (see section 5.1.3)
2. Organize an Ecological Consultation Group and host meetings.	California DFW (Recommendation 2)	No, not a specific measure to protect fish and wildlife	\$30,000	No (see section 5.1.3)
3. Allow large woody material to naturally pass over Grizzly Forebay Dam and Lower Bucks Lake Dam during spill events. Wood at Bucks Lake spillway would be relocated to Lower Bucks Lake spillway and allowed to pass downstream.	FWS, California DFW (Recommendation 10 and 13)	Yes	0	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
4. Implement the Gravel Augmentation Plan, included in the supplement to the final license application, to improve trout spawning habitat and populations downstream of Lower Bucks Dam and Grizzly Forebay.	FWS, California DFW (Recommendation 11 and 14)	Yes	\$28,000	Yes
5. Provide instream flows to enhance aquatic biota, riparian vegetation, and geomorphic processes.	FWS, California DFW (Recommendation 2 and 5)	Yes	\$299,530	Yes
6. Provide unimpaired flows at in Bear Ravine at Milk Ranch Conduit Diversion No. 8 to protect the federally endangered SNYLF and its critical habitat.	FWS, California DFW (Recommendation 3 and 6)	Yes	\$277,440	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
7. Initiate draw down of Three Lakes annually by between August 15 and September 15 to protect aquatic habitat.	FWS, California DFW (Recommendation 4 and 7)	Yes	\$1,000	Yes
8. Implement channel maintenance flows to protect and enhance riparian and instream habitat.	FWS, California DFW (Recommendation 5 and 9)	Yes	\$1,010	Yes
9. Manage reservoir operations to protect and enhance aquatic habitat and recreation resources.	FWS (Recommendation 6)	Yes	\$0	Yes
10. Gradually decrease flows during managed spills to reduce potential effects of flow fluctuations on fisheries and breeding and rearing FYLF.	FWS, California DFW (Recommendation 7 and 10)	Yes	\$6,000	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
11. Determine water-year type annually based on the California DWR forecast to be consistent with other NFFR watershed hydroelectric projects and simplify compliance and operational consistency for instream flows.	California DFW (Recommendation and 3)	Yes	\$0	Yes
12. Leave six inoperable diversions along Milk Ranch Conduit in place to maintain current channel and riparian conditions.	FWS, California DFW (Recommendation 8 and 11)	Yes	\$13,370	Yes
13. Allow unimpaired flow to Milk Ranch Creek and North Fork Grouse Hollow Creek during Wet water years rather than seasonally diverting flows into the conduit.	FWS, California DFW (Recommendation 9 and 8)	Yes	\$19,330	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
14. Implement the Streamflow and Reservoir Level Gaging Plan, included in the supplement to the final license application, to document compliance with streamflow and reservoir level requirements	California DFW (Recommendation 12)	Yes	\$0	Yes
15. Fund fish stocking by California DFW in Bucks Lake, Grizzly Forebay, and Middle and Lower Three Lakes in each year stocking occurs.	California DFW (Recommendation 29)	No	\$70,890	Yes, with modifications to implement a fish stocking plan

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
16. Implement the Aquatic Resources Monitoring Plan, as included in the supplement to the final license application, to monitor stream fish, brook trout in Three Lakes, benthic macroinvertebrates, FYLF, water temperature, water quality, stream channel morphology, large woody material, and riparian vegetation	FWS, California DFW (Recommendation 12 and 16)	Yes, for the gravel monitoring in certain of the project's stream reaches. No, for the remaining components providing for general resource monitoring not specifically tied to project-related actions.	\$82,000	No, except for gravel monitoring (see section 5.1.2) which is adopted.

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
17. Implement the SNYLF Management Plan, as included in the supplement to the final license application, to define protection measures for Sierra Nevada yellow-legged frogs and their suitable habitat that would be implemented during O&M of the project in areas above 4,500 feet.	FWS, California DFW (Recommendation 13 and 15)	Yes	\$144,000	Yes
18. Develop an AIS management plan in consultation with the resource agencies.	FWS, California DFW (Recommendation 14 and 17)	Yes	\$27,130	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
19. Implement the Integrated Vegetation Management Plan, as included in the supplement to the final license application, to provide guidance for vegetation management within the project boundary, protect special-status plant populations and natural communities, and guide vegetation management related to project O&M.	FWS, California DFW (Recommendation 15 and 18)	Yes	\$84,000	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
20. Implement the Bald Eagle Management Plan, as included in the supplement to the final license application, to provide guidance for mitigating disturbance activities potentially affecting bald eagles within the project boundary, describe bald eagle habitats and habitat use in the project area, and provide recommendations for annual monitoring of bald eagle productivity and nest site locations.	FWS, California DFW (Recommendation 16 and 20)	Yes	\$8,000	Yes
21. Implement a limited operating period to protect nesting osprey.	FWS, California DFW (Recommendation 19 and 21)	Yes	\$5,000	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
22. Implement limited operating periods and protective buffers around nests of California spotted owls and northern goshawks when conducting project operations and management activities.	FWS, California DFW (Recommendation 20 and 23)	Yes	\$8,000	Yes
23. Evaluate, and upgrade if necessary, the project transmission line for consistency with APLIC standards and implement other raptor protection measures.	FWS, California DFW (Recommendation 17 and 19)	Yes	\$13,910	Yes
24. Conduct periodic nesting surveys for California spotted owls and northern goshawks.	California DFW (Recommendation 22)	Yes	\$0	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
25. Limit project-related activities during willow flycatcher breeding season within buffer zone around suitable habitat.	FWS, California DFW (Recommendation 18 and 24)	Yes	\$2,000	Yes
26. Consult with a bat biologist prior to structural modifications that have the potential to affect special-status bats.	California DFW (Recommendation 25)	No, not a specific measure to protect fish and wildlife	\$4,000	Yes
27. Consult with a bat biologist prior to activities that may create loud vibrations that have the potential to affect special-status bats.	California DFW (Recommendation 26)	No, not a specific measure to protect fish and wildlife	\$3,000	Yes
28. Inspect project tunnels for bats prior to conducting O&M activities in the winter.	California DFW (Recommendation 27)	Yes	\$3,000	Yes

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Adopted?
29. Implement the Hazardous Materials Management Plan, as included in the supplement to the final application, which includes standard practices regarding the storage, use, transport, and disposal of hazardous materials.	FWS, California DFW (Recommendation 21 and 4)	Yes	\$0	Yes
30. Implement the Erosion Management Plan, as included in the supplement to the final license application, to minimize future erosion and sedimentation as a result of ground-disturbing activities from routine O&M, any emergency actions, and planned projects within the project boundary.	FWS, California DFW (Recommendation 22 and 28)	Yes	\$0	Yes

5.3.2 Land Management Agencies' Section 4(e) Conditions

In section 2.2.5, *Modifications to Applicants' Proposal—Mandatory Conditions*, we list the preliminary 4(e) conditions submitted by the Forest Service, and note that section 4(e) of the FPA provides that any license issued by the Commission “for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation.” Thus, any 4(e) condition that meets the requirements of the law must be included in any license issued by the Commission, regardless of whether we include the condition in our staff alternative.

Of the Forest Service’s 61 preliminary conditions, we consider 23 of the conditions (conditions 3 through 20, and 22 through 26) to be administrative or legal in nature and not specific environmental measures. We therefore do not analyze these conditions in this EIS. Table 5-2 summarizes our conclusions with respect to the 38 preliminary 4(e) conditions that we consider to be environmental measures. We include in the staff alternative 32 conditions specified by the agency, and did not recommend six conditions; the measures not adopted in total are discussed in more detail in section 5.1, *Comprehensive Development and Recommended Alternative*.

Table 5-2. Forest Service preliminary section 4(e) conditions for the Bucks Creek Hydroelectric Project (Source: staff).

Condition	Annualized Cost	Adopted?
No. 1. Annually consult with the Forest Service	\$2,000	No
No. 2. Organize Ecological Consultation Group and host meetings	\$30,000	No
No. 21. Implement the Hazardous Materials Management Plan	\$0	Yes
No. 27. Provide annual employee training.	\$10,460	No
No. 28. Prepare biological evaluation on special-status species before constructing new project features.	\$4,000	No
No. 29. Annually review special-status species.	\$500	No

Condition	Annualized Cost	Adopted?
No. 30. Annually determine water year types pertaining to project reaches and reservoirs.	\$0	Yes
No. 31. Maintain minimum instream flows for Bucks Creek, Grizzly Creek, Milk Ranch Creek, and South Fork Grouse Hollow Creek.	\$299,530	Yes
No. 32. Provide full natural flow in Bear Ravine at Milk Ranch Conduit Diversion No. 8.	\$277,440	Yes
No. 33. Provide full natural flow in Wet water years at Milk Ranch Conduit Diversion No. 1 and No. 2.	\$19,330	Yes
No. 34. Provide channel maintenance flows in Wet and Normal water years for Bucks Creek and Grizzly Creek.	\$1,010	Yes
No. 35. Control project spills at Grizzly Forebay and Lower Bucks Lake.	\$6,000	Yes
No. 36. Project reservoir operations.	\$0	Yes
No. 37. Implement reservoir drawdown level and low-level outlet flow for Three Lakes.	\$1,000	Yes
No. 38. Manage diversion along Milk Ranch Creek conduit for safety and aesthetics.	\$13,370	Yes
No. 39. Implement the Streamflow and Reservoir Gaging Plan.	\$0	Yes
No. 40. Pass woody material at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay Dams.	\$0	Yes

Condition	Annualized Cost	Adopted?
No. 41. Implement the Gravel Augmentation Plan.	\$28,000	Yes
No. 42. Implement the SNYLF Management Plan.	\$144,000	Yes
No. 43. Implement the Aquatic Resources Monitoring Plan.	\$82,000	No, except for gravel monitoring (see section 5.1.2) which is adopted.
No. 44. Implement an AIS management plan.	\$27,130	Yes
No. 45. Implement the Integrated Vegetation Management Plan.	\$84,000	Yes
No. 46. Evaluate the transmission line for consistency with APLIC guidance, and upgrade if necessary.	\$13,910	Yes
No. 47. Implement the Bald Eagle Management Plan.	\$8,000	Yes
No. 48. Conduct breeding osprey surveys before construction and implement timing and protection measures if necessary.	\$5,000	Yes
No. 49. Conduct periodic northern goshawk and California spotted owl nesting surveys.	\$0	Yes
No. 50. Limit project-related activities during California spotted owl and northern goshawk breeding seasons within the vicinity of active nests.	\$8,000	Yes
No. 51. Limit project-related activities during the willow flycatcher breeding season within the vicinity of suitable nesting habitat.	\$2,000	Yes

Condition	Annualized Cost	Adopted?
No. 52. Consult a bat biologist prior to structural modification of project facilities and vegetation management activities.	\$4,000	Yes
No. 53. Consult a bat biologist prior to implementing loud or vibrating activities at Three Lakes Dam or along Three Lakes Road.	\$3,000	Yes
No. 54. Inspect project tunnels for bats prior to operations and maintenance activities in the winter.	\$3,000	Yes
No. 55. Revise the Recreation Management Plan.	\$3,098,230	Yes
No. 56. Implement the Bucks Lake SMP.	\$15,000	Yes
No. 57. Consult with the Forest Service prior to painting the exterior of project facilities.	\$0	Yes
No. 58. Implement the Historic Properties Management Plan.	\$349,760	Yes
No. 59. Implement the Transportation Management Plan.	\$806,910	Yes
No. 60. Implement the Erosion Management Plan.	\$0	Yes
No. 61. Implement the Fire Prevention and Response Plan.	\$55,650	Yes

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. §803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with the federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 15 comprehensive plans that are applicable to the Bucks Creek Hydroelectric Project, located in California. No inconsistencies were found.

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Kilarc-Cow Creek Project LLC
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Merimil Limited Partnership
Milner Dam, Inc.
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Solano Irrigation District
South Feather Water & Power Agency
South Sutter Water District
Southern California Edison Company
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Tacoma, City of (WA)
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Turlock Irrigation District
Trout Unlimited
Turlock Irrigation District
U.S. Army Corps of Engineers
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U.S. Department of Agriculture, Eldorado National Forest
U.S. Department of Agriculture, Stanislaus National Forest
U.S. Department of the Interior
U.S. Fish & Wildlife Service
U.S. House of Representatives
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U.S. Senate
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APPENDIX A

Draft License Conditions Recommended by Staff

1.0 Mandatory Conditions

On October 3, 2018 (revised on May 14, 2019), the U.S. Department of Agriculture, Forest Service (Forest Service) filed 61 preliminary 4(e) conditions (appendix B). These conditions are described in section 2.2.5, *Modifications to Applicants' Proposal – Mandatory Conditions*, of the environmental impact statement (EIS). Of the Forest Service's 61 preliminary conditions, we consider 23 of the conditions (conditions 3 through 20, and 22 through 26) to be administrative or legal in nature and not specific environmental measures. We therefore do not analyze these conditions in this EIS. Of the 38 conditions we consider to be environmental measures applicable to the Bucks Creek Hydroelectric Project, we include in the staff alternative 32 conditions as specified by the agency, and do not recommend six conditions. We recognize, however, that the Commission is required to include valid 4(e) conditions in any license issued for the project. As such, the Forest Service conditions that we do not recommend would be included in a new license.

On October 5, 2018, the California State Water Resources Control Board (Water Board) filed 22 preliminary conditions under section 401 of the Clean Water Act (appendix C). These conditions are described in section 2.2.5, *Modifications to Applicants' Proposal – Mandatory Conditions*, of the EIS. We consider preliminary conditions 2 and 20 through 22 to be administrative. We anticipate that all valid section 401 conditions will be included in any new license issued for the project.

2.0 Additional License Articles Recommended by Commission Staff

We recommend including the following license articles in any license issued for the project in addition to the preliminary mandatory conditions.

Article 401. *Commission Approval, Reporting, and Filing of Amendments*.

(a) Requirement to File Reports

Certain preliminary section 401 certification conditions and preliminary 4(e) conditions also require the licensees to file an annual report with other entities. Because this annual report relates to compliance with the requirements of this license, each such report must also be submitted to the Commission. The preliminary conditions that require the licensees to document compliance in an annual report are listed in the following table:

Preliminary Condition No.	Plan Name	Due Date
Water Board Certification 1; Forest Service 4(e) 31	Instream Flows	Within 1 year of each annual monitoring period

Preliminary Condition No.	Plan Name	Due Date
Water Board Certification 8; Forest Service 4(e) 37	Annual Three Lakes Reservoir Drawdown	Within 1 year of each annual monitoring period
Forest Service 4(e) 33	Unimpaired flow to Milk Ranch Creek and North Fork Grouse Hollow Creek	Annually by May 1 the following each year that a flows were bypassed
Forest Service 4(e) 34	Channel Maintenance Flows	Annually by May 31 the following each year that a channel maintenance flow is released
Forest Service 4(e) 35	Spill Management	After license year 5

The licensees must submit to the Commission documentation of any consultation, and copies of any comments and recommendations made by any consulted entity in connection with each report. The Commission reserves the right to require changes to project operations or facilities based on the information contained in the report and any other available information.

(b) Requirement to File Amendment Applications

Certain Forest Service 4(e) conditions and Water Board certification conditions appear to contemplate unspecified long-term changes to project operations or facilities for the purpose of mitigating environmental impacts (e.g., spill management). These changes may not be implemented without prior Commission authorization granted after the filing of an application to amend the license.

Article 402. *Reservation of Authority to Prescribe Fishways.* Authority is reserved to the Commission to require the licensees to construct and maintain, or to provide for the construction, operation, and maintenance of, such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, pursuant to section 18 of the Federal Power Act.

Article 403. *Approval of Implementation Plans.* The following plans are approved and made part of the license: (1) Erosion Management Plan, filed May 22, 2018; (2) Gravel Augmentation Plan, filed May 22, 2018; (3) Streamflow and Reservoir Level Gaging Plan, filed July 27, 2018; (4) Hazardous Material Management Plan, filed May 22, 2018; (5) Integrated Vegetation Management Plan, filed July 27, 2018; (6) Bald Eagle Management Plan, filed May 22, 2018; (7) Sierra Nevada Yellow-legged

Frog Management Plan, filed May 22, 2018; (8) Transportation Management Plan, filed May 22, 2018; and (9) Fire Prevention and Response Plan, filed May 22, 2018. The plans may not be amended without prior Commission approval. Upon license issuance, the licensees must implement the plans.

Article 404. Drought Management Plan. Within 6 months of license issuance, the licensees must file, for Commission approval, a Drought Management Plan.

The Drought Management Plan must include a definition of drought conditions based on available data specific to the project, including current storage in Bucks Lake, Lower Bucks Lake, Three Lakes, and Grizzly Forebay, watershed snowpack and soil moisture conditions, current and projected operating requirements for instream flows and reservoir elevations, weather forecasts, and other project operation limitations, in consultation with the Forest Service, U.S. Fish and Wildlife Service, the California State Water Resources Control Board, and California Department of Fish and Wildlife.

The licensees must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensees must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensees do not adopt a recommendation, the filing must include the licensees' reasons, based on project specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensees must implement the plan including any changes required by the Commission.

Article 405. Fish Stocking Plan. Within 6 months of license issuance, the licensees must file, for Commission approval, a Fish Stocking Plan for Bucks Lake, Grizzly Forebay, and Middle and Lower Three Lakes.

The Fish Stocking Plan must include, at a minimum, the following:

- (1) A provision to file for Commission approval at least 90 days prior to each fish stocking event, a plan for the stocking that includes the project lakes to be stocked, the species to be stocked in each lake, the date(s) that the stocking will be conducted, and the entity that will conduct the fish stocking;
- (2) A provision to file for Commission approval no later than 60 days after each stocking event, a report documenting the fish stocking that occurred under the Commission approved plan stipulated in item (1) including any variances and the reason(s) why any variance was necessary; and
- (3) An implementation schedule that specifies the years during the license term when the stocking will be conducted.

The licensees must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and

provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensees must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensees do not adopt a recommendation, the filing must include the licensees' reasons, based on project specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensees must implement the plan including any changes required by the Commission.

Article 406. Avian Protection Plan. Within 30 months of license issuance, the licensees must file for Commission approval, an avian protection plan for the Bucks Creek Project. The purpose of this plan is to minimize the potential for bird mortality associated with the project transmission line.

The avian protection plan must include, based on the evaluation of the line required by Forest Service condition 46, the following:

- (1) the results of the evaluation of the transmission for potential hazards to birds;
- (2) a description of proposed modifications of power poles that provides adequate separation of energized conductors, groundwires, and other metal hardware; adequate insulation; or other measures necessary to protect raptors from electrocution hazards;
- (3) an explanation of the extent to which proposed modifications in item (2) are consistent with *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* prepared by Edison Electric Institute (EEI), California Energy Commission, and Avian Power Line Interaction Committee (APLIC) (or updated version of this document as it is issued);
- (4) a description of proposed measures to protect birds from colliding with the transmission line; spacing of the markers; and provisions for periodic inspection and monitoring of the devices;
- (5) an explanation of the extent to which proposed modifications in item (4) are consistent with *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*, prepared by EEI and APLIC (or updated version of this document as it is issued); and
- (6) a schedule for completing any proposed measures.

The licensees shall file as-built drawings of the measures to reduce avian electrocutions and collisions within 90 days after completion of any modifications to the transmission line.

The plan must be prepared after consultation with the Forest Service, U.S. Fish and Wildlife Service, and California Department of Fish and Wildlife. The licensees must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensees must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensees do not adopt a recommendation, the filing must include the licensees' reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the licensees are notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

Article 407. Recreation Management Plan. Within 1 year of license issuance, or at least 90 days prior to the start of any ground-disturbing activity, whichever comes first, the licensees must develop and file, for Commission approval, a revised Recreation Management Plan for the Bucks Creek Project that incorporates the requirements specified in the State Water Resources Control Board's (Water Board) section 401 water quality certification condition 15, and the Forest Service's revised preliminary 4(e) condition 55, filed on May 14, 2019.

The revised Recreation Management Plan must be developed after consultation with the Forest Service. The licensees must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the Forest Service, and specific descriptions of how Forest Service comments are accommodated by the plan. The licensees must allow a minimum of 30 days for the Forest Service to comment and to make recommendations before filing the plan with the Commission. If the licensees do not adopt a recommendation, the filing must include the licensees' reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Land-disturbing activities must not begin until the licensees are notified by the Commission that the plan is approved. Upon Commission approval, the licensees must implement the plan, including any changes required by the Commission.

Article 408. Programmatic Agreement and Historic Properties Management Plan. The licensees must implement the "Programmatic Agreement Between the Federal Energy Regulatory Commission and the California State Historic Preservation Officer for Managing Historic Properties that May be Affected by Issuing a License to the Pacific Gas and Electric Company and the City of Santa Clara for the Continued Operation of the Bucks Creek Hydroelectric Project in Plumas County, California (FERC No. 619-164)," executed on XXX, 2019, and including but not limited to, the

Historic Properties Management Plan (HPMP) for the project. Pursuant to the requirements of this Programmatic Agreement, the licensees must file, for Commission approval, a revised HPMP within six months of the effective date of this license. The Commission reserves the authority to require changes to the HPMP at any time during the term of the license. If the Programmatic Agreement is terminated prior to Commission approval of the revised HPMP, the licensees must obtain approval from the Commission and the California State Historic Preservation Officer before engaging in any ground-disturbing activities or taking any other action that may affect any historic properties within the project's area of potential effects.

Article 409. Land Use and Occupancy. (a) In accordance with the provisions of this article, the licensees must have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensees may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensees must also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensees for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensees must take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensees may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensees must require multiple use and occupancy of facilities for access to project lands or waters. The licensees must also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensees must: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would

be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the impoundment shoreline. To implement this paragraph (b), the licensees may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensees' costs of administering the permit program. The Commission reserves the right to require the licensees to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensees may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69 kilovolt or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project impoundment. No later than January 31 of each year, the licensees must file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensees may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is 5 acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensees must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a

marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensees to file an application for prior approval, the licensees may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensees must consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensees must determine that the proposed use of the lands to be conveyed is not inconsistent with any approved report on recreational resources of an Exhibit E; or, if the project does not have an approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed must not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee must take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee must not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensees to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project must be consolidated for consideration when revised Exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensees under this article must not apply to any part of the public lands and reservations of the United States included within the project boundary.

APPENDIX B

U.S. Department of Agriculture, Forest Service Preliminary Conditions

Enclosure 1

Forest Service

**Preliminary Terms and Conditions Provided Under Section 4(e)
and Preliminary Recommendations Provided Under Section 10(a)
of the Federal Power Act**

**In Connection with the Application for
Relicensing of the Bucks Creek Hydroelectric Project
(FERC No. 619-164)**

26 September 2018

Revised
10 May 2019

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INTRODUCTION

The USDA Forest Service (Forest Service) provides the following Preliminary Terms, Conditions, and Recommendations for the Bucks Creek Hydroelectric Project, Federal Energy Regulatory Commission (FERC or Commission) Project No. 619, in accordance with Section 4(e) and Section 10(a) of the Federal Power Act (FPA), and 18 CFR 5.23(a). Section 4(e) of the FPA states the Commission may issue a license for a project within a reservation only if it finds that the License will not interfere or be inconsistent with the purpose for which such reservation was created or acquired. This is an independent threshold determination made by the FERC, with the purpose of the reservation defined by the authorizing legislation or proclamation (see *Rainson v. FERC*, 106 F.3d 269 (9th Cir. 1977)). Forest Service, for its protection and utilization determination under Section 4(e) of the FPA, may rely on broader purposes than those contained in the original authorizing statutes and proclamations in prescribing conditions (see *Southern California Edison v. FERC*, 116F.3d 507 [D.C. Cir. 1997]).

The following terms and conditions are based on those resource and management requirements enumerated in the Organic Administration Act of 1897 (30 Stat. 11), the Multiple-Use Sustained Yield Act of 1960 (74 Stat. 215), the National Forest Management Act of 1976 (90 Stat. 2949), and any other law specifically establishing a unit of the National Forest System or prescribing the management thereof (such as the Wild and Scenic Rivers Act), as such laws may be amended from time to time, and as implemented by regulations and approved by Land and Resource Management Plans prepared in accordance with the National Forest Management Act. Specifically, the 4(e) conditions in this document are based on the Land and Resource Management Plan (as amended) for the Plumas National Forest, as approved by the Regional Forester of the Pacific Southwest Region.

Pursuant to Section 4(e) of the FPA, the Secretary of Agriculture, acting by and through Forest Service, considers the following conditions necessary for the adequate protection and utilization of the land and resources of the Plumas National Forest. License articles contained in the Commission's Standard Form L-1 (revised October 1975) issued by Order No. 540, dated October 31, 1975, cover general requirements.

Part I of this document includes administrative conditions deemed necessary for the administration of National Forest System (NFS) lands. Part II of this document includes specific resource requirements for protection and utilization of NFS lands.

Part III of this document includes Preliminary FPA Section 10(a) recommendations. FPA Section 10(a) requires "Equal Consideration to Non-Power Values". In the 1986 amendments to the FPA, Congress also broadened the scope of the Federal Energy Regulatory Commission's (FERC) duties, requiring the Commission to "give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality." 16 U.S.C. § 801(a)(1) (Section 10(a)(1)). Thus, the FPA obligates FERC to give equal consideration to non-power values. While Section 4(e) of the Federal Power Act (FPA) provides for the conditions necessary for the adequate protection and utilization of the National Forest System (NFS) lands and resources,

Section 10(a) recommendations typically apply to non-NFS lands or resources under the jurisdiction of other government agencies.

Documents (i.e., management and monitoring plans) referenced as previously filed with the Commission, on the FERC eLibrary, can be found at the following website:
<https://www.ferc.gov/docs-filing/elibrary.asp>.

PART I: FPA SECTION 4(e) ADMINISTRATIVE CONDITIONS

Condition No. 1 – Consultation

Licensees shall annually consult with the United States Department of Agriculture, Forest Service. The date of the consultation meeting will be mutually agreed to by Licensees and Forest Service but in general should be held by April 15. At least 30 days in advance of the meeting, Licensees shall notify other interested stakeholders, confirming the meeting location, time and agenda. At the same time, Licensees shall also provide notice to the United States Department of Interior (USDI) Fish and Wildlife Service (USFWS) and National Park Service (NPS); California Department of Fish and Wildlife (CDFW); and California State Water Resources Control Board (State Water Board or SWRCB), who may choose to participate in the meeting. Licensees shall attempt to coordinate the meeting so interested agencies and other stakeholders may attend.

Licensees shall make available to Forest Service, at least 2 weeks prior to the meeting, an operations and maintenance plan for the year in which the meeting occurs. In addition, Licensees shall present results from current year monitoring of noxious weeds and special-status species as well as any additional information that has been compiled for the Project area, including progress reports on other resource measures. The goals of this meeting are to share information, mutually agree upon planned maintenance activities, identify concerns that may have regarding activities and their potential effects on sensitive resources, and any measures required to avoid or mitigate potential effects. In addition, the goal of the meeting shall be to review and discuss the results of implementing the streamflow and reservoir-related conditions, results of monitoring, and other issues related to preserving and protecting ecological values affected by the Project.

Consultation shall include, but not be limited to:

- A written status report detailing compliance with the Project's Final 4(e) Conditions and any 10(a) Recommendations included in the license. The report shall include a summary of each of the Forest Service conditions and a statement indicating how the Licensees met the condition during the previous year.
- Results of any monitoring studies performed over the previous year in formats agreed to by Forest Service and Licensees during development of implementation plans.
- Review of any non-routine maintenance.
- Discussion of any foreseeable changes to Project facilities or features.
- Discussion of any necessary revisions or modifications to implementation plans approved

as part of this license.

- Discussion of needed protection measures for species newly listed as threatened, endangered, or sensitive, or changes to existing management plans that may no longer be warranted due to delisting of species or, to incorporate new knowledge about a species requiring protection.
- Discussion of any climate change effects on Project operations, and implications for NFS lands and resources.
- Discussion of needed protection measures for newly discovered cultural resource sites.
- Discussion of elements of current year maintenance plans, e.g. road and trail maintenance.
- Discussion of any planned pesticide use.

A record of the meeting shall be kept by Licensees and shall include any recommendations made by Forest Service for the protection of NFS lands and resources. Licensees shall file the meeting record, if requested, with the Commission no later than 60 days following the meeting.

Copies of other reports related to Project safety and non-compliance shall be submitted to Forest Service, and other interested agencies and stakeholders concurrently with submittal to the Commission. These include, but are not limited to: any non-compliance report filed by Licensees, geologic or seismic reports, and structural safety reports for facilities located on or affecting NFS lands.

A copy of the record for the previous water year regarding streamflow, study reports, and other pertinent records shall be provided to Forest Service, and other interested agencies and stakeholders by Licensees at least 60 days prior to the meeting date, unless otherwise agreed.

Copies of other reports related to monitoring, Project safety, and non-compliance on NFS lands shall be submitted to Forest Service concurrently with submittal to the Commission, with the goal of providing the material to Forest Service no later than 90 days in advance of the Annual Meeting. These include, but are not limited to: any non-compliance report filed by Licensees, geologic or seismic reports, and structural safety reports for facilities.

Forest Service reserves the right, after notice and opportunity for comment, to require changes in the Project and its operation through revision of the Section 4(e) conditions to accomplish protection and utilization of NFS lands and resources.

Condition No. 2 - Organize Ecological Consultation Group and Host Meetings

The Licensees shall, within 60 days of license issuance, establish an Ecological Consultation Group (ECG). ECG meetings shall be open to representatives from the Forest Service, State Water Board, USFWS, CDFW (hereafter, "Resource Agencies"), and other agency representatives or individuals, who may fully participate in the meeting. The Licensees shall coordinate meeting agendas with interested agencies. The Licensees shall maintain an ECG e-mail contact list consisting of e-mail addresses (one primary and one alternate) provided to the Licensees by the Forest Service, State Water Board, USFWS, and CDFW, and provided to the Licensees by organizations or individuals that notified the Licensees in writing of their interest in participating in the ECG meetings.

Thereafter, the Licensees shall organize and host ECG meetings, and unless otherwise agreed to by the ECG, meetings shall be held in either Sacramento or Chico, California.

The Licensees shall organize and host at least one ECG meeting each year by April 15, unless otherwise agreed to by the ECG. The Licensees shall organize and host additional ECG meetings or conference calls if agreed upon by the ECG and the Licensees. Unless otherwise modified by the ECG, the meeting shall begin at 9:30 AM, and the agenda shall include the following:

1. Introductions;
2. Public comments;
3. The Licensees' report of any deviations from the conditions in the license since the previous meeting required under this condition;
4. Discussion of the Licensees' FERC filings in the previous calendar year (*e.g.*, monitoring reports required by implementation plans);
5. Discussion of the Licensees' planned license-required monitoring in the current calendar year;
6. Discussion of any license-required agency consultation in the current calendar year, and the Licensees' proposal to complete the consultation, if needed;
7. Discussion of any Licensee-anticipated proposals in the calendar year regarding: 1) changes or additions to facilities or features in the license; 2) variances to conditions in the license; or 3) amendments to the license;
8. The Licensees' follow-up on action items from the last meeting required by this condition;
9. Other Implementation Plans;
10. Identification of the Licensees' follow-up action items from this meeting, if any; and
11. Review the current lists of special-status species (species that are federally endangered or threatened, or proposed for listing as threatened or endangered under the Endangered Species Act; Forest Service sensitive and Forest Service species of conservation concern; State threatened or endangered or candidate for listing under the California Endangered Species Act; State species of special concern; State fully protected species, and State rare plants) that occur or have the potential to occur on Project-affected lands and may be affected by Project operations, maintenance, and recreational activities.

At least 30 days in advance of the meeting, the Licensees shall make available to the ECG the following material:

- Reports and other information from the previous calendar year required by license conditions or implementation plans in the FERC license.

If the Licensees, the Forest Service, and the ECG agree in advance, the ECG meeting may be coordinated with the Annual Forest Service Consultation meeting (Condition No. 1; *i.e.*, depending on the meeting topics, the two meetings may be held as one meeting or may be held as separate meetings on the same day at the same location). If the two meetings are held as one meeting, at a minimum, the Licensees shall ensure that the agenda items for the ECG

meeting are discussed at the joint meeting. Agenda items for Annual Forest Service Consultation meeting shall be summarized and reported separately to the Commission as required in that condition.

The ECG members shall work collaboratively to make decisions and resolve issues assigned to the ECG. The ECG will communicate its recommendations to the Forest Service and State Water Board. The Forest Service is responsible for final decisions covered by the Section 4(e) Conditions and the State Water Board is responsible for final decisions within State Water Board jurisdiction. The Licensees shall also ensure that consultation, permitting, and any necessary approvals within the jurisdiction of other agencies are completed. The Licensees shall implement license conditions as approved and directed by the Commission.

The Licensees shall prepare, for each ECG meeting held under this condition, a letter summary that shall include the date and location of the meeting, attendees, subjects discussed, and the Licensees' action items agreed to by the Licensees at the meeting. The summary is not intended to be a transcript of the meeting or formal comments on the license by the Licensees or participants in the meeting. After a 30-day review by the ECG, the Licensees shall file each meeting summary with the Commission no later than 60 days following the meeting.

Condition No. 3 - Forest Service Approval of Final Design

Before any new construction of the Project occurs on National Forest System lands, Licensees shall obtain prior written approval of Forest Service for all final design plans for Project components, which Forest Service deems as affecting or potentially affecting National Forest System resources. Licensees shall follow the schedules and procedures for design review and approval specified in the conditions herein. As part of such written approval, Forest Service may require adjustments to the final plans and facility locations to preclude or mitigate impacts and to insure that the Project is either compatible with on-the-ground conditions or approved by Forest Service based on agreed upon compensation or mitigation measures to address compatibility issues. Should such necessary adjustments be deemed necessary by Forest Service, the Commission, or Licensees to be a substantial change, Licensees shall follow the procedures of FERC Standard Article 2 of the license. Any changes to the license made for any reason pursuant to FERC Standard Article 2 or Article 3 shall be made subject to any new terms and conditions of the Secretary of Agriculture made pursuant to Section 4(e) of the Federal Power Act.

Condition No. 4 - Approval of Changes

Notwithstanding any license authorization to make changes to the Project, when such changes directly affect NFS lands, Licensees shall obtain written approval from Forest Service prior to making any changes in any constructed Project features or facilities, or in the uses of Project lands and waters or any departure from the requirements of any approved exhibits filed with the Commission. Following receipt of such approval from Forest Service, and a minimum of 60 days prior to initiating any such changes, Licensees shall file a report with the Commission describing the changes, the reasons for the changes, and showing the approval of Forest Service for such changes. Licensees shall file an exact copy of this report with Forest Service at the

same time it is filed with the Commission. This condition does not relieve Licensees from the amendment or other requirements of Article 2 or Article 3 of this license.

Condition No. 5 - Maintenance of Improvements on or Affecting National Forest System Lands

Licensees shall maintain all its improvements and premises on NFS lands to standards of repair, orderliness, neatness, sanitation, and safety acceptable to Forest Service. Disposal of all materials will be at an approved existing location, except as otherwise agreed by Forest Service.

Condition No. 6 - Existing Claims

License shall be subject to all valid claims and existing rights of third parties. The United States is not liable to Licensees for the exercise of any such right or claim.

Condition No. 7 - Compliance with Regulations

Licensees shall comply with the regulations of the Department of Agriculture for activities on National Forest System lands, and all applicable Federal, State, county, and municipal laws, ordinances, or regulations in regards to the area or operations on or directly affecting National Forest System lands, to the extent those laws, ordinances or regulations are not preempted by federal law.

Condition No. 8 - Surrender of License or Transfer of Ownership

Prior to any surrender of this license, Licensees shall provide assurance acceptable to Forest Service that Licensees shall restore any project area directly affecting National Forest System lands to a condition satisfactory to Forest Service upon or after surrender of the license, as appropriate. To the extent restoration is required, Licensees shall prepare a restoration plan which shall identify the measures to be taken to restore such National Forest System lands and shall include adequate financial mechanisms to ensure performance of the restoration measures.

In the event of any transfer of the license or sale of the project, Licensees shall assure that, in a manner satisfactory to Forest Service, Licensees or transferee will provide for the costs of surrender and restoration. If deemed necessary by Forest Service to assist it in evaluating Licensees' proposal, Licensees shall conduct an analysis, using experts approved by Forest Service, to estimate the potential costs associated with surrender and restoration of any project area directly affecting National Forest System lands to Forest Service specifications. In addition, Forest Service may require Licensees to pay for an independent audit of the transferee to assist Forest Service in determining whether the transferee has the financial ability to fund the surrender and restoration work specified in the analysis.

Condition No. 9 - Protection of United States Property

Licensees, including any agents or employees of Licensees acting within the scope of their employment, shall exercise diligence in protecting from damage the land and property of the United States covered by and used in connection with this license.

Condition No. 10 – Indemnification

Licensees shall indemnify, defend, and hold the United States harmless for:

- any violations incurred under any laws and regulations applicable to, or
- judgments, claims, penalties, fees, or demands assessed against the United States caused by, or
- costs, damages, and expenses incurred by the United States caused by, or
- the releases or threatened release of any solid waste, hazardous substances, pollutant, contaminant, or oil in any form in the environment related to the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license.

Licensees' indemnification of the United States shall include any loss by personal injury, loss of life or damage to property caused by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license. Indemnification shall include, but is not limited to, the value of resources damaged or destroyed; the costs of restoration, cleanup, or other mitigation; fire suppression or other types of abatement costs; third party claims and judgments; and all administrative, interest, and other legal costs. Upon surrender, transfer, or termination of the license, Licensees' obligation to indemnify and hold harmless the United States shall survive for all valid claims for actions that occurred prior to such surrender, transfer or termination.

Condition No. 11 - Damage to Land, Property, and Interests of the United States

Licensees has an affirmative duty to protect the land, property, and interests of the United States from damage arising from Licensees' construction, maintenance, or operation of the project works or the works appurtenant or accessory thereto under the license. Licensees' liability for fire and other damages to National Forest System lands shall be determined in accordance with the Federal Power Act and standard Form L-1 Articles 22 and 24.

Condition No. 12 - Risks and Hazards on National Forest System Lands

As part of the occupancy and use of the project area, Licensees have a continuing responsibility to reasonably identify and report all known or observed hazardous conditions on or directly affecting National Forest System lands within the project boundary that would affect the improvements, resources, or pose a risk of injury to individuals. Licensees will abate those conditions, except those caused by third parties or not related to the occupancy and use authorized by the License. Any non-emergency actions to abate such hazards on National Forest System lands shall be performed after consultation with Forest Service. In emergency situations, Licensees shall notify Forest Service of its actions as soon as possible, but not more than 48 hours, after such actions have been taken. Whether or not Forest Service is notified or provides consultation; Licensees shall remain solely responsible for all abatement measures performed. Other hazards should be reported to the appropriate agency as soon as possible.

Condition No. 13 – Access

Subject to the limitations set forth under the heading of “Access by the United States” in Condition No. 19 hereof, Forest Service reserves the right to use or permit others to use any part of the licensed area on NFS lands for any purpose, provided such use does not interfere with the rights and privileges authorized by this license or the Federal Power Act.

Condition No. 14 – Crossings

Licensees shall maintain suitable crossings as required by Forest Service for all roads and trails that intersect the right-of-way occupied by linear Project facilities (powerline, penstock, ditch, and pipeline).

Condition No. 15 - Surveys, Land Corners

Licensees shall avoid disturbance to all public land survey monuments, private property corners, and forest boundary markers. In the event that any such land markers or monuments on National Forest System lands are destroyed by an act or omission of Licensees, in connection with the use and/or occupancy authorized by this license, depending on the type of monument destroyed, Licensees shall reestablish or reference same in accordance with (1) the procedures outlined in the "Manual of Instructions for the Survey of the Public Land of the United States," (2) the specifications of the County Surveyor, or (3) the specifications of FS. Further, Licensees shall ensure that any such official survey records affected are amended as provided by law.

Condition No. 16 – Signs

Licensees shall consult with Forest Service prior to erecting signs related to safety issues on NFS lands covered by the license. Prior to Licensees erecting any other signs or advertising devices on NFS lands covered by the license, Licensees must obtain the approval of Forest Service as to location, design, size, color, and message. Licensees shall be responsible for maintaining all Licensee-erected signs to neat and presentable standards.

Condition No. 17 – Ground Disturbing Activities

If Licensees proposes ground-disturbing activities on or directly affecting NFS lands that were not specifically addressed in the Commission’s NEPA processes, Licensees, in consultation with Forest Service, shall determine the scope of work and potential for Project-related effects, and whether additional information is required to proceed with the planned activity. Upon Forest Service request, Licensees shall enter into an agreement with Forest Service under which Licensees shall fund a reasonable portion of Forest Service staff time and expenses for staff activities related to the proposed activities.

Condition No. 18 – Use of National Forest System Roads for Project Access

Licensees shall obtain suitable authorization for all project access roads and NFS roads needed for Project access. The authorization shall require road maintenance and cost sharing in reconstruction commensurate with Licensees’ use and project-related use. The authorization shall specify road maintenance and management standards that provide for traffic safety,

minimize erosion, and damage to natural resources and that are acceptable to Forest Service as appropriate.

Licensees shall pay Forest Service for its share of maintenance cost or perform maintenance or other agreed to services, as determined by Forest Service for all use of roads related to project operations, project-related public recreation, or related activities. The maintenance obligation of Licensees shall be proportionate to total use and commensurate with its use. Any maintenance to be performed by Licensees shall be authorized by and shall be performed in accordance with an approved maintenance plan and applicable Best Management Practices (BMPs). In the event a road requires maintenance, restoration, or reconstruction work to accommodate Licensees' needs, Licensees shall perform such work at its own expense after securing Forest Service authorization.

Licensees shall complete a condition survey and a proposed maintenance plan subject to Forest Service review and approval as appropriate once each year. The plan may take the format of a road maintenance agreement provided all the above conditions are met as well as the conditions set forth in the proposed agreement.

In addition, all NFS roads used as Project Access roads (PAR) and Right-of-Way access roads (ROW) shall have:

- Current condition survey.
- Be mapped at a scale to allow identification of specific routes or segments.
- Forest Service assigned road numbers are used for reference on the maps, tables, and in the field.
- GIS compatible files of GPS alignments of all roads used for Project access are provided to Forest Service.
- Adequate signage is installed and maintained by Licensees at each road or route, identifying the road by Forest Service road number.

Condition No. 19 - Access by the United States

The United States shall have unrestricted use of any road over which Licensees has control within the project area for all purposes deemed necessary and desirable in connection with the protection, administration, management, and utilization of Federal lands or resources. When needed for the protection, administration, and management of Federal lands or resources the United States shall have the right to extend rights and privileges for use of the right-of-way and road thereon to States and local subdivisions thereof, as well as to other users. The United States shall control such use so as not to unreasonably interfere with the safety or security uses, or cause Licensees to bear a share of costs disproportionate to Licensees' use in comparison to the use of the road by others.

Condition No. 20 - Road Use

Licensees shall confine all vehicles being used for project purposes, including but not limited to administrative and transportation vehicles and construction and inspection equipment, to roads or specifically designed access routes, as identified in the *Transportation Management Plan* (refer

to Condition No. 59). Forest Service reserves the right to close any and all such routes where damage is occurring to the soil or vegetation, or, if requested by Licensees, to require reconstruction/construction by Licensees to the extent needed to accommodate Licensees' use. Forest Service agrees to provide notice to Licensees and the Commission prior to road closures, except in an emergency, in which case notice will be provided as soon as practicable.

Condition No. 21 - Hazardous Materials Management Plan

Upon Commission approval, Licensee shall implement the Hazardous Materials Management Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), for locations on, or directly affecting, NFS lands.

Condition No. 22 - Pesticide-Use Restrictions on National Forest System Lands

Pesticides may not be used on NFS lands or in areas affecting NFS lands to control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, non-native fish, etc., without the prior written approval of Forest Service. During the Annual Meeting described in Condition No. 1, Licensees shall submit a request for approval of planned uses of pesticides for the upcoming year. Licensees shall provide at a minimum the following information essential for review:

- Whether pesticide applications are essential for use on NFS lands;
- Specific locations of use;
- Specific herbicides proposed for use;
- Application rates;
- Dose and exposure rates; and
- Safety risk and timeframes for application.

Exceptions to this schedule may be allowed only when unexpected outbreaks of pests require control measures that were not anticipated at the time the report was submitted. In such an instance, an emergency request and approval may be made.

Any pesticide use that is deemed necessary to use on NFS lands within 500 feet of known locations of western pond turtles (*Actinemys [Emys] marmorata*), Sierra Nevada yellow-legged frog (*Rana sierrae*), foothill yellow-legged frog (*Rana boylei*), or known locations of Forest Service special-status or culturally significant plant populations will be designed to avoid adverse effects to individuals and their habitats. Application of pesticides must be consistent with Forest Service riparian conservation objectives.

On NFS lands, Licensees shall only use those materials registered by the U.S. Environmental Protection Agency and consistent with those applied by Forest Service and approved through Forest Service review for the specific purpose planned. Licensees must strictly follow label instructions in the preparation and application of pesticides and disposal of excess materials and containers. Licensees may also submit Pesticide Use Proposal(s) with accompanying risk assessment and other Forest Service required documents to use pesticides on a regular basis for

the term of the license as addressed further in Condition No. 45, *Integrated Vegetation Management Plan*. Submission of this plan will not relieve Licensees of the responsibility of annual notification and review.

Condition No. 23 - Construction Inspections

Within 60 days of planned ground-disturbing activity on or affecting NFS lands, Licensees shall file with the Commission a ‘Safety During Construction Plan’ that identifies potential hazard areas and measures necessary to address public safety. Areas to consider include construction activities near public roads, trails, and recreation areas and facilities.

Licensees shall perform daily (or on a schedule otherwise agreed to by Forest Service in writing) inspections of Licensees’ construction operations on NFS lands and Licensees adjoining property while construction is in progress. Licensees shall document these inspections (informal writing sufficient) and shall deliver such documentation to Forest Service on a schedule agreed to by Forest Service. The inspections must specifically include fire plan compliance, public safety, and environmental protection. Licensees shall act immediately to correct any items found to need correction.

A registered professional engineer or other qualified employee of the appropriate specialty shall regularly conduct construction inspections of structural improvements on a schedule approved by Forest Service.

Condition No. 24 - Unattended Construction Equipment

Licensees shall not place construction equipment on NFS lands prior to actual use or allow it to remain on NFS lands subsequent to actual use, except for a reasonable mobilization and demobilization period agreed to by Forest Service.

Condition No. 25 – Review of Improvements on National Forest System Lands

If during the term of the License the Commission determines that the project involves the use of any additional National Forest System (NFS) lands, outside the current project boundary, Licensees shall obtain a special use authorization from Forest Service for the occupancy and use of such additional NFS lands. Licensees shall obtain the executed authorization before beginning any ground-disturbing activities on NFS lands outside the FERC boundary covered by the special use authorization, and shall file that authorization with the Commission if the activity is related to the Project. Licensees shall be responsible for the costs of collecting all information directly related to the evaluation of the effects of the proposed occupancy and use that Forest Service needs in order to make a decision concerning issuance of a special use authorization.

If, during the term of the License, Licensees propose to perform any project construction work, Licensees shall obtain a construction temporary special use authorization from Forest Service before beginning any ground-disturbing activities on NFS lands outside the FERC boundary. The special use authorization will include appropriate vegetation management and erosion control measures as needed to protect NFS lands and resources. Licensees shall be responsible for the costs of collecting all information directly related to the evaluation of the effects of the proposed

construction that Forest Service needs in order to make a decision concerning issuance of a construction temporary special use authorization. Licensees may commence ground-disturbing activities authorized by the License and construction temporary special use authorization no sooner than 60 days following the date Licensees files Forest Service temporary special use authorization with the Commission, if the temporary special use authorization is related to Project activity, unless the Commission prescribes a different commencement schedule. In the event there is a conflict between any provisions of the License and Forest Service special use authorization, the special use authorization shall prevail to the extent that Forest Service, in consultation with the Commission, deems necessary to protect and utilize NFS resources.

Condition No. 26 - Modifications of 4(e) Conditions after Biological Opinion or Water Quality Certification

Forest Service reserves the right to modify these conditions, if necessary, to respond to any Final Biological Opinion issued for this Project by the National Marine Fisheries Service, United States Fish and Wildlife Service; or any Certification issued for this Project by the State Water Resources Control Board.

PART II: FPA SECTION 4(e) RESOURCE CONDITIONS

Condition No. 27 – Annual Employee Training

The Licensees shall, beginning in the first full calendar year of the new license term, annually perform employee environmental awareness training for hydro operation and maintenance staff. New hydro operation and maintenance staff starting after the employee environmental awareness training shall be required to review all environmental awareness training materials within 1 month of Project assignment. The training shall include:

- Providing and reviewing maps showing the locations of federal land and environmentally sensitive areas (*e.g.*, locations of special-status species populations, designated critical habitat for Federally listed species, areas with Limited Operating Procedures, confidential cultural resources, historic property sites, and protected habitats) known to occur within the FERC Project Boundary;
- Describing the general contents of the license, including plans, as they pertain to operations and maintenance and the protection of environmental resources;
- Providing guides for the identification of special-status species, non-native invasive plants (NNIP) and aquatic invasive species (AIS) that are known or suspected by the Licensees to occur within the FERC Project Boundary;
- Providing information on the biology of special-status species as it relates to the identification and knowing the signs of disturbance or distress. This will also include focused training for helicopter pilots on the location of known bird nests (*i.e.*, bald eagle, osprey, northern goshawk, and/or California spotted owl) and avoidance measures during take-off, landing, and flight paths;
- Describing reporting procedures to the Licensees' management if hydro operation and maintenance staff incidentally, during the performance of their work, observe new populations of special-status species, NNIP or AIS, or if they observe dangerous, injured, or dead wildlife; and
- Familiarize the Licensees' staff with the procedures for reporting to the Forest Service and other appropriate State and Federal agencies, and complying with Forest Service orders that pertain to NFS lands in the vicinity of the Project.

The goal of the training shall be to familiarize the Licensees' hydro operation and maintenance staff with special-status species, NNIP and AIS and sensitive areas known or suspected by the Licensees to occur within the FERC Project Boundary, and procedures to avoid adverse effects. It is not the intent of this condition that the Licensees' hydro operation and maintenance staff perform surveys or become experts (*i.e.*, have more than a common knowledge) in the identification of special-status species, NNIP, AIS or historic properties.

The Licensees shall direct hydro operation and maintenance staff to avoid disturbance to sensitive areas shown on the maps, and to advise all contractors to avoid these sensitive areas. If the Licensees determine that disturbance of a sensitive area shown on the maps is unavoidable, the Licensees shall consult with the appropriate agencies to minimize adverse effects to the sensitive

area. The Licensees shall update the employee environmental awareness training material as needed.

Condition No. 28 – Special-Status Species

Before taking actions to construct new project features on NFS lands that may affect Forest Service special-status species or their critical habitat on NFS lands, Licensees shall prepare and submit a biological evaluation (BE) for Forest Service approval. The BE shall evaluate the potential impact of the action on the species or its habitat. Forest Service may require mitigation measures for the protection of the affected species on NFS lands.

The BE shall:

- Include procedures to minimize or avoid adverse effects to special-status species.
- Ensure project-related activities shall meet restrictions included in site management plans for special-status species.
- Develop implementation and effectiveness monitoring of measures taken or employed to reduce effects to special-status species.

Condition No. 29 - Annual Review of Special-Status Species Lists and Assessment of New Species on Federal Land

Licensees shall, beginning the first full calendar year after license issuance, in consultation with Forest Service annually review the current lists of all special-status species (species that are Federally Endangered or Threatened, Proposed Threatened or Endangered, Forest Service Sensitive, Forest Service Species of Conservation Concern, or Plumas National Forest Watch Lists, State Threatened or Endangered, State Species of Special Concern, and CDFW Fully Protected) that might occur on National Forest System lands, as appropriate, in the Project area that may be directly affected by Project operations. When a species is added to one or more of the lists, Forest Service, in consultation with Licensees shall determine if the species or unsurveyed suitable habitat for the species is likely to occur on such NFS lands, as appropriate. For such newly added species, if Forest Service determines that the species is likely to occur on such NFS lands, Licensees shall develop and implement a study plan in consultation with Forest Service to reasonably assess the effects of the project on the species. Licensees shall prepare a report on the study including objectives, methods, results, recommended resource measures where appropriate, and a schedule of implementation, and shall provide a draft of the final report to Forest Service for review and approval. Licensees shall file the report, including evidence of consultation, with the Commission and shall implement those resource management measures required by the Commission.

If new occurrences of Forest Service special-status plant or wildlife species as defined above are detected prior to or during ongoing construction, operation, or maintenance of the Project or during Project operations, Licensees shall immediately notify Forest Service. If Forest Service determines that the Project-related activities are adversely affecting Forest Service Sensitive, Forest Service Species of Conservation Concern or watch list species, Licensees shall, in consultation with Forest Service, develop and implement appropriate protection measures

If new occurrences of state or federally listed or proposed threatened or endangered species are detected prior to or during ongoing construction, operation, or maintenance of the Project or during Project operations, Licensees shall immediately notify Forest Service and the relevant Service Agency (United States Fish and Wildlife Service or National Marine Fisheries Service or CDFW) for consultation or conference in accordance with the Endangered Species Act. If state listed or fully protected species are affected, CDFW shall be notified.

Condition No. 30 - Annual Determination of Water Year Types

The Licensees shall use the California Department of Water Resources (DWR) water year forecast of unimpaired runoff in the Feather River at Oroville as set forth in DWR's Bulletin 120, each year in each month from February through May to determine the applicable water year type as described below when implementing instream flows (Condition No. 31), channel maintenance flows (Condition No. 34), and Project reservoir operations (Condition No. 36). The April forecast will be used to determine if conditions are met for the Wet water year Milk Ranch Conduit Diversion Nos. 1 & 2 bypass flows (Condition No. 33). The Licensees have classified water years into four water year types based on inflow to Lake Oroville: Wet, Normal, Dry, and Critically Dry. The water year types are defined as follows:

- Wet: Greater than or equal to 5,679 thousand acre-feet (TAF) inflow to Oroville
- Normal: Less than 5,679 TAF but greater than or equal to 3,228 TAF inflow to Oroville
- Dry: Less than 3,228 TAF but greater than or equal to 2,505 TAF inflow to Oroville
- Critically Dry: Less than 2,505 TAF inflow to Oroville

The Licensees shall use DWR's forecast of the water year type on or about February 10 and operate for the remainder of that month and until the next month's forecast according to the specification for that water year type. New forecasts will be made on or about the tenth of March, April and May after the snow surveys are completed and operations will be changed within two business days, or as soon thereafter as accessible for manually operated gates. The Licensees shall provide notice to FERC, Forest Service, State Water Board, USFWS, and CDFW, of the final water year type determination within 30 days of making the determination.

Condition No. 31 – Instream Flows

The Licensees shall provide instream flow releases at the following locations:

- Bucks Creek below Bucks Lake Dam
- Bucks Creek below Lower Bucks Lake Dam
- Grizzly Creek below Grizzly Forebay
- Milk Ranch Creek below Three Lakes
- Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1
- South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3

The Licensees shall provide minimum streamflows as specified in Table 1 of this Condition. For compliance purposes, the point of measurement for each required minimum instream streamflow

is listed in Table 1 of this condition, and described in the *Streamflow and Reservoir Level Gaging Plan*, (Condition No. 39).

Table 1. Bucks Creek Project Instream Flows (flows in cubic feet per second [cfs]), by Water Year Type. Compliance streamflow PG&E gage ID's are listed for each stream.

WY Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Bucks Creek below Bucks Lake Dam (Manual measurement)												
PG&E gage BUCKS2												
All Water Year Types	3	3	3	3	3	3	3	3	3	3	3	3
Bucks Creek below Lower Bucks Lake Dam (Continuous measurement)												
PG&E gage NF82 / USGS No. 11403530												
Critically Dry	6	4	4	4	6	7	7	7	6	6	6	6
Dry	6	5	5	5	6	8	8	8	8	6	6	6
Normal	6	6	6	6	8	12	12	12	9	8	8	7
Wet	8	8	8	8	10	15	15	15	11	10	8	8
Grizzly Creek below Grizzly Forebay (Continuous measurement)												
PG&E gage NF22 / USGS No. 11404300												
Critically Dry	6	4	4	4	4	6	6	6	6	6	6	6
Dry	6	6	6	6	6	8	8	8	8	8	8	6
Normal	8	8	8	8	8	10	10	10	9	9	9	8
Wet	9	9	9	9	10	13	13	13	11	10	10	9
Milk Ranch Creek Below Three Lakes (Manual measurement)												
PG&E gage MR2												
Critically Dry	0.25	WS	WS	WS	WS	WS	0.25 ¹	0.25	0.25	0.25	0.25	0.25
Dry	0.5	WS	WS	WS	WS	WS	0.5 ¹	0.5	0.5	0.5	0.5	0.5
Normal	1	WS	WS	WS	WS	WS	1 ¹	1	1	1	1	1
Wet	2	WS	WS	WS	WS	WS	2 ¹	2	2	2	2	2
<p>WS: "Winter Setting" where the low-level outlet valve is fully opened and the natural inflow equals the outflow of the reservoir. The Licensees may open the outlet to the WS prior to November 1 if weather is predicted that may restrict safe access to the valve house.</p> <p>¹ Licensees will adjust the valve within two business days, or as soon thereafter as accessible, following the publication of California Department of Water Resources (DWR) water year forecast of unimpaired runoff in the Feather River at Oroville as set forth in DWR's Bulletin 120.</p>												

WY Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Milk Ranch Creek at Milk Ranch Conduit Diversion No. 1 (Manual measurement)												
PG&E gage MRC1												
Critically Dry	0.25	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ²	0.25	0.25	0.25	0.25	0.25
Dry	0.5	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	0.5 ²	0.5	0.5	0.5	0.5	0.5
Normal	1	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	1 ²	1	1	1	1	1
Wet	2	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	0.25 ¹	2 ^{2,3}	2 ³	2 ³	2 ³	2 ³	2
¹ 0.25 or natural inflow, whichever is less. Licensees may set the outlet to 0.25 cfs prior to November 1 if weather is predicted that may restrict safe access to the diversion. ² Licensees will adjust the valve within two business days, or as soon thereafter as accessible, following the publication of California Department of Water Resources (DWR) water year forecast of unimpaired runoff in the Feather River at Oroville as set forth in DWR's Bulletin 120. ³ Bypass flows from April through August 15, if conditions are met, in accordance with the Wet Water Year Milk Ranch Conduit Diversion Nos. 1 & 2 Bypass Flow (Condition No. 33).												
South Fork Grouse Hollow Creek at Milk Ranch Conduit Diversion No. 3 (Manual measurement)												
PG&E gage MRC2												
All Water Year Types	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹	0.5 ¹
¹ 0.5 or natural inflow, whichever is less.												

The Licensees shall implement specified minimum instream flows as soon as reasonably practicable within the first 90 days of the new license term, as required in Table 1 of this Condition, but releases made through manually operated valves may be subject to weather and road conditions affecting access or operability. Where an instream flow release structure must be modified or newly constructed (refer to the *Streamflow and Reservoir Level Gaging Plan*; Condition No. 39), the Licensees shall complete the work as soon as reasonably practicable, but no later than 2 years after receiving all required permits and approvals for the work.

At locations with continuous flow measurements (see Table 1 of this Condition), minimum streamflows shall be measured as an average hourly flow calculated at the top of each hour. The Licensees shall calculate the average hourly flow by taking the mean of four instantaneous measurements at 15-minute intervals, as specified by United States Geological Survey (USGS) standards. The average hourly streamflow shall be at least 90 percent of the applicable minimum streamflow requirement set forth in Table 1 of this Condition. If the average hourly flow temporarily falls below the applicable minimum streamflow requirement (in the event of unforeseen circumstances such as debris blocking the intake, ice conditions on the measurement weir, etc.) the Licensees shall restore the required minimum streamflow as soon as reasonably practicable. The duration and cause for the temporary decrease in flows shall be documented in the annual report described below.

If the average daily flow deviates below the applicable minimum streamflow requirement, the Licensees shall file a report with FERC, the Forest Service, State Water Board, USFWS, CDFW, within 30 days of the incident. The report will identify, to the extent possible, the cause, severity, and duration of the deviation; any observed or reported adverse environmental impacts resulting from it; and any corrective actions taken.

At locations with manual data collection, the release valve shall be inspected and maintained each season in the spring, summer, and fall. Seasonal inspection, maintenance, and documentation of valve settings will constitute compliance with flow requirements at these locations. Adjustments to the valves during seasonal inspections may be needed to comply with the prescribed flow in Table 1 of this Condition, and changes will be documented in the annual report described below.

The minimum streamflow requirements listed in Table 1 of this Condition may be temporarily modified as required for maintenance or repair of the dam, outlet facilities, and minimum flow release facilities. The Licensees shall notify FERC, the Forest Service, State Water Board, USFWS, and CDFW, at least five working days prior to any such modification.

The Licensees shall notify FERC, the Forest Service, State Water Board, USFWS, and CDFW, within two business days of any modification of the minimum streamflow requirements due to operational emergencies beyond the control of the Licensees, or in the interest of public safety. An emergency is defined as an event that is reasonably out of the control of the Licensees and requires the Licensees to take immediate action, either unilaterally or under instruction by law enforcement or other regulatory agency staff, to prevent imminent loss of human life or substantial property damage. An emergency may include, but is not limited to, natural events such as landslides, storms or wildfires, malfunction or failure of Project works, and recreation accidents.

The Licensees shall submit a draft annual report (from the prior water year) to the Forest Service, State Water Board, USFWS, and CDFW, for their review and comment by January 31. For the purpose of reporting compliance with the instream flow requirement, daily mean data shall be included in the report for all continuously gaged locations. Continuous 15-minute or hourly flow data in DSS format (or comparable format) will be provided to the Forest Service, State Water Board, USFWS, and, CDFW upon request.

At locations with flow releases based on manual valve settings, the Licensees shall provide a report including:

The dates the Licensees checked the outlet works/valves at each site during the time the Licensees first accessed each site (starting approximately in April) until November 1;

- The estimated flow released at the time the valve was checked in comparison to the flow requirement as shown in Table 1 of this Condition;
- Documentation of any adjustments made at each site at the time the outlet works/valves were checked; and
- The date the valves were adjusted for the Winter Setting (WS) or minimum over-winter valve settings at Milk Ranch Creek below Three Lakes and at Milk Ranch Conduit Diversion No. 1, respectively.

The Licensees shall allow the Resource Agencies at least 45 days to provide their input on the draft report. The Licensees shall file a final report on the instream flows with FERC within 90 days of providing the draft report to the agencies. The report shall include documentation of consultation with the agencies specified above; copies of their comments and recommendations

on the report; and specific descriptions of how the agencies' comments were incorporated into the report and how their recommendations were addressed. Each year during the annual Forest Service Consultation meeting (Condition No. 1) and the Ecological Consultation Group meeting (Condition No. 2), the Licensees shall review the instream flow documentation.

Condition No. 32 – Full Natural Flow in Bear Ravine at Milk Ranch Conduit Diversion No. 8

For the protection of the federally ESA-listed endangered Sierra Nevada yellow-legged frog, the Licensees shall cease diversion of flows from Bear Ravine into Milk Ranch Conduit at Milk Ranch Conduit Diversion No. 8, thus allowing the full natural flow in Bear Ravine. Within 60 days, or as soon as reasonably accessible following license issuance (whichever is later), the Licensees shall install a cap or cover that will completely close and secure the diversion pipe into the Milk Ranch Conduit. Existing infrastructure will be left in place to minimize adverse environmental effects. The Licensees shall also screen and maintain air vents in order to prevent wildlife from entering the vents. Prior to any modifications of this diversion structure, the Licensees shall invite the Forest Service, State Water Board, USFWS, and CDFW, and into the field to discuss the proposed work. Upon approval of the proposed modifications by the Forest Service and State Water Board, the Licensees shall complete the proposed work. Due to the historic status of this diversion, prior to implementing any activities described in this measure, the Licensees shall review the requirements of the *Historic Properties Management Plan* (Condition No. 58).

The Licensees shall periodically monitor the existing diversion structure and adjacent hillslope following Wet water years for signs that the structure or hillslope are at risk of failure. If the Licensees determine that non-routine maintenance of the structure or hillslope is required to prevent significant adverse environmental impacts, the Licensees shall consult with Forest Service, State Water Board, USFWS, and CDFW, and interested stakeholders regarding appropriate protection measures, as outlined in the *Sierra Nevada Yellow-legged Frog Management Plan* (Condition No. 42).

Condition No. 33 – Wet Water Year Milk Ranch Conduit Diversion Nos. 1 and 2 Bypass Flows

The Licensees shall temporarily close (i.e., bypass) two of the Milk Ranch Conduit Diversions if the end-of-March Bucks Lake elevation is 5,142.0 feet or greater (as measured by PG&E gage NF16), and the April water year forecast for unimpaired runoff in the Feather River at Oroville, as set forth in the DWR Bulletin 120, is greater than 5,679 thousand acre-feet (a Wet Water Year as defined in Condition No. 30, Annual Determination of Water Year Type). The Licensees shall bypass flows at the following diversions within two business days, or as soon as reasonably accessible, from the publication of the April forecast, through August 15, or when the Licensees initiate the annual Three Lakes drawdown (refer to the Annual Drawdown of Three Lakes [Condition No. 37]):

- Diversion No. 1 (Milk Ranch Creek)
- Diversion No. 2 (North Fork Grouse Hollow Creek)

By January 31, when flows were bypassed the prior year, the Licensees shall provide the Forest Service, State Water Board, USFWS, and CDFW, a report documenting the dates when the Licensees closed and reopened the Milk Ranch Conduit diversion valves. The Licensees shall allow the Resource Agencies at least 45 days to provide their input on the draft report. The Licensees shall file a final report with FERC within 90 days of providing the draft report to the agencies. The report shall include documentation of consultation with the agencies specified above; copies of their comments and recommendations on the report; and specific descriptions of how the agencies' comments are incorporated into the report and how their recommendations were addressed.

During the annual Forest Service Consultation meeting (Condition No. 1) and the Ecological Consultation Group meeting (Condition No. 2), the Licensees shall review the dates associated with the bypassed flows from the previous year.

Condition No. 34 – Channel Maintenance Flows

The Licensees shall provide channel maintenance flows in Wet and Normal water years at the following locations:

- Bucks Creek below Lower Bucks Lake
- Grizzly Creek below Grizzly Forebay

Water year designations shall be based on those defined in the Annual Determination of Water Year Type Measure (Condition No. 30).

Bucks Creek below Lower Bucks Lake

Annual Spill Requirements. Prior to March 31 of each water year when a natural spill in excess of 70 cfs, or a High Spill as discussed below, has not occurred in the last 18 months, the Licensees shall provide minimum streamflows of 50 to 70 cfs in Bucks Creek below Lower Bucks Lake Dam for a period of at least 18 hours. This may be accomplished by any combination of spill, release, and accretion flows. At the end of this event, the Licensees shall make a good faith effort, consistent with existing equipment, to smoothly taper off the flow, consistent with the Spill Management at Grizzly Forebay and Lower Bucks Lake Measure (Condition No. 35). The Licensees shall attempt to coordinate the spill with high flows in the North Fork Feather River (NFFR), although this shall not be mandatory due to the relatively low level of the spill compared to typical NFFR flows. An annual spill flow is not required in Dry and Critically Dry years as follows: in the event the spill flow is not implemented prior to issuance of the California Department of Water Resources (DWR) March 1 Bulletin 120 forecast and provided that the forecast indicates that the water-year type is Dry or Critically Dry, this Annual Spill flow is not required for that year, regardless of whether later forecasts indicate that the water-year type is Normal or Wet.

High Spill Requirement. Prior to March 31 of each Normal or Wet water year in which a High Spill (200-300 cfs magnitude flow for at least 18 hours in duration) has not occurred during the previous five years in Bucks Creek below Lower Bucks Lake Dam, the Licensees shall make a good faith effort to schedule a High Spill event of 200-300 cfs. This event shall be concurrent with flows in excess of 3,000 cfs at PG&E gage NF57 on the NFFR (gage is part of the Rock Creek-Cresta Project, FERC Project No. 1962). The Licensees shall not be required to

implement a High Spill if flows at PG&E gage NF57 in excess of 3,000 cfs are not available or the Licensees cannot reasonably accommodate a High Spill at a time when 3,000 cfs may be available due to safety or emergency conditions that may exist at the time. In such event the Licensees may consider a High Spill concurrent with a flow at PG&E gage NF57 less than 3,000 cfs but in no event less than 1,600 cfs, recognizing that this further consideration may result in a postponement of the High Spill to a future year. The Licensees shall notify (by email and phone) the Forest Service, State Water Board, USFWS, and CDFW, of the planned High Spill and provide any information available on the possible schedule for such spill. The Licensees shall make a good faith effort to incorporate any additional comments or suggestions made by Forest Service, State Water Board, USFWS, and CDFW.

Upon completion of the 18-hour High Spill, the Licensees shall make a good faith effort, consistent with existing equipment, to smoothly taper off the flow, consistent with the Spill Management at Grizzly Forebay and Lower Bucks Lake Measure. In the event that the High Spill is not produced before issuance of the DWR March 1 Bulletin 120 forecast and such forecast indicates that the water year type is Dry or Critically Dry as classified below, the above High Spill shall be postponed to the next eligible year, regardless of whether the later forecasts indicate that the water-year type is Normal or Wet.

Unplanned Spill Events. Although rare, it is possible that Lower Bucks Lake may experience an unavoidable spill in the spring months due to uncontrolled spill at Bucks Lake and powerhouse outages or other emergencies. In such event, and to the extent reasonably possible in view of the then existing conditions, the Licensees shall notify the Forest Service, State Water Board, USFWS, and CDFW, and use best efforts to minimize the magnitude of such spill if corresponding high flow conditions (above 3,000 cfs) are not present in the NFFR. In the event an unplanned spill may be expected to occur prior to March 31, and if such spill could be increased to over 200 cfs for at least 18 hours, the Licensees shall notify (by email and phone) the Forest Service, State Water Board, USFWS, and CDFW, prior to implementation of any actions to increase the spill, if time permits. Reasonable efforts shall be made to incorporate any comments received recognizing that rapidly changing conditions may necessitate action by the Licensees in less than 24 hours to take advantage of the opportunity to spill in excess of 200 cfs.

Grizzly Creek Channel Maintenance Flow Requirements

Annual Spill Requirements. The Licensees shall track natural spill events at Grizzly Forebay Dam. If, prior to March 31 of each year, a spill of at least 50 cfs for at least 18 hours duration has not occurred in the last 18 months, the Licensees shall provide minimum streamflows of 50 to 70 cfs in Grizzly Creek below Grizzly Forebay Dam for a period of at least 18 hours prior to April 15 of that year. This may be accomplished by any combination of spill, release, and accretion flows. At the end of this event, the Licensees shall make a good faith effort, consistent with existing equipment, to smoothly taper off the flow, consistent with the Spill Management at Grizzly Forebay and Lower Bucks Lake Measure. An annual spill flow is not required in Dry and Critically Dry years. In the event that the DWR March 1 Bulletin 120 forecast indicates that the water-year type will be Dry or Critically Dry as determined below, the above pulse flow is not required for that year, regardless of whether later forecasts indicate that the water-year type is Normal or Wet.

Unplanned Spill Events. Spill flow at Grizzly Forebay is a common event in Normal and Wet water years; therefore, the Licensees are not required to provide any notification in the event of spill at this location.

Measurement and Reporting of Channel Maintenance Flows

Measurement of channel maintenance flows in Bucks Creek shall be based on reservoir elevation and appropriate rating tables for the spillways for each dam. Telemetered reservoir elevations shall be available to the Licensees to allow monitoring and control of channel maintenance flows. Flows in Grizzly Creek shall be measured at PG&E gage NF22.

The Licensees shall prepare a report for each year that a channel maintenance flow is released in either Bucks Creek or Grizzly Creek. The report shall include data on the timing, magnitude, and duration of the flow(s); any turbidity data collected; and any observations made by operations and maintenance (O&M) personnel.

The Licensees shall submit a draft of the report to the Forest Service, State Water Board, USFWS, and CDFW, for their review and comment by January 31 of the following year. The Licensees shall allow the Resource Agencies at least 45 days to provide their input on the draft report.

The Licensees shall file a final report on the channel maintenance flows, within 90 days of providing the draft report to the agencies. The report shall include documentation of consultation with the agencies specified above; copies of their comments and recommendations on the report; and specific descriptions of how the agencies' comments are incorporated into the report and how their recommendations were addressed.

The Licensees shall also discuss the results of the channel maintenance flow report at the following annual meeting(s) with the Forest Service and the Ecological Consultation Group (per the Annual Forest Service Consultation [Condition No. 1] and the Organize Ecological Consultation Group and Host Meetings [Condition No. 2], respectively).

Emergency Conditions

The Licensees' requirement to consult and/or notify agencies, or implement certain actions under this measure assumes that emergency conditions do not exist and reasonable time is available to accomplish the appropriate actions. If emergency conditions exist, the Licensees' actions shall not be bound by this measure.

Condition No. 35 – Spill Management at Grizzly Forebay and Lower Bucks Lake

In order to minimize the impact of unavoidable spills on Grizzly Creek, Grizzly Forebay shall be drawn down to the extent practical in advance of forecasted spill events.

The remainder of this measure applies to spills caused or influenced by powerhouse (PH) load changes, herein referred to as “managed spills”. Load changes are the only method of significantly affecting rate of change of Project spills at Grizzly Forebay and Lower Bucks,

which have uncontrolled spillways and small low-level outlets designed for minimum instream flow releases.

The following requirements do not apply to spills during periods when the applicable powerhouses are held at constant load for the duration of the spill (*i.e.*, “block loaded”); nor do they apply to spills at Grizzly Forebay when load changes are made in parallel at both Grizzly PH and Bucks PH such that flows through the powerhouses are as equivalent as possible (*i.e.*, “paired schedules” achieving a natural rate of change in flow).

At no time shall managed spills that affect flows on Grizzly Creek be scheduled during the first five days or the last two days of the prescribed daily steps of the Rock Creek-Cresta Project (FERC Project No. 1962) NFFR Cresta Reach 21-day spill recession (CSR)¹. Preferentially, managed spills that affect flows on Grizzly Creek shall be scheduled prior to the CSR; however, if that is impractical they may be scheduled during the fifteen days of constant flow within the CSR (*i.e.*, Days 6-20). This part of the measure may be revised, in consultation with the Forest Service, State Water Board, and CDFW, if instream flow or ramping rate requirements for the confluent hydroelectric project (Rock Creek-Cresta Project) significantly change from current (2018) conditions.

For additional protection of the foothill yellow-legged frog population in the Cresta Reach, extended outages greater than two weeks on Bucks PH and Grizzly PH shall not be scheduled during April through July in order to avoid potential resultant spills on Grizzly Creek during that ecologically sensitive period. Outages during August and September are unlikely to result in spills; however, no outages shall be scheduled for these months if they will cause a spill.

For down-ramping of managed spills that occur from April through September, the load change over 24 hours shall not exceed the megawatt (MW) value in Tables 1, 2, or 3 of this Condition, corresponding to the applicable powerhouse and instantaneous spill flow at the beginning of that 24-hour increment.

For down-ramping of managed spills that occur from October through March, any load changes over 60 minutes shall not exceed the MW value in Tables 1, 2, or 3 of this Condition, corresponding to the applicable powerhouse and instantaneous spill flow at the beginning of that 60-minute increment.

During extended spills of greater than 350 cfs that occur from October through March, flexible schedules and bidding are allowed, but load changes shall not exceed the MW value in Tables 1, 2, or 3 of this Condition, corresponding to the applicable powerhouse and instantaneous spill flow at the beginning of that increment. For spills at Grizzly Forebay, this flexibility applies only when flows on the NFFR exceed 3,500 cfs at NF56.

¹ For the protection of foothill yellow-legged frogs, during the months of May through September in all water year types, the Rock Creek-Cresta Project license specifies a 21-day recession in the Cresta each during the transition time from 1,000 cfs to base flows. The following steps are targets based on daily average flow in cfs, measured at the Cresta Reservoir radial gate: Day 1 at 1000, Day 2 at 920, Day 3 at 840, Day 4 at 760, Day 5 at 680, Days 6-20 at 600, Day 21 at 520, Day 22 at Base Flow.

Table 1. Grizzly Powerhouse Load Changes for Spills at Grizzly Forebay Dam

(Changes in powerhouse flows result in corresponding changes in instream flows; *i.e.*, powerhouse flows are decreasing, instream flows will decrease at a similar magnitude)

Initial Flow at NF22 (cfs)	Allowable Change (MW)	Approximate Powerhouse Flow Change Per Step (cfs)
> 800	N/A	N/A
551 - 800	12.0	203 - 209
351 - 550	8.0	135 - 140
150 - 350	4.0	67 - 70
< 150	2.0*	33 - 35

*Depending on the 9 – 11 MW no-run zone, may require a 3 MW step

Table 2. Bucks Powerhouse Load Changes for Spills at Grizzly Forebay Dam

(Changes in powerhouse flows result in corresponding changes in instream flows – *i.e.*, powerhouse flows are increasing, instream flows will decrease at a similar magnitude)

Initial Flow at NF22 (cfs)	Allowable Change (MW)	Approximate Powerhouse Flow Change Per Step (cfs)
> 800	N/A	N/A
551 - 800	40.0	~207
351 - 550	24.0	119 - 158
150 - 350	12.0	58 - 86
< 150	6.0	29 - 45

Table 3. Grizzly Powerhouse Load Changes for Spills at Lower Bucks Dam

(Changes in powerhouse flows result in corresponding changes in instream flows – *i.e.*, powerhouse flows are increasing, instream flows will decrease at a similar magnitude)

Initial Flow at NFC12 (cfs)	Allowable Change (MW)	Approximate Powerhouse Flow Change Per Step (cfs)
> 800	N/A	N/A
551 - 800	12.0	203 - 209
351 - 550	8.0	135 - 140
150 - 350	4.0	67 - 70
< 150	2.0*	33 - 35

*Depending on the 9 – 11 MW no-run zone, may require a 3 MW step

Stream stage and calculated flow shall be monitored in Bucks Creek downstream of Lower Bucks Lake Dam and in Grizzly Creek downstream of Grizzly Forebay Dam for the first five years of the License, or until all three ramping scenarios are implemented, whichever may come

first. Flow measurement methods are described in the *Streamflow and Reservoir Level Gaging Plan* (Condition No. 39). After License Year Five, the Licensees shall compile a report that documents the effects of implementation of the measure on instream flow conditions in Bucks Creek, Grizzly Creek, and the NFFR. The report shall also provide recommendations to improve the Licensees' compliance with this measure.

Based on the report and associated hydrologic data, the Licensees, in consultation with the Forest Service, State Water Board, USFWS, CDFW, and interested stakeholders, shall review, update, and revise the measure, as needed to protect aquatic species. Sixty days shall be allowed for the Forest Service, State Water Board, USFWS, CDFW, and interested stakeholders to provide written comments and recommendations on the revised measure. After approval by the Forest Service and State Water Board, the Licensees shall work with the Forest Service and State Water Board to file the updated measure with FERC. The Licensees shall include all relevant documentation of coordination and consultation with the updated measure filed with FERC. If the Licensees do not adopt a particular recommendation by USFWS, CDFW, or interested stakeholders, the filing shall include the reasons for not doing so. The Licensees shall implement the measure as approved by FERC.

Condition No. 36 – Project Reservoir Operations

The Licensees shall operate Lower Bucks Lake, Lower and Middle Three Lakes, Bucks Lake, and Grizzly Forebay as follows (gages listed for each reservoir are described in the *Streamflow and Reservoir Level Gaging Plan* [Condition No. 39]):

Lower Bucks Lake

Water surface elevations shall not be drawn down below elevation 4,966 ft. Minimum reservoir pool elevations shall be measured at PG&E gage NF13.

Lower and Middle Three Lakes

Lake levels shall be maintained as in the 10-year period of 1957 through 1967; Lower Three Lakes shall not be drawn down below elevation 6,050 feet and Middle Three Lakes shall not be drawn down below elevation of 6,057 feet. Minimum reservoir pool elevations shall be measured at PG&E gage NF10.

Bucks Lake

Water levels shall be determined based on month and water year type. Water year type is defined in the Annual Determination of Water Year Type (Condition No. 30).

Drawdown for a year other than a Dry or Critically Dry water year during June 1 through September 1 shall not exceed 15 feet below the water surface elevation of June 1, and at no time shall the water surface elevation go below elevation 5,100 feet.

Drawdown for a Dry or Critically Dry water year shall not go below water surface elevation 5,080 feet and this level shall not be reached prior to September 1.

Minimum reservoir pool elevations shall be measured at PG&E gage NF16.

Grizzly Forebay

Forebay levels shall not be drawn down below elevation 4,303 feet. Minimum reservoir pool elevations shall be measured at PG&E gage NF19.

Departure from these reservoir operation criteria shall be permissible only when it is necessary to do maintenance on the respective dams or their outlet works, when in the interest of public safety, or as may be otherwise authorized by FERC. All elevations are on Feather River Power Company datum (Elevation 5,155.0 ft Feather River Power Company = elevation 5,158.5 ft USGS).²

Condition No. 37 – Annual Drawdown of Three Lakes

The Licensees shall verify the water surface elevation (WSE) of Lower Three Lakes by August 15.

- If the WSE is above 6,072 ft, as measured by PG&E gage NF10, the Licensees shall initiate drawdown on or about August 15, and set the low-level outlet valve to release 9 cfs (based on the rating curve at MR2).
- If the WSE is at or below 6,072 ft, as measured by PG&E gage NF10, the Licensees shall calculate a start date to initiate drawdown with the objective of reaching minimum pool at Lower Three Lakes (WSE 6,050 ft) by September 15 at a release of 9 cfs.

The Licensees shall leave the low-level outlet valve at Three Lakes set to release 9 cfs until November 1, upon which the Licensees shall fully open the low-level outlet valve to the “Winter Setting.” The low-level outlet valve will be set to release 9 cfs, based on the rating curve, however actual flow releases from the low-level outlet valve may vary depending upon reservoir head and natural inflow into Three Lakes. The low-level outlet valve may be fully opened prior to November 1 if weather is predicted that may restrict safe access to the valve house.

By January 31, the Licensees shall provide the Forest Service, State Water Board, USFWS, and CDFW, a report documenting the following:

- The WSE of Lower Three Lakes on or about August 15;
- The date the Licensees initiated the drawdown of Three Lakes;
- The date when minimum pool was reached at Lower Three Lakes; and
- The date when the outlet valve was fully opened to the “Winter Setting.”

The Licensees shall allow the Resource Agencies at least 45 days to provide their input on the draft report. The Licensees shall file a final report with FERC within 90 days of providing the draft report to the agencies. The report shall include documentation of consultation with the agencies specified above; copies of their comments and recommendations on the report; and specific descriptions of how the agencies’ comments are incorporated into the report and how their recommendations were addressed.

² Elevations in “PG&E (formerly, Feather River Power Company) Datum” are 3.5 ft lower than those expressed as “U.S. Geological Survey (USGS) Datum.”

Licensees shall review the dates associated with the annual drawdown from the previous year with the Forest Service and the ECG (per the Annual Forest Service Consultation [Condition No. 1] and the Organize Ecological Consultation Group and Host Meetings [Condition No. 2]).

Condition No. 38 – Manage Diversions along Milk Ranch Conduit for Safety and Aesthetics

Any existing inactive diversion structures will be left in place and managed for safety and aesthetics by the Licensees. Six diversions along Milk Ranch Conduit (Current FERC Diversion Nos. 1, 4, 5, 6, 7, and 8 identified in Figure 1 of this Condition and Table 1 of this Condition, below) and the ancillary features are to be left inoperable (*i.e.*, no longer divert flows). The Licensees shall seal any exposed intake and diversion pipe openings at the inoperable diversions. Other specific actions include:

- FERC Diversion No. 5 – The Licensees shall monitor the existing diversion structure following Wet water years for undermining and collapse. If the diversion structure collapses, the Licensees shall consult with Forest Service for appropriate mitigation actions.
- FERC Diversion Nos. 1 and 7 – Within six months of license issuance, the Licensees, in consultation with the Forest Service and other interested Resource Agencies, shall develop an approach to modify or conceal the face of the diversion dam to create a more natural appearance. Methods such as chipping the concrete, modifying the flow pattern over the crest of the dam, and/or planting vegetation will be considered.
- FERC Diversion No. 8 – The Licensees shall remove the exposed diversion pipe and seal the opening.

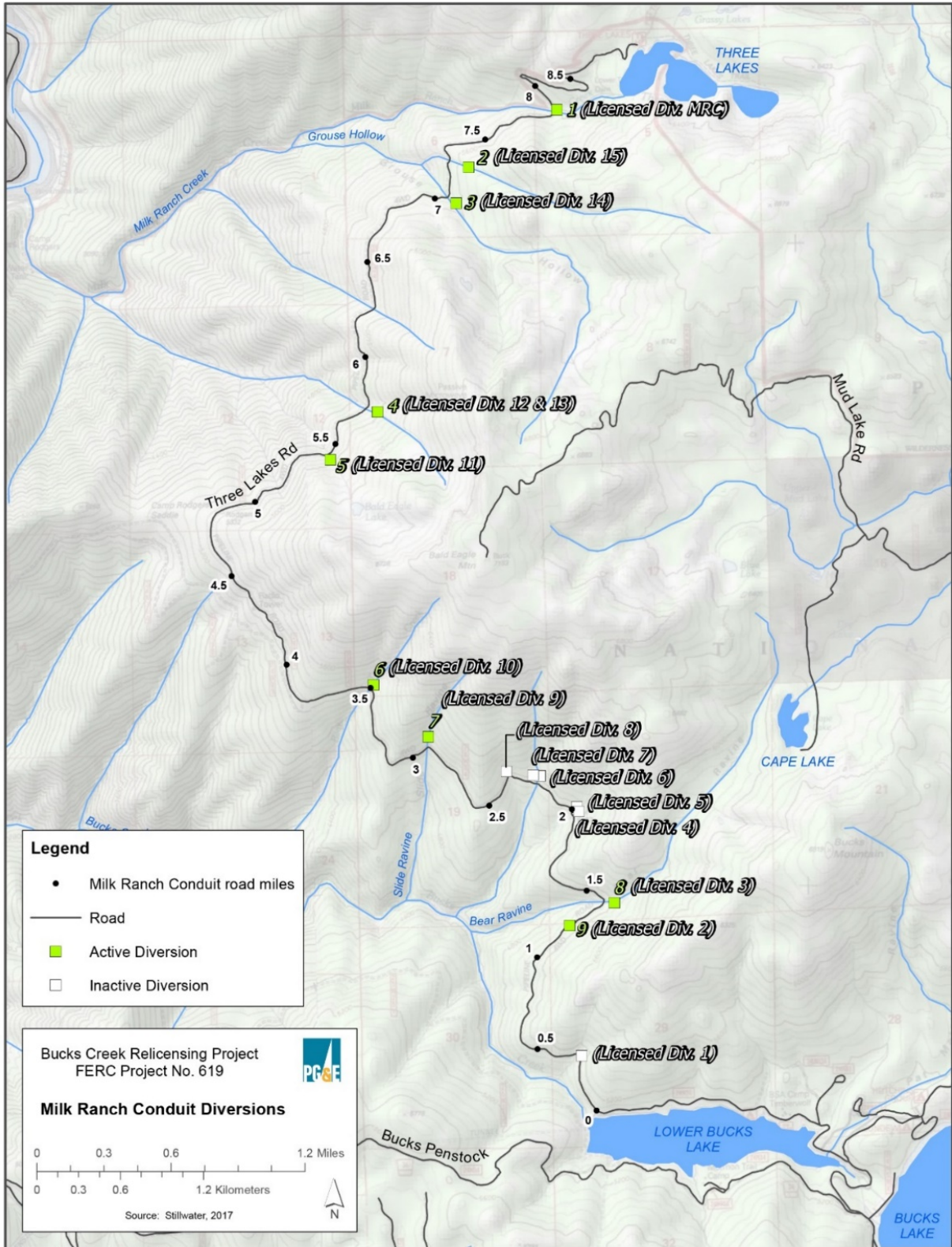


Figure 1. Milk Ranch Conduit Diversions

Table 1. Milk Ranch Conduit Diversions Status and Locations, 2017.

FERC Diversion No. (licensed)	PG&E Diversion No. (proposed)	Stream Drainage	Diversion Status	Road Mile (0.0 near MRC outfall)	UTM (10S) ¹	
					Easting	Northing
1	--	--	Inactive	0.0	651398	4418798
2	9	--	Active	0.9	651313	4419738
3	8	Bear Ravine	Active ²	1.1	651633	4419902
4	--	--	Inactive	--	651377	4420560
5	--	--	Inactive	1.6	651364	4420593
6	--	--	Inactive	1.9	651098	4420817
7	--	--	Inactive	1.9	651049	4420823
8	--	--	Inactive	2.0	650856	4420850
9	7	Slide Ravine	Active	2.6	650294	4421100
10	6	Bear Trap Creek	Active	3.1	649900	4421474
11	5	--	Active	5.1	649591	4423096
12/13	4	--	Active	5.4	649931	4423444
14	3	South Fork Grouse Hollow Creek	Active	6.7	650493	4424947
15	2	North Fork Grouse Hollow Creek	Active	6.9	650582	4425208
Milk Ranch Creek	1	Milk Ranch Creek	Active	7.5	651220	4425622

¹ NAD83 UTM Zone 10N

² Although actively maintained as part of the current FERC Project, the Licensees shall cease diversion of flows from Bear Ravine into Milk Ranch Conduit at Milk Ranch Conduit Diversion No. 8, per the requirements of Condition No. 32 - Full Natural Flow in Bear Ravine at Milk Ranch Conduit Diversion No. 8.

At all active and inactive diversion locations, the Licensees shall remove construction litter and/or diversion debris. The Licensees shall screen and maintain air vents in order to prevent wildlife from entering the vents. Due to the historic status of these diversions, prior to implementing any activities described in this measure, the Licensees shall review the requirements of the *Historic Properties Management Plan* (Condition No. 58).

Condition No. 39 – Streamflow and Reservoir Gaging Plan

Upon Commission approval, Licensee shall implement the Streamflow and Reservoir Gaging Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on July 27, 2018 (FERC eLibrary Accession No. 20180727-5102), for locations on, or directly affecting, NFS lands.

Condition No. 40 – Pass Woody Material at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay Dams

The Licensees shall allow woody material to pass over Grizzly Forebay Dam during spill events and channel maintenance flows (Condition No. 34) by leaving the downstream end of the reservoir's log boom attached only to the right side of the spillway year-round, allowing debris to freely pass over the spillway during spill events. If spill events and channel maintenance flows are not sufficient to pass woody material (*e.g.*, during multiple dry year conditions), the Licensees may periodically mechanically remove woody material from the reservoir.

At Lower Bucks Lake Dam, the Licensees shall also allow woody material to pass over the dam's spillway during spill events. There may also be a periodic need to mechanically remove woody material from the reservoir.

To avoid impacts to downstream culverts in Bucks Creek (below Bucks Lake), wood at Bucks Lake spillway shall be relocated to Lower Bucks Lake spillway. If site conditions preclude placement and passage of wood on Lower Bucks Lake spillway, the Licensees may transport wood offsite following consultation with the agencies as described below.

All sizes of woody material, including woody material with root wads attached, shall be allowed to pass downstream past the dams. The Licensees shall avoid cutting the wood, unless it is unsafe for Project operations or cannot mechanically be moved due to large size.

For any woody material that cannot be passed downstream of Project dams, the Licensees shall consult with the Forest Service, State Water Board, USFWS, and CDFW, and to determine appropriate methods for removal, transport, and disposal.

Condition No. 41 – Gravel Augmentation Plan

Upon Commission approval, Licensee shall implement the Gravel Augmentation Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), for locations on, or directly affecting, NFS lands.

Condition No. 42 – Sierra Nevada Yellow-legged Frog Management Plan

Upon Commission approval, Licensee shall implement the Sierra Nevada Yellow-legged Frog Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), for locations on, or directly affecting, NFS lands.

Condition No. 43 – Aquatic Resources Monitoring Plan

Upon Commission approval, Licensee shall implement the Aquatic Resources Monitoring Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), for locations on, or directly affecting, NFS lands.

Condition No. 44 – Aquatic Invasive Species Management

The Licensees shall, within one year after license issuance, file with the Commission a Plan approved by the Forest Service, State Water Board, USFWS, and CDFW, that provides guidance to manage aquatic invasive species (AIS) that occur or have the potential to be introduced into Project-affected waters within the FERC Project Boundary while addressing applicable current federal and state laws, regulations, and policies. Such AIS include Whirling Disease vector (*Myxobolus cerebralis*), *Ceratonova shasta*, *Tetracapsuloides bryosalmonae*, *Ichthyophthirius multifiliis*, *Batrachochytrium dendrobatidis*, Ranavirus (Frog virus 3), quagga and zebra mussels (*Dreissena bugensis* and *D. polymorpha*, respectively), New Zealand mudsnail (*Potamopyrgus antipodarum*), Asian clam (*Corbicula fluminea*), signal crayfish (*Pacifastacus leniusculus*), virile crayfish (*Orconectes virilus*), American bullfrog (*Lithobates catesbeianus*), Eurasian milfoil (*Myriophyllum spicatum*), Hydrilla (*Hydrilla verticillata*), curly leaf pondweed (*Potamogeton crispus*), Brazilian waterweed (*Egeria densa*), parrot's feather milfoil (*Myriophyllum aquaticum*), water primrose (*Ludwigia* spp.), and didymo (*Didymosphenia geminata*).

The goals of the Plan are to: (1) implement Best Management Practices (BMPs) activities to minimize and prevent the introduction and spread of AIS into and throughout Project-affected waters; (2) provide education and outreach to ensure public awareness of AIS effects and management throughout Project-affected waters; (3) implement monitoring programs to ensure early detection of AIS; 4) ensure all Project AIS management activities comply with federal and State of California laws, regulations, policies, and management plans, and with Forest Service AIS directives and orders.

At a minimum, the Plan shall include BMPs to prevent the introduction of AIS into Project-affected waters, early detection monitoring and monitoring of known AIS populations, and management of existing populations of AIS, to include, but not be limited to:

- A public education program, including CDFW-/Forest Service-supported signage and informational cards at public recreational access sites and on PG&E's AIS website, covering the following prevention actions:
 - Draining water from boat, motor, bilge, live well, and bait containers before leaving a water access site.
 - Removing visible plants, animals, and mud from boat and trailer before leaving waterbody.
 - Cleaning and drying boats using CDFW protocols for the prevention of all AIS before entering any waterbody area.
 - Disposing of unwanted bait in trash, including earthworms.
 - Avoiding the release of plants and animals into a waterbody unless they originated from that waterbody.
 - If any Project-affected water is found to harbor AIS, the Licensees shall consult with appropriate agencies and ensure appropriate CDFW-/Forest Service-supported educational signage is available and visible at the infested waterbody.

- Early detection monitoring for quagga and zebra (dreissenid) mussels, consisting of surface surveys, artificial substrate monitoring, and/or plankton tow sampling utilizing the most current CDFW protocols (available online at <https://www.wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels>), shall be conducted at Project reservoirs where recreational, boating, or fishing activities are permitted, which includes: Three Lakes, Bucks Lake, Lower Bucks Lake, and Grizzly Forebay. The type, location, and intensity of monitoring at each reservoir shall be determined by the vulnerability assessment completed by the Licensees for all Project reservoirs. The vulnerability assessment for each reservoir shall be based on proximity to dreissenid-mussel infested waterbodies, frequency, and type of recreation use, water chemistry utilizing Claudi and Prescott (2011), and other factors that contribute to the potential introduction of dreissenid mussels into Project reservoirs. Water quality profiles, including water temperature, dissolved oxygen, pH, turbidity, and conductivity, at each reservoir shall be collected coinciding with quagga and zebra mussel monitoring.
 - Based on calcium levels in the Project waters, Project reservoirs are unlikely to support dreissenid mussel establishment (Claudi and Prescott 2011 and Mackie 2004).
- Monitoring of other focal AIS
 - Crayfish monitoring in Project-affected streams concurrent with the *Aquatic Resources Monitoring Plan's* Stream Fish Population Monitoring (see Condition No. 43)
 - Environmental DNA (eDNA) sampling (or other current industry standard) concurrent with the *Aquatic Resources Monitoring Plan's* BMI Population Monitoring schedule in Project reservoirs and Project-affected streams (Bucks Creek below Lower Bucks Lake, Grizzly Creek below Grizzly Forebay, and Milk Ranch Creek below Milk Ranch Conduit) (see Condition No. 43). A subset of Project reservoir tributary confluences (Mill Creek, Middle Fork Mill Creek, Right Hand Branch Mill Creek, and Haskins Creek at Bucks Lake, and Grizzly Creek at Grizzly Forebay) shall be sampled once within the first full calendar year after completion of the AIS Plan.
 - *Myxobolus cerebralis*
 - *Ceratonova shasta*
 - *Tetracapsuloides bryosalmonae*
 - *Ichthyophthirius multifiliis*
 - *Batrachochytrium dendrobatidis*
 - *Ranavirus* (Frog virus 3)
- Observations of other AIS, shall be collected and reported as described below.
 - Incidental observations of AIS of concern shall be recorded during AIS monitoring as well as periodic aquatic surveys (e.g., fish, amphibian, etc.). Fish and amphibian monitoring datasheets shall include a checklist of the AIS species included in the AIS Management Plan.
- Annually, or more frequently if appropriate, the Licensees shall access and download data from online AIS databases (e.g., USGS Non-Indigenous Aquatic Species (NAS) database [<https://nas.er.usgs.gov/>]) including the automated alert system, and

iMapInvasives [<https://www.imapinvasives.org/vision>]) to determine if new AIS have been found in the Project Area. AIS occurrence information shall be included in an AIS report provided to agencies annually as described below.

- Annual employee AIS training (*i.e.*, employees and contractors that could potentially affect AIS in Project waters), including:
 - Species identification of AIS species of concern outlined in the Plan. However, it is not the intent of this training that staff become experts in the identification of AIS of concern.
 - BMPs to prevent AIS introduction and spread in Project reservoirs and Project-affected stream reaches.
 - For those staff or contractors that shall perform AIS monitoring, training in CDFW's quagga/zebra mussel protocols for surface survey, artificial substrate monitoring, and veliger sampling.
- Control and Management Actions
If any of the AIS species of concern listed above are detected within the FERC Project Boundary, the Licensees shall immediately notify (within 3 business days) the Forest Service, State Water Board, USFWS, and CDFW and consult with these agencies to develop and institute an appropriate plan of action. Examples of potential actions include:
 - Control of quagga and zebra mussels.
 - If non-native crayfish are detected in any Project-affected streams, implement control measures and evaluate effects of Project flows on invasive species in stream reaches.
 - Educational measures targeted at anglers in relation to crayfish movement and whirling disease decontamination measures (in coordination with CDFW).
 - Consult with the Forest Service, State Water Board, USFWS, and CDFW on appropriate rapid response measures, including:
 - rapid confirmation of the identity of the suspicious organism;
 - assess the extent of the infestation;
 - quick review of available control options to choose one best suited for the treatment conditions;
 - application of the chosen control option(s); and,
 - modification of the control strategy as indicated by the results.
- Reporting and Consultation
Beginning within the first full calendar year of the new license, provide an annual report of AIS prevention and monitoring activities by March 31 of the following year. The annual AIS monitoring report shall be provided to the Forest Service, State Water Board, USFWS, and CDFW. Electronic data (tabular and spatial) shall be provided along with the report. The Licensees shall provide a summary of AIS observed during the previous year at the annual Ecological Group meeting.

- **Plan Revisions**
 The Licensees, in consultation with the Forest Service, State Water Board, USFWS, CDFW, and interested stakeholders, shall review, update, and/or revise the Plan, as needed, when substantial changes in AIS management occur. Changes may be implemented if monitoring feedback indicates that resource objectives are not being met. Sixty days would be allowed for the Forest Service, State Water Board, USFWS, CDFW, and interested stakeholders to provide written comments and recommendations. After consultation and agreement with the Forest Service and State Water Board, the Licensees will work with the Forest Service and State Water Board to file the updated Plan with FERC. The Licensees will include all relevant documentation of coordination and consultation with the updated Plan filed with FERC. If the Licensees do not adopt a particular recommendation by the Forest Service, State Water Board, USFWS, CDFW, or interested stakeholders, the filing will include the reasons for not doing so. The Licensees will implement the Plan as approved by FERC.

Following is an outline of the proposed Aquatic Invasive Species Management Plan:

- 1.0 Introduction
 - 1.1 Background
 - 1.1.1 Bucks Creek Project Description
 - 1.1.2 Aquatic Invasive Species
 - 1.2 Purpose
 - 1.3 Goals and Objectives
 - 1.4 Current Federal and State of California Authorities Applicable to Aquatic Non-native Invasive Species
 - 1.4.1 Federal Laws, Regulations, Policies, and Plans
 - 1.4.2 State Laws, Regulations, Policies, and Plans
 - 1.5 Contents of the Aquatic Invasive Species Management Plan
- 2.0 Aquatic Non-Native Invasive Species Life Histories
 - 2.1 Whirling Disease vector, *Myxobolus cerebralis*
 - 2.2 *Ceratomyxa shasta*
 - 2.3 *Tetracapsuloides bryosalmonae*
 - 2.4 *Ichthyophthirius multifiliis*
 - 2.5 *Batrachochytrium dendrobatidis*
 - 2.6 Ranavirus (Frog virus 3)
 - 2.7 Quagga Mussel (*Dreissena rostriformis bugensis*)
 - 2.8 Zebra Mussel (*Dreissena polymorpha*)
 - 2.9 New Zealand Mudsnail (*Potamopyrgus antipodarum*)

- 2.10 Asian Clam (*Corbicula fluminea*)
- 2.11 Signal crayfish (*Pacifastacus leniusculus*)
- 2.12 Virile crayfish (*Orconectes virilus*)
- 2.13 American Bullfrog (*Lithobates catesbeianus*)
- 2.14 Curly Leaf Pondweed (*Potamogeton crispus*)
- 2.15 Eurasian Watermilfoil (*Myriophyllum spicatum*)
- 2.16 Hydrilla (*Hydrilla verticillata*)
- 2.17 Brazilian Waterweed (*Egeria densa*)
- 2.18 Parrot's Feather Milfoil (*Myriophyllum aquaticum*)
- 2.19 Water Primrose (*Ludwigia* spp.)
- 2.20 Didymo (*Didymosphenia geminata*)
- 3.0 Aquatic Non-Native Invasive Species Management and Monitoring
 - 3.1 Standards and Best Management Practices
 - 3.1.1 Public Education Program
 - 3.1.2 Best Management Practices for Project Activities
 - 3.2 Monitoring
 - 3.2.1 Focal Species Monitoring
 - 3.2.2 Incidental Observations
 - 3.2.3 Data from online AIS databases
 - 3.3 Control and Management
 - 3.3.1 Rapid Response Consultation
- 4.0 Training, Reporting, Consultation, and Plan Revisions
 - 4.1 Annual Employee Education and Training
 - 4.2 Reporting and Consultation
 - 4.3 Plan Revisions
- 5.0 References

Condition No. 45 – Integrated Vegetation Management Plan

Upon Commission approval, Licensee shall implement the Integrated Vegetation Management Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on July 27, 2018 (FERC eLibrary Accession No. 20180727-5102), for locations on, or directly affecting, NFS lands.

Condition No. 46 – Evaluate, and Upgrade if Necessary, Transmission Line for Consistency with APLIC and Implement Other Raptor Projection Measures

The Licensees shall conduct an evaluation of the Project transmission line (Grizzly PH 115 kV) within two years of license issuance to determine its consistency with design configurations as recommended by the Avian Power Line Interaction Committee (APLIC 2006 and 2012)³ guidance documents, or updated versions of these documents as they are issued.

If it is determined that the configurations are inconsistent with APLIC guidelines, the Licensees shall complete: (1) minor repairs or retrofits (*e.g.*, changing conductor spacing, installing bird flight diverters or new insulators) within three years of completing their evaluation, and/or (2) major repairs as appropriate (*e.g.*, pole replacement or retrofit) within 10 years of license issuance, as agreed to in consultation with CDFW, the Forest Service and USFWS.

Throughout the term of the new license, the Licensees shall:

- Ensure all newly installed powerlines, poles, conductors, and other transmission infrastructure and associated equipment conform to current APLIC guidelines.
- Record all incidental observations of bird electrocutions and/or collisions, and dead birds found by the Licensees' O&M staff within the FERC Project Boundary.

Condition No. 47 – Bald Eagle Management Plan

Upon Commission approval, Licensee shall implement the Bald Eagle Management Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), for locations on, or directly affecting, NFS lands.

³ APLIC. 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, CA.

APLIC. 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington D.C.

Condition No. 48 – Limited Operating Period for Breeding Osprey

The Licensees shall perform a pre-construction survey for nesting osprey at locations with suitable habitat and establish a 300 to 500 ft protective buffer around active nests when potentially disruptive activities related to maintenance of Project recreational facilities, and/or other Project O&M activities are conducted during the osprey breeding season (March 15 to August 31). The pre-construction survey shall be conducted by a qualified biologist within one week of the start of work activities and within a minimum 500 ft radius of Project activities. Survey areas shall extend to a 1,000 ft radius of Project activities if prolonged helicopter use (*i.e.*, multiple trips and hovering) is planned. Surveys shall be conducted during an appropriate time of day when conditions provide good visibility, with the most likelihood of determining presence of adults or nestlings at the nest (*e.g.*, during mid-day). Surveys will not be conducted during inclement weather (*e.g.*, rain or strong wind). If construction is initiated in March and continues into April for a total of two weeks past the original survey date, one additional survey will be conducted by a qualified biologist.

The buffer distance (300 to 500 ft) will be determined by a qualified biologist based on site-specific conditions, including observations of the pair's sensitivity to human activity, proximity to existing human activity or development (*e.g.*, roads, structures), current site conditions (*e.g.*, screening vegetation, terrain, *etc.*) and the site-specific Project activities. A 1,000 ft buffer will be implemented when potentially disruptive and prolonged helicopter use is conducted during the osprey breeding season.

For potentially disruptive Project activities which cannot be avoided within a 300 ft buffer (1,000 ft buffer for prolonged helicopter use) of a known active osprey nest during their breeding season, the Licensees shall notify the Forest Service, USFWS, and CDFW, prior to commencement of the activity. The Licensees shall provide notification to each agency as soon as possible, to provide an opportunity to comment prior to implementation. Potentially disruptive activities include helicopter hovering, blasting, tree-felling, and/or jackhammering or prolonged use of heavy equipment (*e.g.*, excavator) in areas with natural to low ambient activity (*e.g.*, light vehicular traffic, small power tools).

If work will occur within 300 ft of an active osprey nest for the activities listed above (less than 1,000 ft for helicopter), the nest will be monitored by a qualified biologist for at least one to two days at the onset of each phase of work activity (*e.g.*, involving new equipment) to determine if the buffer is adequate based on the behavior of the birds. The biologist shall have the authority to order the cessation of Project activities if nesting pairs exhibit signs of disturbance.

Condition No. 49 – Conduct Periodic Northern Goshawk and California Spotted Owl Nesting Surveys

The Licensees shall conduct surveys for California spotted owl and northern goshawk nests/territories the first full calendar year following license issuance, then every seven years thereafter (*i.e.*, Year 1, 8, 15, 22, 29, and 36) with the objective of determining changes to nesting locations within existing territories and/or establishment of new territories. Surveys will be focused around suitable nesting habitat that is safely accessible and within a 0.25-mi buffer of the Project transmission line, Project Roads, Project campgrounds, and Project helicopter landing

pads. Survey methods will be consistent with relicensing studies, to the extent possible, to ensure comparability of survey results with previously collected data by using the same methodologies. A draft report summarizing findings will be provided to the Forest Service, State Water Board, USFWS, and CDFW, for 30-day review, and a final report (including responses to agency comments) will be filed with FERC within one year of data collection.

Condition No. 50 – Limit Project-Related Activities During the California Spotted Owl and Northern Goshawk Breeding Seasons within the Vicinity of Active Nests

The Licensees shall avoid conducting potentially disruptive Project activities (see bulleted list below) related to Project helicopter use, Project recreational facilities maintenance, and/or other Project O&M within a 0.25-mi buffer of known California spotted owl and northern goshawk nests and/or suitable habitat during their respective breeding seasons (February 15 through August 31 for northern goshawk and March 1 through August 31 for California spotted owl). If potentially disruptive Project activities cannot be avoided in an area with a previously documented nest or suitable nesting habitat for California spotted owl and/or northern goshawk during the breeding season, the Licensees shall conduct pre-construction surveys for nesting California spotted owl and/or northern goshawk to determine occupancy and/or nesting status and establish a 0.25-mi protective buffer around active nests (in which no work would occur).

The Licensees shall confer with the Forest Service, USFWS, and CDFW, to address situations in which the activities listed below cannot be avoided within a 0.25-mile buffer of a known California spotted owl or northern goshawk nest during their respective breeding seasons. If work will occur within the 0.25-mi buffer, active nests shall be monitored full-time by a qualified biologist for at least two days at the onset of each phase of work activity (*e.g.*, involving new equipment), then periodically (*e.g.*, every few days) until construction ends or the biologist has determined that the young have fledged. The biologist shall have authority to order the cessation of project activities if nesting pairs and/or their young exhibit signs of disturbance.

Project activities that would trigger the actions described in this measure include:

- Helicopter operations involving extended circling or hovering (*e.g.*, >5 min) multiple round-trips, or repeated sling-loading of equipment into a site
- Project operations or maintenance requiring blasting
- Project operations or maintenance requiring jackhammering in areas with natural to low ambient activity (*e.g.*, light vehicular traffic and small power tools [USFWS 2006])
- Tree-felling (*e.g.*, hazard tree removal) or trimming of woody vegetation requiring extended chainsaw use (*e.g.*, >1 hr) and/or a masticator
- Removal of large slides at Project facilities or along Project roads that would require use of heavy equipment (*e.g.*, a backhoe or an excavator)
- Ditch and/or culvert cleaning along non-paved (*i.e.*, remote) Project roads extensive enough to require a backhoe

Condition No. 51 – Limit Project-Related Activities During the Willow Flycatcher Breeding Seasons

The Licensees shall avoid conducting potentially disruptive Project activities (*e.g.*, helicopter use, blasting, tree-felling, jackhammering, recreational facilities construction, and/or other loud operations and maintenance activities) within 350 ft of suitable willow flycatcher nesting habitat during the breeding season of June 1 through August 31. This includes Project activities which have the potential to disrupt actively nesting willow flycatcher, as determined by a qualified biologist. The presence of suitable habitat within 350 ft of proposed activities will be evaluated by a qualified biologist via desktop and/or field review based on the California Department of Fish and Game’s 2004 document “Determinations of Potential Willow Flycatcher Breeding Habitat” (CDFG/CDFW 2004)⁴, or the most current willow flycatcher habitat assessment guidelines recommended by the CDFW. When utilizing the CDFG (2004) guidelines, all four habitat criteria that are described must be met to be considered suitable willow flycatcher nesting habitat.

If disruptive Project activities cannot be avoided within 350 ft of suitable willow flycatcher nesting habitat during the breeding season, then the Licensees shall conduct protocol-level pre-construction surveys for nesting willow flycatcher and establish a 350 ft protective buffer around active nests. Project activities will not commence within 350 ft of an active nest any sooner than August 31 unless the Licensees can confirm that either (1) the nest successfully fledged young, or (2) the nest is unoccupied or failed, and early commencement of activities has been approved by the Forest Service, USFWS, and CDFW.

The Licensees shall notify the Forest Service, USFWS, and CDFW, prior to conducting potentially disruptive activities during the nesting season that may allow a smaller buffer than 350 ft. The Licensees shall provide notification to each agency as soon as possible to provide an opportunity to comment prior to implementation. The Licensees shall provide a qualified biologist to monitor active nests during Project activities which use a smaller buffer than 350 ft to determine if the buffer is adequate based on the behavior of the birds. Monitoring may be full time or periodic as determined by the qualified biologist. The qualified biologist shall have the authority to order the cessation of Project activities if nesting pairs and/or their young exhibit signs of disturbance. If the qualified biologist determines the implemented buffer is not adequate, the buffer may be increased to a sufficient distance or work may be delayed, based on the birds’ behavior. The Licensees shall notify the Forest Service, USFWS, and CDFW, of the revised buffer.

Condition No. 52 – Consult with Bat Biologist Prior to Significant Structural Modifications and Vegetation Management Activities

Structural Modifications

Prior to conducting Project activities that include structural modifications of Project facilities (*i.e.*, directly modifying potential roost structures) or loud noise and vibrations (*e.g.*, blasting,

⁴ CDFG/CDFW. 2004. DFG Determinations of Potential Willow Flycatcher Breeding Habitat. California Department of Fish and Game, Sacramento, CA.

jack hammering), a qualified biologist will determine if the activity has the potential to directly impact special-status bats or maternity colonies. This measure is intended to protect maternity colonies comprised of approximately 50 bats or more and colonies of any size if comprised of special-status bats. Special-status bats species include those species listed as federally endangered, threatened, or proposed for listing under the Endangered Species Act, Forest Service sensitive species and Forest Service species of conservation concern, State threatened, endangered, or candidate species for listing under the California Endangered Species Act, California species of special concern, and California fully protected species.

If the biologist determines the Project activities have the potential to directly affect maternity colonies or special-status bats, the Licensees shall:

- Implement a limited operating period during the maternity season from May 1 through August 31 to avoid conducting potentially disturbing Project activities when young are non-volant (unable to fly).
 - If work must occur during the maternity season, a qualified biologist will conduct a preconstruction survey and an assessment of potential roost sites to determine the presence of special-status bats and/or maternity colonies that may be directly affected by the Project activities. The biologist will assess appropriate protection measures, such as exclusion of bats (as provided below) from the work area prior to the maternity season, or monitor the site during Project activities, whichever the biologist determines is appropriate for the bat species, location, and Project activity.
- Prior to commencement of the Project activity, the Licensees shall provide notification to each agency as soon as possible, to provide an opportunity to comment prior to implementation, if:
 - Modification to a structure at a location that supports a special-status bat species or bat maternity colony has the potential to affect the current and future use of the roost (*e.g.*, change the building material or spacing of the roof at the intake structures/tunnel intake towers).
 - Temporary or permanent exclusion is planned at a structure that supports special-status bats (regardless of colony size) or a large colony of non-special-status bats comprised of approximately 50 bats or more.
- Notification shall include the proposed exclusion design and materials, if applicable. Replacement habitat would be considered, in coordination with the Forest Service, USFWS, and CDFW, if permanent exclusion occurred at a structure supporting special-status species or a large colony of non-special status species (approximately 50 bats or more). Notification to the agencies would not be provided if only smaller roosts (*e.g.*, day roost, night roost) of non-special status species would be affected.

Vegetation Management

When safety is not of immediate concern (*i.e.*, non-emergency work), the Licensees shall have a qualified biologist conduct a desktop review (such as reviewing tree diameter, aerial photographs, presence of sloughing bark) to assess if hazard tree removal or other tree removal has the potential to adversely affect roosting habitat or roosting bats during the maternity season

(May 1 through August 31). If the biologist determines that suitable habitat may be present, measures to minimize impacts to roosting bats, including, but not limited to, removing the tree in sections and/or creating disturbance to encourage passive escape, shall be implemented.

Condition No. 53 – Consult with Bat Biologist Prior to Loud/Vibration Activities Along Three Lakes Road or Three Lakes Dam

Prior to implementing loud or vibration causing activities (*e.g.*, blasting, jack hammering) along Three Lakes Road (24N24) or at Three Lakes Dam, and when safety is not of immediate concern, the Licensees shall have a qualified bat biologist review the Project activity for the potential to directly affect special-status bats. Cliff and rock faces in the vicinity of these areas may provide roosting habitat for bat species. If a qualified bat biologist determines the activity has the potential to directly affect special-status bats within the maternity season when young are non-volant (unable to fly) (May 1 through August 31), the Licensees shall conduct a preconstruction/emergence survey.

If survey results determine the activity would directly affect special-status roosting bats, the disturbance activity would not occur during the limited operating period from May 1 to August 31.

Special-status bats species include those species listed as federally endangered, threatened, or proposed for listing under the Endangered Species Act, Forest Service sensitive species and Forest Sensitive species of conservation concern, State threatened, endangered, or candidate species for listing under the California Endangered Species Act, California species of special concern, and California fully protected species.

Condition No. 54 – Inspect Project Tunnels for Bats Prior to O&M Activities in Winter

If Project O&M activities (*e.g.*, structure modification, jackhammering, or other activities causing loud noise and vibration to potential roosting structures) occur during the winter (November 1 through March 31) at Grizzly Powerhouse Tunnel portal, Bucks Lake Dam Outlet tunnel, or other Project structures identified as supporting hibernacula, the Licensees shall have a qualified bat biologist survey the site prior to initiating O&M activities.

If O&M activities cannot be avoided at winter hibernacula supporting special-status bats or approximately 50 or more non-special-status bats, the Licensees shall develop appropriate protective measures. Prior to commencement of the Project activity, the Licensees shall notify the Forest Service, USFWS, and CDFW as soon as possible, to provide an opportunity to comment prior to implementation.

If winter hibernacula of special-status bats are present and the bat biologist determines special-status bats are likely to be directly affected by the O&M activities, the Licensees shall implement a limited operating period of November 1 through March 31, during which the activities will not be conducted. Special-status bats species include those species listed as federally endangered, threatened, or proposed for listing under the Endangered Species Act, Forest Service sensitive species and Forest Service species of conservation concern, State threatened, endangered, or

candidate species for listing under the California Endangered Species Act, California species of special concern, and California fully protected species.

If O&M activities cannot be avoided during the limited operating period at winter hibernacula where special-status bats are known to be present, the Licensees shall develop an exclusion proposal prior to commencement of Project activities. The Licensees shall provide the Forest Service, USFWS, and CDFW with an exclusion proposal, including the general design, materials, and methods. Prior to commencement of the Project activity, the Licensees shall notify the Forest Service, USFWS, and CDFW, as soon as possible, to provide an opportunity to comment prior to implementation.

Notification to the Forest Service, USFWS, and CDFW, regarding exclusion activities would only occur if there is potential to directly affect hibernating special-status bat species or approximately 50 or more non-special-status bats.

Condition No. 55 – Recreation Management Plan

In consultation with and as approved by the Forest Service, Licensees shall revise the Recreation Management Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), as follows:

Bucks Lake Boat-in Campground (existing, on NFS lands)

- Delete text in the following sections related to removal of amenities and restoration of Sites 4 and 5, as shown below in strikethrough:
 - Section 3.1, Table 3.1-1

Bucks Lake Boat-in Campground (2)
<ul style="list-style-type: none">• Remove amenities at existing site nos. 2 and 3 4, and 5
<ul style="list-style-type: none">• Construct new sites

- Section 3.1.3.1

“.....Concurrent with campground development, Licensees will remove all amenities (*e.g.*, fire rings, site markers) from the existing campsite nos. 2 and 3 ~~through 5~~. Licensees will restore the sites to discourage overnight use (*e.g.*, reslope land used for tent pads) and post with ‘no camping’ signs.”

Recreation Monitoring Program

- Add the following text to the introduction of Section 5.0 - Recreation Monitoring Program:
 - Prior to initiation of each type of monitoring (*i.e.*, facility occupancy, social, and Bucks Lake water surface), Licensees will consult and reach agreement with the Forest Service on detailed monitoring methods and protocols. However, for the purpose of comparing monitoring data over the term of the license and identifying trends, Licensees will attempt to follow the methods and protocols used in the 2015

recreation relicensing study (PG&E and City of Santa Clara 2016⁵).

- Add the following new section:

Section 5.1.3 Management Actions

During the annual consultation meeting (see Section 6.0, Annual Recreation Coordination Meeting and Plan Revision) Licensees will discuss with the Forest Service the compiled campground and day use occupancy monitoring data to determine if management actions are necessary to maintain a quality visitor experience and alleviate crowding or conflict within Project recreation areas (also see Section 5.2.3). Management actions will be considered when campground or day use area monitoring triggers are met, including expanding and/or developing new facilities/use areas.

CAMPGROUNDS

This Plan may be revised to include additional capacity within the Bucks Lake area, if a predetermined campground occupancy threshold is achieved. Parameters to evaluate occupancy relative to the threshold and actions include the following:

- Indicator Season: Memorial Day through Labor Day
- Indicator Occupancy: Occupancy is calculated as the total number of occupied sites on Friday and Saturday nights for each non-holiday weekend⁶ in the indicator season divided by two times the total number of campsites in the indicator campgrounds (i.e., capacity for Friday and Saturday nights).⁷ Indicator occupancy is the average of all non-holiday weekend occupancies – excluding the highest and lowest occupancies – in the indicator season.
- Indicator Conditions:
 - Evaluation of indicator occupancy will begin after all additional planned overnight capacity at Lower Bucks Lake Campground as described in Table 3.1-1 and Section 3.1.2.8 is constructed and available for use⁸, or in license year 10 (whichever is sooner).
 - The single highest and lowest calculated non-holiday weekend occupancies during the indicator season will be omitted from the trigger calculation to minimize anomalous influences (e.g., bad weather, group events, etc.) for a typical year. This would typically result in 10 weekends during the indicator season and does not include any holiday weekends.

⁵ PG&E and City of Santa Clara. 2016. Bucks Creek Hydroelectric Project, FERC Project No. 619, Final License Application, December 2016. Technical memos contained in Volume III, parts F1 and F2 (Accession Nos. 20161212-5232).

⁶ As of 2019, defined holiday weekends are Memorial Day, Independence Day, and Labor Day. If Independence Day falls on a Monday, Tuesday, Thursday, or Friday, the weekend nearest to the 4th of July will be considered a holiday weekend. If Independence Day falls on a Wednesday, the immediately following weekend will be considered a holiday weekend.

⁷ For example, where 40 of 100 campsites are occupied Friday night, and 60 of 100 campsites are occupied Saturday night, the non-holiday weekend occupancy is 50% [(40 plus 60) divided by (2 times 100) equals 50%].

⁸ Construction is scheduled to be completed by License Year 6.

- If the indicator season results in 7 or fewer weekends to calculate the indicator occupancy, then this year will not be considered for trigger monitoring purposes.
 - Campground host sites are not included in the number of campsites in the indicator campgrounds.
 - Occupancy data will be collected annually, and if there are 8 or more weekends on which to base an indicator occupancy calculation, it will be calculated at the end of each indicator season.
- Data Collection Methods: As described in Section 5.1.1 Campground Occupancy; indicator campgrounds include the following family or multi-family (small group) campgrounds with hosts:
 - Haskins Valley Campground
 - Lower Bucks Lake Campground
 - Mill Creek Campground
 - Sundew Campground
 - Trigger Threshold: The trigger is met when 80% or higher indicator occupancy is achieved in any three years out of a six-year rolling period (six years of monitoring is not necessary if trigger threshold is met sooner).
 - Action if Trigger is Met:
 - In collaboration with the Forest Service, evaluate suitable and feasible locations to increase campground capacity.
 - Initiate a planning process and schedule to increase capacity at a location(s) in the Bucks Lake area. Give consideration to other Project monitoring data that has been collected prior to and during the current six-year monitoring cycle.
 - Actions if Trigger is Not Met: Continue with annual monitoring and data collection.

DAY USE AREAS – FISHING ACCESS

To meet the future demand for accessible fishing opportunities at the Project, this Plan may be revised to include a second fishing access facility at a Project reservoir, at a location separate from the fishing access facility that will be constructed at West End Cove (described in Section 3.1.2.14). The process for determining the need for this one additional fishing access facility is as follows:

- The determination will consider all of the following information:
 - West End Cove fishing access facility monitoring data
 - All Project monitoring data; especially Social Monitoring data (described in Section 5.2)
 - Planned and completed development of Project recreation facilities
 - Availability of suitable sites for different types of fishing access development
 - Forest Service recreation survey data from nearby facilities, if provided by the Forest Service (e.g., National Visitor Use Monitoring data collected every five years)
 - Fishing license information and angler survey data (if readily available from California Department of Fish and Wildlife)

- Recreation user trends in California and the United States
 - Licensees will convene a working group which includes the Forest Service, to assess the need for a second fishing access facility, after the 90% design drawings for the West End Cove fishing access facility have been reviewed and approved by the Forest Service.⁹ The working group will: (1) review and revise as needed, Day Use Monitoring methods (Section 5.1.2, e.g., adding observation counts of the fishing access facility) and Social Monitoring methods (Section 5.2.1, e.g., adding questions related to accessibility for fishing at Project reservoirs), (2) develop parameters for assessing use of the West End Cove fishing access facility that establish indicator season, indicator occupancy, indicator conditions, data collection methods, trigger threshold, and actions that will be taken if the triggers are or are not met, (3) develop revised text for the Recreation Management Plan to incorporate changes resulting from (1) and (2). Revised Day Use Monitoring and evaluation of thresholds will take effect as soon as the West End Cove fishing access facility is constructed and available for use.¹⁰
- Revise Section 5.2.3 (Social Monitoring, Management Actions) with the addition of the parenthetical italicized text, as show below:
 - “...Examples of land-based management actions that may be considered include:
 - Providing additional visitor management and/or enforcement.
 - Providing adequate buffers between uses.
 - Expanding and/or developing new facilities/use areas (*see also Section 5.1.3*)
 - Providing increased visitor education.”

Upon Commission approval, Licensee shall implement the **Revised** Recreation Management Plan for locations on, or directly affecting, NFS lands.

Condition No. 56 – Bucks Lake Shoreline Management Plan

In consultation with the Forest Service and other interested stakeholders, Licensees shall revise the Bucks Lake Shoreline Management Plan (SMP), filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107) as follows:

- Reformat the SMP to be consistent with other management and monitoring plans submitted in support of the new license
- Include a map of relevant Project facilities, docks, and other features covered by the SMP
- 1.0 Executive Summary
 - Clarify that Forest Service (Plumas National Forest) recreation residences are along the western shore
 - Remove references to work or facilities that was anticipated, but is now complete – e.g., “In addition, a new day use site is being developed in an area commonly known

⁹ Construction is scheduled to be completed by License Year 10; design work is anticipated to begin 2-3 years prior.

¹⁰ Construction is scheduled to be completed by License Year 10

- as Indian Rocks and West End Cove” (page 4 in the SMP filed with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018)
- 2.0 Overview
 - Remove references to work or facilities that was anticipated, but is now complete – e.g., “Recently, PG&E and Plumas County officials identified a need to upgrade recreational cabin licensee septic facilities around the lake”
 - Add a statement describing the relationship of the SMP to other new license management and monitoring plans, approved by FERC, including but not limited to:
 - Bald Eagle Management Plan
 - Erosion Management Plan
 - Fire Prevention and Response Plan
 - Hazardous Materials Management Plan
 - Historic Properties Management Plan
 - Integrated Vegetation Management Plan
 - Sierra Nevada Yellow-legged Frog Management Plan
 - Transportation Management Plan
 - 3.0 General Shoreline Uses
 - Provide a clear definition of “short term use”
 - Define how the following issues will be addressed/enforced (e.g., will County law enforcement be engaged?):
 - “Outside marinas and other areas of permitted use, boats or personal property owned or used by parties that are not at that time residing at Bucks Lake shall be removed from the shoreline”
 - “The owner of the boat or personal property is responsible for its safe use and to insure that it does not pose a threat or nuisance to the public”
 - Long term boat storage, monitoring and enforcement
 - Docks and Buoys:
 - Clarify that one dock and one buoy are allowed
 - Accurately describe Forest Service process for addressing pre-existing docks for non-lakefront lots. For example, there is currently one community dock permitted to four non-lakeside cabin owners, on a conditional basis. If ownership of one of these cabins is transferred, the new cabin owner would not be allowed to be part of the community boat dock. Other non-lakeside cabin owners have docks that are “conditionally approved”. Similarly, if cabin ownership is transferred, the boat dock permission will not be transferred.
 - Clarify that on NFS lands, campfires are only permitted in designated fire rings at recreation residences and in designated campgrounds
 - Project Recreational Development: provide a list of developed recreation facilities at Bucks Lake, Lower Bucks Lake, Grizzly Forebay
 - 4.0 Other Requirements and Conditions
 - Water Quality Degradation: Include information on State water quality regulations regarding septic and vault waste disposal systems for recreation facilities near waterbodies.
 - Add the following new section:
 - 4.x Cultural Resources

The location and character of cultural resource properties within the Project boundary are identified in the *Historic Properties Management Plan* (HPMP). Cultural resource data are confidential and, as such, are not displayed within the SMP. The HPMP complies with Section 106 of the National Historic Preservation Act by taking into account potential impacts or adverse effects to historic properties associated with the operation and maintenance of the Bucks Creek Hydroelectric Project. Consistent with the HPMP, the Licensees will consider potential adverse effects to historic properties/cultural resources when reviewing an application for any project or undertaking within the FERC Project Boundary including those actions that may affect vulnerable shoreline cultural sites. Sensitive information pertaining to the location and character of cultural resources will only be shared with appropriate project personnel and/or contractors on an as needed basis to comply with provisions of the HPMP, as approved by FERC.

- Add the following new section:

- 4.x Monitoring

- Monitoring that is relevant to the SMP is covered in three other management plans for the new license:

- *Recreation Management Plan* – campground/day use occupancy, social/visitor surveys, water surface use
 - *Aquatic Resources Monitoring Plan* – water quality related to human (bacterial) sources, and general water chemistry to identify risks related to aquatic invasive species
 - *Historic Properties Management Plan* – biennial review/inspection of recorded Historic Properties

- In addition to monitoring performed to comply with these other Project resource management plans, Licensees will monitor activities specifically covered by this plan, such as boats and other equipment stored temporarily along the shoreline, permitted and unpermitted boat docks and buoys, construction or activities that could cause shoreline erosion, and other activities agreed to with the Forest Service and stakeholders. SMP monitoring should be conducted periodically through the license term:

- To provide information in support of adequacy reviews required by FERC
 - In association with construction or other activities that may cause shoreline erosion

- Add the following new section:

- 5.0 Reporting and Plan Revisions

- For any monitoring activities done exclusively for this Plan, by March 1 of the year following the year in which monitoring occurs, Licensees will provide to the Forest Service, State Water Board, USFWS, and CDFW, a draft report describing the findings of that year's monitoring efforts and summarizing previous years monitoring results. Licensees will provide a 60-day review period. A final report (including responses to agency comments) will be filed with FERC within one year of data collection.

The Licensees, in consultation with the Forest Service, State Water Board, USFWS, CDFW, and interested stakeholders, will review, update, and revise the Plan, every five

to ten years, pursuant to FERC SMP guidance, or as needed, when significant changes in the existing conditions occur. Sixty days will be allowed for the Forest Service, State Water Board, USFWS, CDFW, and interested stakeholders to provide written comments and recommendations. After consultation and agreement with the Forest Service and SWRCB, Licensees will work with the Forest Service and SWRCB to file the updated Plan with FERC. Licensees will include all relevant documentation of coordination and consultation with the updated Plan filed with FERC. If the Licensees do not adopt a particular recommendation by the Forest Service, State Water Board, USFWS, CDFW, or interested stakeholder, the filing will include the reasons for not doing so. The Licensees will implement the Plan as approved by FERC.

Upon Commission approval, Licensee shall implement the **Revised** Bucks Lake Shoreline Management Plan for locations on, or directly affecting, NFS lands.

Condition No. 57 – Consult with the Forest Service Prior to Painting the Exterior of Project Structures

The Licensees shall consult with the Forest Service prior to painting the exterior of all existing and new Project facilities whenever these facilities are repainted during regular maintenance or painted anew during initial construction.

Condition No. 58 – Historic Properties Management Plan

Upon Commission approval, and when deemed final, Licensees shall implement the Historic Properties Management Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5108, Privileged, Revised Draft Historic Properties Management Plan) for locations on, or directly affecting, NFS lands.

Condition No. 59 – Transportation Management Plan

Upon Commission approval, Licensee shall implement the Transportation Management Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107; subsequent cover page errata submitted to FERC by Licensees on July 27, 2018), for locations on, or directly affecting, NFS lands.

Condition No. 60 – Erosion Management Plan

Upon Commission approval, Licensee shall implement the Erosion Management Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), for locations on, or directly affecting, NFS lands.

Condition No. 61 – Fire Prevention and Response Plan

Upon Commission approval, Licensee shall implement the Fire Prevention and Response Plan, filed separately with the Commission, by Pacific Gas and Electric Company and the City of

Santa Clara, on May 22, 2018 (FERC eLibrary Accession No. 20180522-5107), for locations on, or directly affecting, NFS lands.

PART III: FPA SECTION 10(a) RECOMMENDATIONS

Recommendation No. 1 – Fish Stocking

Beginning within the first full calendar year after license issuance and annually thereafter for the term of the license and subsequent annual license extensions, the Licensees will fund the stocking of fish by CDFW in Bucks Lake, Grizzly Forebay, and Middle and Lower Three Lakes in each year stocking occurs. The Licensees will enter into renewable five-year contracts with CDFW to support stocking of the following fish species and stocking targets as determined by CDFW:

- Bucks Lake – up to 5,000 pounds of catchable rainbow trout, 6,000 pounds of catchable brown trout, and 6,400 pounds of catchable brook trout
- Grizzly Forebay – up to 10,000 fingerling brown trout
- Lower and Middle Three Lakes – up to 10,000 fingerling trout species to be determined on an annual basis

In the event the quantities of one or more of the species or sizes of fish listed above are not available from a CDFW hatchery, or fisheries management strategy of the waterbody changes, CDFW may substitute an equivalent quantity of another other trout species, not to exceed the totals provided. The Licensees' support of the fish stocking will be based on the final annual stocking allotment for each waterbody.

By December 31 of each year during the term of the new license, the Licensees will notify the Commission of the Licensees' funding of CDFW's stocking activities within the FERC Project Boundary in that calendar year.

The Licensees will implement this measure in compliance with both: (1) any reasonable and prudent measures contained in a Biological Opinion issued by the USFWS for the relicensing of the Project, and (2) the Mitigation Strategies for Effects of Fish Stocking described in Appendix K of the 2010 Final Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement prepared for the California Department of Fish and Game and USFWS.

APPENDIX C

California State Water Resources Control Board Preliminary Conditions

Attachment B
Preliminary Terms and Conditions for
Pacific Gas and Electric Company and the City of Santa Clara's
Bucks Creek Hydroelectric Project
Federal Energy Regulatory Commission Project No. 619

In accordance with Item 2 under the Integrated Licensing Process section of the *Memorandum of Understanding between the Federal Energy Regulatory Commission and the California State Water Resources Control Board Concerning Coordination of Pre-Application Activities for Non-Federal Hydropower Proposals in California*, State Water Resources Control Board (State Water Board) staff is providing preliminary terms and conditions in response to the notice of Ready for Environmental Analysis (REA) by FERC for the Bucks Creek Hydroelectric Project (Project), FERC Project No. 619. The Project is owned by Pacific Gas and Electric Company and the City of Santa Clara (Licensees). Conditions outlined below are preliminary in nature and are being circulated to further coordinate informational needs and potential conditions between FERC and the State Water Board. As such, this document does not reflect a decision by the State Water Board to adopt any term or condition, nor does it limit the State Water Board from considering a term or condition different from those presented below. Furthermore, the California Environmental Quality Act (CEQA) requires the City of Santa Clara to complete an environmental analysis and it would be improper for the State Water Board staff to commit to potential conditions so as to effectively preclude alternatives or measures that otherwise would be considered under CEQA.

In some cases, the State Water Board issues conditions that require development of a management plan for the protection of beneficial uses of water. Often this requires consultation with the appropriate stakeholders prior to review and approval by the Deputy Director of the Division of Water Rights (Deputy Director). For resource management plans that have already been agreed upon by relicensing participants, re-consultation may not be required.

The State Water Board will likely condition the Project diversions in light of the entire record. The entire record includes: (a) the City of Santa Clara's CEQA document; (b) the FERC National Environmental Policy Act (NEPA) document; (c) the Licensees' Final License Application for the Project as amended May 22, 2018¹ and including all the studies performed for the application; (d) comments on the record; and (e) relevant management plans including the Sacramento River Basin and San Joaquin River Basin Plan (Basin Plan).

1. Instream Flows

The State Water Board will most likely require minimum instream flows below Project diversions. This section provides potential minimum instreams flows by location, month, water year type, and standards that the State Water Board will most likely require.

Based on information in the record, the previous years of consultation and the completion of all requested studies, State Water Board staff preliminarily recommends the flow schedules outlined in Tables 1-6. The State Water Board reserves the right to alter such recommendation following completion of the NEPA and CEQA processes or receipt of other new information.

The State Water Board will most likely require the Licensees measure minimum instream flows as both a 24-hour average (mean daily) and instantaneous readings. Instantaneous flows should be used to construct the averages of the mean daily flow value and be

¹ The Licensees filed an erratum to the Amended Final License Application on July 27th, 2018.

measured in time increments of not more than 15-minutes. Mean daily flows should be 24-hour averages of the instantaneous readings from midnight of one day to midnight of the next day. The Licensee should record instantaneous streamflow as required by USGS standards. Instantaneous flow measurements should be at least 90 percent of the minimum flow listed in Table 1, and Table 2. Minimum instream flow compliance below Three Lakes Dam, Bucks Lake, and Milk Ranch Conduit Project Licensed Diversion 1 and Diversion 8 (Tables 3-6) should be based on valve settings documented in the Gaging and Reservoir Elevation Plan (Potential Condition 14) and reported in the Annual Report, described below.

Table 1. Minimum Instream Releases (cfs) from Lower Bucks Dam as Measured at NF12 and NF82 combined²				
Month	Water Year Type			
	Wet	Normal	Dry	Critically Dry
October	8	6	6	6
November	8	6	5	4
December	8	6	5	4
January	8	6	5	4
February	10	8	6	6
March	15	12	8	7
April	15	12	8	7
May	15	12	8	7
June	11	9	8	6
July	10	8	6	6
August	8	8	6	6
September	8	7	6	6

Table 2. Minimum Instream Releases (cfs) from Grizzly Dam as Measured at NF22				
Month	Water Year Type			
	Wet	Normal	Dry	Critically Dry
October	9	8	6	6
November	9	8	6	4
December	9	8	6	4
January	9	8	6	4
February	10	8	6	4
March	13	10	8	6
April	13	10	8	6
May	13	10	8	6
June	11	9	8	6
July	10	9	8	6
August	10	9	8	6
September	9	8	6	6

² Gage NF 82 is part of the Lower Bucks Dam outlet valve structure and at max reservoir elevation has a capacity of 28 cfs. Gage NF 12 constitutes flow that is spilled over Lower Bucks Dam. The combination of NF 12 and NF 82 measure the water discharged from the Project in Bucks Creek.

Milk Ranch Conduit

The State Water Board will most likely condition the Project so that following license issuance and annually in the years following and when reasonably practicable, the licensee shall operate Milk Ranch Conduit Diversion 1, Milk Ranch Conduit Diversion 3 and releases from Three Lake Dam according to the tables below. The WS or 'winter setting' in Table 3 involves fully opening the outlet so that natural inflow equals outflow while maintaining a minimum pool at Three Lakes. The potential measurement compliance requirements including orifice rating, cleaning schedules, data availability, and reporting are outlined in Potential Condition 14 (Gaging and Reservoir Elevation Plan) and compliance should be documented in the Annual Report.

Table 3. Instream Flows Releases (cfs) Below Three Lakes Dam				
Month	Water Year Type			
	Wet	Normal	Dry	Critically Dry
October	2	1	0.5	0.25
November	WS	WS	WS	WS
December	WS	WS	WS	WS
January	WS	WS	WS	WS
February	WS	WS	WS	WS
March	WS	WS	WS	WS
April	2	1	0.5	0.25
May	2	1	0.5	0.25
June	2	1	0.5	0.25
July	2	1	0.5	0.25
August	2	1	0.5	0.25
September	2	1	0.5	0.25

Table 4. Instream Flows releases (cfs) Below Milk Ranch Conduit Diversion 1				
Month	Water Year Type			
	Wet	Normal	Dry	Critically Dry
October	2	1	0.5	0.25
November	0.25	0.25	0.25	0.25
December	0.25	0.25	0.25	0.25
January	0.25	0.25	0.25	0.25
February	0.25	0.25	0.25	0.25
March	0.25	0.25	0.25	0.25
April	2	1	0.5	0.25
May	2	1	0.5	0.25
June	2	1	0.5	0.25
July	2	1	0.5	0.25
August	2	1	0.5	0.25
September	2	1	0.5	0.25

South Fork Grouse Hollow

The State Water Board will most likely condition the Project to require modification of Milk Ranch Conduit Diversion Number 3 at South Fork Grouse Hollow to allow for 0.5 cfs or natural flow via a fixed orifice in all water year types. Potential measurement compliance requirements including orifice rating, cleaning schedules, data availability, and reporting are outlined in Potential Condition 14 (Gaging and Reservoir Elevation Plan) and compliance should be documented in the Annual Report.

Table 5. Instream Flows Releases (cfs) Below Milk Ranch Conduit Diversion 3 at South Fork Grouse Hollow	
All Months	0.5

Bucks Lake

The State Water Board will most likely condition that the Licensees provide a continuous minimum release of 3 cfs below Bucks Lake Dam. The potential measurement compliance requirements including orifice rating, cleaning schedules, data availability, and reporting are outlined in Potential Condition 14 (Gaging and Reservoir Elevation Plan) and compliance should be documented in the Annual Report.

Table 6. Instream Flow Releases (cfs) Below Bucks Lake Dam	
All Months	3.0

Bear Ravine

The State Water Board will most likely condition that the Licensees cease diversions from Milk Ranch Conduit No. 8. The Licensees should permanently render the diversion inoperable. The Licensees should also screen and maintain air vents in order to prevent wildlife from entering the vents. Prior to any modifications of this diversion structure, the Licensees should invite the United States Forest Service (USFS), United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and State Water Board into the field to discuss the proposed work. The Licensees should periodically monitor the diversion structure to prevent increased erosion or diversion structure failure that could impact waters of the state. If non-routine maintenance of the structure or hillslope is required to prevent significant adverse environmental impacts, the Licensees should consult with USFS, USFWS, CDFW, State Water Board, and interested stakeholders regarding appropriate protection measures, as outlined in the Sierra Nevada Yellow Legged Frog Management Plan (Potential Condition 12).

2. Water Year Type

The State Water Board will most likely require determination of water year types for the Project. Water year type determinations will likely be based on Department of Water Resources' (DWR) Bulletin 120 unimpaired runoff projection for Lake Oroville. The State Water Board will likely require the Licensees determine the Water Year Type based on the common delineations for the watershed.

Table 7. Water Year Types*	
Wet	Greater than or equal to 5,679 thousand acre-feet (TAF)
Normal	Less than 5,679 TAF, but greater than or equal to 3,228 TAF
Dry	Less than 3,228 TAF, but greater than or equal to 2,505 TAF
Critically Dry	Less than 2,505 TAF
*Based on forecasted unimpaired runoff of the Feather River at Lake Oroville provided in DWR's Bulletin 120.	

3. Wet Water Year Milk Ranch Conduit Diversion Closure

The State Water Board will most likely condition differing operations of Milk Ranch Conduit Diversion No. 1 and No. 2 when hydrologic conditions are considered 'Wet'. Wet water year determinations most likely will be based upon Water Year Types outlined in Potential Condition 2 and Table 7.

4. Drought Management Plan

The State Water Board will most likely require the development of a Drought Management Plan to set a default process to protect beneficial uses of water when water supply dictates that Project reservoir minimum pool targets or minimum instream flow requirement cannot be achieved. The Plan may outline thresholds for requests, consultation requirements, timing for requests, public participation and any additional monitoring and reporting required as a result of a temporary variance.

5. Large Woody Material Management at Bucks Lake, Lower Bucks Lake, and Grizzly Forebay

The State Water Board will most likely require that the licensees operate the Project so that Large Woody Material (LWM) from Bucks Lake, Lower Bucks Lake, and Grizzly Forebay is passed into to waterbodies below each impoundment. The State Water Board will most likely require that Project LWD management is as described below.

Grizzly Forebay

The Licensees should allow woody material to pass over Grizzly Forebay Dam during spill events and the channel maintenance flows by leaving the downstream end of the reservoir's

log boom attached only to the right side of the spillway year-round, allowing debris to freely pass over the spillway during spill events. If spill events and channel maintenance flows are not sufficient to pass woody material (e.g., during multiple dry year conditions), the Licensees may periodically mechanically remove woody material from the reservoir.

Lower Bucks Lake

At Lower Bucks Lake Dam, the Licensees should also allow woody material to pass over the dam's spillway during spill events. There may also be a periodic need to mechanically remove woody material from the reservoir.

Bucks Lake

Large woody material at Bucks Lake spillway should be relocated to Lower Bucks Lake spillway. If site conditions preclude placement and passage of wood on Lower Bucks Lake spillway, the Licensees may transport wood offsite following consultation with the agencies as described below.

All sizes of woody material, including woody material with root wads attached, shall be allowed to pass downstream past the dams. The Licensees shall avoid cutting the wood, unless it is unsafe for Project operations or cannot mechanically be moved due to large size.

For any woody material that cannot be passed downstream of Project dams, the Licensees shall consult with the USFS, USFWS, CDFW, and State Water Board to determine appropriate methods for removal, transport, and disposal.

6. Ramping Rates / Spill Management

The State Water Board will most likely require the Licensees operate the Project within ramping rate flow criteria to minimize Project related fluctuations in affected river reaches. Ramping rates will most likely be required below Grizzly Forebay and Lower Bucks Dam. Additionally, because of the interrelated nature of Pacific Gas and Electric Company's North Fork Feather River hydroelectric projects, the State Water Board will most likely condition the Project to coordinate spill management with the Rock Creek-Cresta Hydroelectric Project (FERC Project No. 1962).

Flow data illustrating implementation of the ramping rate measure should be available to stakeholders prior to the annual meeting required as part of Potential Condition 9. The State Water Board will also most likely require revisiting the ramping rate measure, in consultation with stakeholders, after a sufficient number of implementation years to determine if measure objectives are being achieved.

7. Reservoir Operations

The State Water Board will most likely require the Licensees manage Project reservoir elevations. Any minimum reservoir condition would be designed to maximize recreational opportunities and satisfaction, protect aquatic resources and allow flexible Project generation. The State Water Board preliminarily recommends minimum reservoir operations outlined in Table 8 and sections below.

Bucks Lake

Water Year	Allowable Elevation drop 6/1 through 9/1	Minimum Elevation (ft) ³
Wet and Normal	Not to exceed 15 feet	5,100
Dry and Critical	N/A	5,080

Lower Bucks Lake

Lower Bucks Lake should be limited to an elevation of 4,966 feet of elevation or greater throughout the year. Lower Bucks Lake water surface elevations should be measured at NF-13.

Grizzly Forebay

Grizzly Forebay should be maintained at an elevation of 4,303 feet or greater throughout the year. Grizzly Forebay water surface elevations should be measured at NF-19.

Lower and Middle Three Lakes

Lower Three Lakes should be maintained at a water surface elevation of 6,050 or greater throughout the year. Middle Three Lakes should be limited to a water surface elevation of 6,057 or greater throughout the year. Three Lakes Water surface elevation compliance should be measured at NF-10. Potential Three Lakes reservoir drawdown operations are outlined in Potential Condition 8.

8. Annual Three Lakes Reservoir Drawdown

The State Water Board will most likely condition the Project to manage Three Lakes water surface elevations to balance Brooke trout spawning (*Salvelinus fontinalis*), recreational interests and power generation.

Based on measured water surface elevation at NF-10 the licensees should initiate the annual draw down of Three Lakes. In the beginning of August, the Licensee shall verify water surface elevation at Three Lakes.

- If the WSE is above 6,072 ft, as measured by gage NF10, the Licensees should initiate drawdown on or about August 15, and set the low-level outlet valve to release 9 cfs (based on the rating curve at MR2).
- If the WSE is at or below 6,072 ft, as measured by gage NF10, the Licensees should calculate a start date to initiate drawdown with the objective of reaching minimum pool at Lower Three Lakes (WSE 6,050 ft) by Sep 15 at a release of 9 cfs.

The Licensees should set the low-level outlet at Three Lakes dam to release 9 cfs until forecasted weather indicates access may be restricted but no later than November 1st. At

³ Elevations in “PG&E (formerly, Feather River Power Company) Datum” are 3.5 feet lower than those expressed as “U.S. Geological Survey (USGS) Datum”.

this time, Three Lakes Dam should be set to the fully open 'winter setting'. Included in the Annual Report discussed in Potential Condition 14, the Licensee should include the date the Three Lakes drawdown began, the elevation on or around August 15th, the date minimum pool was reached, and when the valve was opened to the 'winter setting'.

9. Ecological Consultation Group

The State Water Board will most likely require the formalization of an Ecological Consultation Group (ECG) specific to the Bucks Creek Project. The ECG should meet annually at a minimum to discuss any Project license deviations, results of required monitoring, planned monitoring, Project maintenance that may affect require alterations to the FERC license or associated resources plans, and an opportunity for the public to provide comments on activities within the Project.

10. Erosion and Sedimentation Control Plan

The State Water Board may require the development of an Erosion and Sedimentation Plan specific to the Project. Any Erosion and Sediment Control Plan should be developed in consultation with relicensing participants and designed to minimize and avoid undesirable erosion conditions near Project streams and reservoirs. At a minimum the plan should include best management practices and procedures for ground disturbing activities for routine maintenance, new construction, Project emergencies, management of historic properties, transportation and recreations. Protocols should abide by applicable regulations and reduce impacts to water quality within the Project area. The State Water Board may include specific metrics or methods that would appear in a plan or supplement.

11. Aquatic Resources Monitoring Plan

The State Water Board will most likely require the development of an Aquatic Resources Monitoring Plan to protect the beneficial uses of Project waterways and assure that the underlying assumptions of any water quality certification over the life a new FERC license. The State Water Board will most likely require that the Aquatic Resources Monitoring Plan be developed in consultation with relicensing participant and be submitted to the Deputy Director for approval following consultation. The plan should include the following elements at a minimum: (1) objectives and goals; (2) monitoring methodologies; (3) monitoring locations and frequencies; (4) an opportunity to revise the monitoring plan in future; (5) and the aquatic resources areas discussed below.

Water temperature

The State Water Board will most likely condition seasonal temperature monitoring of Project-affected stream reaches. This monitoring effort will mostly likely be similar to existing monitoring at Lower Bucks, Lower Grizzly, and Lower Milk Ranch Creek currently employed as part of the Condition 4.C of the Rock Creek-Cresta (FERC Project No. 619) license.

Bacteriological Sampling

The State Water Board will most likely condition periodic bacteriological sampling at Project impoundments near recreational facilities during the life of a new FERC license. This sampling should coincide with any recreational facility monitoring as part of Potential Condition 15.

Turbidity

The State Water Board will most likely condition turbidity monitoring when the Licensee draws Project reservoirs down to a predetermined level or when as outlined in Potential Condition 4 (Drought Management Plan).

Large Woody Material

The State Water Board will most likely condition monitoring of large woody material recruitment below Project impoundments. The Licensee should sample following high spill events and once following license issuance. Sampling should be co-located and coincide with Stream Channel Morphology sampling when applicable.

Stream Channel Morphology

The State Water Board will most likely condition the Project to periodically monitor stream channel morphology, with an emphasis on spawning size gravels, below Project impoundments. The Licensee should sample periodically during the life of a new FERC license including following gravel augmentation events. Monitoring locations should be in the vicinity of gravel augmentation sites below Project impoundments and to the extent possible co-located with stream fish population sampling.

Riparian Vegetation

The State Water Board will most likely condition the Project to periodically sample riparian vegetation below Project impoundments. The Licensee should, to the extent practicable, establish long term monitoring transects at locations established during riparian vegetation relicensing studies. Following license issuance, the Licensee should establish baseline conditions and monitor periodically for the life of the license.

Foothill yellow-legged frogs

The State Water Board will most likely require periodic monitoring of Foothill yellow-legged frogs (*Rana boylei*) below Project impoundments and near the confluence of Project affected tributaries near the North Fork Feather River. The State Water Board in consultation with the Licensees and other relicensing participants may require additional monitoring elements based on new Foothill yellow-legged frog distribution information.

Stream Fish Population

The State Water Board will most likely condition that the Project monitor fish populations below Project impoundments over the term of a new FERC license. Monitoring should be located at relicensing survey locations below Project impoundments and near the confluence of Project affected tributaries and the North Fork Feather River.

Three Lakes Brooke trout

The State Water Board will most likely condition the Project to monitor Brooke trout populations in Three Lakes Reservoir to ensure that any new reservoir operations do not negatively impact reproductive success. The Licensee should establish spawning locations and periodicity following license issuance. Following establishment of Brooke trout spawning locations and timing the Licensee should periodically monitor reservoir populations through the life of a new FERC license.

Benthic Macroinvertebrate

The State Water Board will most likely condition the Project to monitor benthic macroinvertebrate (BMI) assemblages and associated species richness indexes over the course of a new FERC license. The Licensee should to the extent possible at relicensing locations periodically monitoring BMI over the life of a new FERC license and assess community health with the California Stream Condition Index (CSCI) or another agreed upon assessment tool below Project impoundments.

The State Water Board upon further review and based on all comments, analyses and data as part of the record may expand the scope and number of parameters in the Aquatic Resources Plan.

12. Sierra Nevada yellow-legged frog Management Plan (SNYLF Plan)

The State Water Board will most likely require the development of Sierra Nevada yellow-legged frog management plan developed in consultation with USFWS, USFS, CDFW and the State Water Board. This plan will most likely include best management practices (BMPs) for operations and maintenance activities within the designated critical habitat within the Project boundary. The SNYLF Plan should detail SNYLF monitoring requirements for the life of the license and stipulations for plan revisions based on new information.

13. Fish Stocking

The State Water Board will most likely require the Licensees to notify the Deputy Director annually regarding the arrangements that have been made to stock fish in Project waters. This notification should include the timing, location, weight and any documentation of pre-stocking assessments done by CDFW.

14. Gaging Plan

The State Water Board will likely require the Licensees to develop, in consultation with relicensing participants, a plan to manage and report Project operations. The State Water Board will most likely require gages monitoring compliance with Potential Condition 1, 3, 4, 6, and 7. Additionally, the State Water Board will most likely require the following items in a Gaging Plan:

- A. Plan Objectives;
- B. Gage description and locations;
- C. Maintenance, operation, and QA/QC protocols;
- D. Modifications or Construction of Project Gages;
- E. Data collection and availability including the frequency and data storage

F. Description of information to be included in the Annual Report of Measurement of Project Diversions

Separate from any preliminary conditions for the Project, the Licensees are responsible for adherence to requirements outlined in the California Code of Regulations Title 23 § 933, specifically measurement requirement regulations adopted as a result of California State Senate Bill 88.

15. Recreational Management Plan

The State Water Board will most likely require the Licensees develop in consultation with relicensing participants a Recreational Management Plan (Rec Plan) specific to the Project. The Rec Plan should describe existing and proposed Project recreational facilities, construction design and implementation schedules, and Project reservoir variances. The Rec Plan should include measures the Licensees will implement to protect water quality and beneficial uses of the surface waters during construction and maintenance activities associated with recreational facilities.

16. Road Management Plan

The State Water Board will most likely require that the Licensees develop in consultation with USFS and the State Water Board. The Road Management Plan should prescribe the protection, maintenance, and construction of Project roads in a manner that is protective of water quality. At a minimum, the Road Management Plan should include the following:

- A. An inventory and map of all roads associated with the Project, including locations of drainage structures, streams, and surface water bodies;
- B. An assessment of Project roads to determine if any drainage structures or road segments are impacting or have the potential to impact water quality;
- C. Proposed measures and an implementation schedule to rehabilitate existing damage and minimize erosion from Project roads. Proposed measures designed to improve drainage should be consistent with the most current United States Department of Agriculture, Forest Service National BMP's [Best Management Practices] Road Management Activities; and
- D. A schedule and plan for inspection and maintenance of Project roads throughout the term of the license and any extensions.

17. Gravel Augmentation Plan

The State Water Board will most likely condition the Project to develop a plan for periodic gravel augmentation below Project impoundments. The Gravel Augmentation Plan should include potential augmentation locations to be finalized in consultation with relicensing participants, timing of pre and post augmentation monitoring, reporting and consultation and opportunities for plan revisions.

18. Aquatic Invasive Species Management Plan

The State Water Board will likely require the Licensee, in consultation with relevant resource agencies, to develop and implement a plan to manage aquatic invasive species (AIS). The goal of this plan is to establish a framework with specific activities to minimize the spread and impact of AIS on native fauna and habitats. This plan should identify and describe AIS

currently established within the Project area and AIS with high potential to become established within the Project area. This plan may include, but is not limited to, the following measures:

1. Implement actions to minimize and prevent the introduction and spread of AIS into and throughout Project-affected waters.
2. Provide education and outreach to ensure public awareness of AIS effects and management throughout Project-affected waters.
3. Implement monitoring programs for early detection of AIS.
4. Ensure all Project AIS management activities comply with federal and State of California laws, regulations, policies, and management plans, and with USFS directives and orders regarding AIS.
5. Monitor and minimize the spread of established AIS.

Additionally, the State Water Board may include specific metrics or methods that would appear in or supplement the plan or include specific measures to be taken if new AIS are discovered in the Project area.

19. Milk Ranch Conduit Inactive Diversions

The State Water Board will most likely require the Licensee to manage inactive Milk Ranch conduit diversions to minimize Project related erosion. This includes FERC diversion Numbers 1,4,5,6,7 and 8. The Licensees should seal or otherwise render these diversions permanently inoperable. If inactive diversions degrade and impose a threat to the water quality of the waters of the state, the State Water Board will most likely require that the Licensees consult with relicensing participants on appropriate mitigation and removal.

20. General Construction Permit

The Licensees shall comply with the State Water Board's General Permit and amendments thereto (Water Quality Order 2009-0009-DWQ and National Discharge Elimination System No. CAS000002, as amended by Order No. 2010-0014-DWR and Order No. 2012-0006-DWQ). For all construction or other activities that could impacts water quality or beneficial uses, including those activities not subject to the Construction General Permit, a Deputy Director-approved water quality monitoring and protection plan shall be prepared and implemented.

21. Plan Approvals and Consultation

The State Water Board will most likely require all plans or changes to plans required by the water quality certification or related to water quality shall be developed in consultation with relevant stakeholders. The Licensees shall provide the relevant state and federal agencies with a minimum 30-day comment period on the plans and draft report, if applicable. The final plans and final reports shall include documentation of consultation with the stakeholders, all comments made by the relevant state and federal agencies, and a description of how the final plan and/or final report incorporates or addresses the comments made by the relevant stakeholders. Licensee shall file the final report and final plan with the Deputy Director for approval. The Deputy Director can make changes as part of any approval. Upon Deputy Director approval, the Licensee shall file the approved final plan and

approved final report with FERC.

22. Additional Conditions

In order to ensure that the Projects operate to meet water quality standards as anticipated, to ensure compliance with other relevant state and federal laws, and to ensure that the Projects will continue to meet state water quality standards and other appropriate requirements of state law over its lifetime, the certification will consider conditions regarding monitoring, enforcement, and potential future revisions. Additionally, California Code of Regulations, title 23, section 3860 requires imposition of certain mandatory conditions for all water quality certifications.