COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

COVER LETTER

PAGES i to v

FEIS

FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON, DC 20426

OFFICE OF ENERGY PROJECTS

TO THE PARTY ADDRESSED:

Reference: Final Environmental Impact Statement

Attached is the final environmental impact statement (final EIS) for the Upper North Fork Feather River Project (FERC No. 2105), located on the North Fork Feather River and Butt Creek, in Plumas County, California. This final EIS has been prepared pursuant to requirements of the National Environmental Policy Act (NEPA) and the Federal Energy Regulatory Commission (FERC or Commission) regulations implementing NEPA (18 CFR Part 380).

This final EIS documents the view of governmental agencies, non-governmental organizations, affected Indian tribes, the public, the license applicant, and Commission staff. It contains staff evaluations on the applicant's proposal and the alternatives for relicensing the Upper North Fork Feather River Project.

The final EIS contains an analysis of Section 18 fishway prescriptions and Section 10(j) recommendations which were filed by NOAA Fisheries on March 14, 2005, after issuance of the draft EIS. The final EIS also contains an analysis of potential measures for providing colder water to the Upper North Fork Feather River during the summer. Because these analyses first appear in the final EIS, you are specifically invited to file comments on these three items in this document. Any comments, conclusions, or recommendations that draw upon studies, reports, or other working papers should be supported by appropriate documentation. Your comments will be considered in the Commission's order in this proceeding.

Comments should be filed with Magalie R. Salas, Secretary, Federal Energy Regulatory Commission, 888 First Street, N.E., Washington, DC 20426. All comments must be filed by December 19, 2005, and should reference Project No. 2105-089. Comments may be filed electronically via the Internet in lieu of paper. The Commission strongly encourages electronic filings. See 18 CFR 385.2001(a)(1)(iii) and instructions on the Commission's website at http://www.ferc.gov under the eLibrary link.

Before the Commission makes a licensing decision, it will take into account all concerns relevant to the public interest. The final EIS will be part of the record from which the Commission will make its decision.

Copies of the final EIS are available for review in the Commission's Public Reference Branch, Room 2A, located at 888 First Street, N.E., Washington, DC 20426.

The final EIS also may be viewed on the Internet at www.ferc.gov under the eLibrary link. Please call (202) 502-8822 for assistance.

Attachment: Final Environmental Impact Statement

COVER SHEET

a. Title: Relicensing the Upper North Fork Feather River Project in Plumas County, California, FERC Project No. 2105-089

b. Subject: Final Environmental Impact Statement

c. Lead Agency: Federal Energy Regulatory Commission

d. Abstract: Pacific Gas and Electric Company (PG&E) filed an application for a new license for the existing Upper North Fork Feather River (UNFFR) Project, which is located on the North Fork Feather River, in the vicinity of the community of Chester, Plumas County, California. The UNFFR Project generates 1,171.9 gigawatt-hours of electricity annually.

The final environmental impact statement (EIS) presents the staff's evaluation of the developmental and non-developmental consequences of PG&E's proposal, alternatives to the proposed action, and the no-action alternative. Key issues associated with relicensing this project include providing appropriate minimum flows in the bypassed reaches, whether enhancement of the supply of gravel and other native materials is needed, management of Lake Almanor water surface elevations and its effect on nearshore and riparian habitat, controlling invasive weeds, protecting threatened and endangered species, providing recreational enhancements, and protecting cultural resources.

The staff's recommendation is to relicense the project as proposed, with additional measures to protect and enhance environmental resources, including various measures to protect and monitor water quality; measures to control flows to the bypassed reaches and manage Lake Almanor water levels to enhance habitat for aquatic biota; monitoring aquatic, riparian, and terrestrial plants, fish, and wildlife; protective measures for fish and wildlife; various recreational enhancements; and development of several land use plans.

e. Contact: John Mudre
Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, N.E.
Washington, DC 20426
(202) 502-8902

f. Transmittal: This final EIS prepared by the Commission's staff on the hydroelectric license application filed by PG&E for the existing Upper North Fork Feather River Project (FERC No. 2105-089) is being made available to the public on or about November 10, 2005, as required by the National Environmental Policy Act of 1969[1] and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR Part 380).

[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).

FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)[2] and the U.S. Department of Energy Organization Act[3] is authorized to issue licenses for up to 50 years for the construction and operation of non-federal hydroelectric development subject to its jurisdiction, on the necessary conditions:

> That the project … 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 such other conditions not inconsistent with the FPA 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]

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[2] 16 U.S.C. §791(a)-825r, as amended by the Electric Consumers Protection Act of 1986, Public Law 99-495 (1986), and the Energy Policy Act of 1992, Public Law 102-486 (1992).

[3] Public Law 95-91, 91 Stat. 556 (1977).

[4] 16 U.S.C. §803(a)(1).

[5] 16 U.S.C. §803(g).

[6] 18 CFR §385.206 (1987).

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

TABLE OF CONTENTS

PAGES vii to xviii

FEIS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATONS

°C	degrees Celsius
ADA	Americans with Disabilities Act
Albion	Albion Environmental, Inc.
APE	area of potential effects
AW	American Whitewater
Basin Plan	Central Valley Regional Water Quality Control Board Basin Plan
BIA	U.S. Bureau of Indian Affairs
BMP	best management practice
BRM	bedrock mortars
CalEPPC	California Exotic Pest Plant Council
CA/MX	California-Mexico Power Area
CARB1	Caribou No. 1 powerhouse
CARB2	Caribou No. 2 powerhouse
CCC	California Coastal Commission
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDPR	California Department of Parks and Recreation
CDWR	California Department of Water Resources
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CNPS	California Native Plant Society
COEHHA	California Office of Environmental Health Hazard Assessment
Commission	Federal Energy Regulatory Commission
CRLF	California red-legged frog
CRMP	Cultural Resources Management Plan
CSC	state species of concern
CSUCRF	California State University Chico Research Foundation
CTR-FALP	California Toxics Rule, Freshwater Aquatic Life Protection
CVRWQCB	Central Valley Regional Water Quality Control Board
DO	dissolved oxygen
EBNFFR	East Branch of the North Fork Feather River
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERC	Ecological Resources Committee (for the Rock Creek-Cresta Project, FERC Project No. 1962)
ESA	Endangered Species Act
FDA	U.S. Food and Drug Administration
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FS	U.S. Department of Agriculture, Forest Service

FSS	FS sensitive species
FWS	Fish and Wildlife Service
HPMP	Historic Properties Management Plan
HSC	habitat suitability criteria
HSP	hazardous substances plan
I&E	interpretation and education
IFIM	Instream Flow Incremental Methodology
IIHR	Iowa Institute of Hydraulic Research
Interior	U.S. Department of the Interior
KVP	key viewing point
kWh	kilowatt-hours
LAC	limits-of-acceptable change
LACSP	Lake Almanor Cloud Seeding Project
LART	Lake Almanor Recreation Trail
LRMP	Land and Resource Management Plan
LWD	large woody debris
µmhos/cm	micromhos per centimeter
MCDG	Maidu Cultural and Development Group
mg/l	milligram(s) per liter
MIF	minimum instream flow
MOU	Memorandum of Understanding
MTBE	methyl-tert-butyl ether
MW	megawatt
MYLF	mountain yellow-legged frog
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NFFR	North Fork Feather River
NFS	National Forest System
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NOAA Fisheries	National Oceanographic and Atmospheric Administration, National Marine Fisheries Service
NPS	U.S. National Park Service
NTU	nephelometric turbidity unit(s)
O&M	operations and maintenance
ORV	off-road vehicle
PA	Programmatic Agreement
PAR	PAR Environmental Services, Inc.
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
pH	potential hydrogen (a measure for acidity and alkalinity)
PHABSIM	Physical Habitat Simulation

QA/QC	quality assurance/quality control
REA	ready for environmental analysis
RFIP	recreation flow implementation plan
RRMP	recreation resource management plan
SA	Settlement Agreement
SHPO	State Historic Preservation Officer
SMP	shoreline management plan
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TCP	traditional cultural properties
TON	threshold odor number
TPZ	timberland production zone
TRG	technical review group
UNFFR	Upper North Fork Feather River
USDA	U.S. Department of Agriculture
USGS	United States Geological Survey
VELB	valley elderberry longhorn beetle
WECC	Western Electricity Coordinating Council
WQC	water quality certification
WQMP	water quality monitoring program
WUA	weighted useable area
WY	water year

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

SUMMARY

PAGES xix to xxiv

FEIS

SUMMARY

On October 23, 2002, Pacific Gas and Electric Company (PG&E) filed an application with the Federal Energy Regulatory Commission (Commission or FERC) for a new license for the existing Upper North Fork Feather River (UNFFR) Project. The UNFFR Hydroelectric Project is an existing 342.6-megawatt (MW) hydroelectric facility located on the North Fork Feather River (NFFR) and Butt Creek, in Plumas County, California. The project occupies 1,024 acres of lands of the United States administered by the U.S. Department of Agriculture, Forest Service, and the U.S. Department of the Interior, Bureau of Land Management. The UNFFR Project consists of five hydraulically connected developments, with a total of three dams and reservoirs, five powerhouses, associated tunnels, surge chambers, and penstocks. The project has a combined average annual generation of 1,171.9 gigawatt-hours. PG&E proposes no increased capacity.

In this final environmental impact statement (EIS), we analyze the environmental effects associated with the issuance of a new license for the existing hydropower project and recommend conditions for inclusion in any license issued. For any license issued, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and development purposes for which licenses are issued, the Commission must give equal consideration to energy conservation and the protection and enhancement of fish and wildlife, aesthetics, cultural resources, and recreational opportunities. The final EIS for the UNFFR Project reflects the staff's consideration of these factors.

On April 30, 2004, PG&E filed with the Commission a Settlement Agreement (SA) reached by the Project 2105 Licensing Group on proposed protection, mitigation, and enhancement measures pertaining to streamflow management, recreation river flow management, reservoir operations, water year types, water quality monitoring, wildlife habitat enhancement, recreation, and land management and visual resource protection. PG&E's proposed action is to relicense the project including the terms of the SA.

PG&E proposes to continue operating the UNFFR Project with the following protection and enhancement measures:

- Operate the project in accordance with the provisions of the SA, including streamflow management, recreation river flow management, reservoir operations, water year types, water quality monitoring, wildlife habitat enhancement, recreation, and land management and visual resource protection.

- Continue to implement the road maintenance agreement between PG&E and the Plumas National Forest.

- Remove the Gansner Bar fish barrier on the Belden reach.

- Modify the project boundary to include approximately 34 additional acres of the Plumas National Forest in the vicinity of the Caribou powerhouse and near Belden dam for the purposes of penstock maintenance and spoil management.

- Finalize and implement a Historic Properties Management Plan.

Our analysis shows that the best alternative for the UNFFR Project is to issue a new license consistent with PG&E's proposed environmental measures (unless noted otherwise) with the following additional measures (staff's alternative):

- Include details that we specify in the following PG&E-proposed plans:

    - Lake Almanor water quality monitoring.

    - Bioaccumulation (methylmercury and PCBs) monitoring in catchable-sized fish.

    - Bacteriological monitoring.

    - Fish and benthic macroinvertebrate monitoring.

    - Gravel monitoring.

    - Amphibian monitoring.

    - Recreation flow implementation plan.

    - Shoreline management.

- Develop and implement a spoil disposal plan.

- Develop and implement a plan that addresses the timing of use of the upper-level gates in the Canyon dam outlet tower for releases to the Seneca bypassed reach.

- Develop and implement a water level and flow gaging plan.

- Develop and implement a woody debris management plan.

- Develop and implement an adaptive management plan for environmental resources.

- Develop and implement a vegetation and invasive weed management plan that incorporates protection and management of valley elderberry longhorn beetle habitat for all project lands.

- Develop and implement a plan for the protection of threatened, endangered, proposed for listing, and sensitive species.

- Develop and implement a peregrine falcon monitoring plan.

- Develop and implement an interagency bald eagle management plan.

- Develop and implement a road management plan.

- Develop and implement a fire prevention, response, and investigation plan.

On November 4, 2004, the FS submitted its final Section 4(e) conditions, which reflect many of the SA measures. We recommend that most of the terms of the SA be approved and made conditions of any license that may be issued for the UNFFR Project. However, a specific 4(e) condition (and SA measure) that we do not include in the staff alternative is the funding for a river ranger position. We conclude that this should be the responsibility of the FS and/or Plumas County because the primary responsibility of this position would be for law enforcement, which is the responsibility of these agencies. We also recommend modifications to some of the SA measures, including five that are also FS Section 4(e) conditions, as listed below:

- Monitoring fish and benthic macroinvertebrates in the Belden and Seneca reaches: PG&E proposes and the FS specifies initiating monitoring between 10 and 12 years after license issuance, with sampling occurring every 2 years over a 6-year period, for a total of three sampling periods; we recommend initiating this monitoring during years 4 and 5 of the new license and then monitoring every fifth year. We recommend this modification because we are concerned that changes, negative or positive, to the fish, amphibian, and macroinvertebrate communities would not be evident in a timely manner under the monitoring program proposed by PG&E and specified by the FS.

- Pulse flows from Canyon and Belden dams: PG&E proposes and the FS specifies providing one pulse flow release from both Canyon dam and Belden dam in January, February, and March if the forecasted water year type for that month indicates that the water year is anticipated to be either normal or wet (no pulse flows are proposed in any of those months if the forecasted water year type is dry or critically dry); in addition to the pulse flows proposed by PG&E and specified by the FS, we recommend providing a pulse flow of 700 cubic feet per second below Canyon dam and Belden dam in March of dry years, unless the water temperature exceeds 10°C for two consecutive days in March and if a flow of this magnitude was not measured in the preceding January or February at NF4 (Seneca) and NF7 (Belden). We recommend this modification to ensure that periodic flows of the magnitude necessary to flush fine substrates from spawning gravels, redistribute small gravels, and activate

floodplain habitat would occur with enough frequency to improve conditions for the aquatic biota in the bypassed reaches, especially during periods of drought.

- Gravel monitoring plan: PG&E proposes and the FS specifies developing and implementing a gravel monitoring plan to evaluate the movement of sediment that occurs in the Belden and Seneca reaches during scheduled pulse flow events and other flow events of similar magnitude; we recommend that the gravel monitoring plan include specific contingency actions for the enhancement of substrate distribution and abundance in the bypassed reaches. We recommend this modification in the event that our recommended pulse flow schedule should be modified to improve the abundance and distribution of spawning-sized gravels, or if gravel supplementation or vegetation management is necessary, based on monitoring results.

- Recreation flow implementation plan: PG&E proposes and the FS specifies implementing the recreation flow implementation plan, including test flows and monitoring, in the Belden reach, in year 1 of the license; we recommend delaying implementation of the plan until year 6. We recommend this modification because it provides an opportunity for the biotic community to adapt to the revised instream flow schedule without being disrupted by recreational release flows, which would improve the likelihood of enhancing macroinvertebrate and fish populations.

- Scheduled recreation flow releases: PG&E proposes and the FS specifies releasing recreation flows in the Belden reach beginning in year 4 of the license, following implementation of the recreation flow implementation plan; we recommend delaying the recreation flow releases in the Belden reach until year 9, also following the implementation of the recreation flow implementation plan.

- Lake Almanor water quality monitoring: PG&E proposes monitoring once every 5 years beginning in year 3 from license issuance; we recommend monitoring only in years 1 to 3.

- Bioaccumulation (methylmercury and PCBs) monitoring in catchable-sized fish: PG&E proposes monitoring once every 5 years beginning in year 1 from license issuance; we recommend monitoring only in years 5, 10, and 15. PG&E also proposes monitoring for bioaccumulation of silver; we do not recommend monitoring for bioaccumulation of silver because previous sampling indicates that silver body burdens are low, silver does not typically biomagnify, and we are not aware of an established action or screening level that represents the risk to human health.

- Bacteriological monitoring: PG&E proposes monitoring in years 1 to 5 from license issuance, then every other year; we recommend monitoring only in years 1 to 3.

- Cadmium and specific conductance monitoring: PG&E proposes monitoring in years 1 and 2 from license issuance, at a minimum; we recommend monitoring for up to 3 years in years 1 to 3.

- Monitoring the effectiveness of seasonal switching of the Canyon dam outlet tower gates: PG&E proposes monitoring for 6 water years (not necessarily consecutive) beginning in year 1 from license issuance; we recommend monitoring only in years 1 to 3, only if those 3 water years are normal, dry, or critically dry.

- Shoreline management plan: PG&E proposes implementing the shoreline management plan included in the license application; the FS specifies and we recommend revising the shoreline management plan prior to implementation.

PG&E evaluated numerous potential measures to reduce water temperatures in the Belden reach and the lower NFFR reaches to make these reaches more suitable for coldwater fish. At this time, PG&E has not proposed implementing any of the measures it has evaluated. The implementation of some of these measures would require modifying UNFFR Project facilities and/or operations. Therefore, we evaluate these measures in this final EIS. We determined that the use of thermal curtains in Lake Almanor and/or Butt Valley reservoir would reduce NFFR temperatures downstream of the Caribou powerhouses; however, we do not recommend it given the adverse effects that these measures would have on the lakes' environmental, cultural, and recreational resources (e.g., coldwater fishery of Lake Almanor, the existing trophy rainbow and brown trout fishery of Butt Valley reservoir, potential disturbance of Native American burial grounds, boating safety, and viewsheds) and its high cost. While we do not recommend modifying the Prattville intake to provide cooler water to downstream reaches, PG&E's proposed, and our recommended, minimum instream flows generally would reduce water temperatures in July and August by about 0.5 to 2.0°C in the Belden reach, and also, albeit to a lesser degree, in the lower NFFR bypassed reaches.

On March 14, 2005, NOAA Fisheries submitted a modified Section 18 fishway prescription for the UNFFR Project to the Commission. The modified prescription calls for the release of adult Central Valley spring-run Chinook salmon and Central Valley steelhead into the Seneca bypassed reach and into Yellow Creek, an unregulated stream that enters the UNFFR in the vicinity of the Belden powerhouse. Both species are listed as threatened under the Endangered Species Act (ESA) but do not currently occur in the project area. The prescription also calls for the trap and transfer of outmigrants (e.g., smolts and post-spawned steelhead) from the Seneca bypassed reach and Yellow Creek to below Oroville dam, part of FERC Project No. 2100.

In this final EIS, we determine that it is likely that the implementation of the modified NOAA Fisheries Section 18 prescription would provide access to approximately 15 miles of spawning and juvenile rearing habitat for Central Valley spring-run Chinook salmon and Central valley steelhead (assuming the prescription is included in the license for the UNFFR Project and a complementary prescription is implemented for the Oroville Project) by trapping adults below the Oroville Project and transporting them to the Seneca reach and Yellow Creek. The minimum instream flows that PG&E proposes and we and the resource agencies recommend for the Seneca reach, combined with the existing physical conditions in the UNFFR, would likely provide suitable habitat for anadromous salmonids. However, as discussed in section 3.3.2.2 of this final EIS, the potential success of this program is uncertain, and there would likely be many adverse effects associated with the implementation of the fish passage prescription (e.g., adverse effects on the existing fish community and on riparian habitat and instream habitat due to construction). Therefore, we do not recommend the implementation of the NOAA Fisheries' fishway prescription.

We estimate that the net annual benefit of the project as currently operated (the no-action alternative) is $52,484,700. The net annual benefit of the project as proposed by PG&E is estimated to be $43,921,000. The net annual benefit of the proposed project with our additional recommended measures would be about $43,825,300. The net annual benefit of the proposed project with our additional recommended measures and additional mandatory measures that we do not recommend is estimated to be $41,363,700.

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

SECTION 1

PURPOSE AND NEED FOR ACTION

PAGES 1-1 to 1-12

FEIS

1.0 PURPOSE OF ACTION AND NEED FOR POWER

On October 23, 2002, Pacific Gas and Electric Company (PG&E) filed an application with the Federal Energy Regulatory Commission (Commission or FERC) for a new license for the existing Upper North Fork Feather River (UNFFR) Project. The licensed capacity of the project is 342.6 megawatts (MW), and PG&E estimates that the dependable capacity is 357.3 MW.[7] On average, the project generates 1,171.9 gigawatt-hours (GWh) of electricity per year. The project is located on the North Fork Feather River (NFFR), in the vicinity of the community of Chester, Plumas County, California (figure 1-1). The project occupies 1,024 acres of United States lands: 409 acres of the Plumas National Forest and 577 acres of the Lassen National Forest, administered by the U.S. Department of Agriculture (USDA), Forest Service (FS); and 38 acres administered by the U.S. Department of the Interior (Interior), Bureau of Land Management.

1.1 PURPOSE OF ACTION

The Commission must decide whether to issue a new license to PG&E for the UNFFR Project and what conditions, if any, should be placed on that license. Issuing a license would allow PG&E to continue generating electricity for the term of that license, making electric power from a renewable source available to its customers.

In this final environmental impact statement (EIS), we assess the effects associated with operation of the project and alternatives to the proposed project; make recommendations to the Commission on whether to issue a new license; and, if so, recommend terms and conditions to become a part of any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and developmental purposes for which licenses are issued (e.g., flood control, irrigation, and water supply), the Commission must give equal consideration to the purposes of energy conservation; the protection of, 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.

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[7] PG&E bases its dependable capacity on load carrying ability during the critical hydrologic period coincident with its peak system load. The critical hydrologic period was in 1977, and the peak system load typically occurs during July and August. Dependable capacity is slightly greater than licensed capacity because PG&E can operate the units with slightly greater head and/or flow than rated.

Non-Internet Public

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

Page 1-2
Figure 1-1

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov.

In this final EIS, we assess the environmental and economic effects of licensing the project (1) as proposed by PG&E, and (2) with our recommended measures. We also consider the effects of the no-action alternative. Important issues that we address include providing appropriate minimum flows in the bypassed reaches, temperature control measures in the NFFR, and whether enhancement of the supply of gravel and other native materials is needed, management of Lake Almanor water surface elevations and its effect on nearshore and riparian habitat, controlling invasive weeds, protecting threatened and endangered species, providing recreational enhancements, and protecting cultural resources.

1.2 NEED FOR POWER

The UNFFR Project is a resource that is important to the operation of the Feather River system as a whole, contributes to PG&E's resource diversity, and plays a part in meeting the capacity requirements of both PG&E and the state of California.

The UNFFR Project is one of the upstream-most projects in a series of water resource and hydroelectric projects in the Feather River basin (figure 1-2). There are 11 powerhouses licensed to PG&E upstream of the California Department of Water Resource's (CDWR's) Lake Oroville Project, which includes hydroelectric generation as well as a 3.5 million acre-foot storage reservoir. Operations at the UNFFR Project not only affect generation at this project, but the reregulation of UNFFR flows influences downstream generation. Thus, project operations affect the availability of generation from the project itself as well as downstream facilities.

The project is operated in conjunction with PG&E's other generating resources to help meet electricity demands and ancillary service needs of PG&E's customers and the state. The UNFFR Project is in the California-Mexico Power Area (CA/MX) of the Western Electricity Coordinating Council (WECC) within the North American Electric Reliability Council (NERC). NERC annually forecasts electrical supply and demand nationally and regionally for a 10-year period. According to NERC's most recent forecast, hydroelectric generation will only account for 80 MW (1.1 percent), of the projected capacity growth of 7,110 MW in the region between 2003 and 2012 (table 1-1) (http://www.wecc.biz/2003_Summer_Assessment_Revised.pdf). If the project ceased generation, the area-wide diversity of the CA/MX would be reduced because the electric output of the project would not be completely replaced by other hydroelectric generation. With the project currently reducing greenhouse gas emissions by 100,000 metric tons of carbon/year compared with fossil-fuel generation, net emissions in the CA/MX would increase over the coming 10-year period if the project ceased to generate electricity.

Non-Internet Public

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

Page 1-4
Figure 1-2

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Table 1-1. Actual and projected generation resources in the California-Mexico Power Area. (Source: http://www.wecc.biz/2003_Summer_Assessment_Revised.pdf, as modified by staff.)

	Resources in 2003 (MW)	Resources in 2012 (MW)	Growth Over Period		Resource Growth as a Percent of Total Growth (%)
			(MW)	(%)	
Hydro - conventional	7,193	7,213	20	0.3	0.3
Hydro- pumped storage	3,840	3,900	60	1.6	0.8
Steam – coal	3,604	2,024	–1,580	–43.8	–22.2
Steam – oil	276	0	–276	–100.0	–3.9
Steam – gas	18,016	14,070	–3,946	–21.9	–55.5
Nuclear	4,450	4,450	0	0.0	0.0
Combustion turbine	6,787	6,749	–38	–0.6	–0.5
Combined cycle	6,600	19,438	12,838	194.5	180.6
Geothermal	2,184	2,184	0	0.0	0.0
Internal combustion	40	48	8	20.0	0.1
Other	1,013	1,037	24	2.4	0.3
Total	54,003	61,113	7,110	13.2	100

Peak summer demand and annual energy requirements for the CA/MX are projected to grow at an average of 1.9 and 1.8 percent, respectively, from 2003 through 2012 (table 1-2). Projected resource summer capacity margins (generating capacity in excess of demand) vary over the period, but overall decrease from 24.9 to 13.4 percent of firm peak demand (http://www.wecc.biz/2003_Summer_Assessment_Revised.pdf). With available reserve in the CA/MX projected to decrease below generally accepted values of 15 to 18 percent, generation loss from this project could have a significant effect on the ability of the area to meet regional requirements for generation.

Due to its effect on the Feather River system, the lack of projected new hydroelectric resources in the system, and the projected growth in demand and lack of reserve capability in the region, we conclude that power from the UNFFR Project would help meet both short- and long-term needs for power and ancillary services in the CA/MX.

Table 1-2. Actual and forecasted generation, demand, and reserve capability for CA/MX and WECC. (Source: http://www.wecc.biz/2003_Summer_Assessment_Revised.pdf, as modified by staff)

	2003 Actual	2012 Forecasted	Annual Percentage Change
CA/MX			
Existing/planned generation (MW)	54,003	61,113	1.4
Summer peak demand (MW)	53,334	64,585	2.2
Winter peak demand (MW)	42,017	50,921	2.2
Annual energy load (GWh)	292,024	349,983	2.0
Summer reserve as percentage of firm peak demand	24.9%	13.4%	
Winter reserve as percentage of firm peak demand	19.8%	14.3%	
WECC			
Existing/planned generation (MW)	173,440	205,763	1.9
Summer peak demand (MW)	136,587	164,417	2.1
Winter peak demand (MW)	125,149	148,931	2.0
Annual energy load (GWh)	841,180	1,001,964	2.0
Summer reserve as percentage of firm peak demand (%)	31.6	21.2	
Winter reserve as percentage of firm peak demand (%)	36.3%	27.4%	

1.3 INTERVENTIONS

On December 26, 2002, the Commission issued a notice accepting PG&E's application to relicense the UNFFR Project. This notice set a 60-day period, which ended on February 24, 2003, during which interventions could be filed. In response to that notice, the following entities filed motions to intervene:

Intervenor	Date of Letter
U.S. Department of Agriculture, Forest Service	February 19, 2003
Biggs-West Gridley Water District	February 20, 2003
Butte Water District	February 20, 2003
U.S. Department of the Interior	February 20, 2003
Richvale Irrigation District	February 20, 2003
Western Canal Water District	February 20, 2003

Intervenor	Date of Letter
California Department of Fish and Game	February 21, 2003
U.S. Department of Commerce, National Marine Fisheries Service	February 21, 2003
Plumas County and Plumas County Flood Control and Water Conservation District	February 21, 2003
State Water Resources Control Board	February 21, 2003
California Trout, Trout Unlimited, and California Sportfishing Protection Alliance	February 24, 2003
California Trout and Trout Unlimited	February 24, 2003
Lassen Municipal Utility District	April 17, 2003
Maidu Cultural and Development Group	May 15, 2003
Anglers Committee Against Artificial Whitewater Flows	September 5, 2003
State Water Contractors	January 8, 2004
California Department of Water Resources	January 7, 2005

1.4 SCOPING PROCESS

Before preparing the draft EIS, we conducted scoping to identify issues and alternatives. Scoping Document 1 was distributed to interested agencies and other parties on April 25, 2003. We held one scoping meeting on May 20, 2003, in Chester, California, and one scoping meeting on May 21, 2003, in Chico, California, to receive oral comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these comments are part of the Commission's public record for the project. In addition to oral comments received at the scoping meetings, the following agencies, representatives, individuals, and non-governmental organizations (NGOs) provided written comments.

Commenting Entity	Date of Letter
Bridget Johnston	June 7, 2003
National Park Service	June 11, 2003
Lake Almanor Fishing Association	June 14, 2003
Anglers Committee Against Artificial Whitewater Flows	June 17, 2003
California Department of Fish and Game	June 17, 2003

Commenting Entity	Date of Letter
Plumas County Board of Supervisors	June 17, 2003
American Whitewater Affiliation, Shasta Paddlers, and Chico Paddleheads	June 18, 2003
California State Water Resources Control Board	June 19, 2003
U.S. Fish and Wildlife Service	June 19, 2003
Maidu Cultural Development Group	June 20, 2003
U.S. Department of Commerce, National Marine Fisheries Service	June 19, 2003
Plumas County Flood Control and Conservation District	June 20, 2003 and July 7, 2003
U.S. Department of the Interior	October 16, 2003

We issued the revised Scoping Document 2 on August 7, 2003, which addressed these comments.

1.5 AGENCY CONSULTATION

The Commission's regulations require applicants to consult with appropriate state and federal environmental resource agencies, Indian tribes, and the public before filing a license application. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and other federal statutes. Pre-filing consultation must be completed and documented in accordance with Commission regulations. The Commission issued a public notice on August 25, 2003, that the application for the UNFFR Project was ready for environmental analysis (REA), and that comments should be filed by December 1, 2003. The following entities commented:

Commenting Entity	Date of Letter
Maidu Cultural and Development Group	November 24, 2003
California Department of Fish and Game	November 26, 2003
U.S. Department of Commerce, National Marine Fisheries Service	November 26, 2003
American Whitewater Affiliation, Shasta Paddlers, and Chico Paddleheads	December 1, 2003
U.S. Department of the Interior	December 1, 2003
U.S. Department of Agriculture, Forest Service	December 1, 2003

PG&E filed reply comments on the recommended terms and conditions by letter dated January 15, 2004. All comments become part of the record and are considered during our analysis of the proposed action. We discuss the comments and recommendations in section 3.3, *Proposed Action and Action Alternatives*.

1.6 SETTLEMENT AGREEMENT

On January 24 and 25, 2001, PG&E met with several resource agencies in Sacramento to begin a series of discussions on environmental topics relating to project relicensing. Eventually, NGOs were involved in this series of discussions, which ultimately developed into a broad group of UNFFR Project relicensing stakeholders. PG&E referred to this group as the 2105 Collaborative, and it included PG&E, the FS, the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (FWS), Plumas County and the local 2105 Committee, the U.S. National Park Service (NPS), the National Oceanographic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), American Whitewater (AW) and local recreation interests, the California Sportfishing Protection Alliance, the Anglers Committee, Native American interest groups, the California Hydro Reform Coalition, and the California State Water Resources Control Board (SWRCB). The 2105 Collaborative had a goal of reaching mutually acceptable protection, mitigation, and enhancement (PM&E) measures for inclusion in a new license that could be issued for the project.

On October 1, 2003, PG&E filed a letter with the Commission that provided an update on its efforts to reach agreement on behalf of the 2105 Collaborative. Attached to the letter was a flow issues settlement proposal, which included draft settlement language tentatively agreed to at a meeting on September 29, 2003, on the subjects of streamflow management, recreation flow management, reservoir operation, and water year type. At that time, PG&E anticipated that it would have a final fully, executed Settlement Agreement (SA) filed with the Commission by December 1, 2003.

NPS, the FS, and Plumas County, all filed letters with the Commission in support of the 2105 settlement process and the general settlement language submitted by PG&E. CDFG submitted a letter to PG&E expressing its agreement with the terms and conditions defined in the draft SA, and Jerry Mensch of the California Sportfishing Protection Alliance sent an email to William Zemke of PG&E supporting both the collaborative process and the draft agreement process. PG&E filed both the letter from CDFG and the email from Jerry Mensch with the Commission on October 16, 2003.

In response to the Commission's REA notice, on November 28, 2003, CDFG submitted its recommendations pursuant to Section 10(j) of the Federal Power Act (FPA). In its recommendations, CDFG indicated its support of the PM&E measures outlined in the draft SA and attached to CDFG's recommendations was a copy of the draft SA dated October 31, 2003.

On March 5, 2004, PG&E filed a letter with the Commission with an updated version of the draft SA. PG&E stated that this version reflected the 2105 Collaborative's progress from meetings held on February 20, March 1, and March 4, during which they reviewed the draft line-by-line. In its letter, PG&E stated that the 2105 Collaborative was optimistic that a consensus could be reached on final language in the near future. PG&E also indicated that a date for all of the parties of the 2105 Collaborative to sign the SA had not yet been set, but that it could realistically occur in early April 2004.

Also in its March 5, 2004, letter, PG&E disclosed that the issue of water temperature control was not resolved in the draft SA, but that it is recognized as an important topic by the 2105 Collaborative. PG&E acknowledged that study results and modeling information critical to this issue have only recently been available. It stated that additional studies and data synthesis would be necessary before any decision-making on water temperature by the Collaborative and indicated its willingness to continue discussions in hopes that an addendum to the current SA addressing this issue could be completed; PG&E chose to not estimate a date for the completion of the addendum.

On April 30, 2004, PG&E filed the SA, with the Commission (PG&E, 2004a; see appendix A of this EIS). In its transmittal letter, PG&E indicated that the SA represented the concerted effort of a broad-based group of resource agencies, public entities, and NGOs and that it addressed many key issues concerning the project and its operation. PG&E also acknowledged that agreement on appropriate measures for the control of water temperatures in the NFFR was not included in the settlement. PG&E stated that discussions with the Collaborative were continuing and that its goal is to reach a collaborative settlement on this issue, if possible. PG&E intends to keep the Commission informed of the status of these discussions.

The April 30, 2004, SA includes measures pertaining to minimum streamflows, pulse flows, ramping rates, recreation flows, reservoir operations, water quality monitoring, wildlife habitat enhancement, recreation facilities development, maintenance and monitoring, adjustments to the project boundary, an interpretation and education (I&E) program, and land management and visual resources. We consider the SA to represent the proposed measures of PG&E and the other signatory parties[8] to the agreement, superseding previous recommendations made by these respective entities.[9]

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[8] Signatory parties to the SA include PG&E, U.S. Forest Service, Plumas National Forest, Lassen National Forest, CDFG, Plumas County Board of Supervisors, CA Sportfishing Protection Alliance, American Whitewater, Shasta Paddlers, Chico Paddleheads, and Mountain Meadows Conservancy.

[9] In section 3.1 of the SA, the parties to the settlement requested that FERC accept and incorporate, without material modification, as license articles all of the PM&E measures included in appendix A of the SA.

1.7 COMMENTS ON THE DRAFT EIS

The Commission sent the draft EIS to the U.S. Environmental Protection Agency (EPA) and made the draft EIS available to the public on September 17, 2004. The Commission requested that any written comments on the draft EIS be filed by November 1, 2004. In addition, the Commission accepted oral testimony on the draft EIS at two meetings: one held on October 19, 2004, in Chester, California, and one held on October 20, 2004, in Chico, California. We modified the text of the EIS in response to oral and written comments received, as appropriate. Appendix C lists the commenters, summarizes the comments, and presents our responses to those comments. Also, in response to the draft EIS, the FS filed its final Section 4(e) conditions for the UNFFR Project by letter dated November 4, 2004 (appendix B).

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

SECTION 2

PROPOSED ACTION AND ALTERNATIVES

PAGES 2-1 to 2-16

FEIS

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 APPLICANT'S PROPOSAL

PG&E proposes to maintain its existing operations, with minor modifications, at the UNFFR Project. No new construction is proposed.

2.1.1 Project Description and Operation

2.1.1.1 Project Description

The existing UNFRR Project consists of three dams and reservoirs; five powerhouses; tunnels and penstocks connecting the reservoirs to the powerhouses, and associated transmission, operations and maintenance (O&M), and access facilities. The five developments include a total of eight hydroelectric generating units with a total installed capacity of 342.6 MW. All three reservoirs provide regulated storage. The project waters continue downstream in the NFFR to the Rock Creek reservoir and the Rock Creek-Cresta Hydroelectric Project (FERC No. 1962).

The upstream-most reservoir is Lake Almanor, located on the NFFR. Lake Almanor has a usable storage capacity of 1,134,016 acre-feet, a maximum water surface area of 27,000 acres, and a maximum normal water surface elevation of 4,494 feet (PG&E datum). Lake Almanor is impounded by Canyon dam, an earth-filled structure 135 feet high and 1,400 feet wide at its base. The dam has an outlet tower and tunnel capable of releasing up to 2,100 cubic feet per second (cfs) to the NFFR through outlets with inverts at 4,420 feet and 4,465.0 feet (PG&E datum), as well as a simple overflow spillway at 4,500 feet (PG&E datum). The maximum water storage elevation, as authorized by the California Division of Safety of Dams, is 4,994 feet (PG&E datum). Water also leaves Lake Almanor through the Prattville intake, which has an invert located at 4,410.0 feet (PG&E datum). From the Prattville intake, flow passes through the 10,899-foot-long Prattville Tunnel No. 1A, then the 5,568-foot-long Butt Valley penstock to the Butt Valley powerhouse.

Butt Valley reservoir, located on Butt Creek, takes inflows from Butt Creek as well as the Butt Valley powerhouse. Butt Valley reservoir has a usable storage capacity of 49,897 acre-feet, a maximum water surface area of 1,600 acres, and a maximum normal water surface elevation of 4,132.1 feet (PG&E datum). Butt Valley reservoir is impounded by Butt Valley dam, an earth filled structure 1,350 feet long, 74 feet high, and 850 feet wide at its base. The dam has no low-level outlet, and an ungated overflow spillway has a crest elevation of 4,132.1 feet (PG&E datum). Water also leaves Butt Valley reservoir through the Tunnel No. 2 intake, which has an invert elevation of 4,066.9 feet (PG&E datum), through the 9,776-foot-long Tunnel No. 2 and the 2,222-foot-long Caribou No. 1 penstock to the Caribou No. 1 powerhouse, and through the Tunnel No. 2A intake, which has an invert elevation of 4,093.0 feet (PG&E datum)

through the 8,710-foot-long Tunnel No. 2A and the 2,322-foot-long Caribou No. 2 penstock to the Caribou No. 2 powerhouse.

Belden forebay, located on the NFFR, receives water from the Seneca bypassed reach, and the Caribou Nos. 1 and 2 powerhouses. Belden forebay has a usable storage capacity of 2,421 acre-feet, a maximum water surface area of 42 acres, and a maximum normal water surface elevation of 2,975.0 feet (PG&E datum). Belden forebay is impounded by Belden forebay dam, a rock filled structure 500 feet long, 152 feet high, and 630 feet wide. Water exiting the Belden forebay is either diverted to the Belden powerhouse via the Belden intake, which has an invert elevation of 2,930.0 feet (PG&E datum), then through the Belden tunnel and penstock, or continues down the NFFR. The dam also has a spillway with four radial gates and a siphon that activates if the reservoir exceeds 2,975.5 feet (PG&E datum).

The Butt Valley powerhouse includes a single, 55,000-hp vertical Francis turbine. The generator is a 13.8-kV, 44,400-kVA, 3-phase unit with a 0.9 power factor. The development includes a 40,000-kVA transformer bank that steps up voltage from 13.8 kV to 115 kV for transmission.

The Caribou No. 1 powerhouse includes three, 30,000-hp double overhung impulse turbines. Two of the turbines are connected to 11.5-kV, 27,777-kVA, 3-phase generators with a 0.9 power factor, and one turbine is connected to an 11.5-kV, 26,500-kVA, 3-phase generator with a 0.9 power factor. The generating units are connected to a 90,000-kVA transformer bank that steps up voltage from 13.8 kV to 115 kV for transmission, and the development's output can also be tied to Caribou No. 2 development through a 56,000-kVA autobank.

The Caribou No. 2 development has two, 76,000-hp, six-jet vertical shaft impulse turbines. One of the turbines is connected to 13.8-kV, 64,000-kVA, 3-phase generators with a 0.9 power factor, and one turbine is connected to a 13.8-kV, 67,000-kVA, 3-phase generator with a 0.9 power factor. The generating units are connected to a 137,800-kVA transformer bank that steps up voltage from 13.8 kV to 230 kV for transmission, and the development's output can also be tied to Caribou No. 1 development through a 56,000-kVA autobank.

The Oak Flat development, located at the base of Belden forebay dam, has a single 1,837-hp horizontal shaft Francis turbine. The turbine is connected to a 1,628-kVA, 3-phase generator with a 0.86 power factor. The generating unit is connected to a 2,001-kVA transformer bank which connects to a 21/2.4-kV distribution line.

The Belden powerhouse contains a single, 158,000-hp vertical shaft Francis turbine. The turbine is connected to 13.8-kV, 131,000-kVA, 3-phase generator with a 0.90 power factor. The generating unit is connected to a 131,000-kVA transformer bank that steps up voltage from 13.8 kV to 230 kV for transmission.

There are two transmission lines associated with the project. A 7.4-mile-long line from Butt Valley to the Caribou development was developed to 230 kV standards but is currently operated at 115 kV. A 12-kV tap line carries power from the Oak Flat development to a local distribution line.

The applicant proposes no new facilities, but it does propose to add 33.73 acres of lands of the Plumas National Forest to the project because of historical and future project use of these lands.

2.1.1.2 Project Boundary

The UNFFR Project boundary includes approximately 31,060 acres of land. Of this acreage, 30,032 acres are owned by PG&E, 1,024 acres are federal lands, and 2.84 acres are privately owned. The FS administers about 986 acres of the federal land (577 acres of the Lassen National Forest and 409 acres of the Plumas National Forest) and the BLM manages the remaining 38 acres of federal land. The UNFFR Project is located entirely in Plumas County, California.

The UNFFR Project boundary encompasses all of Lake Almanor up to the 4,500' elevation contour (PG&E datum); several recreational facilities located along the shoreline of Lake Almanor including the Almanor scenic overlook, the Canyon dam day-use area, the East Shore picnic area, the Rocky Point campground (three road loops), Camp Connery group camp, Last Chance campground, and Last Chance group camp; Canyon dam, including its outlet tower and tunnel; the Prattville intake, including a concrete tower with an enclosed control building; the Prattville Tunnel No. 1A; the Butt Valley penstock; the Butt Valley powerhouse; all of Butt Valley reservoir up to the 4,180' elevation contour (PG&E datum); three recreational facilities on the eastern shore of the reservoir including Ponderosa Flat campground, Cool Springs campground, and Alder Creek day-use area; Butt Valley dam; Tunnel No. 2, including a concrete tower and hoist house; Tunnel No. 2A, including a concrete tower and a hoist house; the Caribou No. 1 penstock and powerhouse, including an outdoor switchyard (shared with Caribou No. 2); the Caribou No. 2 penstock and powerhouse, including an outdoor generation unit and switchyard; the Belden forebay; the Oak Flat powerhouse; Belden forebay dam and intake; the Belden tunnel and penstock; the Belden Adit; the Belden powerhouse; a 7.4 mile-long transmission line extending from Butt Valley to the Caribou powerhouse; a 600 foot-long 12 kV tap line extending from the Oak Flat powerhouse to a local distribution line; and six roads including the Butt Valley Dam Road (two roads), the Butt Valley Powerhouse Road, the Oak Flat Powerhouse Road, the French Creek Road, and the Belden Surge Chamber Road (the project boundary is 60-feet wide along most of the project roads and 40-feet wide along the French Creek Water Supply Road).

2.1.1.3 Project Operation

The developments are operated in an integrated manner, and their operation is also coordinated with other facilities in the Feather River system, including the upstream

unlicensed Hamilton Branch Project, and the downstream Rock Creek-Cresta (FERC No. 1962), Bucks Creek (FERC No. 619), and Poe (FERC No. 2107) projects.

Water levels in Lake Almanor are maintained below the authorized level of 4,994.0 feet (PG&E datum) by releases through the Prattville intake to the Butt Valley development, and through the low-level outlet at Canyon dam, which releases flows into the NFFR. Due to the large capacity of Lake Almanor, Canyon dam is rarely operated to control water level. The water level has never exceeded the authorized level, and thus the spillway has never been used to pass flows. The minimum flow requirement downstream of Canyon dam in the UNFFR is 35 cfs. Outflow from Lake Almanor is controlled in the spring to refill the lake with snowmelt, though in drier years the reservoir will not completely fill.

Butt Valley reservoir is operated to meet power system needs. The average daily reservoir fluctuation was 0.27 foot, and daily fluctuations exceeded 1 foot about 3.5 percent of the time over the period of record. Spill at Butt Valley dam is rare due to the high hydraulic capacity of the Caribou developments.

Belden forebay can fluctuate up to 10 feet in a day due to changing upstream inflows. The minimum flow to the NFFR is 140 cfs from the last Saturday in April to Labor Day, and 60 cfs for the remainder of the year. Spill at the dam is infrequent due to upstream control of inflows and the control of flows to the Belden development.

Operation of all project developments is controlled from the Caribou No. 1 powerhouse. The maximum flow through (i.e., hydraulic capacity of) each development is as follows:

- Butt Valley: 2,118 cfs
- Caribou No. 1: 1,114 cfs
- Caribou No. 2: 1,464 cfs
- Oak Flat: 140 cfs
- Belden: 2,410 cfs

2.1.2 Proposed Environmental Measures

PG&E proposes the following PM&E measures:

1. Use the upper-level gates in the Canyon dam outlet tower for releases to the Seneca reach beginning in September and continuing until at least mid-October.

2. Continue to implement the road maintenance agreement between PG&E and the Plumas National Forest.

3. Operate and maintain the existing gages to determine river stage and minimum streamflow below Canyon dam (NF-2) and Belden forebay dam (NF-70) under the supervision of the U.S. Geological Survey (USGS).

4. Prepare annual water quality report(s) that contain elements consistent with reporting requirements from five water quality programs.

5. Develop a monitoring program to evaluate the effectiveness of seasonal switching of the Canyon dam outlet tower gates used.

6. Develop a monitoring program to determine if the elevated dissolved cadmium and specific conductance levels recorded within the UNFFR basin during 2002 and 2003 were caused by the project and potential solution(s) if they are project effects.

7. Develop a monitoring program to document long-term water quality conditions in Lake Almanor under altered project operations for the new license.

8. Develop a monitoring program to assess potential bioaccumulation of methylmercury, silver, and PCBs in catchable-sized fish in the UNFFR Project area.

9. Develop a bacteriological monitoring program, using a methodology appropriate to determine compliance with state water quality standards.

10. Provide minimum streamflows to the Seneca and Belden reaches, as measured at gages NF-2 and NF-70, in accordance with tables A-1 and A-2 in the SA. Minimum streamflows would commence within 60 days of the issuance of the new license, unless facility modifications are required.

11. Maintain existing streamflow in lower Butt Creek. No action would be taken to reduce dam leakage, tunnel leakage, spring, or other natural flows that currently provide inflow to Butt Creek below the Butt Valley dam.

12. Provide one pulse flow release from both Canyon dam (Seneca reach) and Belden dam (Belden reach) in each of January, February, and March if the forecasted water year type for that month indicates that the water year is anticipated to be either normal or wet. No pulse flows are proposed in months where the water year type forecast for that month indicates that the water year would be dry or critically dry.

13. Develop a monitoring plan to evaluate movement of sediment that occurs during scheduled pulse flow events and other flows of a similar magnitude as scheduled pulse flows. Emphasis would be placed on monitoring the movement of spawning-sized gravel and recruitment of similar-sized

materials into the Belden and Seneca reaches. This plan would be developed after consultation with the FS, FWS, SWRCB, and CDFG. If it is determined that the pulse flows appear to have a detrimental effect on the availability and distribution of spawning-sized gravel or it appears that a pulse flow of a different magnitude or duration would be beneficial, the pulse flow schedule would be altered to achieve the desired results.

14. Implement a ramping rate of 0.5 foot per hour, in all months, at Canyon dam, measured at gage NF-2, and Belden dam, measured at gage NF-70, when ramping rate can be controlled.

15. Block load at the Belden powerhouse at times when the Rock Creek dam is spilling water in excess of the minimum streamflow required under the license for the Rock Creek-Cresta Project but less than 3,000 cfs.

16. Rehabilitate and maintain an existing streamflow gaging station on lower Butt Creek designated as NF-9 and read the gage four times a year.

17. Develop a monitoring plan in lower Butt Creek to (a) determine if the weir for gage NF-9 is acting to block upstream fish passage, and (b) evaluate habitat quality at intervals of 3 to 5 years.

18. If determined to be necessary based on the results of the monitoring program in lower Butt Creek, provide pulse flows in lower Butt Creek via use of the Butt Valley reservoir spillway or an acceptable alternative.

19. Develop an aquatic monitoring plan in the Seneca and Belden reaches that includes monitoring of fish and benthic macroinvertebrates in at least three sites in each reach.

20. Maintain Lake Almanor water levels (PG&E datum) as follows:

    - Wet and Normal Water Years—By May 31, the water surface elevation would be at or above 4,485.0 feet[10] (908,000 acre-feet) and from June 1 through August 31, at or above 4,485.0 feet (908,000 acre-feet);
    - Dry Water Years—By May 31, the water surface elevation would be at or above 4,483.0 feet (859,000 acre-feet) and from June 1 through August 31, at or above 4,480.0 feet (787,000 acre-feet);
    - Critically Dry Water Years—By May 31, the water surface elevation would be at or above 4,482.0 feet (835,000 acre-feet) and from June 1 through August 31, the water surface elevation is at or above 4,480.0 feet (787,000 acre-feet); and

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[10] Lake level is defined as the water surface elevation, expressed in PG&E datum, which is 10.2 feet lower than the USGS datum.

- Multiple Dry Water Years—In the event of multiple, sequential dry or critically dry water years, decreases in surface water elevations below those specified above would be allowed, as well as the current minimum elevations specified for the Butt Valley and Belden reservoirs. By March 10 of the second or subsequent dry or critically dry water year and the year following the end of a sequence of dry or critically dry water years, notify CDFG, FWS, SWRCB, FS, and Plumas of drought concerns. By May 1 of these same years consult with representatives from CDFG, FWS, SWRCB, FS, Plumas, and other parties to discuss operational plans to manage the drought conditions.

21. Take such reasonable actions as may be prudent to prevent the water surface elevation in Lake Almanor from exceeding elevation 4,494.0 feet unless a higher level is approved by the Commission and CDWR, Division of Safety of Dams.

22. Operate Butt Valley reservoir so that the minimum water surface elevation from June 1 through September 30 is at or above 4,120.0 feet (32,000 acre-feet) and from October 1 through May 31 at or above 4,115.0 feet (24,500 acre-feet).

23. Continue to operate Belden reservoir so that the minimum water surface elevation is 2,905.0 feet (300 acre-feet), year round.

24. Forecast the water year type on or about January 10; notify the FS, CDFG, FWS, SWRCB, and Plumas County within 15 days; and operate for the remainder of that month and until the next forecast, based on that January forecast. New forecasts would be made on or about the tenth of February, March, April, and May, after snow surveys are completed, and operations would be changed as appropriate. The May forecast would be used to establish the water year type for the remaining months of the year and until the following January 10, when forecasting should begin again.

25. Remove the Gansner Bar fish barrier on the Belden reach.

26. Design a wildlife habitat enhancement plan, within 1 year of license issuance.

27. Develop an amphibian monitoring plan for FS-sensitive species for the Seneca, Butt Creek, and Belden bypassed reaches.

28. Continue to comply with measures protecting bald eagles according to existing nesting territory management plans.

29. Finalize and implement a recreation resource management plan (RRMP) for the project that includes the following elements:

    - A recreation facilities development program;

- A recreation operations and maintenance (O&M) program;
- An I&E program, including the development of a bathymetric map of Lake Almanor;
- A recreation monitoring program;
- A resource integration and coordination program; and
- A RRMP review and revision program.

30. Implement recreational facility enhancement measures (part of the recreation facilities development program) at Lake Almanor, Butt Valley reservoir, Belden forebay, and the bypassed reaches based on target completion dates and monitoring triggers (standards) in the RRMP.

31. Provide the FS with matching funds up to a maximum of $5,000,000 (2004 dollars) to construct recreation improvements at FS-owned recreation facilities.

32. Assume responsibility for operational maintenance and heavy maintenance of the following FS facilities prior to the start of the first recreation season following license issuance: the Dyer View day-use area, the Canyon dam boat launch and day-use area, and the Almanor boat launch. As each recreation facility is individually constructed, assume operational maintenance and heavy maintenance responsibility for the southwest shoreline access zone facilities. Within 6 months of completion of construction of the recreation improvements planned for the FS Almanor Family Campground and amphitheater, the FS Almanor Group Campground, and the FS Almanor beach, apply to the Commission to incorporate these additional FS facilities within the project boundary and include these facilities in the O&M program.

33. If a decision is made to proceed with recreation river flow releases, upon FS request, provide up to a maximum of $125,000 (2005 dollars) to the FS for construction of non-project river access to the lower Belden reach.

34. Provide up to $50,000 (2004 escalated dollars) to (1) reimburse CDFG for stocking approximately 5,000 pounds of catchable trout per calendar year in the waters of the NFFR between its confluence with the East Branch of the North Fork Feather River (EBNFFR) and the Belden diversion dam; and (2) augment CDFG's existing Lake Almanor fisheries program.

35. Provide up to $25,000 (2004 dollars) to the FS by March 1 of each year of the new project license to assist in funding a river ranger position to provide additional light maintenance, visitor information/assistance, user safety, and law enforcement presence in the project's bypassed river reaches.

36. Coordinate with the FS, Plumas County, and CalTrans to develop an MOU to produce a Belden interagency recreation river flow management plan.

37. Establish a recreation river flow TRG within 6 months of issuance of a new license for the purpose of consulting with PG&E in the design of recreation and resource river flow management and monitoring plans, reviewing and evaluating recreation and resource data, and in developing possible recreation river flows in the Belden reach.

38. Implement the recreation flow implementation plan (RFIP) as described in the SA.

39. Implement the recreation river flow schedule and other provisions as presented in the SA.

40. Post, through a third party or other mechanism, an annual recreation flow calendar scheduling the initial recreation flow day per month.

41. Conduct an annual planning meeting each year in March to discuss expected water year type, results of monitoring efforts, PG&E maintenance needs that may conflict with recreation flow releases, and other relevant issues.

42. During scheduled recreation river flows, count observed boater use in number of boats per day to determine whether recreation flow release days should be added or subtracted. If the number of boats per day on the first recreation river flow day for a month exceeds 100 boats per day, one day of recreation river flow would be added to the recreation river flow schedule in that month the next year. If the number of boats per day is less than 100 boats per day for both the recreation river flow releases in one month, one day of recreation river flow would be subtracted from the recreation river flow schedule for the that month in the next year.

43. Develop and implement a visitor survey for up to 3 years to determine if visitors would choose to return to recreate on the Belden reach based on their experience related to the number of boats encountered on the river.

44. Apply the basic ramping rates when implementing recreation river flows.

45. Create a calendar that lists the dates of the March pulse flow in the Seneca reach and any scheduled pulse flow or recreation river flow releases in the Belden reach, and make that calendar available on the Internet through a third party or other mechanism.

46. Meet annually with a committee appointed by the Plumas County Board of Supervisors between March 15 and May 15 to inform the committee about the water elevation levels of Lake Almanor predicted to occur between May 1 and September 30. Schedule an additional meeting with the committee if forecasts show that PG&E's obligation to deliver water to the state of

California and the Western Canal Water District pursuant to the January 17, 1986, agreement would require it to deviate from the Lake Almanor water elevation levels previously predicted.

47. Modify the project boundary to include approximately 34 additional acres of the Plumas National Forest at Caribou and Belden dam for the purposes of penstock maintenance and spoil management.

48. Apply to the Commission within 1 year of license issuance to adjust the project boundary to include all recreation improvements covered by the SA at PG&E facilities as well as the following FS facilities located on the Plumas and Lassen National Forests: Canyon dam boat launch and day-use area, Dyer View day-use area, and Almanor boat launch.

49. Apply to the Commission to adjust the project boundary as needed to incorporate the Almanor Family Campground and amphitheater, the Almanor Group Campground, and the Almanor beach, 6 months after the FS has completed construction of all of the recreation improvements it has planned for each of these facilities.

50. File an FS-approved road traffic survey plan for roads used for project purposes located on NFS lands with the Commission within 1 year of license issuance which includes provisions for monitoring traffic every 6 years when monitoring recreation use in accordance with FERC Form 80 requirements.

51. Implement aesthetic improvement measures and develop FS-approved visual management plans within 2 years of license issuance.

52. Implement the Lake Almanor shoreline management plan (SMP) included in the final license application as amended for the project within 30 days after license issuance.

53. Conduct an annual meeting with the FS, CDFG, and Plumas County to coordinate ongoing project-related land management activities.

54. Preserve the historic features and character of the clubhouse, houses, and grounds at Camp Caribou and consult with the FS when planning maintenance and repair activities at this facility.

55. Finalize and implement the Historic Properties Management Plan (HPMP).[11]

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[11] In its application, PG&E called this document a "Cultural Resources Management Plan." To be consistent with current Commission practice, we now refer to this as an HPMP throughout the EIS, regardless of what we or other parties may have called it in the past. We consider both naming conventions to be synonymous.

2.2 MODIFICATIONS TO APPLICANT'S PROPOSAL

2.2.1 Mandatory Conditions

2.2.1.1 Section 18 of the Federal Power Act—Authority to Require Fishways

Section 18 of the FPA, 16 USC §811, states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Commerce and the Interior may prescribe. By letter dated December 1, 2003, Interior stated that it reserved its authority to prescribe the construction, operation, and maintenance of such fishways as appropriate, including measures to determine, ensure, or improve the effectiveness of such fishways. According to Interior's letter, this reservation includes, but is not limited to, authority to prescribe fishways for rainbow trout, steelhead, spring run Chinook salmon, and any other fish to be managed, enhanced, protected, or restored to the Feather River basin during the term of any license.

By letter dated November 26, 2003, NOAA Fisheries provided a fishway prescription, conditioned on the passage of anadromous fishes at one or more unspecified dams below the project area. By letter dated March 14, 2005, NOAA Fisheries provided a modified fishway prescription for the UNFFR, conditioned on the implementation of a successful trap and transfer program for adult anadromous salmonids at CDWR's Lake Oroville Project (FERC Project No. 2100). Additionally, NOAA Fisheries stated that it reserved its authority to prescribe fishways under Section 18 of the FPA.

2.2.1.2 Section 4(e) Conditions

Because the project occupies lands of the Lassen and Plumas National Forests, the FS has authority to impose conditions under Section 4(e) of the FPA. The FS provided 47 final Section 4(e) conditions by letter dated November 4, 2004 (letter from J. Rider, Attorney, USDA Office of the General Counsel, Pacific Region, San Francisco, CA, to M. Salas, Secretary of the Commission). On December 1, 2003, the FS provided 50 preliminary Section 4(e) conditions (letter from J. Gipsman, Attorney, USDA, Office of the General Counsel, Pacific Region, San Francisco, CA, to M. Salas, Secretary of the Commission) that we considered in the draft EIS. Unless otherwise noted, this final EIS addresses the final Section 4(e) conditions.

Condition nos. 1 through 24 are standard conditions that would involve obtaining FS approval on final project design and changes, yearly consultation with the FS to ensure the protection and development of natural resources, restrictions and protective measures that should be in place, and project O&M procedures that would enable continued project operations to be consistent with applicable provisions of the Lassen and Plumas National Forests' Land and Resource Management Plans. Condition nos. 31, 32, 33, 34, 42, and 43 pertain to development of plans for use of FS-managed lands (including spoil pile, habitat, recreation, traffic, visual, and cultural resource

management). Condition nos. 25, 27, 28, and 30, pertain to establishing and publicizing reservoir water levels and flow regimes in project reaches. Condition nos. 41, 44, 45, 46, and 47 pertain to project-specific consultation with the FS regarding FS special-status species and invasive weeds. Condition nos. 26, 29, 31, 32, 35, 36, 37, 38, 39, and 40 pertain to monitoring water quality, water temperature, plants, fish, macroinvertebrates, wildlife, recreational use, and project lands and facilities to enable appropriate corrective actions to be taken and serve as a basis for adaptive management decisions. Many of these conditions are identical to the terms that are specified in the SA. We include the complete FS final Section 4(e) conditions as appendix B of this EIS.

2.2.2 Staff's Alternative

After evaluating PG&E's proposal and recommendations from resource agencies and other interested parties, we considered what, if any, additional PM&E measures would be necessary or appropriate with continued operation of the project. In addition to, or in lieu of, PG&E's proposed measures, we recommend the following additional environmental measures:

1. Develop a plan, including the schedule, for using the Canyon dam outlet upper-level gates to alleviate heavy metal concentrations and odors associated with late-summer and fall releases from Canyon dam.
2. File with the Commission a spoil disposal plan within 6 months of issuance of a new license and at least 60 days prior to any ground-disturbing or soil producing or piling activity.
3. Develop a water level and flow gaging plan.
4. Develop a monitoring program to document water quality trends in Lake Almanor under a new license and project operations.
5. Develop a bacteriological monitoring program for the first 3 years after license issuance, using a methodology appropriate to determine compliance with state water quality standards.
6. Use existing water temperature models to assess the effects of operating the project to meet flow and lake level requirements of a new license, while being consistent with the Rock Creek-Cresta Project ERC and FS determination for modifying the Prattville intake and implementing other temperature control measures.
7. Develop a plan to monitor DO concentrations in Lake Almanor and Butt Valley reservoir.
8. Revise the draft SMP and implement the revised plan.
9. For any recommended new recreational facilities, develop site-specific plans to control erosion and prevent potential adverse effects on water

quality. These plans would be included in the recreation facilities development program of the RRMP.

10. Provide a pulse flow of 700 cfs in the Seneca reach and in the Belden reach in March of water years classified as dry.

11. Develop an aquatic resources monitoring plan for the Seneca and Belden reaches. Periodically monitor fish populations (in a manner consistent with data presented in pre-filing study reports) and benthic macroinvertebrates in the Seneca and Belden reaches, as recommended in the SA. Initiate monitoring during years 4 and 5 of the new license. After this 2-year monitoring period, the frequency of surveys could be reduced to every fifth year to evaluate long-term responses to measures implemented in the new license and any subsequent modifications that are made.

12. Implement one mid-term geomorphological evaluation in project reaches to assess the response of channel processes to the recommended flow schedule.

13. As part of the proposed coarse sediment management plan, develop specific contingency actions for the enhancement of substrate distribution and abundance in bypasses reaches.

14. Delay implementation of recreational flow releases for a period of 6 years to allow the riverine aquatic biota to respond to a new minimum and pulse flow schedule.

15. Develop a woody debris management plan.

16. Develop an adaptive management plan that addresses the results of all monitoring and special studies conducted on water temperature, water quality, flow, macroinvertebrates, gravel, woody debris, fisheries, amphibian populations and habitat, and vegetation.

17. Develop and implement, within 1 year of license issuance, a vegetation and invasive weed management plan that incorporates protection and management of valley elderberry longhorn beetle (VELB) habitat for all project lands.

18. Develop a plan for the protection of threatened, endangered, proposed for listing, and sensitive species.

19. Incorporate the determination of the California red-legged frog (CRLF) habitat into the amphibian monitoring plan.

20. Develop a peregrine falcon monitoring plan within 1 year of license issuance.

21. Develop an interagency bald eagle management plan within 1 year of license issuance.

22. Develop a fire prevention and response plan within 1 year of issuance of a new license.

23. Implement the measures outlined in the Programmatic Agreement (PA).

24. Consult with the FS, Plumas County, and the Maidu community to more fully investigate the possibility of providing seed funds for a curation facility or interpretive center, and provide the results of this consultation in the HPMP.

25. Invite the FS, Plumas County and NPS to attend future Cultural Resources Working Group meetings.

26. Provide Plumas County with copies of all requested cultural resources reports, including the non-confidential volume of the ethnographic study, if Plumas County agrees not to make the reports available to the public, in compliance with Section 304 of the NHPA.

27. Include, as part of the HPMP: (1) the details of PG&E's employee and public education and interpretive program; (2) site-specific treatment measures for historic archaeological sites and standing structures that the Commission, in consultation with the California State Historic Preservation Officer (SHPO), has determined are eligible for the National Register; and (3) protocols for PG&E to consult and work with the Greenville Rancheria, Susanville Indian Rancheria, and other interested Maidu groups.

2.3 NO-ACTION ALTERNATIVE

Under the no-action alternative, PG&E would continue to operate the project under the terms and conditions of the current license. The environmental measures proposed by PG&E and/or recommended by staff, would not be implemented.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

As part of our independent analysis, we considered several other alternatives to the relicensing proposals: (1) federal government takeover; (2) issuance of a nonpower license; and (3) project retirement. We eliminated them from detailed study, however, because they are not reasonable in the circumstances of this license for the following reasons.

2.4.1 Federal Government Takeover of the Project

We do not consider federal takeover to be a reasonable alternative. Federal takeover of the UNFFR Project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that a federal takeover should be recommended to Congress. No party

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

2.4.2 Issuing a Nonpower License

A nonpower license is a temporary license the Commission would terminate whenever it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the nonpower license. At this time, no governmental agency has suggested a willingness or ability to takeover the project. No party has sought a nonpower license, and we have no basis for concluding that the UNFFR Project should no longer be used to produce power. Thus, we do not consider a nonpower license to be a reasonable alternative.

2.4.3 Retiring the Project[12]

Retiring the project could be accomplished with or without removing project dams and related project works. Either retirement option would involve denial of the relicensing application and surrender or termination of the existing license with appropriate conditions. At a minimum, project retirement would have the following effects: (1) the energy currently generated by the project (about 1,171.9 gigawatt-hours [GWh] annually) would be lost, and generation at PG&E's downstream Rock Creek-Cresta and Poe projects would be substantially negatively affected; and (2) there would be substantial costs associated with retiring the powerhouses and appurtenant facilities. However, no agency or any other party has advocated the retirement of the project, and the project is a viable operation that supplements PG&E's power generation mix.

In the case of retiring the project with dam removal, adverse effects on the watershed likely to occur within the first 5 to 10 years following project retirement as a result of erosion include suspension of sediments in the project reservoirs, bank failure, development of debris jams and gravel bars, scour, and deposition. Removal of the UNFFR Project dams would not allow for anadromous fish to be restored to the project area unless downstream dams were also removed or passage provided. Removal of the project dams would eliminate the warmwater recreational fisheries found in Lake Almanor and Butt Valley reservoirs and habitat for common carp, which is an important forage species for bald eagle. The loss of open water habitat, with dam removal, would also reduce foraging opportunities for osprey, bald eagle, and other piscivorous birds, and for several species of bats. Project retirement would not affect habitat for the VELB but it would cause temporary noise disturbance to bald eagles during dam removal and

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[12] In Scoping Document 2, we indicated that we would assess project retirement to the extent that information was available to address each of the resource issues identified for analysis. Our analysis in this section concludes that retirement of the project is not a viable alternative.

restoration. Adverse socioeconomic impacts on Plumas County and the town of Chester would be tremendous, due to the loss of Lake Almanor.

With dam removal, the areas surrounding Lake Almanor and Butt Valley Reservoir would be converted from lacustrine to riverine environments. The large meadow that existed prior to the creation of Lake Almanor would likely be re-established. The removal of Canyon dam would cause water levels to drop and would likely dewater the developed recreation sites along the shoreline of Lake Almanor and Butt Valley Reservoir with the possible exception of those sites on Lake Almanor near the confluence of the NFFR. Recreational use within the project area would change to that associated with more riverine conditions. Lower water levels would change recreational uses in the Lake Almanor area from flatwater-based opportunities such as motor boating, boat fishing, and flatwater canoeing to more river-based opportunities, such as shore fishing and whitewater boating. Fishing in the Lake Almanor area would change from lake species to more riverine species. The restored NFFR may provide new shoreline angling opportunities.

Retirement of the project with the retention of dams would require a reconfiguration of Canyon dam and or the outlet tower, because of the elevation of the spillway. Failure to do so would result in unacceptable dam safety concerns and result in upstream flooding. With dams in place, all project reservoirs would remain at full pool on a year-round basis, and riparian habitat around the reservoirs would be relatively similar to current conditions.

Under either retirement scenario, the trophy trout fishery in Butt Valley reservoir would likely be lost, because wakasagi from Lake Almanor would no longer be entrained into Butt Valley reservoir. In addition, the limnology of Butt Valley reservoir would be significantly affected by loss of inflow from Lake Almanor through the Prattville intake.

PG&E would no longer require the project lands for project operations, thus ownership of those lands currently owned by PG&E may change. Depending on the subsequent landowner, public access to some parts of the project area and recreational opportunities may be eliminated.

If the project is retired, the protection and enhancement measures that would be specified in the HPMP would not be implemented. Abandonment of the project facilities could lead to loss or deterioration of historically important project elements due to lack of repair, maintenance, and the protection afforded by active use. Consequently, prior to abandonment, PG&E would be required to consult with the SHPO to determine what provisions would be necessary to protect those project elements that contribute to their eligibility for listing in the National Register.

For these reasons, we conclude that project retirement is not a reasonable alternative.

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

SECTION 3

ENVIRONMENTAL ANALYSIS

PAGES 3-1 to 3-330

FEIS

3.0 ENVIRONMENTAL ANALYSIS

In this section, we first describe the general environmental setting in the project vicinity and any environmental resources that could be cumulatively affected by relicensing the UNFFR Project. Then, we address each affected environmental resource. For each resource, we first describe the affected environment—the existing condition and the baseline against which to measure the effects of the proposed project and any alternative actions—and then the environmental effects of the proposed project, including proposed enhancement measures. Unless otherwise stated, the source of our information is the license application for the project (PG&E, 2002a).

3.1 GENERAL DESCRIPTION OF THE UPPER NORTH FORK FEATHER RIVER BASIN

The UNFFR Project is located on the NFFR and Butt Creek, a tributary to the NFFR. The project extends from the upper end of Lake Almanor at elevation 4,500 feet (PG&E datum),[13] approximately 3 miles north of the community of Chester, down to elevation 2,205 feet (PG&E datum), where Yellow Creek enters the NFFR. The project also makes use of Butt Creek, from approximate elevations 4,330 to 4,070 feet (PG&E datum). Figure 3-1 shows how the project is hydraulically situated with respect to other hydroelectric projects on the NNFR.

The upper end of the project is located on the western side of the crest of the Sierra Nevada Mountains at elevation 4,500 feet. Precipitation occurs primarily during the winter months, and substantial snow accumulation can occur at this elevation. Mount Lassen (elevation 10,457 feet USGS datum) is at the northwestern end of the Lake Almanor basin. Normal annual precipitation at Lake Almanor is approximately 38 inches, and summer months are typically dry and mild. Butt Valley, on Butt Creek, is located at elevation 4,140 feet. Seasonal temperatures and precipitation at Butt Valley are similar to those at Lake Almanor. Because Caribou is located at elevation 2,980 feet in the NFFR canyon, seasonal temperatures are higher at Caribou than at Butt Valley and Lake Almanor. Annual average precipitation at Caribou is 41 inches, and snow accumulation is typically rare. The Belden powerhouse is located at elevation 2,215 feet, and conditions are similar to those at Caribou.

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[13] Lake level is defined as the water surface elevation, expressed in PG&E datum, which is 10.2 feet lower than the USGS datum.

Non-Internet Public

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

Page 3-2
Figure 3-1

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov.

Project features range in elevation from 4,500 to 2,215 feet. Lake Almanor is in a very broad basin with surrounding peaks of generally 6,000 to 7,000 feet. Butt Valley reservoir is in a small basin with surrounding ridges around 5,500 feet in elevation. Below Lake Almanor dam (also known as Canyon dam), the NFFR enters a canyon with steep sides dropping from elevation 4,400 feet at the base of the dam to elevation 2,985 feet at Caribou, a distance of about 11 river miles. This canyon is generally inaccessible, except at Seneca, which is located approximately midway between Lake Almanor dam and Caribou. Butt Creek below Butt Valley dam is also in a steep canyon until it joins the NFFR.

The NFFR passes through a narrow notch in rock outcroppings just below the Caribou powerhouse. From Belden forebay dam to the confluence with the EBNFFR, the NFFR drops in elevation from 2,850 feet (USGS datum) to 2,290 feet (USGS datum), a distance of about 7.5 river miles. Over the remaining 1.75 miles to the Belden powerhouse, the NFFR drops to elevation 2,215 feet (USGS datum). The slopes of the NFFR canyon remain very steep between Caribou and Belden.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations of implementing the National Environmental Policy Act (NEPA) (40 CFR §1508.7), an action may cause cumulative effects on the environment if its effects overlap in space and/or time with effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities. At this time, we have identified water quality and quantity, fisheries, and the federally listed bald eagle as potentially cumulatively affected resources. Our analysis of cumulative effects to these resources is found in the corresponding resource section.

3.2.1 Geographic Scope

The geographic scope of the analysis defines the physical limits or boundaries of the proposed action's effects on the resources. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary. However, in this instance, we conclude that the geographic scope for all identified resources is the same and would extend from the point where the NFFR enters Lake Almanor downstream to the point where the NFFR flows into Lake Oroville. Although project operations could influence flows and associated environmental resources in the NFFR downstream of Lake Oroville, the relatively large storage capacity of Lake Oroville (3.5 million acre-feet) mutes any project influences beyond this location.

3.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis in this EIS includes past, present, and future actions and their possible cumulative effects on each resource. Based on the license term, the temporal scope looks 30 to 50 years in the future, concentrating on the effects of the resources from reasonably foreseeable future actions. The historical discussion, by necessity, is limited to the amount of available information for each resource.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

3.3.1 Water Resources

3.3.1.1 Affected Environment

Water Quantity

The UNFFR Project uses water resources of the NFFR basin to generate electricity. The river basin drains a large portion of the eastern Sierra-Cascade geomorphic area in California, and its headwaters are located on the southeastern slope of Mount Lassen. The river generally flows southwesterly and enters Lake Oroville, a primary reservoir for the California State Water Project, approximately 30 miles downstream of the Belden powerhouse.

PG&E operates one hydroelectric project upstream of the UNFFR Project. The Hamilton Branch Project uses water from the Hamilton Branch of the NFFR and some other small streams located above the UNFFR Project to produce up to 4.8 MW at its powerhouse, which is located at the mouth of Hamilton Branch along the shoreline of Lake Almanor's eastern lobe. PG&E also regulates flow in Bucks Creek, a major tributary to the lower NFFR, with its Bucks Creek Project (FERC No. 619), including the city of Santa Clara's Grizzly powerhouse which is operated in coordination with the Bucks Creek Project.

The NFFR basin has mild, dry summers and heavy winter precipitation. Mean annual precipitation in the upper NFFR basin ranges from 20 inches in eastern portions of the EBNFFR subbasin to 90 inches in the northwestern portion of the basin near Mount Lassen. Monthly average precipitation varies at Chester from less than 0.5 inch in July and August to 6.5 inches in January (table 3-1). Much of the precipitation in the headwaters of the basin comes in the form of snow during November through March. Based on monthly average snow cover, most of the snowpack at Chester is melted by April.

Table 3-1. Meteorological summary for Chester, California. (Source: Weatherbase, 2003)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Air Temperature (°F)												
30	34	38	43	50	58	64	63	57	48	38	31	46
Average Precipitation (inches)												
6.5	5.4	4.6	2.1	1.6	0.9	0.3	0.4	0.8	2.0	4.1	5.5	34.1
Average Snowfall (inches)												
39.0	27.9	22.3	7.4	1.4	0.1	--	--	--	0.8	12.5	28.2	139.7
Average Snow Cover (inches)												
16	19	11	2	--	--	--	--	--	--	1	7	5

Note: -- indicates no value reported.

Since the winter of 1952–53, PG&E has implemented the Lake Almanor Cloud Seeding Project (LACSP) to increase snowfall during November through May in the NFFR basin above Lake Almanor. PG&E's LACSP includes a network of nine, ground-based cloud seeding burners located near the south and west boundaries of the target area. The LACSP's goal is to increase snowfall during naturally occurring precipitation periods. Generally, operational seeding periods are set for 12 hours; however, PG&E's meteorological staff in San Francisco, California, determines the specific operations. LACSP includes guidelines for temporary suspension or curtailment of operations under certain conditions to avoid runoff or reservoir storage beyond manageable limits. PG&E estimates that LACSP increases precipitation in the basin above Lake Almanor by 5 percent annually.

Annual runoff patterns are characteristic of snowmelt-dominated hydrology of Sierra Nevada mountain streams that experience peak runoff during the late winter and spring and low flows during the summer. Average annual runoff for the drainage area contributing to Lake Almanor is about 27 inches per year, while runoff from the upper Butt Creek basin is about 19 inches per year. Table 3-2 shows monthly and annual flows for gaged stations in the project vicinity.

The hydrology of the upper NFFR basin is affected by diverse conditions, including regional and seasonal distribution of precipitation, influence of snow melt, differing geomorphic conditions, the impoundment and diversion of flow, and the consumptive use of surface and groundwater. Subbasins associated with the project area are generally broad plateau-like areas that are densely timbered. Large meadow areas were inundated by construction of the project. Big Meadow, the largest of these, was inundated by the creation of Lake Almanor in 1914.

Table 3-2. Summary of daily average flow discharge (cfs) data, by month and overall, for the project vicinity.[a] (Source: PG&E, 2003a, as modified by staff)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall
NF59 - NFFR below Chester, WY 1970 to 1985													
Mean	324	301	340	439	684	531	308	218	194	184	246	244	334
Maximum	5,660	1,520	1,450	1,360	1,860	1,640	1,150	878	783	652	2,850	2,280	5,660
10% Exceedance	594	593	548	699	1,165	1,073	712	399	355	335	496	485	739
25% Exceedance	351	356	433	547	840	750	394	296	279	274	336	312	433
50% Exceedance (Median)	193	212	295	409	651	458	246	167	121	130	161	157	240
75% Exceedance	112	109	149	250	433	221	118	86	78	99	115	118	118
90% Exceedance	97	88	100	130	258	107	64	60	62	80	86	88	80
Minimum	42	52	53	47	60	21	16	12	24	51	67	42	12
NF46 - Hamilton Branch Creek at Red Bridge Pump, WY 1970 to 2002													
Mean	98	73	118	85	137	81	51	49	47	55	61	58	78
Maximum	3,870	1,480	2,640	2,000	4,502	1,150	693	693	660	999	1,500	1,900	4,502
10% Exceedance	146	144	266	145	414	170	81	74	74	75	68	84	123
25% Exceedance	53	62	83	78	80	61	53	54	52	52	50	51	61
50% Exceedance (Median)	42	37	46	48	43	43	43	41	33	32	32	36	42
75% Exceedance	22	21	27	26	27	27	27	25	21	22	21	22	24
90% Exceedance	8	10	15	13	19	18	18	16	11	14	14	13	16
Minimum	0	0	0	0	0	0	0	0	0	0	3	0	0
NF83 - Hamilton Branch Powerhouse, WY 1976 to 2002													
Mean	108	124	149	125	134	128	104	61	75	75	83	92	105
Maximum	242	282	233	267	242	242	232	215	222	406	218	242	406
10% Exceedance	209	210	213	214	213	212	209	176	204	204	207	208	210
25% Exceedance	194	205	208	208	209	204	173	87	107	106	117	132	196
50% Exceedance (Median)	95	109	179	106	163	115	83	43	40	45	54	60	78
75% Exceedance	42	54	95	56	48	53	45	19	31	32	33	39	40
90% Exceedance	31	36	44	41	39	38	36	0	0	0	29	32	31
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
NF2 - NFFR near Prattville, WY 1970 to 2002 (USGS No. 11399500)													
Mean	94	92	41	47	54	75	69	65	47	51	51	36	60
Maximum	2,140	1,940	722	803	730	747	709	708	505	706	694	417	2,140
10% Exceedance	41	54	41	39	40	42	40	41	39	39	40	38	40
25% Exceedance	38	39	38	38	39	39	38	38	37	37	37	37	38
50% Exceedance	36	37	37	36	37	37	37	36	36	36	36	36	37

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall
(Median)													
75% Exceedance	36	36	36	36	35	36	36	36	35	35	35	35	35
90% Exceedance	34	35	35	35	35	35	35	35	34	34	34	34	35
Minimum	18	5	14	16	15	6	15	10	9	5	5	15	5
NF47 - NFFR above Caribou Powerhouse Operation, WY 1970 to 1989													
Mean	140	130	146	133	124	196	174	96	76	76	85	103	123
Maximum	1,190	1,420	1,060	575	935	2,710	2,090	1,720	125	426	328	841	2,710
10% Exceedance	230	188	234	193	175	122	99	93	88	86	107	146	153
25% Exceedance	117	137	159	141	126	104	92	85	80	81	88	100	109
50% Exceedance													
(Median)	89	107	125	117	98	86	79	77	75	77	79	83	84
75% Exceedance	78	85	95	96	79	75	71	68	69	68	72	74	75
90% Exceedance	70	75	83	78	70	66	63	62	64	65	67	68	67
Minimum	51	67	71	53	51	49	47	45	43	42	48	30	30
NF4 - Butt Creek below Almanor-Butt Creek Tunnel, near Prattville, WY 1970 to 2002 (USGS No. 11400500)													
Mean	106	112	155	171	168	97	55	48	45	50	66	77	96
Maximum	2,660	2,830	1,460	1,020	1,480	590	152	205	95	160	800	1,220	2,830
10% Exceedance	167	171	251	294	340	199	80	62	59	64	91	118	193
25% Exceedance	95	116	175	220	228	105	65	55	54	58	65	74	103
50% Exceedance													
(Median)	66	79	118	140	119	69	53	48	47	50	53	59	61
75% Exceedance	53	58	84	102	73	48	39	35	35	40	45	48	48
90% Exceedance	45	49	67	78	54	40	35	32	30	36	39	42	38
Minimum	33	39	45	39	26	26	27	27	27	29	33	34	26
NF71 - Butt Valley Powerhouse, WY 1970 to 2002 (USGS No. 11400600)													
Mean	701	597	400	454	420	674	1,075	1,294	1,247	1,123	1,128	1,059	849
Maximum	2,620	2,240	2,250	2,250	2,260	2,200	2,520	2,290	2,300	2,460	2,520	2,520	2,620
10% Exceedance	2,060	1,909	1,560	2,010	1,790	1,770	1,817	2,150	2,067	1,880	2,191	2,118	2,010
25% Exceedance	1,481	1,229	694	727	622	1,207	1,676	1,841	1,710	1,570	1,858	1,669	1,530
50% Exceedance													
(Median)	215	38	0	0	0	559	1,080	1,460	1,410	1,220	1,096	1,050	839
75% Exceedance	0	0	0	0	0	0	609	921	904	729	455	323	0
90% Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
NF9 - Butt Creek near Caribou, WY 1970 to 1984 (USGS No. 11401100)													
Mean	18	18	30	19	29	59	70	36	16	16	17	17	29
Maximum	57	52	521	47	600	808	808	808	18	23	33	41	808
10% Exceedance	22	23	26	26	24	28	28	18	17	18	20	20	23
25% Exceedance	18	19	23	22	21	19	19	17	16	16	17	18	19

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall
50% Exceedance													
(Median)	16	17	18	18	18	18	17	16	16	16	16	16	17
75% Exceedance	15	15	16	16	17	17	17	16	15	15	15	15	15
90% Exceedance	14	15	15	15	15	15	15	15	14	15	15	14	15
Minimum	14	14	14	14	14	14	14	14	14	7	14	14	7
NF63 - Caribou Powerhouse No. 1, WY 1970 to 2002													
Mean	223	249	208	223	178	232	308	393	377	321	364	314	283
Maximum	1,350	1,200	1,170	1,480	1,139	1,160	1,159	1,156	1,160	1,235	1,139	1,159	1,480
10% Exceedance	695	807	752	994	866	850	771	891	944	863	938	851	871
25% Exceedance	397	492	332	288	121	388	532	652	644	484	668	543	506
50% Exceedance													
(Median)	29	27	0	0	0	0	231	348	296	250	258	189	102
75% Exceedance	0	0	0	0	0	0	0	14	0	0	0	0	0
90% Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
NF263 - Caribou Powerhouse No. 2, WY 1970 to 2002													
Mean	590	506	374	388	380	517	732	869	880	843	833	819	645
Maximum	1,510	1,510	1,620	1,500	1,620	1,484	1,520	1,500	1,530	1,550	1,530	1,520	1,620
10% Exceedance	1,460	1,389	1,204	1,397	1,218	1,259	1,300	1,430	1,460	1,441	1,457	1,459	1,430
25% Exceedance	1,080	915	656	677	559	900	1,136	1,270	1,290	1,210	1,318	1,292	1,120
50% Exceedance													
(Median)	435	315	177	136	172	310	799	993	981	956	904	874	642
75% Exceedance	68	32	0	0	82	114	257	506	609	550	437	416	111
90% Exceedance	0	0	0	0	0	30	88	105	4	0	35	32	0
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
NF103 - Oak Flat Powerhouse, WY 1986 to 2002													
Mean	58	58	66	79	122	120	121	121	68	61	60	57	83
Maximum	96	112	142	160	145	153	147	143	153	145	73	100	160
10% Exceedance	66	69	82	120	139	139	139	139	120	69	65	65	132
25% Exceedance	65	65	65	108	132	132	134	134	65	65	65	65	120
50% Exceedance													
(Median)	64	64	64	65	120	120	120	120	63	64	64	64	65
75% Exceedance	57	57	57	63	112	112	114	114	57	57	57	57	63
90% Exceedance	54	53	54	56	108	110	110	110	54	53	55	34	56
Minimum	0	0	0	0	35	0	0	0	0	0	0	0	0
NF70 - NFFR below Belden Diversion Dam, WY 1970 to 2002 (USGS No. 11401112)													
Mean	131	109	106	172	168	147	140	136	120	129	136	117	134
Maximum	2,130	2,100	1,490	2,300	1,570	1,160	615	183	2,300	2,390	2,800	2,540	2,800
10% Exceedance	91	90	153	449	157	150	149	149	145	75	72	73	149

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall
25% Exceedance	67	68	72	146	146	145	144	144	88	67	65	67	142
50% Exceedance (Median)	63	64	64	68	143	142	142	142	64	63	63	63	68
75% Exceedance	61	61	62	63	140	139	140	140	61	61	61	61	62
90% Exceedance	59	60	60	60	124	134	135	107	60	59	60	60	60
Minimum	48	49	37	41	56	12	58	52	48	2	4	11	2
NF51 - East Branch of NFFR near Rich Bar, WY 1970 to 2002 (USGS No. 11403000)													
Mean	1,608	1,725	2,414	1,893	1,527	654	191	108	112	174	496	796	971
Maximum	69,276	52,099	36,617	19,700	18,729	6,170	1,270	358	593	2,210	22,400	25,789	69,276
10% Exceedance	3,463	3,560	4,824	3,704	3,795	1,733	418	199	189	278	771	1,748	2,520
25% Exceedance	1,452	1,854	2,840	2,546	1,978	776	214	128	134	215	335	668	1,090
50% Exceedance (Median)	503	956	1,670	1,517	971	315	129	92	102	145	209	288	278
75% Exceedance	255	401	875	769	392	138	79	59	66	96	149	195	131
90% Exceedance	166	214	494	379	188	84	56	46	52	71	118	140	78
Minimum	117	125	131	78	86	44	30	23	24	35	49	89	23
NF74 - Belden Powerhouse, WY 1970 to 2002 (USGS No. 11403050)													
Mean	896	852	675	602	519	766	1,045	1,252	1,234	1,146	1,178	1,135	942
Maximum	2,600	2,600	2,500	2,460	2,540	2,450	2,540	2,600	2,600	2,610	2,600	2,530	2,610
10% Exceedance	2,190	2,169	1,988	2,240	1,760	1,872	1,830	2,068	2,151	2,151	2,291	2,220	2,140
25% Exceedance	1,560	1,570	1,130	880	769	1,330	1,600	1,779	1,690	1,570	1,780	1,690	1,540
50% Exceedance (Median)	675	585	406	246	230	640	1,076	1,350	1,325	1,290	1,200	1,150	895
75% Exceedance	125	103	0	0	0	0	502	788	877	585	536	502	168
90% Exceedance	0	0	0	0	0	0	0	221	0	0	6	0	0
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: WY -- water year

The major tributaries to Lake Almanor, the reservoir for the project's uppermost development, are the upper NFFR and Hamilton Branch. Flows from Hamilton Branch into Lake Almanor include flows in the branch itself at its confluence with the lake as well as discharge from the Hamilton Branch powerhouse, which is diverted from Hamilton Branch several miles upstream. Downstream of Mountain Meadows reservoir, flows from Hamilton Branch are diverted into a 3-mile-long canal paralleling Hamilton Branch (see figure 1-1). From this canal, water passes through a penstock to the Hamilton Branch powerhouse and reenters Hamilton Branch at its confluence with Lake Almanor. The Hamilton Branch powerhouse can discharge up to 200 cfs, although mean monthly outflows are generally less than 100 cfs from August to December (table 3-2). The mean annual flows from the upper NFFR measured below Chester, Hamilton Branch at the lake, and the Hamilton Branch powerhouse are 330, 80, and 100 cfs, respectively.

The reservoir also receives surface water from minor tributaries including Benner, Last Chance, and Bailey creeks and ground water from various submerged springs. Meinzer (1927) reported that there are many large springs in the lava-covered areas of the upper NFFR basin. These springs include Pratt Spring near the Prattville intake, Dotta Spring about 1 mile north of Canyon dam, and Big Spring near what is now the northern shore of the eastern lobe of Lake Almanor. USGS reported outflows from Dotta Spring ranging from 50 to 122 cfs and averaging about 90 cfs between September 1902 and August 1906 (Meinzer, 1927). PG&E (2002a) reported that numerous springs were visible near Lake Almanor's water edge in the Big Spring area during low lake levels in 2000 and 2001. However, the current understanding of inflows from this source and other springs is limited because these springs are submerged during most periods. Inflow from submerged springs was estimated to be about 400 cfs using mass balance calculations (Jones & Stokes, 2004).

PG&E diverts water from Lake Almanor to the Butt Valley powerhouse (located along the northwest shoreline of the Butt Valley reservoir) by drafting up to about 2,100 cfs through the Prattville intake located near the shoreline of the south-central portion of Lake Almanor. Based on mean annual flows for the Butt Valley powerhouse and NFFR below Canyon dam (station NF2 in table 3-2), about 93 percent of the reservoir's outflow is routed through the powerhouse, and 7 percent continues down the NFFR past Canyon dam. These proportions vary considerably through time depending on project operations.

The project generally stores water in Lake Almanor during high flow periods in winter and spring and draws down the reservoir in summer and fall. Lake Almanor's historic storage and water levels for water years 1970-2003 are shown in figure 3-2 and summarized in table 3-3. During the droughts of 1976-77 and the late 1980s through mid 1990s, Lake Almanor did not refill. At the normal maximum water level of 4,494 feet (PG&E datum), Lake Almanor has a usable storage capacity of about 1,134,000 acre-feet and a surface area of 27,000 acres. The hydraulic retention time of the reservoir averages 291 days.

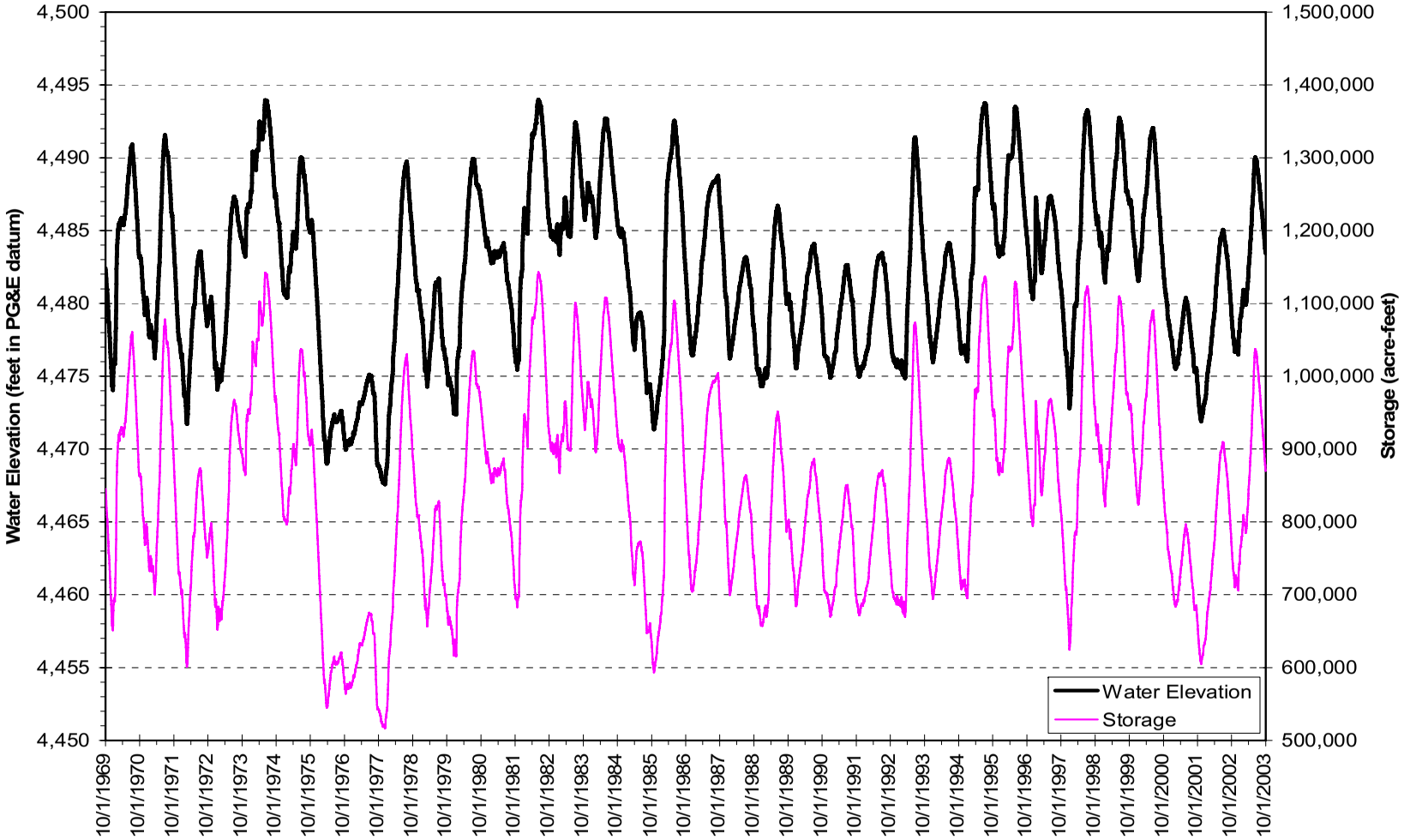

Figure 3-2. Lake Almanor (NF1) end-of-day water surface elevation and storage, water years 1970–2003. (Source: PG&E, 2003a, as modified by staff)

Table 3-3. Summary of Lake Almanor end-of-day water surface elevations, water years 1970-2003. (Source: PG&E, 2003c, as modified by staff)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	4,478.63	4,479.50	4,481.08	4,483.00	4,485.16	4,486.86	4,486.37	4,484.46	4,482.27	4,480.43	4,479.16	4,478.43	4,482.12
Maximum	4,490.43	4,490.05	4,492.03	4,492.50	4,493.71	4,494.00	4,493.78	4,492.52	4,489.35	4,487.29	4,488.29	4,487.94	4,494.00
Minimum	4,468.98	4,470.62	4,468.97	4,469.05	4,470.85	4,471.84	4,471.85	4,471.57	4,468.83	4,468.05	4,467.67	4,467.55	4,467.55
10% Exceedance	4,485.68	4,485.26	4,488.43	4,490.06	4,491.82	4,492.95	4,492.44	4,490.13	4,487.78	4,486.29	4,484.93	4,484.56	4,489.95
25% Exceedance	4,482.20	4,483.56	4,485.63	4,485.87	4,489.11	4,491.50	4,490.57	4,488.48	4,486.41	4,484.94	4,483.79	4,482.15	4,486.47
50% Exceedance (Median)	4,477.20	4,478.53	4,480.18	4,482.85	4,485.26	4,487.66	4,488.27	4,486.19	4,483.61	4,480.94	4,478.87	4,477.32	4,482.37
75% Exceedance	4,475.57	4,475.88	4,477.31	4,479.88	4,482.16	4,483.19	4,482.91	4,481.16	4,478.92	4,476.81	4,476.14	4,475.56	4,477.57
90% Exceedance	4,474.07	4,474.02	4,475.23	4,477.63	4,479.37	4,479.79	4,478.11	4,476.10	4,475.34	4,473.12	4,472.39	4,473.20	4,474.77

The Butt Valley powerhouse is typically used for peaking, which can result in discharges changing by up to about 2,000 cfs in a few minutes. As table 3-2 shows, the Butt Valley powerhouse does not discharge water on more than half the days in March, April, and May. These operations have minimal effects on water elevations of Lake Almanor, due to its large size. However, Butt Valley reservoir water levels tend to fluctuate more rapidly due to its smaller size. Butt Valley reservoir water elevations typically fluctuate between 4,132 and 4,115 feet (PG&E datum) on an annual basis, and may fluctuate about 1 foot on a daily basis. In addition to receiving water from the Butt Valley powerhouse, Butt Valley reservoir receives inflow from Butt Creek (station NF4) which has a mean annual flow of about 95 cfs (table 3-2). At an elevation of 4,132 feet (PG&E datum), the reservoir has a usable storage capacity of approximately 49,900 acre-feet and a surface area of 1,600 acres. The hydraulic retention time for the reservoir generally ranges from 14 to 32 days.

Although the project diverts up to approximately 2,100 cfs from Lake Almanor to the Butt Valley powerhouse, virtually all of this water, along with flow from upper Butt Creek, is generally routed through the Caribou nos. 1 and 2 powerhouses, thereby bypassing the lower portion of Butt Creek and a 10.8-mile-long reach of the NFFR referred to as the Seneca reach. No controlled minimum flow release is made from Butt Valley dam to lower Butt Creek; however, leakage of approximately 0.07 cfs (30 gallons per minute) occurs. Lower Butt Creek also receives inflow from springs and Benner Creek. Spills at the Butt Valley dam rarely occur because of the large capacity of the Caribou nos. 1 and 2 developments. Flows in Butt Creek monitored near its mouth (station NF9) indicate that the mean annual flow is 29 cfs, and minimum flows are generally 14 cfs (table 3-2). Butt Creek contributes these flows to the Seneca reach at a point approximately 9.6 miles downstream of Canyon dam.

At Canyon dam, water is released into the upper end of the Seneca reach, which extends 10.8 miles down to the Belden forebay. The current license mandates a year-round minimum flow of 35 cfs in the channel immediately downstream of the dam, which is accomplished by using the gated outlet tower near Canyon dam. Flows monitored by PG&E, in cooperation with USGS, at a permanent gaging station about 0.5 mile downstream of Canyon dam (station NF2) indicate little seasonal variation (table 3-2). Based on flow measurements reported by PG&E for June through September of 2000 and 2001, the Seneca reach gains about 6 to 31 cfs between the upper gaging station and the gaging station located above the Caribou No. 1 powerhouse (station NF47) excluding Butt Creek. During 2001, monthly mean accretion to this reach was 50 to 71 percent lower than in the wetter summer of 2000. In the upper portion of the bypassed reach (the 4.7-mile-long section from station NF2 to Seneca Bridge), the NFFR gained between 4 and 16 cfs during the summer of 2001. Average accretion was highest (13 cfs) in June and lowest (5 to 6 cfs) in August and September. Flows measured immediately upstream of the Butt Creek confluence indicate that the NFFR received little accretion in the 4.4-mile-long section between the Seneca Bridge and immediately

upstream of the Butt Creek confluence during the summer of 2001. Accretion to the lower portion of the Seneca bypassed each (Butt Creek confluence to the Caribou No. 1 powerhouse) ranged from less than 1 to 5 cfs and averaged 1 cfs or less during June, July, and August.

The Belden forebay receives water from the Seneca bypassed reach, and the Caribou Nos. 1 and 2 powerhouses. Mean annual inflow from the NFFR is about 125 cfs, while inflows from the Caribou Nos. 1 and 2 powerhouses are about 280 and 650 cfs, respectively (table 3-2). Differences between the Caribou discharges demonstrate that PG&E prefers to operate the Caribou No. 2 development. NFFR inflows are generally stable, due to minimum flow releases from the Canyon dam outlet and accretion. In contrast, inflows from the Caribou powerhouses can vary considerably between days and over short periods, because of the typical peaking operations of the developments. Table 3-2 shows that the Caribou No. 1 powerhouse is operated on less than half of the days from March through June. Peaking operations may result in discharges from each of the powerhouses changing by more than 1,000 cfs in a few minutes.

Belden forebay is the smallest of all of the project's impoundments. At its normal maximum water elevation of 2,975 feet (PG&E datum), it has a usable storage capacity of 2,421 acre-feet and a surface area of 42 acres. Under normal operation, the impoundment's water elevation typically fluctuates between 2,960 and 2,973 feet (PG&E datum) with typical daily fluctuations of 5 to 10 feet when water is being released from Lake Almanor. PG&E estimates the average hydraulic retention time as 0.5 to 1 day.

Water exiting the Belden forebay is either diverted to the Belden powerhouse or continues down the NFFR. Water diverted to the Belden powerhouse bypasses a 9.3-mile-long reach of the NFFR referred to as the Belden bypassed reach. The existing license mandates minimum flows of 140 cfs below the Belden dam during the fishing season (last Saturday in April through Labor Day) and 60 cfs during the remainder of the year. Since October 1985, PG&E has typically routed its minimum flow for this reach through the Oak Flat powerhouse. The turbine has a high-flow and a low-flow runner, which are changed in the spring and fall. During change-out periods, which are a few days long, water is continuously released through the pressure release valve at the end of the outlet pipe. Monthly and annual flow summaries are presented for the Oak Flat powerhouse (station NF103) and a gaging station approximately 0.5 mile downstream of the Belden dam-Oak Flat powerhouse complex (station NF70) in table 3-2.

The Belden bypassed reach receives additional inflow from two primary tributaries. Mosquito Creek generally contributes a flow of about 2 to 10 cfs approximately 2.9 miles downstream of the Belden dam. PG&E estimated that flows averaged about 5 to 6 cfs during the summers of 2000 and 2001. The EBNFFR (station NF51) contributes a mean annual flow of nearly 1,000 cfs to the Belden bypassed reach approximately 7.5 miles downstream of the Belden dam. Flows in the EBNFFR vary considerably throughout the year. Median monthly flows are roughly 100 to 200 cfs

during July through November, but exceed 1,500 cfs during March and April (table 3-2). The Belden bypassed reach ends approximately 1.8 miles downstream of the EBNFFR confluence, where Yellow Creek joins the NFFR.

Water diverted through the Belden powerhouse is discharged into Yellow Creek immediately upstream of its confluence with the NFFR. Annual flows through the powerhouse average nearly 950 cfs. Similar to the project's upper developments, the Belden development is used for peaking, and large rapid fluctuations—more than 1,000 cfs—of its discharges are common. In the Rock Creek-Cresta SA (PG&E, 2000a), PG&E agreed to continue to implement its voluntary practice of block loading (i.e., maintaining a constant generating load for a predetermined period) at the Belden powerhouse from March through May until a level for ramping rates is established under the UNFFR Project license. During June through September, Yellow Creek also contributes about 40 to 170 cfs.

Water Use

PG&E holds water rights to store, divert, and use water from the NFFR and its tributaries for the production of power, domestic water supply, industrial and fire protection water supply, and irrigation (table 3-4). Most of these water allocations are for the non-consumptive use of producing energy, although three of them are for consumptive uses.

Table 3-4. PG&E water rights for the UNFFR Project. (Source: PG&E, 2003a, as modified by staff)

No.	Priority Date	When	Description	Use(s)
SWDU No. 922	1902	Year-round	Storage of 1,142,964 acre-feet at Canyon dam[a]	Power at licensee's powerhouses in the Feather River watershed; domestic and irrigation in the Sacramento Valley
Permit No. 21151	May 20, 1993	Oct 1–Jun 30	Storage of 500,000 acre-feet at Canyon dam	Power at Butt Valley and Caribou powerhouses
SWDU No. 923	1902	Year-round	Storage of 49,897 acre-feet at Butt Valley dam[a]	Power at licensee's powerhouses in the Feather River watershed; domestic and irrigation in the Sacramento Valley

No.	Priority Date	When	Description	Use(s)
SWDU No. 933	1913	Year-round	Divert 2,000 cfs at Canyon dam	Power at Butt Valley powerhouse
Permit No. 21152	May 20, 1993	Nov 1-Jun 30	Divert 1,000 cfs at Canyon dam	Power at Butt Valley and Caribou powerhouses
Permit No. 21153	Dec. 6, 1994	Year-round	Divert 1,400 cfs at Canyon dam	Power at Butt Valley and Caribou No. 2 powerhouses
SWDU No. 931	Pre-1914 and riparian rights	Year-round	Divert 1,000 cfs at Butt Valley dam	Power at Caribou No. 1 powerhouse
SWDU No. 932	Pre-1914 and riparian rights	Year-round	Divert 1,350 cfs at Butt Valley dam	Power at Caribou No. 2 powerhouse
SWDU No. 11477	Riparian right	Year-round	Divert 2,410 cfs at Belden diversion dam	Power at Belden powerhouse
License No. 9871	Jan. 9, 1940	Year-round	Divert 2,465 cfs at Belden diversion dam, 2,896 cfs at Rock Creek diversion dam, 3,500 cfs at Cresta diversion dam, and 3,500 cfs at Poe diversion dam	Power at Belden, Rock Creek, Cresta, and Poe powerhouses, respectively.

No.	Priority Date	When	Description	Use(s)
Permit No. 20864	Apr. 7, 1981	Year-round	Divert 135 cfs at Belden diversion dam, 604 cfs at Rock Creek diversion dam, 600 cfs at Cresta diversion dam, and 800 cfs at Poe diversion dam	Power at Belden, Rock Creek, Cresta, and Poe powerhouses, respectively.
Permit No. 18962	Nov. 2, 1982	Year-round	Divert 160 cfs at Belden diversion dam	Power at Oak Flat powerhouse
License No. 637	Jan. 10, 1924	Year-round	Divert 0.5 cfs from French Creek	Domestic, industrial and fire protection at Caribou camp
License No. 809	Jan. 10, 1924	Year-round	Divert 600 gallons per day from Oak Creek	Domestic, industrial and fire protection at Howells patrol station
SWDU No. 11477	Pre-1914	Year-round	Divert 10 cfs from Butt Creek	Irrigation in Humbug Valley

[a] Western Canal Water District exercises the licensee's consumptive water rights pursuant to a 1986 contract, which stipulates that the licensee must release 145,000 acre-feet from storage in its reservoirs between each March 1 and October 31 for irrigation downstream of Lake Oroville (CDWR, 1986).

Water Quality

The NFFR basin lies within the Sacramento River basin and the Fourth Edition of the Central Valley Regional Water Quality Control Board Basin Plan (Basin Plan) for the Sacramento and San Joaquin River basins (CVRWQCB, 1998) applies to waters in the area. The Basin Plan designates existing beneficial uses for waterbodies in the basin. Existing beneficial uses designated for Lake Almanor are hydropower generation, water contact recreation, warm and cold freshwater habitat, warm spawning habitat, and wildlife habitat. Existing beneficial uses designated for the NFFR are hydropower generation, municipal and domestic supply, water contact recreation, non-water contact recreation, cold freshwater habitat, cold spawning habitat, and wildlife habitat.

Water quality standards applicable to surface waters in the project area are defined in three primary documents: the Basin Plan (CVRWQCB, 1998); the California Toxics Rule (40 CFR Part 131); and drinking water standards set in California Code of Regulations Title 22 (CDHS, 2002), which are applicable to surface waters of the NFFR designated for municipal water supply.

Table 3-5 summarizes selected applicable criteria. The California SWRCB (2003) did not include any waterbodies in the project area on its 2002 303(d) list of water-quality-limited waterbodies.

General Water Quality

General water quality is largely dependent on the geologic and hydrologic characteristics of a basin. PG&E monitored water quality and water temperature at several stations to document recent conditions in various waterbodies in the project area (figure 3-3). Table 3-6 summarizes PG&E's seasonal measurements of various water quality parameters that PG&E monitored in 2000 and supplemental monitoring that it conducted in the fall of 2002 and spring and summer of 2003. These measurements indicate that project waters are soft to moderately hard, generally have low to moderate total suspended solids and turbidities, and do not have excessively high nutrient (phosphorous or nitrogen) concentrations. Seasonal near surface chlorophyll-*a* concentrations for 2000 were typically 3 μg/l or less in both Lake Almanor and Butt Valley reservoir (PG&E, 2003a). These concentrations indicate that the reservoirs have relatively low productivity (lower mesotrophic) based on Carlson's (1977) trophic state index. Secchi depth was measured in Lake Almanor during 2000 (May through December) and 2001 (March through September). Secchi depth averaged 5.0 meters (range 2.3–8.4 meters) during 2000 and 4.9 meters in 2001 (range 2.9–7.4 meters) in 2001. The primary cation and anion are calcium and bicarbonate, respectively.

Table 3-5. Water quality criteria for the UNFFR Project.

Constituent	Objectives of Basin Plan for the Sacramento and San Joaquin River Basins (Source: CVRWQCB, 1998)	California Toxics Rule (40 CFR Part 131)	CA Drinking Water Standards[a] (CDHS, 2002)
Temperature	Natural water temperatures shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration does not adversely affect beneficial uses. At no time or place shall the temperature be increased more than 5°F above the natural receiving water.	--	--
Dissolved oxygen (DO)	Monthly median of mean daily DO concentration shall not fall below 85% of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75% of saturation. DO concentrations shall not be reduced below 7.0 mg/l.	--	--
pH	The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 units.	--	--
Specific conductance	Shall not exceed 150 μmhos/cm (90 percentile) in well-mixed waters.	--	--
Fecal coliform	Based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 200/100 ml, nor shall more than 10% of the total number of samples taken during any 30-day period exceed 400/100 ml.	--	--
Oil and grease	Waters shall not contain oils, greases, 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.	--	--

Constituent	Objectives of Basin Plan for the Sacramento and San Joaquin River Basins (Source: CVRWQCB, 1998)	California Toxics Rule (40 CFR Part 131)	CA Drinking Water Standards[a] (CDHS, 2002)
Turbidity	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 increases of 1 nephelometric turbidity unit (NTU) where natural turbidity is 0–5 NTU, increases of 20% where natural turbidity is 5–50 NTU, increases of 10 NTU where natural turbidity is 50-100 NTU, and increases of 10% where natural turbidity is >100 NTU.	--	--
Tastes and Odors	Shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affects beneficial uses.	--	Secondary maximum contaminant level (MCL) 3 Odor units
Methyl-*tert*-butyl ether (MTBE)	--	--	Primary MCL 0.013 mg/l; Secondary MCL 0.005 mg/l

		Dissolved Concentrations (mg/l)			
Trace Metals		**4-day Avg.**	**1-hr Avg.**	**Ins. Max.**	
Aluminum	--	0.087	0.750	--	Primary MCL 1.0 mg/l; Secondary MCL 0.2 mg/l
Arsenic	--	0.15	0.34	--	Primary MCL 0.05 mg/l
Barium	--	--	--	--	Primary MCL 1.0 mg/l

Constituent	Objectives of Basin Plan for the Sacramento and San Joaquin River Basins (Source: CVRWQCB, 1998)	California Toxics Rule (40 CFR Part 131)			CA Drinking Water Standards[a] (CDHS, 2002)
Cadmium[b]	--	0.0013	0.0020	--	Primary MCL 0.005 mg/l
Chromium (total)	--	--	--	--	Primary MCL 0.05 mg/l
Copper[b]	--	0.0050	0.0070	--	Primary MCL 1.3 mg/l Action level[c]; Secondary MCL 1.0 mg/l
Iron	--	--	--	1.0	Secondary MCL 0.3 mg/l
Lead[b]	≤0.015 in waters designated as domestic or municipal supply	0.0012	0.030	--	Primary MCL 0.015 mg/l Action level
Manganese	--	--	--	--	Secondary MCL 0.05 mg/l
Mercury (inorganic)	--	0.00077	0.0014	--	Primary MCL 0.0020 mg/l
Nickel[b]	--	0.026	0.23	--	Primary MCL 0.1 mg/l
Selenium	--	0.005	0.02	--	Primary MCL 0.05 mg/l
Silver[b]	--	--	--	0.00105	Secondary MCL 0.1 mg/l
Zinc[b]	--	0.066	0.065	--	Secondary MCL 5.0 mg/l

[a] Applicable only to the NFFR.

[b] Hardness-dependent criteria. The listed criteria are for a hardness of 50 mg/l.

[c] Action level based on concentration of 90th percentile exceedance of samples

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FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

Page 3-22
Figure 3-3

Table 3-6. Range of general water quality parameters measured in project waters by PG&E in 2000, 2002, and 2003. (Sources: PG&E, 2003a, October 29, 2004, comments on the draft EIS)

Parameter (units)	Lake Almanor	Butt Valley Reservoir[a]	NFFR[b]	Butt Creek[c]	Tributaries[d]
pH (standard units)	6.9–8.3	6.8–8.0	7.1–8.4	7.4–8.2	7.1–8.8
	6.9–8.4[e]	7.0–8.3	7.4–8.5[e]	8.0–8.3[e]	7.6–8.5[e]
Total alkalinity (mg $CaCO_3$/l)	48–50	48–60	49–90	87–150	26–100
Total hardness (mg $CaCO_3$/l)	10–46	36–50	41–89	76–99	17–97
	41–54[e]	41–49[e]	43–87[e]	82–94[e]	24–107[e]
Specific conductance (μmhos/cm)	85–99	85–119	89–185	159–200	44–323
	94–137[e]	91–111[e]	93–199[e]	174–188[e]	63–251[e]
Calcium (mg/l)	<0.1–9.4	8.6–10	8.9–21	20–24	4.7–23
Magnesium (mg/l)	0.1–4.8	4.2–5.2	4.2–8.4	6.7–8.0	2.0–8.6
Potassium (mg/l)	<0.1–2.6	1.2–2.6	<0.1–2.7	<0.1–0.9	0.3–2.3
Sodium (mg/l)	2.7–4.4	3.2–7.8	3.4–27	4.9–6.1	2.8–14
Bicarbonate (mg/l)	48–50	48–60	<10–90	87–150	<10–100
Chloride (mg/l)	<0.2–1.6	<0.2–3.3	0.6–3.3	0.2–2.0	<0.2–4.5
Sulfate (mg/l)	<0.2–9.3	<0.2–2.0	<0.2–6.0	2.8–3.4	<0.2–7.4
Silica (mg/l)	8.1–20	8.1–23	8.6–22	13–26	9.0–35
Total suspended solids (mg/l)	<1–23	<1–9	<1–140	<1–1	<1–10
Turbidity (NTU)	0.4–11	0.7–15	0–17	0.5–2.3	0.2–19
	0.0–3.4[e]	0.0–2.8[e]	0.0–4.8[e]	0.0–6.5[e]	0.0–14.3[e]
Total phosphorous (mg/l)	<0.01–0.12	<0.01–0.08	<0.01–0.13	0.02–0.11	<0.01–0.07
Orthophosphate (mg/l)	<0.01–0.01	<0.01–0.04	<0.01–0.07	<0.01–0.03	<0.01–0.13
Ammonia (mg/l)	<0.1	<0.1	<0.1–0.3	<0.1	<0.1–0.3
Total organic nitrogen (mg/l)	<0.2–1.7	<0.2–7.7	<0.2–0.2	<0.2	<0.2

Parameter (units)	Lake Almanor	Butt Valley Reservoir[a]	NFFR[b]	Butt Creek[c]	Tributaries[d]
Nitrate (mg NO_3/l)	<0.1–0.9	<0.1–2.7	<0.1–16	<0.1–8.0	<0.1–14
Chlorophyll-*a* (mg/l)	<0.001–0.021	<0.001–0.013	<0.001–0.013	<0.001–0.003	<0.001–0.018

[a] Butt Valley reservoir and Butt Valley powerhouse tailrace.
[b] Project-affected reaches of the NFFR including the Seneca and Belden bypassed reaches; Belden forebay; and Caribou No.1, Caribou No. 2, and Belden powerhouse tailraces.
[c] Project-affected reach of Butt Creek (i.e., reach between the Butt Valley dam and confluence with the NFFR).
[d] Inflows to Lake Almanor, Butt Valley reservoir, and the project-affected reaches of the NFFR.
[e] Summary of fall 2002 and spring and summer 2003 values.

Total alkalinity measurements indicate that Lake Almanor, Butt Valley reservoir, and the NFFR generally have low to moderate buffering capacity to resist changes in pH. The data indicate that Butt Creek downstream of Butt Valley dam, which is highly influenced by ground water, has a higher buffering capacity than other project-affected waters.

PG&E's reported pH values for 2000, 2002, and 2003 indicate that relatively consistent pH levels occur throughout the upper NFFR basin. Overall, reported pH values ranged from 6.8 to 8.8 standard units (table 3-6). The Hamilton Branch powerhouse and EBNFFR were the only stations to have a reported pH value outside the criteria ranging from 6.5 to 8.5 standard units. These stations are not influenced by project operations. The overall range of discrete pH measurements for NFFR project-affected stream reaches ranged from 7.1 to 8.5 standard units.

PG&E reported that overall specific conductance ranged from 85 to 323 μmhos/cm (see table 3-6). Conductance was most variable in tributaries to project waters and two tributaries to the Belden bypassed reach (East Branch and Mosquito Creek) and had values of greater than the 150-μmhos/cm Basin Plan criterion. Conductance was also rather variable in the project's bypassed reaches, and exceedances of the 150-μmhos/cm Basin Plan criterion were reported for six stations in these reaches. This criterion was exceeded in all of the measurements for lower Butt Creek and nearly all of the measurements for the lower ends of the Seneca and Belden reaches. Other locations in the Seneca and Belden reaches also had values exceeding the 150-μmhos/cm Basin Plan criterion.

Temperature

As part of relicensing the downstream Rock Creek-Cresta Project, an SA (PG&E, 2000b) was developed and signed by PG&E, resource agencies (FS, FWS, CDFG, SWRCB, Plumas County), and NGOs (Natural Heritage Institute, Friends of the River, California Outdoors, California Trout, AW, Chico Paddleheads, and Shasta Paddlers). One of the principal goals of this agreement was to improve cold freshwater habitat in the Rock Creek and Cresta bypassed reaches. A process was established to ensure that PG&E would implement all reasonably practicable control measures to satisfy a daily mean water temperature of 20°C which was agreed would protect cold water fishes in the Rock Creek and Cresta reaches. The SA requires PG&E to develop and implement a water temperature management plan, and conduct modeling to evaluate the anticipated effectiveness of modifying the Prattville intake and implementing other potential temperature control measures. According to the Rock Creek-Cresta SA, PG&E would implement Prattville intake modifications determined by representatives of the parties signing the agreement to be reasonable and practicable measures to maintain daily mean temperatures of 20°C or less in the Rock Creek and Cresta bypassed reaches.[14]

On October 23, 2002, PG&E filed its water temperature monitoring plan for the Rock Creek-Cresta Project with the Commission (PG&E, 2002b). The Commission approved this plan with modifications on February 28, 2003 (FERC, 2003). The objectives of this plan include:

- documenting continuous summer temperature and flow monitoring in the Rock Creek-Cresta reaches and upstream areas;
- determining if mean daily water temperatures of 20°C or less can be met in the Rock Creek and Cresta reaches through implementation of reasonable control measures, including modification of the Prattville intake by PG&E; and
- developing and verifying a temperature model that predicts, with reasonable accuracy, the temperature profile of the NFFR.

Adoption of the plan formalized water temperature and flow monitoring along with water temperature modeling to be conducted by PG&E for the Rock Creek-Cresta Project. However, PG&E had monitored flow and water temperatures throughout the

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[14] While the Rock Creek-Cresta SA's signatories may bind themselves pursuant to the SA to perform effectiveness studies of potential modifications to the Prattville intake, any modifications to the UNFFR Project facilities must be authorized by the Commission.

NFFR basin in a similar manner as proposed in the plan during the years of 2000 through 2002. It did this by continuously monitoring water temperatures at 26 stations in the upper NFFR basin from June 1 to September 30 (table 3-7), and monitoring vertical profiles of temperature in Lake Almanor and Butt Valley reservoir during 2000, 2001, and 2002; and in the Belden forebay during 2000. PG&E also monitored water temperatures according to the FERC-approved plan in 2003 and 2004 (PG&E, 2004b; 2005a). Table 3-7 presents the range of daily average temperatures reported, along with an evaluation of the frequency and timing that daily average temperatures exceeded 20.0°C at each station.

In the following discussion of water temperatures, we discuss results of PG&E's 1999 through 2004 monitoring studies. The discussion proceeds in an upstream to downstream direction.

Table 3-7. Monitoring locations for Commission-approved Rock Creek-Cresta water temperature monitoring plan and summary of daily average water temperatures for continuous monitoring in June through September of 1999 through 2004.[a] (Sources: PG&E, 2002a,b; 2003b; 2004b; 2003e; 2005a, as modified by staff)

Station	Monitoring Parameters[b]	Range (°C)	Greater than 20.0°C	
			Months[c]	%[d]
NFFR at Chester (NF1A)	TR, FT	8.3–16.8	None	0
Hamilton Branch Creek at Hwy A13 bridge (HB1)	TR, F	8.4–15.3	None	0
Hamilton Branch powerhouse (HB2)	TR,F	9.1–21.1	June–July	2
Lake Almanor at Canyon dam near surface (LA1-S)	TR	16.1–26.3	June–Sept.	72
Lake Almanor at Canyon dam near bottom (LA1-B)	TR	8.2–16.1	None	0
Butt Valley powerhouse (BV1)	TR, F	11.7–22.2	July–Sept.	33
Butt Valley reservoir at Caribou intake near surface (BV2-S)	TR	17.0–24.6	June–Sept.	73
Butt Valley reservoir at Caribou intake near bottom (BV2-B)	TR	9.4–21.5	July–Sept.	11
Butt Creek upstream of Butt Valley reservoir (BC1)	TR, F	8.8–16.2	None	0
Butt Creek downstream of Butt Valley reservoir (BC2)	TR	10.2–13.1	None	0
Butt Creek at mouth (BC3)	TR, FT	10.5–13.1	None	0

Station	Monitoring Parameters[b]	Range (°C)	Greater than 20.0°C	
			Months[c]	%[d]
NFFR downstream of Canyon dam (NF2) [e]	TR, F	9.4–22.5	July-Aug.	10
NFFR at Seneca Bridge (NF3A) [e]	TR, S	10.8–19.9	None	0
NFFR upstream of Butt Creek (NF3B)	--	12.8–17.2	None	0
NFFR upstream of Caribou powerhouse (NF4) [e]	TR, FT	11.4–18.1	None	0
Caribou No. 1 powerhouse (CARB1)	TR, F	10.9–21.9	July–Sept.	35
Caribou No. 2 powerhouse (CARB2)	TR, F	16.6–24.0	June–Sept.	65
Belden forebay at intake (BD1)	TR	15.5–22.8	June–Sept.	52
NFFR downstream of Belden dam (NF5)	TR, F	13.9–21.8	July–Sept.	29
Mosquito Creek at mouth (MC1)	TR, S	10.4–15.6	None	0
NFFR near Queen Lily campground (NF6)	TR	14.0–21.4	July–Sept.	21
NFFR near Gansner Bar (NF7)	TR	14.7–21.3	July–Sept.	20
EBNFFR at mouth (EB1)	TR, F	14.6–26.4	June–Sept.	64
NFFR at Belden Town Bridge (NF8)	TR	15.1–22.9	June–Sept.	51
Belden powerhouse (BD2)	TR, F	15.4–22.8	June–Sept.	49
Yellow Creek near mouth (YC1)	TR, FT	10.6–18.9	None	0
NFFR downstream of Rock Creek dam (NF-57, NF10)	TR, F	14.1–22.5	June–Sept.	51
NFFR near Tobin downstream of Granite Creek (NF11)	TR	14.1–22.8	June–Sept.	50
NFFR upstream of Bucks Creek (NF12)	TR	14.2–22.9	June–Sept.	50
NFFR upstream of Rock Creek powerhouse (NF13)	TR	13.3–23.0	June–Sept.	16
Rock Creek powerhouse (RC1)	TR, F	14.3–22.6	June–Sept.	58
NFFR downstream of Cresta dam (NF14)	TR	14.0–22.2	June–Sept.	39
NFFR downstream of Grizzly Creek (NF-56, NF15)	TR, F	14.0–22.4	June–Sept.	41
NFFR upstream of Cresta powerhouse (NF16)	TR	14.4–22.7	June–Sept.	46
Cresta powerhouse (Cresta 1)	TR, F	13.8–22.5	June–Sept.	44

Station	Monitoring Parameters[b]	Range (°C)	Greater than 20.0°C	
			Months[c]	%[d]
NFFR downstream of Cresta powerhouse (Poe-1A)	--	13.9–22.3	June–Sept.	17
NFFR downstream of Poe dam (Poe-5)	--	12.9–22.5	June–Sept.	20
NFFR at Pulga bridge (Poe-2A)	--	14.8–22.6	June–Sept.	28
NFFR at Bardee's Bar (Poe-6)	--	13.7–23.2	June–Sept.	39
NFFR upstream of Poe powerhouse (Poe-3)	--	16.9–24.5	June–Sept.	71
Poe powerhouse (Poe-4B)	--	14.0–22.7	June–Sept.	23
NFFR at Big Bend dam (Poe-7)	--	16.7-22.8	July-Sept.	40

[a] Monitoring periods for the stations differed by day and year. Staff used all available June to September data.

[b] F = flow gaging station or powerhouse records, FT = temporary flow gaging station, TR = temperature recorder, P = reservoir profile, S = staff gage, and -- = not included.

[c] Months that had at least 1 day with an average temperature of greater than 20.0°C.

[d] Percent of monitored days that had daily average temperature of greater than 20.0°C.

[e] PG&E's practice has been to preferentially uses the Canyon dam outlet tower low-level gates for flow releases into the Seneca reach. During 2004, while the Canyon dam outlet lower gates needed repairs, PG&E used an upper gate (#7). As a result; temperatures in discharges to the upper end of the Seneca reach were considerably warmer than occurred in other years monitored.

The primary surface inflows to Lake Almanor (NFFR, Hamilton Branch, and Hamilton Branch powerhouse) had daily average temperatures that ranged from 8.3 to 21.1°C. The warmest daily average temperatures for the NFFR and Hamilton Branch were 16.8 and 15.3°C, respectively. In contrast, discharge from the Hamilton Branch powerhouse reached as high as 21.1°C. Daily average temperatures exceeded 20.0°C at the Hamilton Branch powerhouse on 2 percent of the days with measurements.

Vertical profiling of water temperatures in Lake Almanor indicate that thermal gradients typically begin to develop in April and May, are well established during June to mid-September, and lake turnover (mixing of water throughout the entire profile) occurs in late September to November. From June through mid-September, a warm upper layer (epilimnion) exists and generally extends to a depth of 30 to 40 feet, while a much cooler layer (hypolimnion) resides below a depth of about 50 feet (figure 3-4).

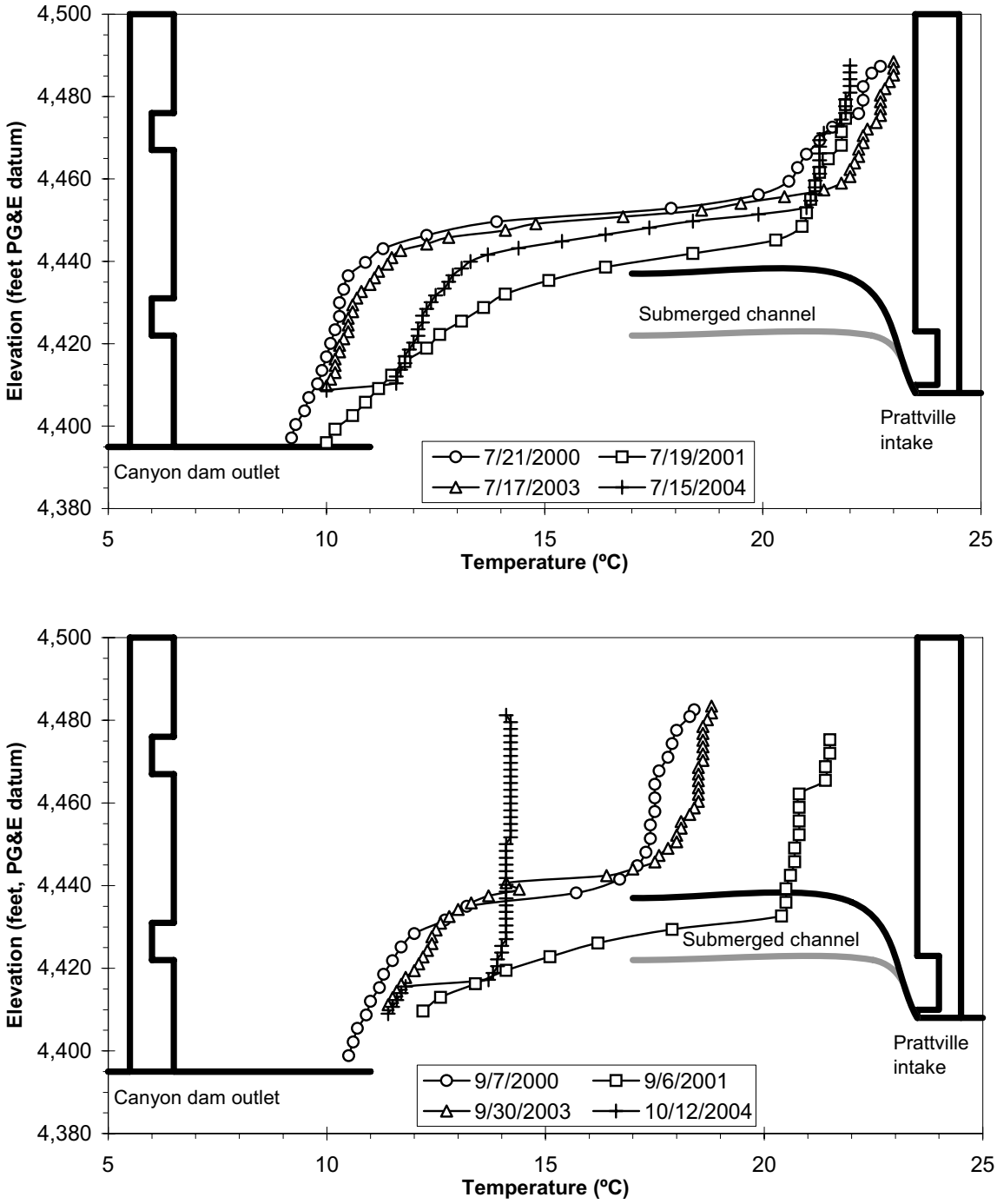

Figure 3-4. Vertical profiles of water temperature for Lake Almanor near Canyon dam along with schematics of gate elevations and general bed profiles of Prattville intake and Canyon dam outlet, mid-July and September/October. (Sources: PG&E, 2002a, 2004b, 2005a, as modified by staff)

Consequently, when the lake is stratified, water temperatures in the Seneca reach are influenced by the elevation of the Canyon dam outlet tower gate that is used (FERC, 1996). The low-level gates with an invert elevation of 4,422 feet msl (PG&E datum) are typically used to provide MIF releases to the Seneca reach (PG&E, 2004c). Daily average Lake Almanor near surface water temperature based on continuous seasonal monitoring ranged from 16.1 to 26.3°C, while temperatures near the bottom were much cooler ranging from 8.2 to 16.1°C. Surface temperatures tended to be highest during July and August, although near bottom temperatures increased as summer progressed. During the drought of 2001, Lake Almanor's water level was considerably lower than normal and likely was one of the principal causes of early summer temperatures being about 2 to 4°C warmer near the bottom than in other years monitored. Daily average temperatures of near surface (3 feet below the surface) waters exceeded 20.0°C in June through September on 72 percent of days monitored.

The temperature of water drafted through the Prattville intake and discharged from the Butt Valley powerhouse is affected by the configuration of the lake bed in the area of the intake, which was excavated in the shallower western lobe of the lake (Ettema et al., 2004). As will be discussed in more detail below, this results in warmer water being drafted than would be expected based on the depth of the intake. Daily average temperatures of discharges from the Butt Valley powerhouse were generally about 2 to 4°C cooler than the near surface waters of Lake Almanor. They ranged from 11.7 to 22.2°C and exceeded 20.0°C on 33 percent of the days monitored. Daily average temperatures of greater than 20.0°C generally occurred in July and August, although temperatures of greater than 20.0°C also occurred in September.

The thermal regime of the Butt Valley reservoir is largely dependent on discharges from Butt Valley powerhouse, due to its high proportion of the total inflow to the reservoir, along with the relatively short transit time through the impoundment (14 to 32 days) relative to Lake Almanor. Vertical profiles of temperatures in the reservoir indicate that a moderate thermal gradient exists during late spring and early summer. However, little stratification was evident during mid- to late summer. The relatively small amount of coldwater storage, short retention time, and withdrawal of cooler water through the deeper Caribou No. 1 intake probably all contribute to the thermal characteristics of Butt Valley reservoir.

Daily average temperatures, based on seasonal sampling, for near surface waters of Butt Valley reservoir ranged from 17.0 to 24.6°C, while near bottom temperatures ranged from 9.4 to 21.5°C. The seasonal pattern of surface and bottom temperatures was similar to that observed in Lake Almanor. Surface waters tended to be warmest in July and August, and bottom waters warmed throughout the summer. Near surface daily average temperatures of greater than 20.0°C were common in June, July, August, and September. Seventy-three percent of the days monitored had a daily average temperature at the surface of Butt Valley reservoir of greater than 20.0°C.

Daily average temperatures reported for Butt Creek ranged from 8.8 to 16.2°C. Both the lowest and highest values were reported for the monitoring station upstream of Butt Valley reservoir. Daily average temperatures reported for the two sites downstream of Butt Valley reservoir ranged from 10.2 to 13.1°C.

Daily average water temperatures measured in the Seneca reach ranged from as low as 9.4 to 22.5°C, both occurring a short distance downstream of Canyon dam. However, this range of temperatures does not reflect conditions that occur under typical operations because it includes temperature data collected during 2004, when one of the Canyon Dam outlet tower upper gates was used instead of the low-level gates (used under typical operations) (table 3-7). Under typical operations, the maximum daily mean temperature that was measured in the Seneca reach was 17.2°C, which occurred immediately upstream of the Butt Creek confluence; all values for the reach were below 20.0°C. Water temperatures tended to increase between the upper end of the reach (station NF2) and immediately upstream of the Butt Creek confluence (station NF3B), and decrease below the Butt Creek confluence. We suspect that the cooler conditions monitored at the lower end of the reach (station NF4) are largely due to cool inflow from Butt Creek (station BC3). None of the daily average temperatures reported for the Seneca reach exceeded 20.0°C.

The temperature of discharges from the two Caribou powerhouses differed substantially from one another. Discharges from Caribou No. 1 powerhouse ranged from 10.9 to 21.9°C, while discharges from Caribou No. 2 powerhouse ranged from 16.6 to 24.0°C. This is probably due to the shallower intake depth and approach channel of Caribou No. 2 (approach channel elevation of 4,100 feet for Caribou No. 2 versus approximately 4,085 feet for Caribou No. 1). Caribou No. 1 daily average temperatures of greater than 20.0°C were common in August, and occurred less frequently in July and September. Caribou No. 2 daily average temperatures of greater than 20.0°C were common in July, August, and September; and occurred less frequently in June. Daily average temperatures exceeded 20.0°C for 35 percent of the days monitored at the Caribou No. 1 powerhouse and 65 percent of the days monitored at the Caribou No. 2 powerhouse.

Results of vertical temperature profile monitoring in Belden forebay during 2000 indicate that little thermal stratification occurs. Temperatures within each of the vertical profiles reported varied by less than 3°C. Many factors, including the impoundment's small capacity, short (1 day or less) retention time, deep-water fish releases, and large daily changes in the impoundment's storage level during the summer, likely cause these relatively uniform temperatures throughout the water column.

Daily average temperatures reported for the Belden forebay at the intake range from 15.5 to 22.8°C, with 52 percent of the days monitored having temperatures of greater than 20.0°C. Daily average temperatures of greater than 20.0°C were common in July and August and occurred less frequently in June and September. During the

summer, inflow to the Belden forebay predominantly comes from the Caribou Nos. 1 and 2 powerhouses. Their warm discharges have considerable effect on temperatures at the intake in comparison to inflows from the Seneca reach of the NFFR. Data for 2004 were similar to other years, suggesting that the warmer releases from the upper-level Canyon dam outlet gates that year had little effect on water temperatures downstream of the Caribou powerhouses.

Daily average temperatures reported for the Belden reach ranged from 13.9 to 22.9°C, and tended to increase in a downstream direction (table 3-7). At the three stations located upstream of the confluence with the EBNFFR, daily average temperatures were generally similar and exceeded 20.0°C on 20 to 29 percent of the days monitored. Nearly all of the days with daily average temperatures of greater than 20.0°C in the upper portion of the Belden reach occurred in July or August. In contrast, daily average temperatures in the lower Belden reach (NF8) were generally about 1 to 2°C warmer and temperatures of greater than 20.0°C occurred in all of the months of June to September. Daily average temperatures exceeded 20.0°C on just over half of the days monitored. These warmer conditions are at least partially caused by warm inflows from the EBNFFR, which ranged from 14.6 to 26.4°C and exceeded 20.0ºC on 64 percent of the days during the study period.

The temperature of Belden powerhouse discharges is similar to ambient conditions in the lower Belden reach. Daily average temperatures ranged from 15.4 to 22.8°C, and exceed 20.0°C on nearly half of the days monitored. Temperatures of greater than 20.0°C were reported for June to September and were common in July and August.

The warm inflow to the Rock Creek reservoir along with high ambient temperatures and solar radiation leads to warm temperatures in the lower NFFR. Daily average temperatures were frequently greater than 20.0ºC in the bypassed reaches and powerhouse discharges of the Rock Creek, Cresta, and Poe hydro-developments. In the lower end of the Poe reach, daily mean temperature reached as high as 24.5ºC and exceeded 20.0ºC on more than 70 percent of the days monitored in June through September. Cooler discharges from the Poe powerhouse reduced peak temperatures, but still resulted in NFFR inflows to Lake Oroville frequently exceeding 20.0ºC.

Dissolved Oxygen

PG&E monitored DO concentrations at 24 stations in the project vicinity during 2000. Monitoring was conducted in April, June, July, August, September, and November. Table 3-8 presents the results of this monitoring program. As part of a supplemental monitoring effort designed to address comments of the SWRCB, PG&E also monitored DO concentrations at 20 of the 24 stations during October 2002, April 2003, and July 2003 (PG&E October 29, 2004, comments on the draft EIS). Staff incorporated the results of supplemental monitoring into the following discussion.

Table 3-8. Summary of dissolved oxygen concentrations monitored by PG&E during 2000. (Source: PG&E, 2002a)

	Concentration (mg/l)			Percent of Saturation		
Location	**Min.**	**Avg.**	**Max.**	**Min.**	**Avg.**	**Max.**
NFFR at Chester (NF1)	8.0	10.1	12.2	86	100	111
Hamilton Branch Creek at Hwy A13 bridge (HB1)	8.6	9.7	11.0	89	98	106
Hamilton Branch powerhouse (HB2)	7.5	9.8	12.3	94	108	126
Lake Almanor at Canyon dam near surface (LA1-S)	5.8	7.7	9.6	77	92	102
Lake Almanor at Canyon dam near bottom (LA1-B)	0.7	5.5	9.8	8	58	99
Lake Almanor near Prattville intake near surface (LA2-S)	6.8	8.1	10.6	92	99	107
Lake Almanor near Prattville intake near bottom (LA2-B)	3.0	6.4	10.3	34	73	100
Butt Valley powerhouse (BV1)	6.3	8.0	10.2	80	90	101
Butt Valley reservoir at Caribou No. 1 intake near surface (BV2-S)	6.0	8.3	10.6	76	97	108
Butt Valley reservoir at Caribou No. 1 intake near bottom (BV2-B)	0.4	4.1	10.3	5	42	100
Butt Creek upstream of Butt Valley reservoir (BC1)	9.3	10.0	11.2	89	98	104
Butt Creek at mouth (BC3)	8.4	9.4	10.3	86	94	99
NFFR downstream of Canyon dam (NF2)	7.3	9.2	10.7	78	96	117
NFFR upstream of Caribou powerhouse (NF4)	8.6	9.4	11.2	89	94	103
Caribou No. 1 powerhouse (CARB1)	6.8	7.7	9.3	78	86	90
Caribou No. 2 powerhouse (CARB2)	6.5	7.8	10.1	76	92	102
Belden forebay at powerhouse intake near surface (BD1S)	7.4	8.1	8.8	93	99	105
Belden forebay at powerhouse intake near bottom (BD1B)	6.2	7.0	8.1	73	84	99
NFFR downstream of Belden dam (NF5)	7.2	8.5	10.5	87	94	100

Location	Concentration (mg/l)			Percent of Saturation		
	Min.	Avg.	Max.	Min.	Avg.	Max.
NFFR near Gansner Bar (NF7)	7.4	9.0	11.4	88	96	105
EBNFFR at mouth (EB1)	6.6	8.9	12.5	83	95	106
NFFR at Belden Town bridge (NF8)	7.4	8.9	11.4	84	94	98
Belden powerhouse (BD2)	6.7	8.0	10.7	77	88	99
Yellow Creek near mouth (YC1)	8.7	10.1	12.2	90	96	107

All DO concentrations reported by PG&E for the inflow to Lake Almanor were greater than 7.0 mg/l (table 3-8; PG&E October 29, 2004, comments on the draft EIS).

DO concentrations in Lake Almanor follow the typical clinograde pattern for large, thermally stratified reservoirs. Surface waters generally remain well aerated, while DO concentrations of near-bottom waters are progressively reduced during the summer and early fall, prior to turnover. Measurements of DO concentrations in the reservoir's epilimnion ranged from 5.8 to 10.6 mg/l, while concentrations measured in the hypolimnion ranged from 0.7 to 10.3 mg/l. The lowest DO concentrations monitored in the reservoir occurred near the bottom at the Canyon dam outlet tower, which is deeper and receives substantially less flow than near the Prattville intake. Near-bottom DO concentrations at this station were 7.0 mg/l or higher during April, September, and November; 1 to 3 mg/l in June, July, and October; and less than 1 mg/l in August. Near-surface DO concentrations of less than 7.0 mg/l occurred at the Canyon dam station in June 2000 (5.8 mg/l) and in July 2003 (6.4 mg/l), although these values had corresponding levels of 88 to 89 percent of saturation. Near the Prattville intake, DO concentrations of slightly less than 7.0 mg/l occurred near the surface in June 2000, and DO concentrations of approximately 3 mg/l occurred near the bottom in June and July.

During July through November 2001, PG&E monitored DO and other water quality in Lake Almanor near the Canyon dam outlet tower as part of a study to evaluate the effects of late summer releases from Canyon dam. Near-surface DO levels monitored for the 2001 study ranged from 6.5 to 7.2 mg/l and 73 to 99 percent of saturation. In contrast, near-bottom DO levels ranged from 0.2 to 4.8 mg/l and 2 to 50 percent of saturation. Anoxic (DO concentration of <0.5 mg/l) conditions occurred near the bottom during each of the monitoring visits from early August through mid-October. Since no measurements were reported prior to the August 8 value of 0.2 mg/l, it is not evident when anoxic conditions began to occur. By mid-November, turn-over had begun to occur, and the near-bottom DO concentration was 4.8 mg/l.

DO concentrations measured in 2000, 2002, and 2003 for the Butt Valley powerhouse ranged from 6.3 to 10.2 mg/l, and are quite similar to conditions in the

Lake Almanor epilimnion from which the water is drafted. DO concentrations of less than 7.0 mg/l occurred in July and August 2000.

DO concentrations measured in Butt Valley reservoir ranged from 0.4 to 10.6 mg/l. DO concentrations in the epilimnion ranged from 6.0 to 10.6 mg/l, while they ranged from 0.4 to 10.3 mg/l at depths of greater than 46 feet. Values of less than 7.0 mg/l were reported for a depth of 3 feet in July 2000 and near the bottom during the months of June through September 2000 and July 2003. Measurements near the bottom indicate that anoxic conditions occurred in August 2000 and hypoxic (DO concentration of <2.0 mg/l) conditions occurred in June and July 2000.

In 2000, DO levels were somewhat depressed in discharges from the Caribou developments, bottom of Belden forebay, and Belden powerhouse. DO concentrations of less than 7.0 mg/l were reported for both of the Caribou powerhouses in September, near the bottom of Belden forebay in June and July, and for the Belden powerhouse in July and September. DO concentrations monitored in 2002 and 2003 remained at or above 7.0 mg/l in the tailraces of the Caribou and Belden powerhouses. Results of PG&E's studies indicate that low-DO water drafted from the hypolimnion of Butt Valley reservoir via the Caribou No. 1 facility is generally re-aerated to 7 to 8 mg/l by the time it reaches the powerhouse tailrace.

All of PG&E's seasonal measurements of DO concentrations for project-affected stream reaches (i.e., the Seneca, Belden, and lower Butt Creek bypassed reaches) were greater than 7.0 mg/l.

Coliform Bacteria

Four principal sources of coliform data are available to describe bacteriological water quality conditions in the project area. Fecal coliform densities reported for a study conducted between 1993 and 1996 by Henrici Labs that sampled 12 locations along the margin of Lake Almanor for 3 months a year (typically, May, August, and October) ranged from less than 2 MPN/100 ml to greater than 1,600 MPN/100 ml (PG&E, 2003a). With the exception of four of the 134 samples analyzed, all samples had fecal coliform densities of less than 200 MPN/100 ml.

Fecal coliform densities reported for CDWR's study conducted between 1995 and 1999 at 22 stations in Lake Almanor and Hamilton Branch of the NFFR ranged from zero to 1,710 MPN/100 ml. Of the total 428 samples, all but five had values of less than 200 MPN/100 ml.

PG&E reported fecal coliform densities ranging from less than 2 to 80 MPN/100 ml for a total of 118 samples collected at 20 locations during April, June, July, August, September, and November 2000 (table 3-9).

PG&E monitored fecal coliform densities in Lake Almanor at the Canyon dam picnic area by sampling five times within 30 days (as specified in the Basin Plan) between June 29 and July 24, 2001. Samples were collected prior to and following the July 4 holiday in an effort to monitor worst-case conditions. This location receives considerable day use by swimmers and recreational watercraft, and has pit toilets located upgradient from the sample site. Fecal coliform densities reported for each of the five days monitored were less than 2 MPN/100 ml; therefore the geometric mean for the 30-day period also was less than 2 MPN/100 ml.

Table 3-9. Summary of total coliform and fecal coliform densities monitored by PG&E during 2000 to 2002.[a] (Source: PG&E, 2002a)

Station	Total Coliform Range (MPN/100 ml)	Fecal Coliform Range (MPN/100 ml)
NFFR at Chester (NF1)	11–300	2–26
Hamilton Branch Creek at Hwy A13 bridge (HB1)	4–30	<2–23
Hamilton Branch powerhouse (HB2)	13–130	<2–4
Lake Almanor at Canyon dam near surface (LA1-S)	<2–2	<2
Lake Almanor at Canyon dam near bottom (LA1-B)	<2–70	<2
Lake Almanor at the Canyon dam picnic area[b]	23–900	<2
Butt Valley powerhouse (BV1)	2–50	<2–17
Butt Valley reservoir at Caribou intake near surface (BV2-S)	<2–13	<2
Butt Valley reservoir at Caribou intake near bottom (BV2-B)	<2–12	<2
Butt Valley reservoir at Ponderosa campground[c]	50–300	<2–80
Butt Creek upstream of Butt Valley reservoir (BC1)	8–500	2–80
Butt Creek at mouth (BC3)	4–50	<2–2
NFFR downstream of Canyon dam (NF2)	4–30	<2–2
NFFR upstream of Caribou powerhouse (NF4)	2–80	<2–8
Caribou No. 1 powerhouse (CARB1)	2–13	<2–2
Caribou No. 2 powerhouse (CARB2)	2–23	<2–2
NFFR downstream of Belden dam (NF5)	8–240	<2–4
NFFR near Gansner Bar (NF7)	23–300	<2–4

Station	Total Coliform Range (MPN/100 ml)	Fecal Coliform Range (MPN/100 ml)
EBNFFR at mouth (EB1)	11–500	<2–9
NFFR at Belden Town Bridge (NF8)	17–900	<2–50
Belden powerhouse (BD2)	11–110	<2–2
Yellow Creek near mouth (YC1)	8–70	<2–4

[a] All rows with the exception of footnoted rows are based on samples collected in April, June, July, August, September, and November 2000.

[b] Five samples taken between June 29 and July 24, 2001; fecal coliform geometric mean is <2 MPN/100 ml.

[c] Five samples taken between August 29 and September 23, 2002; fecal coliform geometric mean is <5.5 MPN/100 ml.

Between August 29 and September 23, 2002 (which included the Labor Day holiday weekend), PG&E monitored fecal coliform densities in Butt Valley at the Ponderosa campground using the methodology specified in the Basin Plan. Reported fecal coliform densities for this period ranged from less than 2 to 80 MPN/100 ml, and had a geometric mean of less than 5.5 MPN/100 ml.

Study results suggest that the state criteria for fecal coliform are nearly always satisfied within waters in the project area, although fecal coliform concentrations of >200 MPN/100 ml sometimes occur along the southern part of Lake Almanor (see sampling results of Henrici Labs and CDWR discussed earlier). The source of these relatively high fecal coliform concentrations is not evident, although the Chester Sewage Treatment Plant has discharged partially treated sewage into Lake Almanor in the past. On April 23, 2004, the SRWCB issued a cease-and-desist order for the treatment plant to eliminate discharges that do not meet NPDES requirements, including prohibitions on discharges to Lake Almanor during the recreational season (i.e., from June 1 through September 30) (CVRWQCB, 2004).

Metals and Polychlorinated Biphenyls

The project may influence the concentrations of metals and polychlorinated biphenyls (PCBs) in water through its current and past operations. There are three primary pathways for this potential influence: (1) PG&E's LACSP, which vaporizes a silver iodide/acetone solution, (2) potential PCB contamination resulting from the 1984 Caribou rockslide and subsequent storage of contaminated soils, and (3) sorption/ desorption of metals in sediments deposited in project impoundments as a function of cyclical redox functions.

As described earlier, PG&E implements the LACSP to increase snowfall in the upper part of the basin. It uses nine cloud seeding burners, which vaporize a silver iodide/acetone solution and form microscopic-sized crystals. During the 12 winter seasons of 1989–90 through 2000-01, the cumulative operation of cloud-seeding burners ranged from 44 hours in 1996–97 to 3,808 hours in 2000–01. PG&E estimates that these operations released an average of 102 pounds of silver iodide into the atmosphere per year during winter storm periods. Annual estimates ranged from 2 pounds of silver iodide in 1996–97 to 176 pounds of silver iodide in 2000–01.

On February 24, 1984, a large rockslide severely damaged the Caribou No. 1 penstock and Caribou No. 2 powerhouse. The slide completely destroyed the Caribou No. 2 switchyard and damage to the Caribou No. 1 penstock resulted in flooding of the switchyard, which included transformers and oil circuit breaker switches that contained PCB-contaminated mineral oil (letter from W.M. Gallavan, Vice President, PG&E, to W.F. Kopfler, II, Regional Engineer, FERC, San Francisco, CA, dated July 19, 1984). The slide ruptured some of this equipment, resulting in PCB-contaminated mineral oil leaking onto the slide area and into the water. PG&E (1984) reported that most of the mineral oil at these facilities contained less than 50 ppm PCBs, although a small amount of the oil contained greater than 50 ppm PCBs.

This leakage resulted in PCB contamination of some of the soil, slide spoil, and Belden forebay sediments. By mid-July 1984, PG&E had cleaned up and/or removed these PCB contaminated materials, with the exception of those with concentrations of less than 0.4 ppm in the Belden forebay sediments and less than 7 ppm in the Oak Flat spoil pile, which was used for disposal of dredged material. SWRCB and CDFG continued to be concerned with the potential for residual PCBs to adversely affect the fishery and wildlife resources, and required further cleanup of all detectable PCBs. PG&E continued to clean up the PCB contamination as mandated by SWRCB (letter from W.M. Gallavan, Vice President, PG&E, to W.F. Kopfler, II, Regional Engineer, FERC, San Francisco, CA, dated July 19, 1984).

PG&E sampled waters for trace metals at 20 stations in the upper NFFR basin during 2000. This sampling effort consisted of collecting samples during April, June, July, August, September, and November and analyzing the samples for total

concentrations of 12 metals (arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, silver, and zinc) and hardness. Unfortunately, method detection limits for cadmium, lead, mercury, and silver were too high to ensure that samples with non-detectable levels did not actually exceed applicable criteria. Because arsenic, cadmium, copper, lead, mercury, silver, and zinc have criteria based on concentrations of their dissolved fractions, PG&E used standard acceptable protocols for estimating their dissolved fractions (EPA, 1996) and then compared these estimated values to the appropriate criteria.

Following the 2000 sampling effort, PG&E consulted with resource agencies and modified the monitoring program to focus on obtaining information appropriate for further evaluating selected trace metals. Between July and November 2001, PG&E sampled eight stations for dissolved concentrations of iron, manganese, and silver at method detection limits of 0.050, 0.001, and 0.001 mg/l, respectively. Sampling stations were in Lake Almanor near the Canyon dam outlet tower, in the Seneca reach, and in the springs in the upper end of the Seneca reach.

PG&E developed a supplemental monitoring program that used trace metal clean methodology and had low detection limits necessary for comparison to applicable criteria. This program included sampling for cadmium, lead, mercury, and silver during 2002 and 2003. PG&E filed the results of this monitoring effort with the Commission on October 29, 2004.

We discuss the results of the 2000 through 2003 sampling programs below with a focus on exceedance of applicable criteria. As discussed above, we note that method detection limits for the 2000 study were too high to be adequate for comparison of water samples with non-detectable levels to criteria applicable to cadmium, lead, mercury, and silver.

During 2000 and 2001, copper was the only metal that was found to possibly exceed the applicable dissolved criterion. This occurred in the Caribou No. 1 powerhouse tailrace in July 2000, where the laboratory reported a total recoverable concentration of 0.0063 mg/l and a hardness of 49 mg/l as $CaCO_3$. Using the metals translator (EPA, 1996), PG&E estimated a dissolved copper concentration of approximately 0.00605 mg/l, which exceeds the California Toxics Rule, Freshwater Aquatic Life Protection (CTR-FALP) hardness-dependent 4-day average criterion of 0.0049 mg/l. However, observed concentration was from a single sample, and was not a 4-day average and thus is not directly comparable to the criterion. Also, the estimated dissolved fraction was less than all of the other CTR and drinking water criteria. None of the other four samples analyzed for this station had a detectable total copper concentration of 0.00040 mg/l or greater, which converts to a dissolved concentration of less than 0.00038 mg/l. Each of these four estimated concentrations of the dissolved fraction of copper is below the applicable hardness-dependent criteria for the dates sampled.

Total iron concentrations sampled in 2000 exceeded the Title 22 Secondary MCL of 0.3 mg/l at three stations in the NFFR. These stations included the upper and lower ends of the Seneca reach (NF2 and NF4), and the lower end of the Belden reach (NF8). One of the samples analyzed (NFFR below Canyon dam [NF2] during September) had a total iron concentration of 1.7 mg/l. While this concentration is higher than the CTR-FALP instantaneous maximum criterion for dissolved iron (1.0 mg/l), it is unknown whether the concentration of dissolved iron exceeded the applicable criterion.

Dissolved iron concentrations reported for the 2001 sampling program ranged from less than the method detection limit of 0.050 mg/l to 4.02 mg/l. Concentrations of more than the allowable instantaneous maximum of 1.0 mg/l were reported for Lake Almanor at the Canyon dam outlet tower near the bottom (LA1-B) during September to mid-October, and a mineral spring located adjacent to the Canyon dam release structure (MS) during July to November. The highest dissolved iron concentration reported for any of the NFFR stations was 0.273 mg/l, which occurred in the NFFR below Canyon dam (NF2) on October 10.

Total recoverable manganese was detected above the detection limit of 0.00046 mg/l at 17 stations during 2000. Manganese concentrations exceeded the Title 22 Secondary MCL of 0.05 mg/l at the upper and lower ends of the Seneca reach (NF2 and NF4), Caribou No. 1 and No. 2 powerhouse tailraces (CARB1 and CARB2, respectively), the upper end of the Belden reach (NF5), and the Belden powerhouse tailrace (BD2).

Dissolved manganese concentrations reported for the 2001 sampling program ranged from less than the method detection limit of 0.001 mg/l to 3.23 mg/l. Reported values for the NFFR were compared to the Title 22 secondary criterion of 0.05 mg/l. Concentrations of greater than 0.05 mg/l were reported for three stations in the upper 0.6 mile of the Seneca reach in mid-September to mid-October. On both of the days with concentrations of greater than 0.05 mg/l in the Seneca reach, concentrations were reduced substantially between the Canyon dam release (NF2) and Skinner Flat (SF), which is approximately 0.6 mile downstream of the dam. For example, on September 11, the dissolved manganese concentration was 0.755 mg/l at the Canyon dam release and 0.057 mg/l at Skinner Flat.

PG&E's analysis of water samples for total mercury concentrations in 2000 is of limited value because the detection levels (0.2 µg/l) were not adequate for comparison to CTR Human Health Criteria for water and organisms (0.050 µg/l) and organisms only (0.051 µg/l), and the July samples were contaminated in the laboratory by a broken thermometer (personal communication from D. Mayugba, QA Director, ChromaLab Inc., Pleasanton, CA, to B. Mattax, Louis Berger Group, Seattle, WA, August 2, 2000). All of the valid total mercury concentrations reported for 2000 satisfied the CTR-FALP 4-day average criterion of 0.77 µg/l. To provide data sufficient to evaluate compliance with applicable standards, PG&E included total mercury in its supplemental monitoring

program for 2002-2003 (PG&E October 29, 2004, comments on the draft EIS). The maximum total mercury concentration reported for this study was 0.00656 µg/l in a sample collected from the NFFR at Chester in April 2003. None of the reported values exceeded any of the applicable mercury criteria.

The maximum dissolved cadmium concentration measured for the 2002 and 2003 sampling was 0.8 µg/l, which occurred in July 2003 at the Butt Valley powerhouse tailrace. Although it is not possible to determine exceedances of EPA's national 4-day average criteria based on single measurements, three of the discrete samples analyzed had concentrations that were higher than the corresponding EPA national 4-day average cadmium criteria of 0.11 to 0.13 µg/l. These samples included a July 2003 sample from Butt Valley powerhouse with a cadmium concentration of 0.8 µg/l, a July 2003 surface sample from Lake Almanor that had a concentration of 0.15 µg/l, and an October 2002 sample from the NFFR upstream of Lake Almanor that had a concentration of 0.18 µg/l.

The maximum dissolved lead concentration measured in the 2002 and 2003 samples that reached the laboratory in acceptable condition was 0.68 µg/l, which was reported for October 2002 at the Hamilton Branch powerhouse tailrace. All samples of acceptable quality had concentrations of less than all applicable dissolved lead criteria.

Nearly all of the water samples collected during PG&E's studies in 2000 to 2003 had undetectable silver concentrations. As discussed, the detection limits for analysis of samples collected in 2000 exceeded the applicable criteria, but the detection limits were subsequently lowered (to about 0.090 µg/l) by implementing trace metal clean sampling analysis methods for the samples collected in 2002 and 2003. The maximum detectable concentration of dissolved silver measured during PG&E's 2000 to 2003 studies was 0.155 µg/l for a sample collected from the Butt Creek bypassed reach in October 2002. All silver concentrations were well below the applicable criteria.

PG&E also evaluated bioaccumulation of mercury, silver, and PCBs in fishes and crayfish during 2001, 2002, and 2003. In 2001, PG&E collected fish and crayfish from the Belden forebay and Belden reach and analyzed homogenized whole organism samples. Prior to the 2002 sampling, PG&E modified its sampling and analysis protocol to target the collection of fish species and sizes that would represent fish caught by sport fishers and to analyze samples of fillets for total mercury, instead of methylmercury, concentrations. Because most of the mercury accumulated in fish is generally in the form of methylmercury and methylmercury analysis is relatively expensive, EPA (2000) recommends analysis of total mercury as a conservative surrogate of methylmercury in fish and shellfish tissue. The revised protocols resulted in analyzing fillets of fish collected from Butt Valley reservoir in 2002 and 2003 for total mercury concentrations and fillets of fish collected from the Belden forebay and the NFFR immediately downstream of the Oak Flat spoil pile in 2002 for PCB concentrations. Table 3-10 summarizes the results of the contaminant bioaccumulation studies conducted between 2001 and 2003.

Table 3-10. Fish and crayfish tissue analysis results for silver, mercury, and PCBs in Butt Valley reservoir, Belden forebay and Belden reach, 2001–2003.[a] (Source: PG&E, 2002a, October 29, 2004, comments on the draft EIS)

Year	Species	Number of Organisms	Length (mm)	Silver (µg/kg)	Methyl Mercury (µg/kg)	Hg (II) (µg/kg)	Total Mercury (µg/kg)	Total PCBs (µg/kg)
Butt Valley Reservoir								
2002	Rainbow trout	6	266–555	--	--	--	70–120	--
2002	Brown trout	2	538–565	--	--	--	130–200	--
2003	Smallmouth bass	9	255–369	--	--	--	60–150	--
Belden Forebay								
2001	Rainbow trout	1	229	14	53.5	1.1	54.5	2.60
2001	Brown trout	1	280	10	68.1	1.4	70.6	9.70
2001	Smallmouth bass	2	175–180	2–4	55.6–111.0	1.0–3.3	56.7–114.0	5.70–14.90
2001	Sacramento sucker	3	333–358	5–6	53.2–91.1	1.4–1.9	54.7–92.8	11.00–14.60
2001	Signal Crayfish	~12[b]	Various	23	31.5	1.8	33.3	0.80
2002	Rainbow trout	6	245–572	--	--	--	--	2.35–6.9
2002	Smallmouth bass	6	286–397	--	--	--	--	0.67–3.15
2002	Sacramento sucker	3	376–395	--	--	--	--	3.33–6.59
NFFR downstream of Dredge Disposal Pile								
2001	Rainbow trout	4	172–295	--	--	--	--	5.10–6.70

Year	Species	Number of Organisms	Length (mm)	Silver (µg/kg)	Methyl Mercury (µg/kg)	Hg (II) (µg/kg)	Total Mercury (µg/kg)	Total PCBs (µg/kg)
2001	Sacramento sucker	4	360–425	--	--	--	--	2.30–7.30
2001	Signal Crayfish	~6[b]	Various	--	--	--	--	0.20
2002	Rainbow trout	6	203–276	--	--	--	--	0.93–3.42
2002	Sacramento sucker	6	349–413	--	--	--	--	0.62–4.51

-- indicates not reported; NA indicates not applicable.

[a] Tissue analyses for 2001 samples were conducted on whole specimens (i.e., entire fish and crayfish were homogenized); whereas analyses for 2002 and 2003 were conducted on fillets.

[b] Single composite sample was analyzed.

The concentration of silver in all whole-organism samples of the fish and crayfish sampled during 2001 ranged from 2 μg/kg in smallmouth bass to 23 μg/kg in the composite sample of crayfish in Belden forebay. These results indicate that body burdens of silver in fish and crayfish are generally low in the Belden forebay.

Methylmercury concentrations reported for whole-organism samples of fish and crayfish collected from the Belden forebay in 2001 ranged from 31.5 μg/kg for the composite crayfish sample to 111 μg/kg in a smallmouth bass. Comparison of the total mercury and methylmercury for each sample indicates that from 95 to 98 percent of the mercury is in the methylated form. This evaluation confirms that total mercury concentrations are generally representative of methylmercury concentrations in tissues of the species sampled. Results of the 2002–2003 study of fish fillets from Butt Valley reservoir indicated that total mercury concentrations ranged from 60 to 200 μg/kg and tended to be highest in the largest fish.

Various agencies have established mercury concentrations that they use as screening values to protect the health of humans and wildlife. The U.S. Food and Drug Administration (2000) developed and currently has an action level of 1,000 μg/kg methylmercury in edible portions of fish and other aquatic organisms to protect human health. The California Office of Environmental Health Hazard Assessment (COEHHA) established a screening value of 300 μg/kg following the EPA-recommended approach to identify chemical contaminants in fish tissue that may be of human health concern for frequent consumers of sport fish (Brodberg and Pollock, 1999). SWRCB established a maximum tissue residue concentration for mercury at 370 μg/kg to be used as a guideline indicator of potential human health concerns (Rasmussen, 2000). FWS evaluated whether the 300-μg/kg screening value set for human health also would protect the health of bald eagles, based on consumption of various trophic levels of fish, birds, and other terrestrial organisms (Russell, 2003). This evaluation indicates that applying the 300-μg/kg screening value to the highest tropic level (e.g., adult bass) should sufficiently protect the health of bald eagle populations. All of the fish or crayfish samples analyzed had total mercury concentrations of less than the U.S. Food and Drug Administration (FDA) action level, COEHHA screening value, SWRCB maximum tissue residue level, and FWS level to protect bald eagles, suggesting that methylmercury is not at concentrations that cause significant risk to populations of humans and bald eagles.

Total PCB concentrations (a summation of the 209 separate cogeners for each sampled organism) for whole-organism samples ranged from 0.8 μg/kg in the composite crayfish sample to 14.9 μg/kg in a smallmouth bass in the Belden forebay and from 0.2 μg/kg in the composite crayfish sample to 7.3 μg/kg in a Sacramento sucker in the Belden reach below the Oak Flat spoil pile. Total PCB concentrations in fillet samples from fish collected in 2002 ranged from 0.67 to 6.9 μg/kg for the Belden forebay and 0.62 to 4.51 μg/kg for the Belden reach downstream of the Oak Flat spoil pile.

Federal and state regulatory agencies have developed screening values for total PCBs to be used as indicators of potential increases in health risks of humans and wildlife. Screening values for potential increases in human health risks include the FDA tolerance level used to prohibit interstate commerce of fish flesh of 2,000 μg/kg, the SWRCB screening value for California lakes of 20 μg/kg (Brodberg and Pollock, 1999), the EPA (2000) screening values of 20 μg/kg for recreational fishers and 2.45 μg/kg for subsistence fishers. All of the fish or crayfish samples analyzed had total PCB concentrations of less than the 2,000-μg/kg FDA tolerance level and the 20-μg/kg screening values of SWRCB for California lakes and EPA for recreational fishers. However, many of the fillet samples and the whole-organism samples exceeded the 2.45-μg/kg screening value set to indicate potential risk to subsistence fishers, This value is based on the 99th percentile consumption rate of fish and shellfish from estuarine and fresh waters (142.4 grams, 5 ounces) uncooked per day and an average body weight of 70 kilograms (154 pounds). In samples collected from the Belden forebay, 83 percent of rainbow trout fillets, 17 percent of the smallmouth bass fillets, and all of the Sacramento sucker fillets exceeded the 2.45-μg/kg screening value. Downstream of the Oak Flat spoil pile, fillet samples exceeded the 2.45-μg/kg screening value less frequently (17 percent of the rainbow trout and 50 percent of Sacramento suckers).

Screening values for the protection of piscivorous wildlife is very limited, and no California guidelines have been set. Therefore, we use the National Academy of Sciences and National Academy of Engineering (1973, as cited in Riva-Murray et al., 2003) guideline of 500 μg/kg and New York State Department of Environmental Conservation screening value of 110 μg/kg (Newell et al., 1987, as cited in Riva-Murray et al., 2003) to suggest potential increased risk to the health of piscivorous wildlife. All of the 2001 whole-organism and 2002 fillet samples had total PCB concentrations that were well below the 500-μg/kg and 110-μg/kg screening values used as indicators of potential health risks to piscivorous wildlife.

Four samples (three Sacramento suckers and one smallmouth bass) from the Belden forebay exceeded the EPA screening level of 10 μg/kg for PCBs; however, all of these tissue levels were below the FDA allowable level of 2,000 μg/kg.

Odors and Sulfide

PG&E reported that hydrogen sulfide odors were evident at the NFFR release from Canyon dam in both 2000 and 2001. During summer 2001, PG&E included an evaluation of conditions that could lead to odor problems in its investigation of the water quality of late summer releases from Canyon dam. Odor and sulfide levels were sampled during four events between July 10 and October 10 during typical operations of releasing 35 cfs into the upper end of the Seneca reach through the lower gates of the Canyon dam outlet tower.

Odors monitored during these four days ranged from less than 2 to 4 odor units reported as threshold odor number (TON).[15] Values of greater than the 3 Odor unit (reported as TON) Drinking Water Secondary MCL were reported for two of the 32 samples taken. These high values (4 TON) were reported for October 10 near the bottom of Lake Almanor near the Canyon dam outlet tower (LA1-B) and the NFFR at the Canyon dam release (NF2).

Sulfide concentrations measured during these four days ranged from less than 0.0017 to 0.504 mg/l. The highest values were reported for near the bottom of Lake Almanor (LA1-B) between September and mid-October. Sulfide concentrations at this station increased rapidly from less than 0.0017 mg/l in August to 0.504 mg/l in September and then declined to 0.221 mg/l on October 10. Measured sulfide concentrations exceeded 0.005 mg/l at two of the other stations monitored during 2001. At the mineral spring located adjacent to the Canyon dam release structure (MS), sulfide concentrations of 0.0102, 0.0081, and 0.0059 were reported for July 10, August 8, and October 10, respectively. At the Canyon dam release into the NFFR (NF2), a sulfide concentration of 0.0086 mg/l was reported for October 10.

MTBE

MTBE, an additive to gasoline, which makes it burn more efficiently, could enter the project's reservoirs as a result of power boating. On August 17, 2000, PG&E collected near-surface and near-bottom waters of Lake Almanor and Butt Valley reservoir (LA1-S, LA1-B, BV2-S, and BV2-B) for MTBE analysis. Each of the four samples collected had a non-detectable MTBE level at a method detection limit of 0.005 mg/l. These limited data do not suggest any exceedances of the primary or secondary drinking water MCLs for MTBE.

Lake Almanor Shoreline Erosion

In 1957, PG&E executed a legal agreement, referred to as the Clifford Deed, with Edward A. Clifford and Josephine Clifford, landowners of property adjoining the project boundary at 4,500 feet (PG&E datum). The Clifford Deed grants PG&E the right to flood or erode lands owned or acquired by the Cliffords by wave action, seepage, or other actions of the water (Clifford et al., 1957) up to elevation 4,510.2 feet (PG&E datum). This agreement perpetuates with land sales, and PG&E reports that it is thereby effective on 733 of the approximate 1,000 residential lots adjoining the project boundary around Lake Almanor at an elevation of 4,500 feet (PG&E datum).

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[15] Odors are measured by having individuals evaluate whether samples diluted with odor-free water have a perceptible odor, and are reported as the ratio of the greatest dilution sample with a definitely perceptible odor (e.g., a sample reported as 3 TON had a perceptible odor when diluted 2 odor-free water to 1 sample water).

Under PG&E's existing shoreline management program, adjacent property owners can obtain permits for installing erosion control structures on PG&E lands below the 4,500-foot contour (PG&E datum). PG&E reports that 70 riprap permits have been issued to private parties under this program. In addition, PG&E has placed riprap on its lands adjoining 267 properties that are not under the Clifford Deed in order to prevent erosion from extending above an elevation of 4,500 feet.

Two years before increasing the normal maximum operating level of Lake Almanor to elevation 4,494 feet (PG&E datum) in 1976, Dames and Moore assessed the potential for shoreline erosion. PG&E reports that, because the original Dames and Moore report is no longer available, it used the 1975 Environmental Data Report as the source of information for the results from the study. The study concluded that the potential for erosion below elevation 4,490 feet (PG&E datum) was minimal because of low-gradient shoreline slopes. Above elevation 4,490 feet (PG&E datum), erosion was categorized by its severity and mapped. This study concluded that:

- 23 percent of the shoreline had significant erosion as determined by noticeable slope scars on the shoreline and sloughing of material into water;
- 55 percent of the shoreline had slight erosion determined by slight slope scars resulting from small wave cutting action; and
- 22 percent of the shoreline had no detectable erosion.

In 2000 (nearly 24 years after implementing the increased maximum lake level), PG&E again surveyed shoreline erosion. This survey included mapping shoreline erosion by boat with emphasis on the eastern lobe of Lake Almanor where the banks are steeper and potential for erosion is higher. Bank slopes were determined between elevation 4,490 and 4,494 feet (PG&E datum), and erosion was categorized using the same criteria as the 1974 Dames and Moore survey. Results of the 2000 survey indicate that substantial localized erosion occurs along the eastern shore of the eastern lobe and the western shore of the Almanor peninsula. Overall, approximately 4.2 miles (7 percent) of the 58-mile-long shoreline has noticeable slope scars.

3.3.1.2 Environmental Effects

Water Quantity

Reservoir Water Levels and Flows in the Bypassed Reaches

Although reservoir water level management, minimum flows in the bypassed reaches, block loading of the Belden powerhouse, winter pulse flows, summer recreational flows, and ramping rates associated with controlled releases are hydrological functions, their consequences primarily influence habitat for aquatic and riparian organisms and recreational resources. Therefore, we discuss these measures in

sections 3.3.2, *Aquatic Resources*, 3.3.3, *Terrestrial Resources*, and 3.3.5, *Recreational Resources*.

Flow and Water Level Monitoring

In the SA (PG&E, 2004a), PG&E proposes to continue monitoring flows in the Seneca and Belden reaches at its NF-2 (USGS gage No. 11399500), and NF-70 (USGS No. 11401112) stream gages under the general supervision of the USGS, and to rehabilitate the NF-9 gage (Butt Creek near Caribou) to enable flow measurement in lower Butt Creek. PG&E would complete any necessary modifications to the NF-2 and NF-70 gages for the purpose of measuring the new minimum instream flow (MIF) within 3 years of license issuance. For compliance purposes, the SA dictates that all daily mean flows should be at least as high as the monthly MIF, and the 15-minute streamflows at the compliance gages should be at least 90 percent of the applicable MIF. PG&E also would develop a stage vs. discharge rating curve for the NF-9 gage that would not be required to meet USGS standards, and would read the staff gage at this station on or about April 1, June 1, August 1, and October 1. In addition, PG&E would make daily midnight storage and water surface elevation (rounded to the nearest 100 acre-feet and 0.1 foot, respectively) of Lake Almanor available on the Internet within 7 to 10 days.

In its November 4, 2004, letter to the Commission, the FS specifies, as paragraphs 5 and 8 of final Section 4(e) condition no. 25, that PG&E operate and maintain the existing gages at NF-2, NF-70, and NF-9; and the FS specifies, as paragraph 11 of final Section 4(e) condition no. 30, that PG&E make Lake Almanor water level and storage information available as described above for the SA.

Our Analysis

The purpose of flow and water level monitoring in the context of this analysis is to allow the Commission to be able to verify compliance with flow and water surface elevation requirements that are included in a new license issued for a project. To verify compliance with MIF and specific water surface elevation requirements discussed in section 3.3.2, *Aquatic Resources*, it is necessary to monitor flows in the Seneca and Belden reaches, as well as water surface elevations in Lake Almanor, Butt Valley reservoir, and Belden forebay.

PG&E gages NF-2 and NF-70 currently monitor flows in Seneca reach and Belden reach, respectively. PG&E also currently monitors water surface elevations in Lake Almanor (NF-1), Butt Valley reservoir (NF-8), and Belden forebay (NF-67). Continued operation of the above gages would allow evaluation of compliance with required MIF and water surface elevations.

As discussed in section 3.3.2, *Aquatic Resources,* PG&E is also required to ensure that it takes no action that would reduce existing inflow to lower Butt Creek.

Although no measure proposed for this license explicitly reduces flows below the Butt Valley dam, it is possible that the change in reservoir operations after relicensing may affect groundwater recharge and leakage, which would correspondingly affect inflows to lower Butt Creek. However, as shown in section 3.3.2, the elevation in Butt Valley reservoir is likely to be the same or higher than currently observed. Since increased reservoir elevation would cause an increase in the hydraulic pressure pushing leakage through dam facilities, and would also result in an increase to the groundwater available for inflow to lower Butt Creek through exfiltration from the reservoir, the flows in lower Butt Creek are likely to be unchanged or increase slightly due to operational changes required in this license.

As part of the licensing of PG&E's downstream Rock Creek-Cresta Project, the Commission included a requirement to develop a flow and water temperature monitoring plan in the license order for that project. PG&E filed this plan with the Commission on October 23, 2002, and the Commission approved the plan on February 28, 2003. Under the approved plan, PG&E would monitor flow at 10 USGS gaging stations and 6 ungaged stations in the UNFFR Project area from June 1 through September 30 for 15 years, including gaging stations NF-2, NF-70, and NF-9. As part of the plan, gaging stations that historically have contributed greater than 10 percent of the flow in the main stem, including NF-9, are to be gaged with continuous stage recorders.

Although PG&E currently operates gaging sufficient to ensure compliance with MIF and water surface elevation requirements as discussed above, PG&E's coordination of the collection and reporting of this data would ensure that compliance is continually checked and confirmed, and the Commission can easily verify compliance as warranted.

Water Quality

Water Quality Monitoring Program

The SA (PG&E, 2004a) includes a multi-faceted WQMP that would provide data to evaluate a reasonable protection of beneficial uses of the project waters and identify project-related changes in water quality that may occur over time.

According to the SA, within 3 months of issuance of a new license for the project, PG&E would develop monitoring plans that provide specific details, analytical methods, sampling protocols, and QA/QC procedures to be used in the initial monitoring studies for the five facets of the WQMP, in consultation with SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP. The WQMP would be adaptive and may be modified to more effectively focus on specific project-related water quality conditions identified in project waters, if agreed to by PG&E, SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP. PG&E would

also develop, in consultation with these same parties, any future modification of the initial water quality monitoring plans. The initial water quality monitoring plans and any subsequent revisions would be filed with the Commission for approval.

PG&E would analyze the water quality data collected and prepare an annual water quality report containing elements consistent with reporting requirements from all of the plans under the WQMP, and provide the report to the Commission, SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP by no later than March 15 of the following year. If an adverse trend in water quality is determined to be a result of O&M of the project, PG&E would develop and implement measures to mitigate project-related effects on water quality. PG&E would convene a discussion group meeting between April 15 and 28 once annually at least 30 days following distribution of the annual water quality monitoring report.

As described in the SA, the WQMP would include the following five components:

- Canyon Dam Mitigation Measures Evaluation—The objective of this sampling program is to evaluate the adequacy and efficacy of mitigating elevated odor and dissolved metal levels in the Seneca reach through seasonal gate switching at the Canyon dam outlet tower. PG&E would (1) conduct *in situ* monitoring of temperature, DO, pH, specific conductance, and turbidity throughout one vertical profile in Lake Almanor near the Canyon dam outlet tower at 1-meter intervals during June, July, August, September, and October; (2) sample hydrogen sulfide, iron, manganese, and arsenic at the surface and bottom of Lake Almanor and at three locations in the Seneca reach during the September and October sampling events; and (3) collect a sediment sample from Lake Almanor near Canyon dam during the October sampling event and analyze it for hydrogen sulfide, sulfate, iron, manganese, and arsenic. Sample timing would be coordinated with switching the release flow path from the lower gate to the upper gate at the Canyon dam outlet tower. September sampling would be done prior to the gate switch, and October sampling would be done after the gate switch. Monitoring would begin in the first year after issuance of a new license for the project, and would be conducted in a minimum of 6 water years with various hydrologic conditions. After sampling has been conducted in 2 wet water years, 2 normal water years, and 2 dry/critically dry water years after issuance of a new license for the project, PG&E would make a determination of the effectiveness of the mitigation measure and need (if any) for additional monitoring or development and implementation of alternative measures in consultation with SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP.

- Selected Water Quality Monitoring—PG&E would conduct a special study to identify the cause of high dissolved cadmium and specific conductance levels in waters of the upper NFFR that were measured in 2002-2003. Monitoring would be conducted seasonally (spring, summer, and fall) at 20 specified locations within the upper basin, and would include analysis of dissolved cadmium, total hardness, temperature, DO, pH, specific conductance, and turbidity. At a minimum, this sampling program would be conducted in years 1 and 2 after issuance of a new license.

- Lake Almanor Water Quality Monitoring Program—The objectives of this monitoring program are to monitor long-term water quality trends in Lake Almanor; and determine if the water quality protects the designated beneficial uses for Lake Almanor and meets water quality objectives outlined in the Basin Plan (CVRWQCB, 1998), California Toxics Rule criteria (40 CFR Part 131), and National Recommended Ambient Water Quality criteria (EPA, 2002). PG&E would monitor the water quality of Lake Almanor at three representative locations: (1) in the channel near the Canyon dam outlet tower, (2) in the western lobe, and (3) in the eastern lobe. Sampling would include:

  1. monitoring *in situ* parameters (including temperature, DO, pH, specific conductance and turbidity), at 1-meter intervals;
  2. measuring Secchi depths; and
  3. collecting and analyzing surface and near-bottom samples for general analytes (hardness, sulfate, total alkalinity, and total suspended solids), minerals (calcium, chloride, magnesium, potassium, and sodium), metals (total concentrations[16] of aluminum, arsenic, cadmium, copper, iron, manganese, mercury, nickel, silver, and zinc), nutrients (nitrate+nitrite, total ammonia, orthophosphate, total phosphorous, total organic nitrogen, total Kjeldahl nitrogen, total organic carbon, and chlorophyll-*a*), and petroleum products (MTBE, TPHG,[17] and BTEX[18]).

  PG&E would monitor once per season (spring, summer, and fall) every 5 years beginning in year 3 after issuance of a new license, and continue for the term of the new license. During the new license term, monitoring and

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[16] Dissolved concentrations would be calculated for cadmium, copper, nickel, silver, and zinc as outlined in EPA (1996a).

[17] Total petroleum hydrocarbons as gasoline.

[18] Benzene, toluene, ethylbenzene, and xylenes sampled only at the surface.

reporting requirements may be modified to more appropriately monitor for changes in project operations, regulatory mandates, or focus study needs, or terminated if agreed to by PG&E, SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP. A modification that could be implemented is increasing the sampling frequency for specific parameters to once every 3 years if results exhibit a substantial increasing trend over time or if a parameter that has historically had low levels approaches or exceeds applicable federal or state water quality standards.

- Fish Tissue Bioaccumulation Screening—PG&E would monitor the potential bioaccumulation of silver, total mercury, and PCBs in tissue samples collected from resident catchable-sized (minimum total length of 8 inches) fish in waters of the project. The sampling strategy would be consistent with the field methods developed in the relicensing process in coordination with SWRCB's Toxic Substances Monitoring Program (table 3-11).

  Sampling would target fish with a total length of at least 10 to 12 inches. Silver and mercury analyses would be conducted for fish collected from Lake Almanor, Butt Valley reservoir, and the Belden forebay; and PCB analyses would be conducted for fish collected from Belden forebay. Fish tissue bioaccumulation screening samples would be collected once every 5 years beginning with the first year after issuance of a new license, and continue through the term of the new license. During the term of the license, monitoring and reporting requirements may be reduced or terminated after it is demonstrated to the satisfaction of SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP that the given requirement is no longer necessary.

Table 3-11. Fish tissue bioaccumulation screening-sampling protocols. (Source: PG&E, 2004a)

Sample Species	Analysis	Sample Description	Alternative Sample Description[a]
Lake Almanor			
Smallmouth bass	Silver and mercury	18 individuals	--
Brown trout[b]	Silver and mercury	9 individuals	--
Brown bullhead	Silver and mercury	2 composites of 3 individuals[c]	--
Butt Valley reservoir			
Smallmouth bass	Silver and mercury	9 individuals	--
Brown trout	Silver and mercury	6 individuals	--
Rainbow trout	Silver and mercury	6 individuals	--
Belden forebay			
Smallmouth bass	Silver, mercury, and PCB	6 individuals	3 composites of 3 individuals[c]
Rainbow trout	Silver, mercury, and PCB	6 individuals	3 composites of 3 individuals[c]
Sacramento sucker	Silver, mercury, and PCB	2 composites of 3 individuals[c]	2 composites of 3 individuals[c]

[a] This sample set may be prepared and analyzed rather than the one listed in the column to the left.

[b] Sacramento pikeminnow may be substituted, if brown trout can not be reasonably obtained.

[c] The total length of all individuals included in each composite sample must fall within a 25 percent range of one another.

- Bacteriological Sampling—PG&E would conduct bacteriological monitoring consistent with the Basin Plan objectives for protection of the water contact recreation beneficial uses at 10 locations in the project boundaries. Sampling would include five annually rotating stations

(stations would be selected on an annual basis and may differ by year) at PG&E-owned or managed recreation sites around Lake Almanor, three rotating stations at PG&E-owned or -managed recreation sites around Butt Valley reservoir, and two stations at recreation sites on the upper NFFR. PG&E would select sampling locations by April 30 for each upcoming field season by consulting SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP. Five samples would be collected at each of the 10 selected sampling locations during the 30-day period that spans either the Independence Day holiday or the Labor Day holiday. Bacteriological monitoring would be conducted annually for the first 5 years after license issuance and once every other year for the remaining term of the new license. This monitoring program may be modified or terminated if agreed to by PG&E, SWRCB, CVRWQCB, Plumas County, the FS, CDFG, FWS, and other parties who request involvement in the WQMP.

In its comments on the draft EIS, filed with the Commission on November 1, 2004, the FS states that it fully supports the water quality component of the SA.

In its comments on Scoping Document 1, letter filed with the Commission on July 7, 2003, Plumas County recommends that PG&E be required to augment the water quality monitoring plan if it is insufficient to ensure that water quality problems would be detected.

Our Analysis

We agree there is a need to document that water quality conditions under any new license issued meet applicable federal and state water quality standards and meet the objectives of applicable management plans. These standards are set to protect the designated beneficial uses of surface waters. Any new license issued for the project is expected to include measures that would alter water quality in project impoundments and stream reaches. Although PG&E conducted studies to evaluate the effects that implementing various measures would have on water quality, it has not determined with reasonable certainty the effects of some measures. For instance, its test of using the upper-level Canyon dam intake gates during the fall was done under lower than normal Lake Almanor water levels, which may have resulted in substantially different results than would occur under a higher reservoir level.

Our review of available water quality information (section 3.3.1.1, *Water Quality*) indicates that project waters typically comply with the applicable federal and state standards for most water quality parameters. However, the available information indicates that the applicable criteria for water temperature and DO are frequently not satisfied in some areas, and it is questionable whether other water quality standards including specific conductance and some trace metals are typically satisfied throughout project waters. We discuss these in the following section.

Our review of temperature data reported by PG&E indicates that daily mean water temperatures of greater than 20°C generally occur more than 20 percent of the time from June through September throughout the Belden reach; in near-surface waters of Lake Almanor and Butt Valley reservoir; and in discharges from the Butt Valley, Caribou No. 1, Caribou No. 2, and Belden powerhouses (see table 3-7). Under the terms of the Rock Creek-Cresta SA (PG&E, 2000a), PG&E is required to evaluate and potentially modify the Prattville intake, implement other options for using the coldwater supply in Lake Almanor and Butt Valley reservoir, and/or implement other measures to attain cooler temperatures in the NFFR downstream of the Caribou developments. Implementation of these measures for the Rock Creek-Cresta Project along with altering operations of this project under any new license could substantially alter the thermal regimes of Lake Almanor, Butt Valley reservoir, and the NFFR downstream of the Caribou developments. We evaluate the effects of these measures below in our discussion of *Water Temperature and Dissolved Oxygen Management*.

DO concentrations of less than 7.0 mg/l are common near the bottom of Lake Almanor, Butt Valley reservoir, and Belden forebay; and occur occasionally in the surface waters of Lake Almanor and Butt Valley reservoir along with the Butt Valley, Caribou No. 1, Caribou No. 2, and Belden powerhouse tailraces (see table 3-8). Data collected by PG&E in 2000, 2002, and 2003 indicate DO levels generally satisfy the applicable standard in the Seneca, Belden, and lower Butt Creek bypassed reaches. DO levels could be altered in Lake Almanor and the Seneca reach if the Commission adopts PG&E's proposal to shift its typical use of the lower gate at the Canyon dam outlet tower to the upper gate from September and October. We address the effects of modifying the Prattville intake and other temperature control options being considered below in our discussion of *Water Temperature and Dissolved Oxygen Management*, and discuss the need for monitoring effects of switching the Canyon dam outlet tower gate used in our discussion of *Odors and Metals in the Seneca Reach*.

During relicensing studies for this project, PG&E conducted evaluations of the concentration of metals in water; however, not all of these studies analyzed the dissolved metal fraction, where appropriate, or had method detection limits sufficient to verify compliance with applicable criteria. PG&E modified its monitoring protocol for trace metals to address these concerns and sampled 20 stations throughout the UNFFR basin in fall 2002 and spring and summer 2003. PG&E reported relatively high concentrations of dissolved cadmium in samples collected from the NFFR near Chester (NF1), Lake Almanor near Canyon dam surface (LA1-S), and Butt Valley powerhouse tailrace (BV1). However, the sampling protocol did not support a comparison with the EPA 4-day average criteria.

PG&E also reported that specific conductance values exceeded the Basin Plan criterion of 150 μmhos/cm at six stations located in the Project's bypassed reaches and two tributaries to the Belden reach. Our review of the data suggests that the high and variable conductivity in these reaches may be primarily reflective of the geology and

hydrology of the project area. This is supported by the higher conductivity observed in non-project affected tributaries than below project reservoirs, and reduced conductivities at higher flow levels at some locations, suggesting that lower conductivity surface water is diluting higher conductivity groundwater. A potential project impact is an increase in conductivity in bypass reaches caused by reduced dilution of groundwater-origin flows resulting from flow diversions.

Data obtained during implementation of a monitoring program consistent with the selected water quality monitoring described in the SA would provide additional information on both spatial and seasonal differences in these parameters. We anticipate that seasonal monitoring for a period of 1 to 3 years in combination with the results of PG&E's 2002 and 2003 studies, filed on October 29, 2004, should be sufficient to determine the extent and cause(s) of elevated dissolved cadmium and specific conductance levels and identify potential measures to remedy the situation, if the cause(s) is due to the project. We note that implementation of this monitoring program could provide sufficient information to determine the cause(s) and potential remedies in less than 3 years; review of the results of the study annually by PG&E and the appropriate agencies could determine the cause(s) and potential remedies, if necessary, and determine if monitoring should be reduced or terminated.

Lake Almanor's limnology could be substantially influenced by operational changes incorporated into a new license for this project, although these changes would be expected to improve water quality conditions. However, we acknowledge the need to document compliance with federal and state water quality standards under any new license. We conclude that it would be appropriate to monitor water quality conditions in Lake Almanor for the first wet, normal, and dry/critically dry year of any new license period to document water quality conditions that result from the modified operations. In this manner, the effects of the new operations could be readily evaluated and corrective actions, if necessary, could be made within a few years of implementing the new license terms. We concur with the SA that *in situ* monitoring of the identified water quality parameters; measuring Secchi depths; and analyzing general analytes, minerals, metals, nutrients, and petroleum products seasonally at the three indicated locations would be appropriate to document conditions in the reservoir. Data collected could be used to determine compliance with applicable federal and state water quality standards for trace metals and other water quality parameters.

Although monitoring Lake Almanor once every 5 years for the term of any new license would provide data that could be used to assess long-term trends, it is not the objective of our recommended monitoring plan and it would unnecessarily prolong determination of any adverse effects that may occur and could delay implementation of corrective actions, if necessary. We acknowledge that modifying the Prattville intake also could substantially affect Lake Almanor's limnology, as discussed later in this section. However, PG&E has not proposed modifying the Prattville intake. We conclude that monitoring Lake Almanor water quality early in any new license period

would sufficiently document project-induced changes in the lake's water quality. If the Prattville intake is later modified, it would be beneficial to conduct monitoring to document the resulting water quality conditions in Lake Almanor.

Natural, project-related, and other human-related activities have led to the concentration of metals in the sediments of Lake Almanor, some of which are subsequently mineralized and dissolve into water when DO concentrations are low at the water/substrate interface. The anoxic conditions and generally neutral pH near the bottom of Lake Almanor, along with the long hydraulic residence time (average of about 290 days), result in methylation of mercury and a buildup of mercury in the reservoir's deep water. Methylmercury concentrations may increase substantially in the overlying water column upon fall turnover of the reservoir, be drafted through the Prattville intake and discharged into the Butt Valley reservoir, and then on to the Belden forebay and the Belden reach. PG&E's cloud seeding operations, which vaporize a silver iodide/acetone solution, increase the potential for elevating silver concentrations in precipitation and subsequently surface waters. Although, the LACSP does increase the potential for silver to be introduced to Lake Almanor and consequently other project water bodies, results of PG&E's 2002–2003 study indicate that silver concentrations in water are substantially less than the applicable criteria. Concentrations of PCBs in water and biota in the project area are probably largely a result of the 1984 Caribou landslide.

Trace metals and PCBs can bioaccumulate and may, in some cases, present a hazard to the health of both biota and humans. To evaluate bioaccumulation, PG&E sampled silver, mercury, and PCB concentrations in whole-organism samples of various fish species and crayfish collected in 2001 and fillet samples of fishes collected in 2002 and 2003. The results of these studies are summarized in table 3-10. These results indicate that some silver, mercury, and PCBs are accumulating in fish and crayfish tissues. We conclude that biomagnification (higher concentrations of contaminants in successive levels of the food chain) of methylmercury and PCB could lead to elevated concentrations of these contaminants in these organisms' predators, including birds of prey and humans (Eisler, 1987, 1986). However, biomagnification of silver is unlikely (Howe and Dobson, 2002).

After reviewing the results of the 2001 bioaccumulation study, SWRCB and CDFG became concerned that the mercury and PCB concentrations reported could represent a risk to human health, and requested that PG&E evaluate that risk through further sampling. Subsequently, PG&E analyzed fish fillets for these contaminants in 2002 and 2003. The fillet sampling results suggest that methylmercury concentrations do not generally bioaccumulate to levels that significantly increase health risks for either humans or piscivorous wildlife. Results of sampling fish fillets for PCB concentrations suggest that PCBs bioaccumulate in fishes residing in the Belden forebay and the NFFR near the Oak Flat spoil site to concentrations that may potentially cause a

health hazard for subsistence fishers that consume an average of 142.4 grams (5 ounces) per day of uncooked fish.[19] There is no evidence of any subsistence fishers currently using the project area. However, the results indicate that bioaccumulation of PCBs in fish do not significantly increase health risks for recreational fishers.

Implementation of the fish tissue bioaccumulation screening identified in the SA would provide additional information on the levels of mercury, PCBs, and silver in fishes in project impoundments. We question the value of analyzing fish samples for silver, however; because sampling indicates that silver body burdens are low, silver does not typically biomagnify, and we are not aware of an established action or screening level that represents the risk to human health. We conclude that monitoring for bioaccumulation of mercury and PCBs under any new license by sampling and analyzing fishes in a standardized fashion at intervals of 5 years for a period of 15 years would provide adequate information to document changes in body burdens that may be caused by altered project operations under a new license and to assess risk to the health of humans and piscivorous wildlife.

The results of historical monitoring conducted by CDWR and Henrici along with PG&E's screening-level and Basin-Plan-level investigations of fecal coliform densities suggest that fecal coliform standards set in the Basin Plan are generally satisfied in project waters. However, maintaining Lake Almanor at a higher level as PG&E proposes or project or non-project sources may result in increased contamination of Lake Almanor waters and could result in exceedance of the criteria for water contact recreation. Results of monitoring fecal coliform levels using a method that is consistent with the Basin Plan criterion and targets high recreational use periods such as the Independence Day or Labor Day holidays would ensure that project waters comply with the standard.

We concur with CDFG that it would be appropriate to select sampling stations prior to each season of monitoring based on the presence of water contact recreation and sources of potential introduction of pathogens to the water column in the immediate area. However, we conclude that by monitoring coliform levels for the first 3 years would sufficiently document coliform levels and identify non-compliance with the standard, should it occur. As recreational use of the area increases and additional recreational facilities are developed and used there could be increased contamination of surface waters. The recreation management plan discussed in section 3.3.5, *Recreational Resources*, would address appropriate actions to minimize contamination from new recreational developments and any monitoring of the effects of these developments on water quality. It is also possible that ongoing erosion along the shoreline of Lake Almanor could potentially result in contamination of the lake's waters by interception of leach fields located adjacent to eroding areas. Implementation of the

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[19] Assuming the person weighs 70 kilograms (154 pounds).

Shoreline Management Plan discussed in *Lake Almanor Shoreline Erosion* below would address appropriate actions to determine if shoreline erosion is resulting in contamination from leach fields and appropriate measures to remedy the situation, if necessary.

Water Temperature and Dissolved Oxygen Management

Daily mean water temperatures in the Belden reach frequently exceed 20°C during June through September (see table 3-7) and, as such, become suboptimal for trout. In addition, the daily mean temperature of water discharged from the Belden powerhouse frequently exceeds 20°C during July through September. As water flows downstream, its temperature tends to further increase as it equilibrates with ambient conditions, which generally include warmer air temperature (Moore and Miner, 1997). In years when Lake Almanor summer water surface levels are substantially below full pool, resulting in the drafting of warmer water, water temperatures in the Rock Creek and Cresta reaches can exceed 20°C by as much as 1 to 3°C in the Rock Creek and Cresta reaches (PG&E, 2000b, as cited in FERC and Plumas National Forest, 2001; PG&E, 2003b, 2004b), and can exceed 20°C by as much as 2 to 4°C in the Poe reach (PG&E, 2003e).

The SA for the UNFFR Project does not include any measures specifically aimed at addressing water temperature, although some of the measures included could influence water temperatures during critical periods. These measures include revising the flow regimes of the project's bypassed reaches and releasing Seneca reach instream flows from the Canyon dam outlet tower upper-level gate instead of the low-level gate from September 15 through at least November 1.

In its November 1, 2004, filing with the Commission, the FS states that it fully supports the water quality component of the UNFFR SA. In its final terms and conditions filed with the Commission on November 4, 2004, the FS does not provide any provisions addressing water temperature.

As part of the SA for the Rock Creek-Cresta Project, PG&E agreed to conduct a modeling study to predict the effectiveness of modifying the Prattville intake to maintain daily mean water temperatures of 20°C or less in the Rock Creek and Cresta reaches and implement all reasonable practicable control measures (PG&E, 2000a). PG&E has been conducting these feasibility studies, including modeling the water temperature effects of potential Prattville intake modifications, re-operation of the Canyon dam outlet gates, and modification of Caribou No. 2 intake for the past few years. In response to an AIR issued by the Commission on December 17, 2004, PG&E filed several reports addressing this issue on January 13, 2005. PG&E continues to evaluate the feasibility and effectiveness of some potential methods of reducing downstream water temperatures and meets with state and federal agencies, local counties, and interested stakeholders to discuss this issue. In a public statement that

PG&E released on November 18, 2004, it states that it does not anticipate proposing a floating thermal curtain[20] in Lake Almanor as a reasonable control measure for reducing downstream water temperatures in the NFFR. PG&E filed a report on water temperature for the Rock Creek-Cresta Project on July 29, 2005, and amended the report to make it clear that it presented its view, not the view of others including the ERC on September 21, 2005 (PG&E, 2005b). In this report, PG&E states that it had not identified an alternative for which the benefits were commensurate with the corresponding adverse effects and costs and concludes that there are no additional reasonable water temperature control measures for achieving a year-round water temperature of 20˚C or less in the subject reaches.

Interior made its Section 10(j) recommendations in a December 1, 2003, filing with the Commission, and provided modifications to its recommendations in an October 27, 2004, filing with the Commission. On February 3, 2005, Commission staff had a teleconference with Interior and other resource agencies to resolve apparent inconsistencies with the FPA. Interior recommends that PG&E develop a water temperature management plan that includes evaluation of potential effects on the coldwater fishery of the Seneca and Belden reaches, and fund construction/modification of structure(s) to satisfy appropriate water temperature criteria beyond that provided by the Coldwater Habitat and Fishery Mitigation and Enhancement Fund under the relicensing SA for the Rock Creek-Cresta Project. Interior recommends that it be included among the consulted entities during plan development and that the plan be developed within 6 months of license issuance.

In addition, Interior recommends that PG&E establish a process to develop appropriate additional temperature criteria for the Seneca and Belden reaches by season, reach, and outlet location to avoid unintended adverse effects of sublethal temperature stress on aquatic biota as a result of structures or operations that involve planned surface water release discharge. These criteria would be included in the water temperature management plan. The plan would include a schedule for construction of structure(s) demonstrated to reasonably meet temperature targets. PG&E would complete construction within 5 years of license issuance. In the event that any new license does not include a specific measure focused on management of water temperature, Interior requests that PG&E consider temperature effects and the need for management criteria within the context of Interior's 10(j) recommendation no. 13 for adaptive management.

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[20] The floating thermal curtain referred to is a large, flexible geotechnical-fabric sheet held in place with buoys and anchors in front of the Prattville intake to help withdraw water from deeper areas in the lake and thereby reduce the temperature of water discharged from the Butt Valley powerhouse and eventually supplied to the lower NFFR.

On October 12, 2004, Plumas County issued Resolution 04-7076, which states its concerns with the potential to modify the Prattville intake and further evaluate the use of floating curtains in Lake Almanor and Butt Valley reservoir (Plumas County, 2004). This resolution declares the county's adamant opposition to construction of the Prattville intake modification (thermal curtain) because it would substantially degrade the balance of the Lake Almanor and Butt Valley reservoir ecosystems resulting in their fisheries and the local socio-economic status being depressed, be extremely costly to PG&E's ratepayers, would only minimally reduce temperatures in the lower NFFR even with two additional curtains in Butt Valley reservoir, and provide minimal benefit to the lower NFFR fishery. In addition, the county notes that dredging of Lake Almanor for the curtain would apparently disturb cultural and burial sites of the Maidu Tribe.

The Maidu Summit (2004) and Susanville Indian Rancheria (2004) also issued resolutions expressing their opposition to installation of thermal curtains in Lake Almanor or Butt Valley reservoir, and dredging of soil on the bottoms of Lake Almanor and Butt Valley reservoir. Their resolutions support upstream restoration as an alternative method of cooling water in the NFFR.

At the meetings we held to receive comments on the draft EIS, several elected officials or their representatives provided comments on the thermal curtain and further evaluation of alternatives to provide cooler water to the lower NFFR. Representatives of Congressmen Doolittle and Herger, State Senator Aanestad, and Assemblymen Keene and LaMalfa noted that their constituency has expressed a widespread and deep opposition to installing or further study of a "thermal curtain," and recommended that other alternatives to provide cool water be evaluated more extensively.

Special interest groups and numerous members of the public also have expressed their opposition to modifying the Prattville intake or Butt Valley reservoir with a floating curtain(s) and dredging sediments from the bottom of Lake Almanor. In its October 27, 2004 letter, the Butt Lake Anglers Association indicates that using a floating curtain to draft cold water from Lake Almanor should not be considered a reasonable alternative. The Save Lake Almanor Committee filed petitions signed by more than 3,000 people that express vehement opposition to building floating curtains at Lake Almanor and Butt Valley reservoir as well as dredging 42,000 cubic yards of sediment from the bottom of Lake Almanor and placement of that sediment along the Lake Almanor shoreline.

Our Analysis

Several controllable (including project operations) and non-controllable factors can affect water temperatures in the project's impoundments and bypassed reaches and the lower NFFR. Retention of water in project impoundments warms surface waters and increases thermal stratification within the impounded reaches during spring through summer, because the water is exposed to sun and air for longer periods than would

occur naturally. This leads to the supply of warmer water than would naturally occur to downstream reaches during summer and fall, depending on the depth from which the water is drafted. In addition, diverting water from natural stream courses typically causes increases of summer temperatures in most bypassed reaches. However, diverting water around stream reaches that receive substantial groundwater inflow can have a cooling effect compared to natural conditions. Figure 3-5 shows existing NFFR basin summer water temperatures and relative water storage and flow rates to provide an overview of water temperatures in the basin and potential sources of cool water.

During the past 20 years, considerable effort has been expended by PG&E and others to evaluate the effects of numerous factors on water temperatures in the NFFR basin and identify reasonable and practicable ways to reduce summer temperatures in the lower NFFR. PG&E (2005b) summarizes the results of a wide variety of control measures that were evaluated. Potential water temperature control measures that have been evaluated by PG&E can be divided into six primary categories: (1) changes in hydro-project operations; (2) modification of hydro-project facilities; (3) water piping and pumping strategies; (4) implementation of mechanical cooling technologies; (5) enlargement or creation of reservoirs; and (6) management of streamside vegetation.

Evaluations of changes in hydro-project operations included changing instream flows in bypassed reaches of PG&E's hydro-power projects along the NFFR, reducing Butt Valley and Caribou powerhouse flows, and preferential use of the deeper Caribou No. 1 over No. 2 intake and use of deeper gates at the Cresta intake. PG&E evaluated the potential effects of modifying its hydro-project facilities to draft cooler water through the Prattville intake during critical periods and reduce warming of water as it flows through Butt Valley reservoir (see figure 1-1). Potential modifications evaluated for the Prattville intake include two bottom sill designs to promote storage of cold water in Lake Almanor prior to July, six thermal curtain configurations and three pipeline configurations with varying levels of dredging to promote drafting cooler water from Lake Almanor in the critical season. Modifications aimed at reducing warming of water as it flows through Butt Valley reservoir include a skimmer wall located up-reservoir of the Caribou intakes, two thermal curtains in the reservoir, and extending the Caribou No. 2 intake with a pipeline to draft deeper water.

The only piping and pumping strategy that was evaluated for the NFFR Project area was piping water from the lower end of the Seneca reach to just downstream of the Belden dam. Piping and pumping strategies evaluated for downstream reaches of the NFFR include piping water from Yellow Creek or the Bucks Creek powerhouse to just downstream of the next dam on the NFFR, piping water from Poe tunnel adit No. 1 to the NFFR near Bardee's Bar, pumping water from Lake Oroville to just downstream of each of PG&E's three lowermost dams on the NFFR, and pumping well water to the NFFR. Measures that would implement mechanical cooling technologies include installation of cooling towers and water chiller systems.

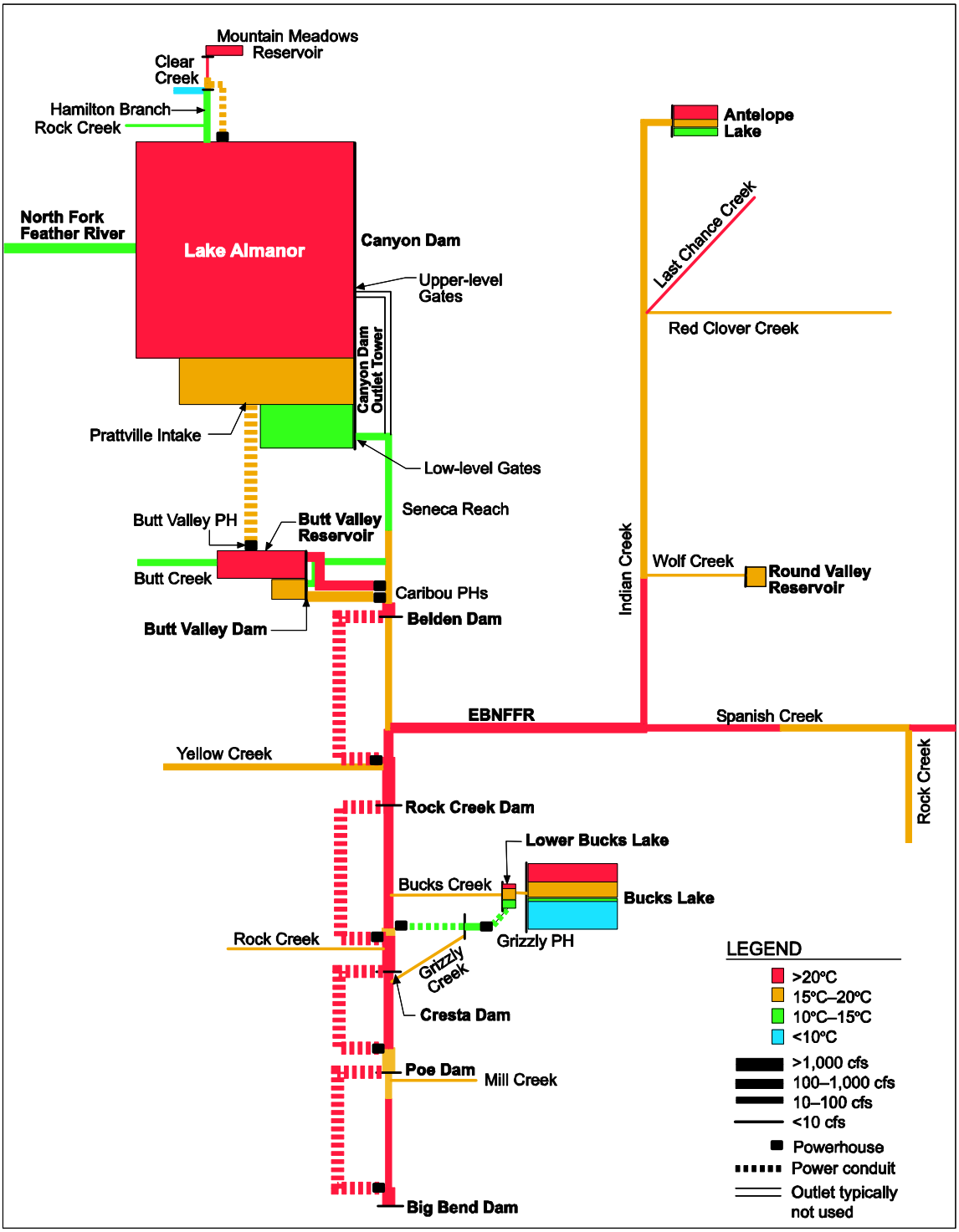

Figure 3-5. Schematic of summer water temperatures displaying relative flows and water storage in the North Fork Feather River Basin under typical existing conditions. (Sources: CDFG, 1988; EPA, 2005; PG&E 2005a, 2004b, 2003f; Plumas Corporation, 2004)

PG&E also evaluated the feasibility and effectiveness of enlarging Round Valley reservoir and creating new reservoirs in tributary basins to the NFFR. In addition, PG&E evaluated the potential effects of managing streamside vegetation in the EBNFFR and its tributaries.

In appendix D, we initially evaluate the advantages and disadvantages of 42 potential measures that could affect water temperatures. Appendix D also identifies which of these control measures we analyze further in this section of the EIS. Our initial analysis indicates that 20 of the potential control measures would not be feasible or effective at substantially reducing summer temperatures for prolonged periods in the lower NFFR reaches. Potential measures that would not be feasible or effective include preferential use of Caribou No. 1 over No. 2 powerhouse, preferential use of the deeper Cresta dam outlet gates, a pipeline extension of the Caribou No. 2 intake, all potential piping and pumping control measures evaluated, mechanical cooling towers and chillers with the exception of a cooling tower along the Rock Creek reach, all measures aimed at reducing temperatures in tributaries to the NFFR,[21] two of the Prattville intake curtains evaluated (Curtains 1 and 2), and 3 of the 4 pipeline extensions to the Prattville intake evaluated. Although the measures aimed at reducing temperatures in the East Branch of the NFFR and its tributaries would result in localized cooling, they would have negligible effects on NFFR summer temperatures due to the quantities of water affected in comparison to NFFR quantities.

Our initial evaluation of potential Prattville intake modifications is primarily based on work completed by the University of Iowa, Iowa Institute of Hydraulic Research (IIHR). The IIHR constructed a physical model of a 3.1 by 1.9 mile section of Lake Almanor, which it used along with several numerical models to predict the effects that 14 potential Prattville intake modifications would have on the temperature of Prattville intake withdrawals and hydraulics near the intake (Ettema et al., 2004; appendix D). The IIHR conducted screening tests for six floating thermal curtains with lengths ranging from about 0.25 to 0.75 mile, and different configurations around the intake.[22] Results of these screening tests indicate that Prattville intake withdrawals of 1,600 cfs in August would be 1.0 to 4.5ºC cooler than existing conditions depending on the curtain configuration. The largest predicted reduction was 4.5ºC for the 4,000-foot-long Curtain 5 followed by 3.5ºC for the 2,770-foot long Curtain 4. The IIHR's modeling predicted that the approximately 3,000-foot-long Curtain 3 would result in a

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[21] Potential measures that we consider "aimed at reducing temperatures in tributaries to the NFFR" consist of enlarging Round Valley reservoir, constructing a new large reservoir in a tributary to the NFFR, and management of streamside vegetation along the East Branch of the NFFR and its tributaries.

[22] More detailed descriptions of the Prattville intake curtains evaluated are provided in Ettema et al. (2004).

little less temperature reduction (3.1ºC) in August. Results of additional testing led to predictions that Curtain 4 in combination with removal of the levees along the submerged channel to the eastern lobe of the lake would result in August withdrawal temperatures of 5.2ºC cooler that existing conditions (i.e., 0.7ºC cooler than the 0.25-mile-longer Curtain 5 without levee removal). Additional modeling of other Prattville intake modifications indicates that extending the intake with a long pipeline with a hooded inlet in combination with removal of the submerged levees would reduce existing August withdrawal temperatures by approximately the same amount as Curtain 4 without removal of the levees (3.8ºC versus 3.6ºC). The pipeline would result in adverse effects from dredging the levees and a short-term interruption of the use of Butt Valley powerhouse while the pipeline is connected to the intake; whereas, similar cooling effects with Curtain 4 would not result in these adverse effects. Therefore, we did not further consider modifying the Prattville intake with the long pipeline with a hooded inlet in combination with removal of the submerged levees. Evaluation of using curtains in Butt Valley reservoir along with Curtain 4 at the Prattville intake indicates that this would result in cooler discharges from the Caribou powerhouses, although this would add substantially to the cost. To minimize the cost-benefit ratio associated with modifying the Prattville intake and supplying cooler water to the NFFR, the Prattville intake modifications that we further evaluate are Curtain 4 with and without removal of the levees along the submerged channel to the eastern lobe of Lake Almanor.

Based on our analysis in appendix D, we focus our analysis here on the following five temperature control measures along with existing conditions, which we use as the baseline condition for comparison:

- Proposed MIF
- Modified MIF
- Proposed MIF with thermal curtain
- Proposed MIF with thermal curtain and removal of levees
- Proposed MIF with thermal curtain, removal of levees, and Canyon dam blending

PG&E's modeling effort focused on evaluating the effects of temperature control measures and other measures that affect water temperature in the project area has evolved and changed its center of focus through time. This has resulted in the use of four primary different modeling approaches and varying levels of effort being used to evaluate the effects of the five measures that we further evaluate below. As previously described, the IIHR used a physical model in combination with numerical models to predict the effects that modifying the Prattville intake would have on temperatures drafted through the Prattville intake and hydraulics within Lake Almanor (Ettema et al,

2004). In addition, PG&E used a modified version of MITEMP3 (a one-dimensional lake temperature model developed by Massachusetts Institute of Technology; Jirka et al, 1978 as cited by Bechtel and TRPA, 2004; Octavio et al., 1980 as cited by Bechtel and TRPA, 2004) to model the water temperature in Lake Almanor, Butt Valley reservoir, and their outflows. In order to more closely evaluate the effects of Curtain 4 with removal of the levees along the submerged channel, version 3.1 of CE-QUAL-W2 (a two-dimensional, laterally averaged, hydrodynamic, and water quality model developed by the U.S. Army Corps of Engineers; Cole and Buchak, 1995; Portland State University, 2005) was used to model the effects on the DO regime of Lake Almanor and Butt Valley powerhouse discharges. Because the CE-QUAL-W2 model requires modeling temperature to model DO, we also used its predictions of Lake Almanor temperatures. Water temperatures in stream reaches are typically about the same throughout the water column, but differ longitudinally. Therefore, a different model was used for these reaches. SNTEMP (a steady-state stream temperature model developed by the FWS; Theurer et al., 1984) was selected and used to model temperatures in the Seneca, Belden, Rock Creek, Cresta, and Poe reaches. Generally, the thermal effects of each of the impoundments upstream of the Belden, Rock Creek, Cresta, and Poe dams were assumed to be negligible and were not modeled.

To further evaluate the effects of the five control measures selected for further evaluation, we compiled study results for the critical June through September period. The varying model assumptions and levels of effort employed by PG&E make comparing the effects of the control measures difficult. For example, it was not possible to evaluate the Modified MIF scenario in the same way as other control measures, since it had been evaluated in a different manner than the other measures. Our evaluation of the other four measures selected for further evaluation was focused on effects for normal, reasonable extreme, and extreme hydrological and meteorological conditions. We provide the details of the basis for these more detailed evaluations of control measures in appendix E. Our overall approach included consolidating data for each of the control measures selected along with the existing conditions and then plotting these data so that the predicted effects of the measures could be readily compared. Including existing conditions in these plots makes it possible to assess the level of improvement that is expected under each of these measures. Modeled normal, reasonable extreme, and extreme water temperatures for the Prattville intake and discharge-weighted Caribou powerhouse discharges are displayed in figure 3-6, and modeled temperatures for the NFFR are displayed in figures 3-7 through 3-9.

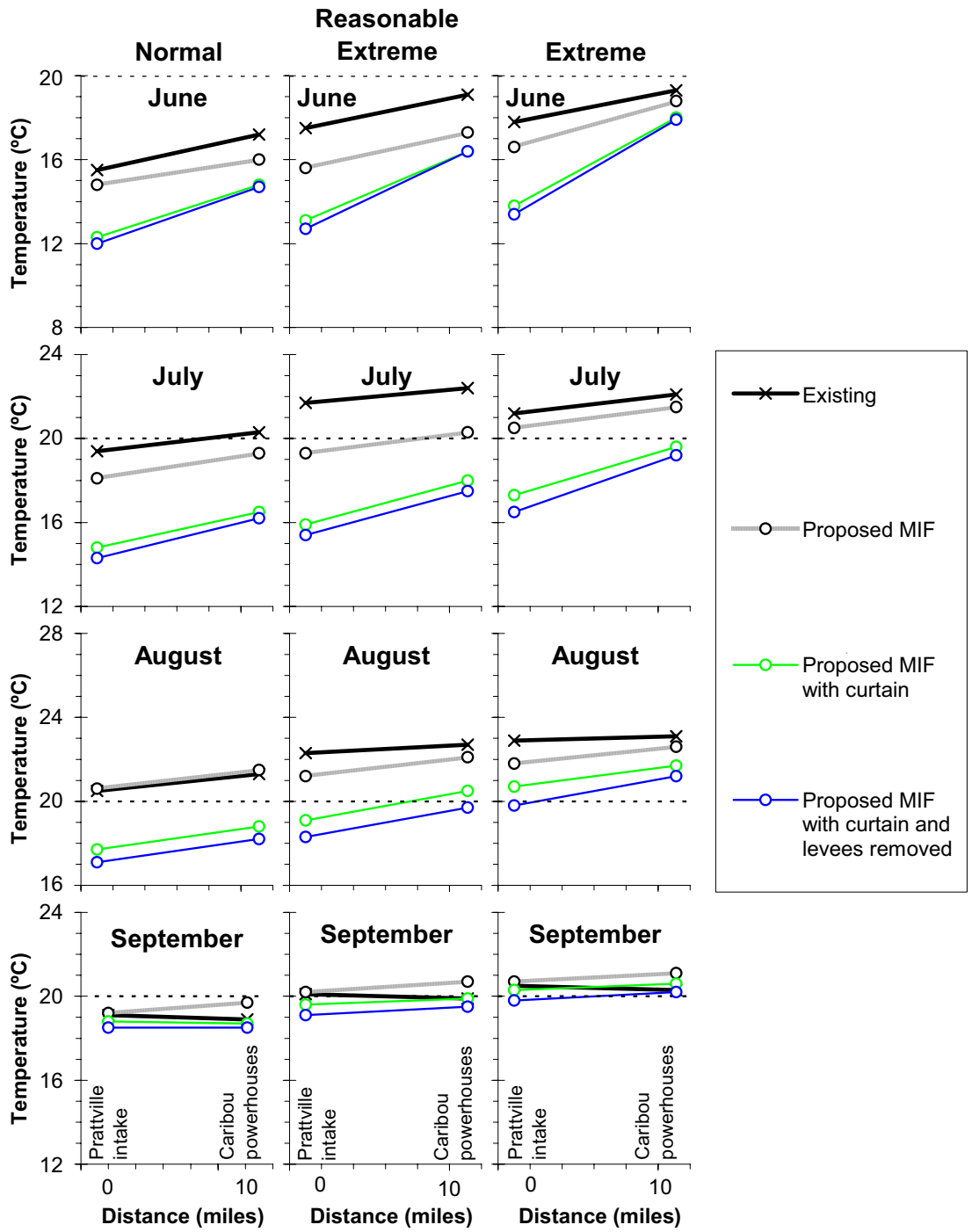

Figure 3-6. Representative Prattville intake and discharge-weighted Caribou powerhouse modeled water temperatures for normal, reasonable extreme, and extreme hydrological and meteorological conditions. (Sources: Bechtel and TRPA, 2004; PG&E, 2003c, as modified by staff)

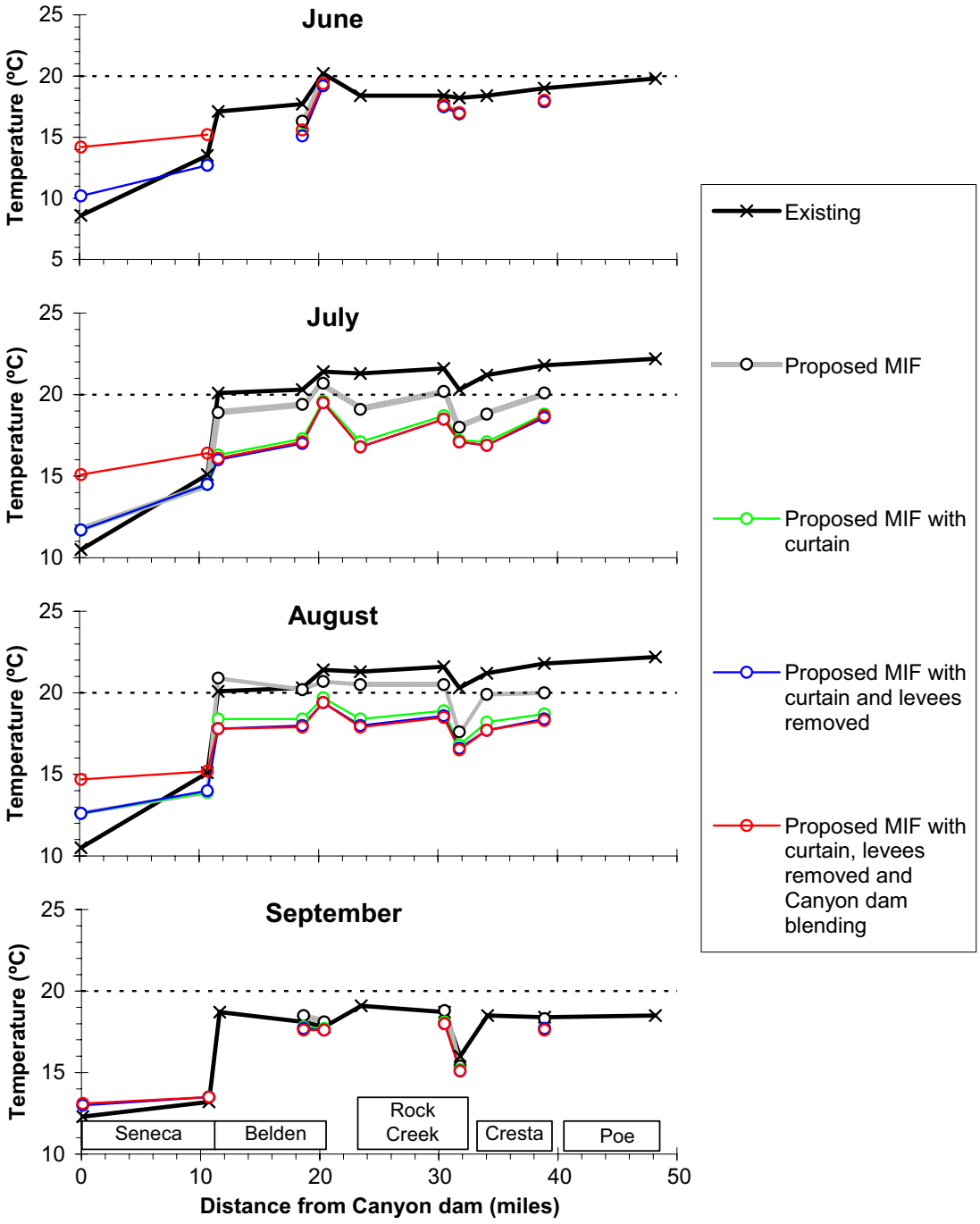

Figure 3-7. Representative modeled water temperatures for normal hydrological and meteorological conditions with Rock Creek-Cresta Project required first 5-year minimum flows and Poe reach required minimum flows. (Sources: Bechtel and TRPA, 2004; PG&E, 2004b, 2003b, 2003c, 2003e, as modified by staff)

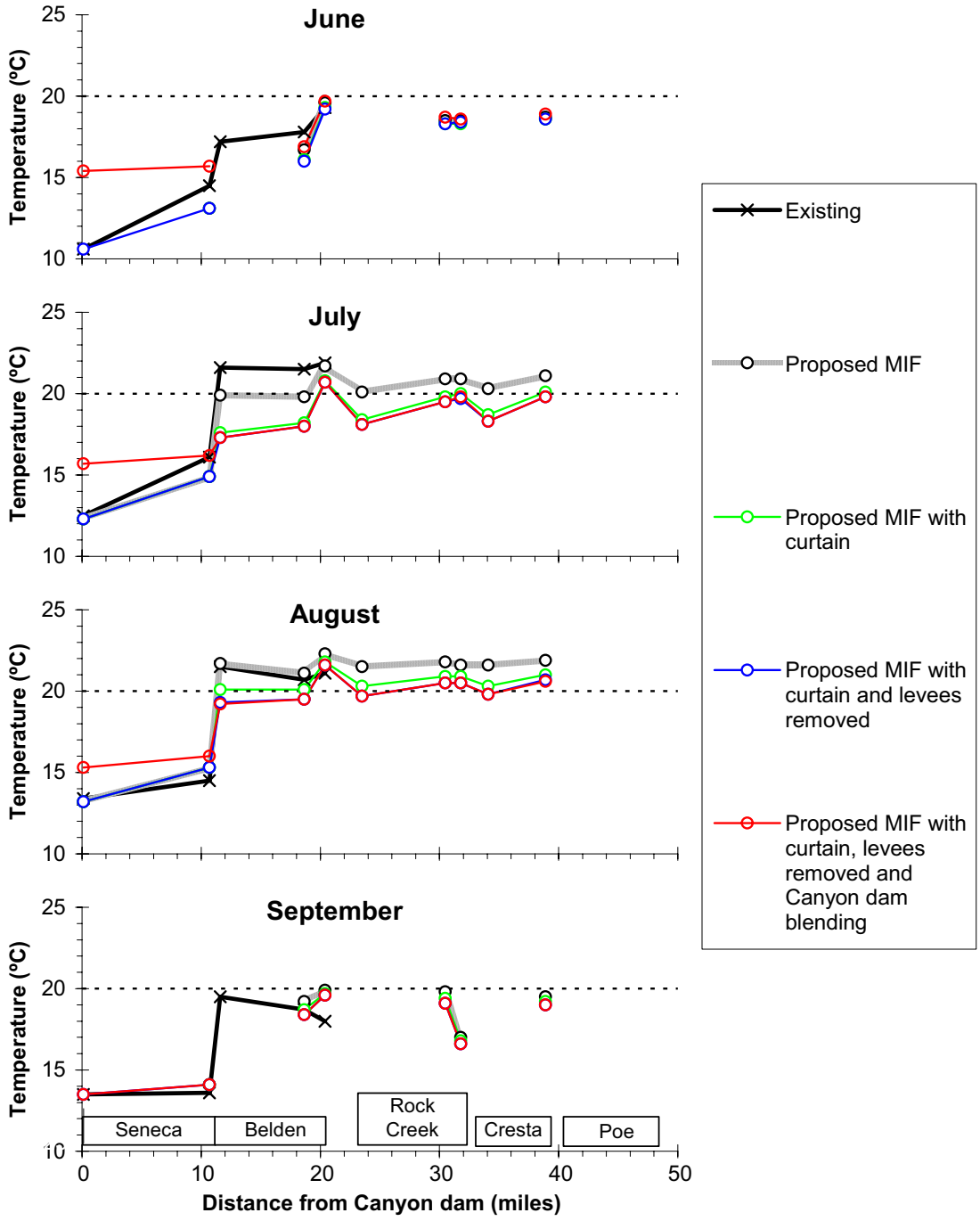

Figure 3-8. Representative modeled water temperatures for dry hydrological and reasonable extreme meteorological conditions with Rock Creek-Cresta Project required first 5-year minimum flows and Poe reach required minimum flows. (Sources: Bechtel and TRPA, 2004; PG&E, 2004b, 2003b, 2003c, 2003e, as modified by staff)

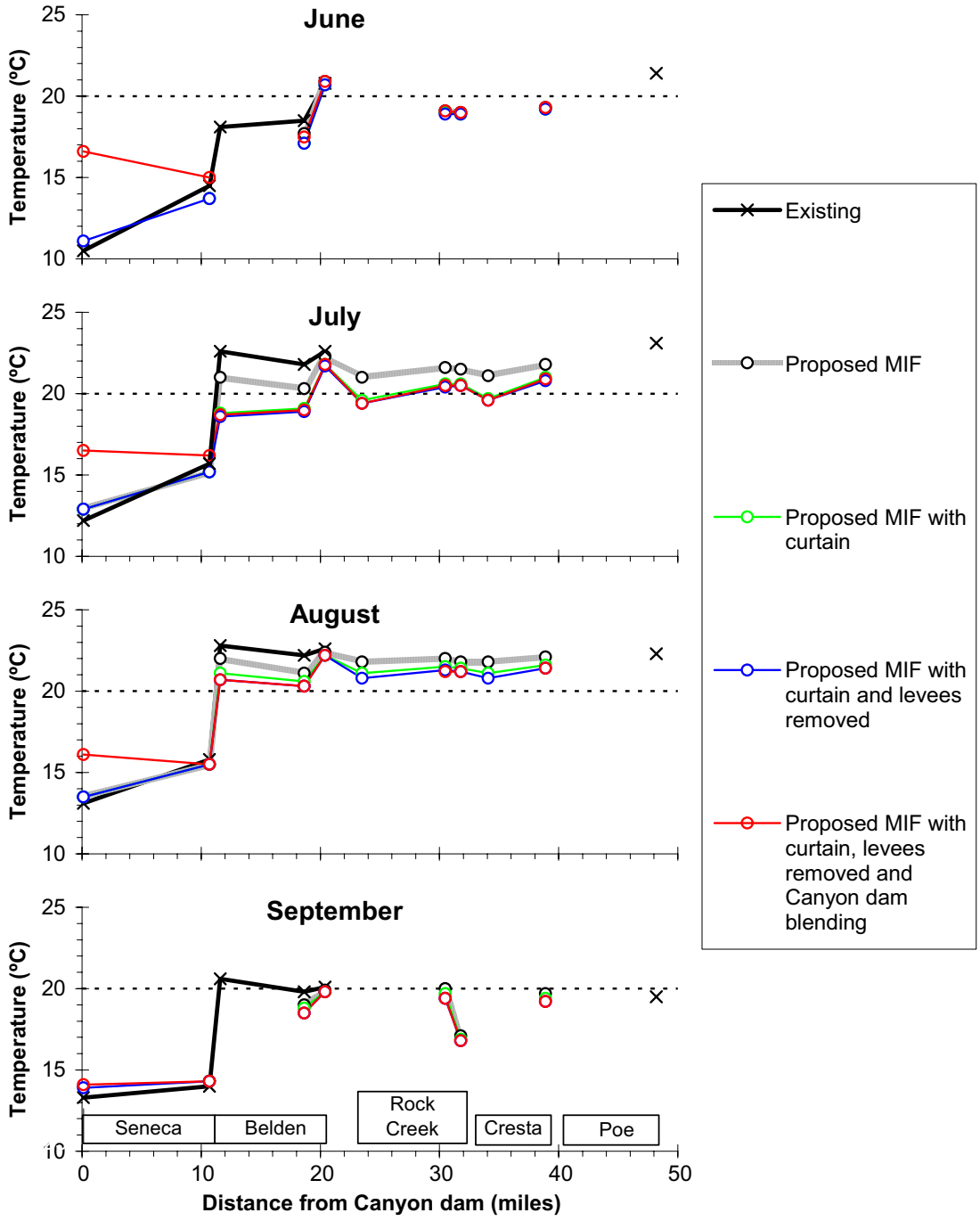

Figure 3-9. Representative modeled water temperatures for critically dry hydrological and extreme meteorological conditions with Rock Creek-Cresta Project required first 5-year minimum flows and Poe reach required minimum flows. (Sources: Bechtel and TRPA, 2004; PG&E, 2004b, 2003b, 2003c, 2003e, as modified by staff)

Existing Conditions—Under existing conditions, thermal stratification of Lake Almanor is well established from June through mid-September. The epilimnion extends down to a depth of about 30 to 40 feet and a hypolimnion resides below a depth of about 50 feet. The Prattville intake is located in a steep-sided trough in a cove of the relatively shallow western lobe of the lake. A submerged channel, which has an invert elevation of approximately 4,422 feet (PG&E datum), leads to the intake, which has an invert elevation of 4,410 feet (PG&E datum). The remainder of the area around the Prattville intake is relatively shallow and water needs to flow over a sill that has a minimum elevation of approximately 4,436 feet (PG&E datum) to reach the intake (see figure 3-3). As a result, water is typically drafted from throughout much of Lake Almanor's water column (Ettema et al, 2004), which results in discharges of greater than 20.0ºC from the Butt Valley powerhouse in July, August, and September (table 3-7 and figure 3-6). As water flows through the Butt Valley reservoir and to the Caribou intakes, additional warming occurs due to solar radiation and the retention time in the reservoir. Monitoring results also indicate that water warmer than 20.0ºC is drafted through the shallower, Caribou No. 2, intake in June, although the weighted temperature of water discharged from the two Caribou powerhouses remains cooler than 20.0ºC in June. Peak water temperatures remain cooler than 17.0ºC in the Seneca reach under typical operations, but they sometimes exceed 20.0ºC in portions of the Belden reach and other downstream reaches (table 3-7 and figures 3-7 to 3-9) during the months of June through September.

The December 2003 and January 2004 underwater inspections of the Canyon dam outlet gates indicate that the rollers for the low-level gates were malfunctioning, which has resulted in PG&E using the upper-level gates instead of the low-level gates since 2004. PG&E is currently conducting restoration efforts that should enable use of low-level Gate No. 5 soon (PG&E, 2004c). Following completion of these restoration efforts, no additional construction should be needed to enable PG&E to resume its typical use of the low-level outlet gates. Therefore, no construction-related water quality effects are anticipated from continuing operations with the existing MIFs.

Proposed MIF—Modeling results (PG&E, 2003c) suggest that implementing the proposed Canyon dam MIF regime would have very little effect on temperatures and stratification within Lake Almanor. However, the model results also suggest that implementation of the proposed MIFs could result in cooler water being drafted through the Prattville intake and discharged from the Butt Valley powerhouse during June through August (figure 3-6) (Bechtel and TRPA, 2004; PG&E, 2004b, 2003c). This can be explained by the increased Canyon dam releases reducing the quantity of water drafted through the Prattville intake and thereby reducing the percentage of water drawn from the warm, less dense, epilimnion to the depth of the intake. Implementation of the proposed MIF regime is expected to have negligible effects on the temperature of water drafted through the Prattville intake and discharged from the Butt Valley powerhouse during September, due to the relatively small change in Canyon dam flow releases in

comparison to existing conditions and weaker thermal stratification in Lake Almanor at that time. Based on model results, it appears that under the proposed MIF cooler water would generally be discharged into the NFFR from the Caribou powerhouses during June through August than occurs under existing conditions.

Implementation of PG&E's proposed MIFs with all releases to the Seneca reach being drafted through the Canyon dam tower low-level outlet gates with an invert elevation of 4,422 feet msl (PG&E datum) would continue to result in water temperatures cooler than 20.0ºC in the Seneca reach. Although cooler than existing conditions, Caribou powerhouse discharges would continue to substantially increase NFFR summer temperatures, and temperatures of greater than 20.0°C would still occur in the Belden reach and bypassed reaches of PG&E's downstream projects (figures 3-7 through 3-9). However, model results suggest that water temperatures would generally be reduced relative to existing conditions by 0.5 to 2ºC in the Belden reach during July and August even in dry and critically dry years, which is the period when most temperatures of greater than 20.0ºC occur. The unavailability of predictions of temperatures for the existing conditions in reaches downstream of the Belden powerhouse under reasonable extreme or extreme conditions limits the ability to evaluate the effects of implementing the proposed MIFs during those water year types. However, the limited model results for reaches of downstream projects suggest that July and August NFFR temperatures would be reduced by about 1 to 2.5ºC under normal hydrological and meteorological conditions.

PG&E is currently conducting restoration efforts that should enable use of Canyon dam outlet low-level Gate No. 5 to provide the proposed Canyon dam MIF releases. Therefore, no construction-related water quality effects are anticipated from implementation of the proposed MIFs.

Modified MIF—PG&E recently used a simplified modeling approach to determine the effects of even higher low-level Canyon dam releases with corresponding reduced Butt Valley and Caribou powerhouse flows on NFFR temperatures (PG&E and Bechtel, 2005; McGurk and Tu, 2005). This analysis focused on the ability to maintain temperatures of 19.0ºC or less at the Belden dam, which would allow 1.0ºC of warming in the Belden reach before exceeding 20.0ºC. Results of this analysis suggest that 200-cfs releases from the Canyon dam outlet low-level gates would reduce the frequency that temperatures exceed 19.0ºC at the Belden dam in July from 82 percent with PG&E's proposed MIF to 50 percent. Similarly, model results suggest that the frequency of exceeding 19.0ºC in August would be reduced from 100 percent with PG&E's proposed releases to 70 percent with a 400-cfs release. Providing these larger Lake Almanor releases through Canyon dam instead of the Butt Valley powerhouse would reduce flows through the Butt Valley reservoir during the period when the hottest ambient conditions occur and thus would increase the depth of the Butt Valley reservoir

epilimnion and temperatures in it and result in adverse effects on the Butt Valley reservoir's coldwater fishery.

Implementation of this measure would not require physical modifications of the project facilities, and is therefore not expected to result in construction-related water quality effects.

Proposed MIF with Thermal Curtain—The temperature of Butt Valley powerhouse discharges is highly influenced by the characteristics of the Prattville intake and its surrounding area. This intake is located on the southwestern shore of Lake Almanor's western lobe, which receives most of its flow from the NFFR (see figure 1-1). This lobe of the lake is much shallower than the lake's eastern lobe which receives inflow from Big Springs, Hamilton Branch, and the Hamilton Branch powerhouse. The invert of the Prattville intake is at an elevation of 4,410 feet (PG&E datum) and located at the bottom of a 40-foot-deep steep-sided constructed trough. In the 1920s, a channel that was about 90 feet wide and 13 feet deep was constructed to link the Prattville intake with the Big Springs area in the eastern lobe of the lake. This channel was constructed to facilitate the Prattville intake drafting cooler water from the springs. When the channel was constructed, excavated sediments were placed along it, creating underwater levees. However, physical modeling of a large portion of the lake shows that the channel is not particularly effective at delivering cold bottom water to the intake, and that little water flows across the fairly flat bed of the western lobe of the lake or along the submerged channel to the intake (Ettema et al., 2004). Instead, studies show that even with the channel in place, most of the water that is entrained into the Prattville intake comes from the higher levels in the water column in the vicinity of the intake and the adjoining shoreline, when operating at its normal flow of 1,600 cfs (PG&E, 2002a; Ettema et al., 2004). As a result, warmer water is discharged from the Butt Valley powerhouse than would occur if the intake drafted more water from along the bottom of the lake or the deeper eastern lobe of the lake and less from the surface.

PG&E investigated the effectiveness of modifying the Prattville intake with the placement of a 700-foot-long by 900-foot-wide U-shaped floating curtain with a bottom elevation of 4,445 feet (PG&E datum) around the Prattville intake (Curtain 4). This curtain would limit the area that water could flow under it to about 5,280 square feet along the bottom of the lake (Ettema et al., 2004). The submerged channel would provide 30 percent of the area in which water could flow under the curtain, and there would be almost no access to the intake from the relatively shallow northeast side of the curtain. Dye studies conducted in the physical model of a large portion of Lake Almanor indicate that modifying the Prattville intake with Curtain 4 would result in drawing more cold water from the deeper eastern lobe of the lake, and substantially increasing the flow of cold water that is drawn along the submerged channel (Ettema et al., 2004). The amount of warm epilimnetic water that would be drafted under the curtain would depend on flow rates through the Prattville intake. As Prattville intake

flow increases, a higher percentage of water would be drawn from the epilmnion outside of the curtain. Results of physical modeling of Curtain 4 suggest that at a Prattville intake flow of 1,600 cfs, 13.3 percent of the flow would be directly supplied by the submerged channel (Ettema et al., 2004).

Modeling predicted that operating the project with Curtain 4 and PG&E's proposed MIFs would deplete the volume of Lake Almanor's cool-water hypolimnion, increase the depth of the thermocline, and slightly increase the temperature of water in the epilimnion (Bechtel and TRPA, 2004). Water that is substantially cooler (about 4ºC) than under existing conditions would be drafted through the Prattville intake during June, July, and August (see figure 3-6). September Prattville intake withdrawals would generally be only about 0.5ºC cooler than without the curtain. The much cooler Butt Valley powerhouse discharges in June through August would warm at a faster rate than under existing conditions in Butt Valley reservoir, although the overall cooling effect of implementing this measure would still reduce Caribou powerhouse discharge-weighted temperatures to well below 20.0ºC under normal conditions. However, Caribou powerhouse discharge-weighted temperatures would still exceed 20.0ºC during extreme conditions in August and September and reasonable extreme conditions in August (see figure 3-6).

Modification of the Prattville intake as described above would have virtually no effect on temperatures in the 10.8-mile-long Seneca reach. During July, the cooler Caribou powerhouse discharges would further reduce the temperature of the proposed instream flow releases at Belden dam by about 2.0 to 2.5ºC and maintain temperatures at less than 20.0ºC (see figures 3-7 to 3-9). During September and critically dry Augusts, smaller reductions in Caribou powerhouse temperatures would have much less effect on NFFR temperatures than in July. Model results indicate that temperatures of greater than 20.0ºC would occur at the Belden dam and in the Belden reach during reasonable extreme and extreme conditions in August, but the minor cooling effect would likely maintain Belden reach temperatures of less than 20.0ºC in September. Model results also indicate that modifying the Prattville intake with Curtain 4 along with implementation of the proposed MIFs would reduce temperatures in the bypassed reaches of PG&E's downstream projects. Temperatures of less than 20.0ºC would likely occur in the Rock Creek, Cresta, and Poe reaches under normal conditions. However, model results also show that temperatures of greater than 20.0ºC would still occur in the Rock Creek and Cresta reaches under reasonable extreme and extreme conditions in August and extreme conditions in July. Although modeled temperatures are not available for the Poe reach, it is reasonable to conclude that temperature reductions in the Poe reach would be less than those in the Rock Creek and Cresta reaches and daily mean temperatures of greater than 20.0ºC would continue to occur.

Although PG&E has not filed the results of any modeling efforts aimed specifically at evaluating the effects of the thermal curtain without removal of the levees

on DO concentrations, it conducted a CE-QUAL-W2 modeling effort to evaluate the effects that the curtain with levee removal would have on the DO regime of Lake Almanor and Butt Valley powerhouse discharges. We present the results of this modeling effort along with our conclusions for the curtain without removal of the levees in the following subsection.

Construction and installation of the curtain as designed by Black & Veatch (2004) would result in minimal effects on water quality in Lake Almanor and Butt Valley powerhouse discharges. Minor localized increases in turbidity could occur during and immediately following installation of galvanized steel walls from the shoreline of the lake to a point offshore where the bottom has an elevation of 4,463 feet (PG&E datum), and when anchors for the curtain are placed on the bottom of the lake. Filling the anchors with concrete once they are placed would increase the risk of contaminating surface waters. However, the potential adverse effects of the aforementioned actions could be minimized through the implementation of appropriate best management practices (BMPs). Implementation of appropriate BMPs would generally limit adverse water quality effects to work areas in and along Lake Almanor, although negligible effects could occur in Butt Valley powerhouse discharges.

Proposed MIF with Thermal Curtain and Removal of Levees—Removal of the levees along the submerged channel would allow water near the lakebed to flow directly toward and under the curtain, while not substantially reducing the rate of flow along the submerged channel (Ettema et al., 2004). Model results indicate that this would allow 0.5 to 1ºC cooler water to be drafted through the Prattville intake than with the curtain alone (see figure 3-6). As water flows through Butt Valley reservoir, its temperature would increase and reduce this cooling effect prior to being discharged from the Caribou powerhouses. The additional cooling effect of removing the levees would be largest in the NFFR during August, when Canyon dam instream flow releases are small, accretion is relatively low, and ambient temperatures are high (figures 3-7 to 3-9). Even under these conditions, levee removal would only provide about 0.5ºC of additional cooling in the Belden reach, and temperatures would still exceed 20.0ºC in reasonable extreme and extreme conditions. Model results indicate that temperatures in the Rock Creek and Cresta reaches also would still exceed 20.0ºC during reasonable extreme and extreme conditions in August. Although modeled temperatures are not available for the Poe reach, it is reasonable to conclude that temperature reductions in the Poe reach would be less than those in the Rock Creek and Cresta reaches and that daily mean temperatures of greater than 20.0ºC would continue to occur.

In addition to modeling of water temperatures, PG&E conducted a CE-QUAL-W2 modeling effort to evaluate the effects that the curtain with levee removal would have on the DO regime of Lake Almanor and Butt Valley powerhouse discharges. Modeling results indicate that operating the project with the modified Prattville intake would produce a 0 to 10 foot deeper thermocline in Lake Almanor,

depending on time of year and water year type, and slightly increase (0.0 to 0.5ºC) temperatures in the epilimnion (Jones & Stokes, 2004). CE-QUAL-W2 model results do not indicate that this scenario would cause any major shifts in Lake Almanor's DO regime, although the combination of minor temperature increases in the epilimnion with the DO concentrations would reduce available habitat for salmonids. In addition, drafting more water from near the bottom of Lake Almanor would substantially reduce DO concentrations in discharges from the Butt Valley powerhouse into Butt Valley reservoir. The model predicts that DO concentrations of 1 to 3 mg/l would be common in Butt Valley powerhouse discharges during July and August. Because these low DO concentrations in Butt Valley powerhouse discharges would adversely affect water quality and aquatic organisms in Butt Valley reservoir, mitigation may be appropriate.

Because operating the project with the curtain installed without removing the levees would draft less water from near the bottom of the lake, we conclude that Butt Valley powerhouse discharges would have slightly higher DO concentrations than with the curtain and removal of the levees. However, even under these conditions, Butt Valley powerhouse discharges would still have DO concentrations that are substantially lower than existing conditions. These lower concentrations would adversely affect water quality and aquatic organisms in Butt Valley reservoir to the extent that mitigation may be appropriate. Mitigation for the low DO concentrations that would result from operating the project with the curtain with or without levee removal could potentially be done in a number of ways including hypolimnetic oxygenation in Lake Almanor or a turbine venting. We further evaluate the effects of the above thermal and DO effects on aquatic organisms along with other effects that the curtain and levee removal would have on aquatic organisms in section 3.3.2.2 and 3.3.2.3.

The construction-related water quality effects of this measure would be primarily associated with dredging the levees along the submerged channel and subsequent handling of the dredged material, although they also would include the construction-related effects of installing the curtain as discussed above. Implementation of this measure would require dredging of approximately 23,000 cubic yards of material from along the submerged channel. Black & Veatch (2004) considered several alternative dredging methods and suggested that conducting clamshell dredging from a spud-equipped barge would be the preferred dredging method for this project. This approach would likely include the use of transfer barges and a tug boat to transport the dredged material to the shoreline, a shore-based crane to unload the transfer barges, and equipment such as a large front-end loader to place the dredged material in the selected disposal area. We anticipate that the primary effect on water quality would be increased turbidity as the dredged materials decant after being placed on the transfer barge. It also is possible, depending on metal levels in the dredged sediments, that dredging would resuspend metals and thereby increase concentrations of metals in the water column for relatively short periods. The transfer of dredged materials to the shore-based operations and subsequent transport and placement of these materials could also increase turbidity

along the lake's shoreline. We anticipate that use of a temporary silt fence around the active dredging area and implementation of other appropriate BMPs would limit turbidity increases outside of the immediate work areas.

It is likely that the dredged material would be disposed of at one of two potential disposal sites, both under PG&E ownership: (1) a site immediately north of and adjacent to the Prattville intake, or (2) a former quarry site near the Canyon dam service center, located approximately 5 miles from the Prattville intake. Due to the close proximity of the site adjacent to the Prattville intake, use of this site would limit the need for unnecessary handling and hauling of the dredged material.

Proposed MIF with Thermal Curtain, Removal of Levees, and Canyon Dam Blending—PG&E and others have indicated that using the Canyon dam outlet tower's low-level gates to provide the entire flow release to the Seneca reach could result in temperatures that are too cold for aquatic resources in the Seneca reach (Bechtel and TRPA, 2004; PG&E, 2004b). Therefore, the effects of blending summer flow releases from the Canyon dam outlet tower's upper and low-level outlet gates were evaluated. The blending approach evaluated assumes a constant 60-cfs release from the low-level gates and all remaining flow releases being provided by the 45-foot higher upper gates, which have an invert elevation of 4,467 feet msl (PG&E datum).

Due to the large storage capacity of Lake Almanor, blending of Canyon dam flow releases is expected to have negligible effects on the thermal regime of the lake and the temperature of water drafted through the Prattville intake. However, water temperatures in the upper end of the Seneca reach would be increased substantially during June through August of most years (see figures 3-7 to 3-9). These increases would depend primarily on the percentage of the total flow release that is provided with the upper gates. Depending on water year type, the percentage of total flow provided by the upper gates for the proposed Seneca reach MIFs would range from 25 to 60 percent in June, 20 to 37 percent in July, and 14 to 25 percent, with the exception of Critically Dry water years, in August. Since PG&E's proposed Seneca reach MIFs for August in Critically Dry water years, and all Septembers are 60 cfs, the entire release would be provided by the low-level gates and thus would not be affected by blending. Modeling results suggest that Canyon dam releases in June through September would generally be in the range of 13.5 to 16.5ºC and would remain within this range throughout the Seneca reach. Model results indicate that blending of Canyon dam releases would increase June temperatures in the Belden reach by about 0.5ºC compared to providing the entire Canyon dam release by the low-level gates along with the Prattville intake curtain and removal of the levees. During July through September, temperatures would be virtually unaffected downstream of the Caribou powerhouses.

Because the proposed MIF and blending of Canyon dam releases would not require any modifications to project facilities, the construction-related water quality

effects that would result from this measure would be the same as for the thermal curtain with removal of levees as described above.

Conclusions—Based on our analysis of the proposed and recommended measures along with other potential measures investigated to provide cooler water to the NFFR downstream of the project we make the following final conclusions:

- Providing PG&E's proposed MIFs exclusively and using the low-level gates for all Canyon dam MIF releases would have negligible effects on the thermal regime of Lake Almanor, continue to maintain cool temperatures in the Seneca reach, and generally reduce peak temperatures in the Belden, Rock Creek, Cresta, and Poe reaches. However, temperatures of a little greater than 20.0ºC would continue to occur throughout most of these reaches during July and August.

- Providing low-level Canyon dam releases of 200 cfs in July and 400 cfs in August along with corresponding reduced flows through the Butt Valley and Caribou powerhouses would further reduce the frequency of high temperatures in the NFFR downstream of the Caribou powerhouses.

- Modifying the Prattville intake with a floating curtain with or without removal of the levees along the submerged channel that extends from the Prattville intake to the eastern lobe of the lake would provide additional cooling effects to the Belden reach and reaches in the lower NFFR, although temperatures would still exceed 20.0ºC in portions of these bypassed reaches during July and August of some years. However, operating the project with these Prattville intake modifications would result in major degradation of summer DO concentrations in Butt Valley powerhouse discharges and Butt Valley reservoir, unless oxygen augmentation is provided.

- Dredging of approximately 23,000 cubic yards of material from the submerged levees would result in minor localized short-term water quality degradation in Lake Almanor.

- Blending flow releases from the Canyon dam low-level and upper outlet gates as described above along with PG&E's proposed MIFs would typically increase temperatures throughout Seneca reach during June to September, but only negligible to minor temperature increases would occur in downstream reaches. Effects on the thermal regime in Belden and other downstream reaches would be negligible if the Prattville intake is not modified.

Monitoring—Monitoring water temperatures and DO concentrations in Lake Almanor, Butt Valley reservoir, the project's powerhouse discharges, and the NFFR would provide a means of documenting the effectiveness of enhancing thermal and DO

conditions with measures implemented under any new license. On February 28, 2003, the Commission approved (with modifications) PG&E's water temperature monitoring plan that was filed pursuant to Article 401 of the Rock Creek-Cresta Project license (PG&E, 2002b; FERC, 2003). Pursuant to this approved plan, PG&E continuously monitors water temperature from June 1 to September 30 at 39 stations in the NFFR Basin. Many monitoring stations are located at sites affected by the UNFFR Project (table 3-7). This monitoring plan also requires PG&E to monitor vertical profiles in Lake Almanor and Butt Valley reservoir at four stations each during June to September. Vertical profiles of temperature are required to be taken from the surface to the bottom at intervals of no more than 1 month. PG&E also monitors DO at a minimum of three depths on each profile (near the surface, the thermocline, and bottom).

We conclude that monitoring water temperature according to the current FERC-approved plan for the Rock Creek-Cresta Project (PG&E, 2002b; FERC, 2003) would show whether anticipated water temperature and DO conditions occur under any new license. Although this monitoring plan does not address monitoring DO concentrations in project powerhouse tailraces or project-affected stream reaches, doing so would provide minimal benefit unless the Prattville intake is modified or another measure causes adverse conditions in these areas. Data collected under current conditions indicate that low DO levels that occur in Lake Almanor and Butt Valley reservoir are typically not propagated downstream (see table 3-8). Therefore, we conclude that DO levels would be adequately documented by monitoring DO concentrations in:

- Lake Almanor and Butt Valley reservoir according to the existing Rock Creek-Cresta Project water temperature management plan; and

- Lake Almanor at 1-meter intervals as outlined in our discussion of the water quality monitoring plan above.

Odors and Metals in the Seneca Reach

PG&E typically uses the Canyon dam outlet tower low-level gates to supply the Seneca reach with cool water; however, these operations have resulted in elevated odors and trace metal concentrations in the NFFR downstream of Canyon dam, particularly in the fall prior to turnover of Lake Almanor.

PG&E proposes to switch the release pathway used for MIFs to the Seneca reach to a Canyon dam upper-level gate in September. PG&E has been inconsistent in the specific dates that it would use the upper-level gates. In the SA (PG&E, 2004a), PG&E proposes to switch use to an upper-level gate on September 15 and to continue using the upper-level gate until at least November 1. On or after November 1, PG&E would switch releases back to the low-level gate. In its rehabilitation plan for the Canyon dam outlet tower gate (PG&E, 2004c), PG&E proposes releasing the MIFs through the Canyon dam upper-level gates during September 1 to October 15, each year. PG&E

also proposes, in its SA, to increase the MIF in the Seneca reach from 35 cfs year-round to flows ranging from 60 to 150 cfs, depending on month and hydrologic water year type. Under the terms of the SA, the Seneca reach MIF would be increased to 60 cfs during September, October, and November of all water year types.

The SA (PG&E, 2004a) includes provisions for a multifaceted WQMP that includes a Canyon dam mitigation measures evaluation. This measure would examine the adequacy and efficacy of using the upper-level gates to alleviate the strong odors and elevated trace metal concentrations in the upper end of the Seneca reach. The evaluation would include a sampling program focused on odors and trace metals in waters of Lake Almanor and the Seneca reach during June to October for a minimum of 6 years after issuance of a new license. For a full discussion of the recommended Canyon dam mitigation measures evaluation, see our discussion of the WQMP, above.

Our Analysis

Trace metal and sulfide concentrations in reservoirs such as Lake Almanor can be affected by stagnation of water in the hypolimnion for long periods of time. In large reservoirs such as Lake Almanor, near-bottom DO concentrations typically become progressively reduced during the summer to early fall (Wetzel, 1975), and PG&E's water quality measurements confirm that this condition occurs in Lake Almanor (see our discussion of DO in section 3.3.1.1). During 2001, anoxic (DO of <0.5 mg/l) conditions occurred near the bottom of Lake Almanor at the Canyon dam outlet tower from early August through mid-October. Fall turnover increased the near-bottom DO concentration to 4.8 mg/l by mid-November.

Low DO concentrations at the water/sediment interface allow reductive chemical processes to occur. Iron and manganese are converted into soluble forms and released from the sediments under anoxic conditions with pH levels of 7.5 units or less (Wetzel, 1975). These conditions also lead to sulfate being reduced to sulfide, which can lead to offensive odors from release of hydrogen sulfide to the atmosphere (Wetzel, 1975).

From mid-summer through early November 2001, PG&E conducted a study to evaluate the timing of the onset of odor problems and to determine the effects of changing operations from the typical condition of providing a 35-cfs MIF via the low-level gate to using the upper gates and increasing the flow release. Results of this study show that concentrations of sulfide, dissolved iron, and dissolved manganese were elevated near the bottom of Lake Almanor at the Canyon dam outlet tower during September and October (table 3-12). The highest measured sulfide concentration (0.504 mg/l) occurred on September 11, and October measurements were all at or above 0.186 mg/l. Dissolved iron concentrations measured in September and October ranged from 1.99 to 4.02 mg/l, with the highest level measured on October 10. Dissolved manganese concentrations measured in September and October ranged from 0.841 to 1.98 mg/l, with the highest level being recorded on October 18.

Table 3-12. Sulfide and dissolved iron and manganese concentrations in Lake Almanor and the Seneca reach, August to November, 2001. (Source: PG&E, 2002a, as modified by staff)

Location	August 8 35-cfs release via lower gate	September 11 35-cfs release via lower gate	October 10 35-cfs release via lower gate	October 17 35 cfs release via upper gate	October 18 200-cfs release via upper gate	November 14 35-cfs release via lower gate
			Sulfide (mg/l)			
LA1-S	<0.0017	0.0033	0.0018	0.0023	<0.0017	0.0017
LA1-B	<0.0017	0.504	0.221	0.265	0.186	0.0031
NF2	<0.0017	<0.0017	0.0086	0.0017	<0.0017	<0.0017
NF2A	<0.0017	<0.0017	0.0034	0.0020	<0.0017	<0.0017
SF	<0.0017	<0.0017	0.0015	0.0017	<0.0017	<0.0017
NF3	<0.0017	<0.0017	0.0007	<0.0017	<0.0017	<0.0017
NF4	0.0028	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017
			Dissolved Iron (mg/l)			
LA1-S	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
LA1-B	<0.050	1.99	4.02	3.84	2.12	0.055
NF2	<0.050	0.122	0.273	<0.050	<0.050	0.068
NF2A	<0.050	0.157	0.198	<0.050	<0.050	0.057
SF	<0.050	0.140	0.105	<0.050	<0.050	<0.050
NF3	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
NF4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
			Dissolved Manganese (mg/l)			
LA1-S	0.001	<0.001	0.004	0.002	0.004	0.006
LA1-B	0.184	0.841	1.160	1.610	1.980	0.008
NF2	0.036	0.755	0.524	0.007	0.008	0.016
NF2A	0.044	0.663	0.316	0.016	0.023	0.010
SF	0.005	0.057	0.073	0.002	0.014	0.003
NF3	0.003	0.002	0.002	0.002	0.012	0.002
NF4	0.005	0.002	0.003	0.003	0.009	0.004

Typical operation of the project includes using the low-level gates to supply the required 35 cfs to the NFFR downstream of Canyon dam. PG&E's evaluation of hydraulics in the vicinity of the Canyon dam outlet tower indicates that, when 35 cfs is routed through the low-level gate, it draws water from a 9-foot-high band that extends above and below the gate's invert elevation of 4,422 feet (PG&E datum). PG&E concludes and we agree that during wet and normal years this results in drafting water from the hypolimnion; however, the drought conditions of 2001 led to lower than normal Lake Almanor water surface elevations and resulted in drafting water primarily from the metalimnion through the low-level gate. We conclude that conditions in Lake Almanor during 2001 led to drafting water with higher DO levels and lower concentrations of sulfide and dissolved iron and manganese than contained in normal-year hypolimnetic releases through the Canyon dam outlet low-level gates.

PG&E concludes and we agree that results of this study suggest that switching the source of the 35-cfs release to the upper-level gate, which is approximately 45 feet higher (invert elevation of 4,467 feet, PG&E datum), would decrease sulfide, dissolved iron, and dissolved manganese concentrations and would increase water temperature at the Canyon dam release outlet, station NF2 (see October 10 and 17 in table E-1, appendix E). It appears that there would be little additional benefit to water quality or reduction of odors associated with increasing the flow release from 35 cfs to 200 cfs on October 18.

PG&E reported that hydrogen sulfide odors were noticeable from the road above Canyon dam in October 2000. During 2001, hydrogen sulfide odors were present downslope of Canyon dam, although they were not as strong as during 2000. An odor of 4 TON occurred at the Canyon dam release to the NFFR on October 10, 2001. Shifting to the upper-level gate on October 17 coincided with a decrease in odor to less than 2 TON, which continued through the period of the 200-cfs release via the upper-level gate.

PG&E concludes and we agree that results of this study suggest using the upper-level gate of the Canyon dam outlet tower in the fall would reduce the levels of odor; concentrations of sulfide, dissolved iron, and dissolved manganese; and would increase water temperature. However, the lower than normal Lake Almanor water levels during the 2001 study period altered water temperature and water quality in the reservoir and, consequently, conditions of water drafted from the reservoir. In addition, the upper-level gate was only used for 2 days during the 2001 study, and prolonged usage of the gate could have a much larger effect on water quality in the hypolimnion of Lake Almanor. Although the 2001 study does not document conditions that would occur with prolonged usage of the upper-level gate, we conclude that switching to the upper-level gates of the Canyon dam outlet tower is a reasonable approach to improving water quality in the NFFR downstream of Canyon dam and minimizing odors in the vicinity of the dam. We further conclude that conducting a study such as the Canyon dam

mitigation measures evaluation that is recommended in the SA would document the effects of prolonged usage of the upper-level gate during wet, normal, and dry years and could provide information to adaptively manage the gate usage. However, we emphasize that the timing in which PG&E proposes to use the upper-level gates is not identified and that implementation of this action would affect water temperatures. Because use of the gate could substantially affect water temperatures in the Seneca reach, we conclude that it would be beneficial for PG&E to consult with the SWRCB, Plumas County, the FS, CDFG, FWS, and other interested parties prior to changing the typical-use pattern of the Canyon dam outlet tower gates to ensure that stakeholder concerns are addressed appropriately.

Recreation and Pulse Flows

Although winter pulse flows and summer recreational flows could affect water quality, their consequences primarily influence habitat for aquatic and riparian organisms and recreational resources. Therefore, we discuss these measures in sections 3.3.2, *Aquatic Resources*, 3.3.3, *Terrestrial Resources*, and 3.3.5, *Recreational Resources*. Effects on water quality are incorporated into the discussion of aquatic resources.

Erosion

Lake Almanor Shoreline Erosion—Wind-generated waves and wakes from boats on Lake Almanor erode banks and may result in local degradation of water quality from turbidity and sedimentation, and endanger cultural (known and unknown), recreational, and other sites along the shoreline of the reservoir. Recreationists who drive off-road vehicles along the shoreline of Lake Almanor also contribute to ongoing localized erosion in some areas.

PG&E (2002c) developed a draft SMP for Lake Almanor, which includes an erosion control plan as one of its components. The goals of this erosion control plan are to identify and provide information on where erosion is taking place, identify where PG&E has the legal right to erode the shoreline, to guide PG&E on when and where it should implement erosion control measures, and provide information on how adjacent property owners can undertake erosion control measures on PG&E lands, while at the same time preserving and sustaining the natural environmental qualities of the reservoir.

Plumas County expresses its expectation that PG&E will amend its draft SMP to address inconsistencies of the plan with land use designations within the project boundary. The county also comments that it would like results of PG&E's investigation of a few moderate to severe erosion sites, identified by the county in a June 13, 2003, meeting with PG&E, to be incorporated into the SMP.

In its draft SMP, PG&E commits to conducting annual surveys to evaluate shoreline erosion around Lake Almanor. PG&E also plans to continue issuing cost-free

permits to adjacent landowners who desire to implement erosion control work on PG&E property. In addition, PG&E plans to implement erosion control measures, as necessary, to limit erosion associated with cultural resource sites, threatened or endangered species sites, PG&E-owned facilities or sites of high value such as developed recreation sites. These measures may include riprap revetments, hardening of trails, or construction of stairways to keep recreationists off fragile slopes in popular dispersed recreation areas.

In addition, PG&E proposes to inform the recreating public of vehicular access restrictions, federal laws regarding the protection of cultural resources, and potential penalties for violation. PG&E also proposes increased monitoring and/or patrolling during periods of reservoir drawdown in fall and winter.

In its SA, PG&E indicated that agreement has not been reached with Plumas County on shoreline erosion. In the SA, which provides limited guidance for shoreline erosion, PG&E commits to:

- provide erosion control measures to protect the Lake Almanor shoreline from wind-caused wave action at the Westwood Beach and Stumpy Beach day-use areas;

- close and rehabilitate user-created vehicular and off-road vehicle (ORV) access routes along Lake Almanor's southwestern shoreline, in consultation with the FS; and

- determine the need to update the SMP based on discussions with the FS, Plumas County, and other interested parties at annual land use meetings and meetings held once every 10 years, at a minimum, specifically for that purpose.

In its November 4, 2004, filing with the Commission, the FS specifies, as a component of final Section 4(e) condition no. 40, that PG&E consult with the FS and other interested SA signatories for the purpose of developing a final SMP within 30 days of license issuance. The FS also recommends that PG&E hold meetings at least every 10 years, as specified in the SA, to discuss the need to update the SMP.

In its July 7, 2003 comments on Scoping Document 1, Plumas County recommends that PG&E be responsible for controlling any shoreline erosion caused by project operations that adversely affect water quality, aquatic resources, cultural resources, recreation, or aesthetics. It also recommends that, at a minimum, PG&E develop in consultation with Plumas County and resource agencies, a comprehensive site-specific erosion protection plan for shoreline areas with significant erosion. In its October 29, 2004, comments on the draft EIS, Plumas County further recommends that

PG&E meet with local citizens and the 2105 Committee prior to finalizing the plan and filing it with the Commission.

Our Analysis

Shoreline erosion is noticeable along portions of the perimeter of Lake Almanor, as it is on many reservoirs. PG&E's shoreline erosion survey conducted in 2000 indicates that about 7 percent of the reservoir's shoreline has substantial erosion, as identified by slope scars on the shoreline and sloughing of material into water. This survey also indicated that erosion is generally most extensive along the southeastern shoreline near Canyon dam and the western shoreline of the Almanor peninsula. Since Lake Almanor's normal maximum water level is at elevation 4,494 feet (PG&E datum) and much of the shoreline is gently sloped, erosion above the 4,500-foot contour (PG&E datum) project boundary is relatively uncommon. However, wind and wave action has eroded steep bank areas to near the 4,500-foot contour in a few locations, which has raised concerns regarding the potential for contamination of Lake Almanor from nearby septic leach fields.

In June 2003, Plumas County informed PG&E of some locations that it viewed as having moderate to severe erosion which were not included in PG&E's draft SMP. Plumas County also noted that the draft SMP is inconsistent with county land use designations in some areas. In October 2004, Plumas County indicated that it had resolved most of its outstanding issues on the SMP with PG&E and recommended that PG&E meet with the 2105 Committee and local citizens prior to finalizing the plan. We conclude that PG&E could improve the draft SMP by revising it to include the erosion sites identified by the county in June 2003 and making it consistent with current county land use designations. We additionally conclude that PG&E could address concerns of interested parties including the 2105 Committee and local citizens by meeting with them prior to finalizing the SMP and revising the SMP, as appropriate.

We conclude that implementation of the erosion control measures proposed by PG&E would reduce erosion, particularly in areas where erosion could result in loss of cultural resources, threatened and endangered species, and project facilities including developed recreation sites; however, localized shoreline erosion could continue to occur particularly on properties not owned by PG&E that are along the 4,500-foot contour (PG&E datum). Should Plumas County adopt an ordinance that limits the use of motorized vehicles at elevations of less than 4,500 feet (PG&E datum), informing the recreating public of these regulations and enforcing them would reduce localized erosion associated with these uses.

Monitoring shoreline erosion annually as proposed by PG&E would document changes in erosion around the reservoir. It would also be beneficial for PG&E to implement a plan developed in consultation with SWRCB, CVRWQCB, CDFG, the FS, Plumas County, and the Maidu community to evaluate any adverse effects of shoreline

erosion on water quality, aquatic resources, cultural resources, recreation, and aesthetics on a regular basis. The results of the annual shoreline erosion surveys and evaluation of shoreline erosion on other resources would facilitate identification of the need for further erosion control measures in the future.

Erosion of Upland Areas—PG&E's ground-disturbing activities, and its use and management of a roadway system that is necessary to maintain and operate the project, may result in erosion and subsequent degradation of water quality. In addition, as part of the cleanup of the 1984 Caribou landslide, PG&E created a spoil pile containing PCB-laden materials at a location referred to as the Oak Flat spoil pile.

In 1998, PG&E and the Plumas National Forest (1998) entered into a road maintenance agreement. This agreement applies to all roads where PG&E and the FS have joint use of Plumas NFS roads. The intent of the agreement is to ensure maintenance of the roads in a condition that provides for their intended use, prevent and correct erosion to the roads and adjacent lands, and ensure safe and efficient use of the roads. The agreement states that PG&E and the FS shall meet annually to develop an annual maintenance plan that addresses all anticipated road maintenance work needed on the roads covered by the road maintenance agreement.

The SA provides limited guidance for controlling erosion of upland areas. As a component of the recreation facility development program, the SA would require PG&E to implement erosion control measures on the slope between the parking lot and the upper picnic area at the Belden rest stop (SR 70) and for construction of a trail down to the Lake Almanor shoreline at the East Shore group camp area. PG&E also would revegetate or harden areas with substantial erosion caused by pedestrian or vehicle traffic at Rocky Point campground and day use area. The SA also would require PG&E to re-grade the Oak Flat spoil piles along Caribou Road to create a more natural rolling topography along the roadside, and establish native plantings where possible between the road and the spoil piles. Additionally, PG&E would stabilize and revegetate all native material that is left on NFS lands following ground-disturbing activities.

In its final Section 4(e) conditions, filed November 4, 2004, the FS specifies measures to control erosion of upland areas on NFS land or lands that would affect NFS lands. Some of these lands are within the project area, although other lands are outside the project area:

- Develop a plan for the control of erosion, stream sedimentation, dust, and soil mass movement for any new ground-disturbing construction or non-routine maintenance that may affect NFS lands. Following approval of the plan by the FS, PG&E would file the FS-approved plan with the Commission 60 days prior to beginning associated construction activities (Condition 15);
- File an FS-approved visual management plan with the Commission within 60 days prior to any ground-disturbing activity. The plan would address

clearing, removal of all non-native materials from NFS lands, locating spoil piles in approved areas on NFS lands or removing spoils from NFS lands, and stabilization and revegetation of all native material left on NFS lands (Condition 40 (G));

- Within 2 years of license issuance, re-grade the Oak Flat road debris spoil piles along Caribou Road and establish native vegetation between the road and spoil pile (Condition 40 (C)); and
- Cooperate with the FS on preparation of a road condition survey and maintenance plan that includes identifying PG&E's responsibility for road maintenance and repair costs based on project-induced use (Condition 42).

In its preliminary Section 10(j) recommendations, filed December 1, 2003, Interior makes a recommendation that PG&E develop an erosion control plan for all project facilities, roads, reservoirs, and bypassed reaches in consultation with the FWS, the FS, CDFG, and SWRCB.

Our Analysis

To control erosion and limit adverse effects on water quality associated with the roadway system, it is important for PG&E to prioritize maintenance efforts and implement BMPs for ground-disturbing activities. We conclude that implementation of PG&E's road maintenance agreement with the Plumas National Forest would ensure that PG&E and Plumas National Forest regularly reevaluate the need for maintenance, prioritize efforts to address these needs, and implement maintenance accordingly.

The SA identifies numerous activities such as development of recreation sites that would necessitate ground-disturbing activities. We consider it appropriate to address erosion control in site-specific design for any recommended new recreational facilities, which could be included in a recreation management plan (discussed in section 3.3.5, *Recreational Resources*). There would be a benefit in PG&E consulting with the appropriate resource agencies along with the Maidu community during development of the plan and upon discovery of previously unidentified cultural materials to ensure that their concerns are adequately addressed.

Similarly, implementation of a visual management plan, as recommended by the FS, would limit the potential for existing and new spoil piles to erode, aid in controlling invasive weeds, and improve the aesthetics of the spoil piles. Appropriate testing of sediments in the existing spoils piles, prior to disturbing them, and after consultation with appropriate resource agencies, would maintain or improve the environmental quality around any spoil piles that contain hazardous materials (such as the potentially PCB-laden materials in the Oak Flat spoil pile).

Hazardous Substances

In its November 4, 2004, filing with the Commission, the FS specifies final Section 4(e) condition 7 to limit the potential for PG&E to introduce hazardous pollutants to waters in the project area. Under this condition, PG&E would be required to file an FS-approved hazardous substances plan (HSP) with the Commission for oil and hazardous substances storage and spill prevention and cleanup. The FS specifies that, at a minimum, PG&E develop an HSP that:

- outlines PG&E's procedures for reporting and responding to releases of hazardous substances, including names and phone numbers of all emergency response personnel and their assigned responsibilities;
- maintains in the project area, a cache of spill cleanup equipment suitable to contain any spill from the project;
- periodically informs the FS of the location of the spill cleanup equipment on NFS lands and of the location, type, and quantity of oil and hazardous substances stored in the project area; and
- informs the FS immediately of the nature, time, date, location and action taken for any spill affecting NFS lands and PG&E adjoining property.

Our Analysis

In accordance with 40 CFR §112.1, an HSP (also frequently referred to as a spill prevention, control, and countermeasure plan) is required to be in place for any facility that has a maximum oil storage capacity of greater than 1,320 gallons above ground or in greater than 660 gallons in a single container. Drawings in Exhibit F of the license application do not provide sufficient information to determine which facilities are required to have an HSP under 40 CFR §112.1. In addition to the onsite storage of lubricants and other oil products, transformers on site are likely oil-cooled; due to the total size of all transformers at each development, we also assume that the total oil capacity of the transformers cumulatively is greater than 1,320 gallons per development, and each development is therefore required to have a HSP. We also note that any other project facility, including mechanical works, maintenance and warehousing areas, and other locations that store a single 660-gallon container or a cumulative 1,320 gallons of petroleum products is required to have an HSP.

PG&E is required to develop and implement an HSP for petroleum products independent of relicensing. This plan would provide a quick reference to procedures and notifications in the case of oil spills with the goal of reducing the effects of spills on the local area including the upper NFFR and Yellow Creek if a spill occurs. Extending the plan to include other hazardous materials stored, used, or disposed of in the project area would reduce the likelihood for contamination by these products and would reduce the extent of contamination should a spill occur.

3.3.1.3 Cumulative Effects on Water Resources

Since construction, project facilities and operations have affected water temperatures throughout much of the NFFR, lower Butt Creek, and project impoundments. Increasing summer flows in the Seneca and Belden reaches would cool water within these reaches. Modifying the Prattville intake to supply cold water from Lake Almanor to downstream reaches, pursuant to the Rock Creek-Cresta SA, would result in cooler water in the Butt Valley reservoir and in the NFFR between the Caribou development and Lake Oroville, although it would also result in a deeper thermocline and a warmer epilimnion in Lake Almanor. Implementation of other coldwater supply options could also cool water in the NFFR downstream of the Caribou development, but some options would warm water in Butt Valley reservoir. Since construction of the Rock Creek-Cresta and Poe projects, a portion of the flow has typically been routed around the Rock Creek, Cresta, and Poe bypassed reaches to the respective powerhouses resulting in summer warming of remaining flows in these reaches. Based on evaluations of modifying project features associated with the Prattville intake and Butt Valley reservoir, we do not anticipate that project features would be modified to provide cold water to downstream reaches. Therefore, the cumulative effects of the project and non project facilities and operations would be cooling of water in the NFFR between the Caribou development and Lake Oroville.

Several project and non-project actions affect the concentrations of trace metals within NFFR basin waters. Since 1952, PG&E's LACSP has seasonally increased silver concentrations in the atmosphere of the watershed that contributes to Lake Almanor, and consequently has increased the likelihood of elevated silver concentrations in precipitation and runoff. Project facilities and operations have historically resulted in accumulation of sediments in the reservoir and low DO levels in water at the water/substrate interface. The naturally high levels of metals in the sediments in combination with the anoxic conditions in the reservoir's hypolimnion have historically resulted in mineralization of trace metals in the reservoir, and elevated trace metal concentrations in Lake Almanor's hypolimnion and the Seneca reach. Modifying the Prattville intake to draft deeper water from Lake Almanor would seasonally increase oxygen levels in deeper waters of Lake Almanor and consequently reduce mineralization of metals contained in the sediments deposited in the reservoir. PG&E's use of the upper gates instead of the low-level gates at the Canyon dam outlet tower during periods with elevated hypolimnetic metal concentrations would reduce the conveyance of water with high metal concentrations to the Seneca reach. Non-project related mining is expected to continue in the Seneca and Belden reaches and other streams within the basin. Mining activity is expected to continue to cause the suspension of sediments with high trace metal concentrations. However, the cumulative effect of anticipated project and non-project actions would be a reduction in trace metal concentrations in Lake Almanor's hypolimnion and the Seneca reach.

Continued operation of the project may result in portions of the Lake Almanor shoreline receding into or near septic leach fields that were constructed prior to raising

the normal Lake Almanor water level to 4,494 feet (PG&E datum) in the mid 1970s. This could result in the introduction of fecal coliform bacteria and human pathogens from the leach fields into Lake Almanor waters. The expected increase in water-oriented recreational use throughout the NFFR basin would increase the potential for fecal coliform bacteria and human pathogens to be introduced to surface waters in the basin. The cumulative effects of these actions would be additive and likely result in localized increases in concentrations of fecal coliform bacteria and human pathogens in surface waters of the NFFR basin.

3.3.1.4 Unavoidable Adverse Effects. None.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

The project area currently supports a diverse assemblage of native and non-native fish species, many of which provide a forage base for game fish as well as for avian predators (table 3-13). The reservoirs support both coldwater and warmwater fisheries, while the bypassed reaches support a coldwater fishery dominated by rainbow trout. The rainbow trout population depends upon adequate year-round instream flows, water temperatures below 20°C, suitable spawning gravels, and access to tributaries that provide quality spawning areas and juvenile rearing habitat. Hardhead (*Mylopharodon conocephalus*) and Sacramento perch (*Archoplites interruptus*), both of which are special-status fish species in California, are known to occur in project waters and are discussed in greater detail below. Project waters also support diverse populations of aquatic macroinvertebrates, amphibians, and aquatic reptiles (PG&E, 2002a).

The historical fish community of the UNFFR likely included anadromous Central Valley spring-run and fall-run Chinook salmon (Yoshiyama et al., 2001). Central Valley steelhead may have occurred in project reaches, but there is uncertainty in regards to their original range (PG&E, 2002a). Although the majority of anadromous salmon may have been blocked by a set of naturally-occurring falls near the town of Seneca, many are reported to have ascended the entire length of the NFFR through the area now inundated by Lake Almanor and into surrounding tributary streams (Yoshiyama et al., 2001). The first man-made blockages to anadromous fish migrations in the Feather River basin were likely associated with mining operations. Hydraulic mining operations altered the river's physical and hydrologic processes, resulting in dewatered river beds, increased sediment loading, and physical alteration to gravel and cobble beds, all of which likely affected salmon populations (Yoshiyama et al., 2001). The construction of Big Bend dam in 1910 upstream of present day Lake Oroville likely blocked migratory fish from accessing waters of the NFFR and its associated tributaries. The construction of Canyon dam in 1914, and a second dam replacing it (1927), Rock Creek dam (1950), Cresta dam (1950), Poe dam (1958), and Oroville dam (1963) created additional migratory barriers in the upper Feather River. After the creation of project reservoirs, introduced fish species such as smallmouth bass, largemouth bass,

Table 3-13. Fish species identified in recent surveys (1996-2002) of waters in the UNFFR Project. (Source: PG&E 2002a, as modified by staff)

	Lake Almanor[a]	Butt Valley Reservoir	Belden Reservoir	Upper Butt Creek	Lower Butt Creek	Seneca Reach	Belden Reach
Native Species							
Rainbow trout (game fish) *Oncorhynchus mykiss*	X	X	X	X	X	X	X
Sacramento sucker *Catostomus occidentalis*	X	X	X	X		X	X
Sacramento pikeminnow *Ptychocheilus grandis*	X	X	X				X
Sacramento perch *Archoplites interruptus*	X	X					
Hardhead *Mylopharodon conocephalus*							X
Prickly sculpin *Cottus asper*	X	X				X	X
Riffle sculpin *Cottus gulosus*		X		X	X	X	X
Tui chub *Gila bicolor*		X					

	Lake Almanor[a]	Butt Valley Reservoir	Belden Reservoir	Upper Butt Creek	Lower Butt Creek	Seneca Reach	Belden Reach
Introduced Species							
Brown trout (game fish) *Salmo trutta*	X	X		X		X	X
Chinook salmon (game fish)[b] *Oncorhynchus tshawytscha*	X						
Smallmouth bass (game fish) *Micropterus dolomieui*	X	X	X				
Largemouth bass (game fish) *Micropterus salmoides*	X	X					
Brown bullhead *Ameiurus nebulosus*	X						
Wakasagi (Japanese pond smelt) *Hypomesus nipponensis*	X	X	X				
Common carp *Cyprinus carpio*	X	X					
Sacramento perch *Archoplites interruptus*	X	X					

[a] Tahoe sucker, tui chub, hitch, brook trout, kokanee salmon, silver salmon, chum salmon, bluegill, green sunfish, and channel catfish have been noted to occur in Lake Almanor, but were not collected in PG&E's recent surveys.

[b] Stocked in Lake Almanor by CDFG.

wakasagi (Japanese pond smelt), and brown trout exploited the new lentic environment, establishing self-sustaining populations.

Lake Almanor and Upstream Waters

Lake Almanor is the largest, most upstream project reservoir, and is approximately 10 miles long and varies between 1 and 4 miles in width. Lake Almanor has a surface area of 27,000 acres and a storage capacity of 1,142,251 acre-feet and (figure 1-1). Because the reservoir was created in what was formerly a large alpine meadow, it is relatively shallow in nature (PG&E, 2002a). Average depth of the reservoir is approximately 42 feet, with the deepest location of approximately 100 feet occurring near Canyon dam. During the summer, the lake is thermally stratified with a warm upper layer (epilimnion) that extends to a depth of 30 to 40 feet and a cold bottom layer (hypolimnion) that develops below 40 feet. The near-surface layer is typically 22°C or warmer in the summer, with temperatures at depth ranging between 10 and 14°C. Lake Almanor is also stratified with respect to the concentration of DO in the water column during summer stratification. Oxygen levels are near saturation at the surface and are diminished in the hypolimnion. In a 1962 study of the Lake Almanor fishery, CDFG reported that hypoxic conditions developed at approximately 35 feet and below, which forced coldwater game fish to seek thermal refugia where cold tributaries entered the reservoir or where upwelling springs occurred (PG&E, 2002a). Inflow into the lake comes from the Hamilton Branch powerhouse; the NFFR; the Hamilton Branch of the Feather River; and a number of smaller tributaries including Benner, Last Chance, and Bailey creeks. Various submerged springs can contribute a substantial volume of water, approximately 400 cfs, to Lake Almanor. Seasonally, elevation of the lake can vary from a low of 4,466.7 feet (PG&E datum) to a high of 4,494 feet (PG&E datum). A target level at or above 4,474 feet is established prior to September 15 to support recreational use. As lake levels recede during the late summer and fall, the shallow northwest portion of the lake de-waters more rapidly than the rest of the nearshore aquatic habitat in the lake.

Lake Almanor supports both coldwater and warmwater fish populations (table 3-12). Primary game fish occurring in the reservoir include rainbow trout, brown trout, stocked Chinook salmon, smallmouth bass, and largemouth bass. Since 1933, CDFG has stocked a variety of game and panfish in the reservoir to supplement the sport fishery. Recent CDFG stocking efforts have focused on rainbow trout, brown trout, and Chinook salmon. A creel survey conducted by PG&E in 2000 revealed that angler catch is dominated by rainbow trout and smallmouth bass, collectively comprising 93 percent of the total recorded catch of participating anglers (EA, 2001).

Wakasagi, which were introduced in the early 1970s, provide an important forage base for piscivorous fish in Lake Almanor. This species tends to aggregate at or below the thermocline in Lake Oroville, and it is likely that a similar behavioral pattern occurs in Lake Almanor (HTI, 2002; personal communication, D. Lee, Supervisory Fisheries

Biologist, CDFG, Rancho Cordova, CA, with J. Wechsler, Fisheries and Aquatic Scientist, Kleinschmidt Associates, Pittsfield, ME, February 17, 2005). Because of the collection techniques used and locations sampled, fish population studies conducted by PG&E in support of the license application do not provide a thorough understanding of the population size of wakasagi within Lake Almanor. However, entrainment studies conducted by PG&E in 2001 indicate that wakasagi accounted for 99.9 percent of all fish entrained (via the Prattville intake) through the Butt Valley powerhouse (ECORP, 2002a). A total of 91,616 wakasagi were collected during 10 days of sampling from June through October, suggesting that an abundant population of wakasagi currently exists in Lake Almanor. Entrainment of wakasagi inhabiting Lake Almanor transports them to downstream reservoirs and riverine reaches where they likely provide an important forage base for piscivorous fishes and avian predators.

Mollusc species inhabiting Lake Almanor include two native gastropods, rock fossaria (*Fossaria modicella*) and Artemesian rams-horn (*Vorticifex effuses*); two introduced gastropods, big-ear radix (*Radix auricularia*) and mimic lymnaea (*Pseudosuccinea columella*); one native bivalve, striated fingernail clam (*Sphaerium striatinum*); and one introduced bivalve, the Asian clam (*Corbicula fluminea*; also known as the Asiatic clam), which is the most dominant mollusc in the reservoir.

Butt Valley Reservoir

Butt Valley reservoir is long (4.75 miles) and narrow (0.75 mile) and has a maximum depth of about 50 feet (see figure 1-1). The surface area of the reservoir is 1,600 acres. The primary source of flow entering the reservoir is from Butt Valley powerhouse, which draws its water from Lake Almanor at the Prattville intake.

Butt Creek is the only major tributary entering the reservoir. Average monthly flows range from 40 to 188 cfs and averaged 99 cfs for the water year period 1970–1999. Butt Creek is an unregulated stream, flowing approximately 21 miles from its headwaters to Butt Valley reservoir. The creek is dominated by boulder and cobble substrates with areas of gravel that provide spawning, rearing, and foraging habitat for rainbow and brown trout. Rainbow and brown trout are the only game fish present in the creek; riffle sculpin and Sacramento sucker are also present (table 3-14). Angler harvest data revealed that 64 percent of all trout caught in the creek were 14 inches or longer (table 3-15). Rainbow trout from Butt Valley Reservoir enter the creek during early spring (March through April) to spawn while brown trout enter the creek during fall (October through November) for spawning. Juvenile rainbow and brown trout have both been documented within the creek during recent fishery surveys (ECORP, 2003a). The creek has a moderate gradient with riffle-run and step-run habitat contained in a well-defined stream channel approximately 30 to 50 feet wide.

Table 3-14. Species composition and relative abundance in Seneca reach, Belden reach, upper Butt Creek, and lower Butt Creek, 2000–2002. (Source: ECORP, 2003a, as modified by staff)

Location	Species	Yearly Abundance (Percent of Total for Location)		
		2000	2001	2002
Seneca Reach	Sculpin[a]	69	58	
	Riffle sculpin			47.8
	Prickly sculpin			5.8
	Rainbow trout	29	40	44.4
	Brown trout	1	<1	0.9
	Sacramento sucker	1	1	1.1
Belden Reach	Sculpin[a]	59.4	51.7	
	Riffle sculpin			55.9
	Prickly sculpin			1.9
	Rainbow trout	21.3	27.4	26.5
	Rainbow trout (hatchery)	-	-	0.7
	Sacramento sucker	19.1	20.9	13.9
	Sacramento pikeminnow	1	-	1.1
Upper Butt Creek	Sculpin[a]	47.5	46	
	Riffle sculpin			54.5
	Rainbow trout	28.5	33	29.4
	Brown trout	5	9.4	11.2
	Sacramento sucker	19	11.6	4.9
Lower Butt Creek	Sculpin[a]	65	61.3	
	Riffle sculpin			59
	Rainbow trout	35	38.7	41

a During 2000 and 2001 surveys sculpin were not identified to species.

Table 3-15. Total number of trout (rainbow and brown) caught by anglers in project waters surveyed in 2000, by size range. (Source: EA, 2001, as modified by staff)

	Size Range (Inches)					
	<8	**8-11**	**11-14**	**14-17**	**>17**	**Total**
Reservoirs						
Lake Almanor	53	85	159	109	99	505
Butt Valley reservoir	4	13	25	34	37	113
Rivers/Streams						
Upper Butt Creek	35	16	32	72	77	231
Lower Butt Creek	2	28	20	3	3	56
Belden Reach	55	43	18	2	4	122

Under normal operating conditions, Butt Valley reservoir fluctuates about 1 foot per day, 3 to 5 feet per week, and 10 feet on an annual basis. The reservoir is thermally stratified during early summer with temperatures near 20°C at the surface and less than 12°C at depths of 20 feet or greater (PG&E, 2002a). The duration of thermal stratification is influenced by the operation of the Caribou No.1 unit, a deeper intake unit that drafts colder water from deeper portions of the reservoir. By mid-July and August, the volume of cold water is typically at its minimum and the reservoir is weakly stratified.

The reservoir supports a trophy rainbow and brown trout fishery, with trout greater than 17 inches comprising a substantial portion (33 percent) of angler catch (table 3-15). The existence of this trout fishery is likely due in part to the forage base provided by wakasagi, which are entrained through the Prattville intake in Lake Almanor. Wakasagi are also reported to reproduce in the Butt Valley powerhouse tailrace and at the mouth of Butt Creek (personal communication, D. Lee, Supervisory Fisheries Biologist, CDFG, Rancho Cordova, CA, with J. Wechsler, Fisheries and Aquatic Scientist, Kleinschmidt Associates, Pittsfield, ME, July 27, 2005). Other fish species present in the reservoir include Sacramento pikeminnow, Sacramento perch, Sacramento sucker, tui chub, and smallmouth bass. Available habitat for fish, especially centrarchids, in the reservoir is limited, as most of the shoreline consists of shallow water with mud or shale substrate with little or no littoral zone present. In 1996 and 1997, fish habitat enhancement structures were constructed within the reservoir as mitigation for a dam seismic remediation project. The structures included 63 smallmouth bass cover and spawning modules in the reservoir and 25 boulder clusters grouped at three locations within Butt

Creek, the tailrace, and the reservoir. The effectiveness of these habitat enhancement structures has not been investigated.

Mollusc species inhabiting Butt Valley reservoir include four native gastropods: black juga (*Juga nigrina*), Artemesian rams-horn, nugget pebblesnail (*Fluminicola seminalis*), and marsh pondsnail (*Stagnicola elodes*). Large quantities of Asian clam shells were documented throughout the reservoir in 2001, though no live individuals were found. A prolonged severe drawdown of the reservoir from early spring 1996 through 1997 for dam safety purposes reduced the reservoir's volume to 5.8 percent of its normal amount and likely decreased the reproductive success of Asian clams in those years (Spring Rivers, 2002).

Belden Reservoir

The Belden reservoir is located on the NFFR downstream of the Seneca bypassed reach and has a surface area of 42 acres (see figure 1-1). The reservoir's daily water surface elevation can fluctuate between 5 and 10 feet depending on power operations. Flow into the reservoir comes from the Caribou No. 1 powerhouse, the Caribou No. 2 powerhouse, and the Seneca reach of the UNFFR.

Fish species inhabiting Belden reservoir include rainbow trout, brown trout, smallmouth bass, Sacramento sucker, and wakasagi. The presence of wakasagi is most likely due to their entrainment in the intakes of Caribou No.1 and No. 2 powerhouses located in Butt Valley reservoir. No data have been collected that suggest that wakasagi reproduce in or reside in Belden reservoir for prolonged periods of time.

Two species of bivalves, the native western pearlshell mussel (*Margaritifera falcate*) and the introduced Asian clam, occur within the reservoir (Spring Rivers, 2002).

Seneca Bypassed Reach

The Seneca bypassed reach of the NFFR begins at the base of Canyon dam and extends 10.8 miles to the Caribou No. 1 powerhouse at the upper end of Belden reservoir (see figure 1-1). A year-round minimum flow of 35 cfs is released into the reach from Canyon dam. Within the uppermost 0.5 mile, the reach receives additional flow from spring seepage and accretion flow. Butt Creek is the only major tributary that enters the Seneca reach. The Seneca reach has an overall stream gradient of 2 percent with varying habitat composed of low gradient riffles, runs, high gradient riffles, cascades, pools, step-runs, and pocket-water. The lower 1.25 miles of the reach, extending from the confluence with lower Butt Creek to the Caribou No.1 powerhouse, contains higher quality, more complex habitat consisting of a greater number of pools and additional flow from lower Butt Creek.

The predominant fish species found within the Seneca reach are riffle sculpin, rainbow trout, and prickly sculpin (table 3-14) (ECORP, 2003a). Less abundant fish species include Sacramento sucker and brown trout. The rainbow trout population within the Seneca reach is dominated by age 0+ and 1+ individuals (ECORP, 2003a). PG&E estimated the density of rainbow trout redds within Seneca reach to be 79 redds per river mile (TRPA, 2002b).

Molluscs inhabiting the reach include four native gastropods (nugget pebblesnail, Artemesian rams-horn, tadpole physa, and black juga) and two native bivalves (striated fingernail clam and western pearlshell mussel) (Spring Rivers, 2002).

Belden Bypassed Reach

The Belden reach of the NFFR is 9.3 miles long and extends from Belden dam to its confluence with Yellow Creek (see figure 1-1). A minimum flow of 140 cfs is released from the last Saturday in April to Labor Day from the Oak Flat powerhouse at the base of Belden dam. During the remainder of the year, 60 cfs is released. To accommodate the two flow rates, the turbine has a high-flow runner and a low-flow runner that are alternated in the spring and fall to correspond with the change in minimum flow requirements. The upper section of the Belden reach starts at the base of Belden dam and extends 7 miles to its confluence with the EBNFFR. Habitat in the upper section of Belden reach is varied, with riffles, runs, pools, pocketwater, and a 0.25- to 0.5-mile long section characterized by split channels and shallow riffles. Mosquito Creek is the largest tributary to the upper section, with flows ranging from 2 to 10 cfs from June to September.

The lower section of the Belden reach extends from the confluence of the EBNFFR to the confluence with Yellow Creek. This section is substantially wider than the upper section and also has a much greater volume of uncontrolled flow due to input from the EBNFFR, which is a large unregulated tributary of the NFFR. Data from the water year period 1970–1999 indicate that average monthly flows in the EBNFFR are highest from January until mid-May, ranging from 1,700 to 2,600 cfs, and are lowest from July until September, ranging between 100 to 300 cfs. The habitat in this section of the Belden reach consists primarily of riffles, runs, and pocket water. The Belden powerhouse discharges into Yellow Creek just upstream of the creek's confluence with the NFFR. Upstream of the Belden powerhouse tailrace, Yellow Creek, a CDFG-designated wild trout stream, contributes flows ranging from 40 to 170 cfs during June to September.

The fish community inhabiting the Belden reach is mostly composed of riffle sculpin, rainbow trout, Sacramento sucker, and prickly sculpin (see table 3-14). PG&E estimated the density of rainbow trout redds within Belden reach to be 17 redds per mile (TRPA, 2002b). Other less abundant species include Sacramento pikeminnow and the hardhead, which is a FS sensitive species (FSS) and a state species of concern (CSC).

Angling pressure throughout the Belden reach is high due to private and public campgrounds and Caribou Road, which provide easy fishing access along the reach. To increase angling opportunities, CDFG annually stocks the reach with hatchery raised rainbow trout.

The Gansner fish barrier is located on the Belden reach 0.2 river miles upstream of its confluence with EBNFFR. This 5-foot-high concrete-topped gabion rock barrier extends across the river and was constructed in 1975 by PG&E at the request of CDFG; PG&E is responsible for maintaining the structure. The barrier was designed to eliminate spawning access to the upper NFFR by Sacramento sucker and other non-game fish species. In 1971, prior to the construction of the barrier, CDFG chemically treated the Belden reach, from Belden dam to its confluence with the EBNFFR, with antimycin (Fintrol) to control non-game fish, primarily Sacramento suckers. The chemical treatment killed approximately 46,000 pounds of suckers and 300 to 500 pounds of rainbow trout. Following the treatment, CDFG restocked 483 rainbow trout that had been removed from the reach by electrofishing prior to the treatment and also stocked 10,000 hatchery-reared sub-catchable rainbow trout in the reach. PG&E noted that during several site visits in the spring of 2001, multiple rainbow trout were observed repeatedly attempting to jump over the barrier without success.

Mollusc species that inhabit the Belden reach include three native gastropods, black juga, Artemesian rams-horn, and tadpole physa, and two bivalves; the native western pearlshell mussel and the introduced Asian clam (Spring Rivers, 2002).

Lower Butt Creek Bypassed Reach

Lower Butt Creek, located in a remote, steep, and narrow canyon, is 1.4 miles long and extends from the Butt Valley dam to its confluence with the Seneca reach (see figure 1-1). It is a high gradient creek (9.4 percent), and there are no existing minimum flow requirements. Flows, which range from 14 and 21 cfs and average 18 cfs, are a result of coldwater spring inflow, seepage from Butt Valley dam, and tributary inflow from Benner Creek. During the summer months, water temperature within the creek ranges from approximately 10 to 13°C. Aquatic habitat consists primarily of high gradient riffle, cascade, and pocket water, and contains a substantial amount of large woody debris (LWD) present (TRPA, 2002; Entrix, 2002). The substrate found within the creek is dominated by boulder and cobble with areas of gravel. PG&E observed rainbow trout redd densities of 171 redds per mile, the highest density recorded in project waters (TRPA, 2002b), indicating that this reach is the most heavily used by spawning rainbow trout.

Riffle sculpin and rainbow trout were the only two fish species collected in the lower Butt Creek bypassed reach in 2000 through 2002 (table 3-14). Age 0+ trout were the dominant age class collected within lower Butt Creek, although juvenile and adult trout were also present (ECORP, 2003a). Based on the high density of trout redds and

age 0+ trout, it is evident that lower Butt Creek provides substantial spawning and rearing habitat for rainbow trout. Positioned across the creek, 0.2 mile upstream of the confluence with the Seneca reach, is a weir associated with an abandoned discharge gage, NF-9, which may act as a barrier to the upstream movement of juvenile and adult trout during low flow periods.

Compared to other project waters, lower Butt Creek possesses the greatest mollusc diversity with six native species including five gastropods; black juga, Lyogyrus sp., nugget pebblesnail, Artemesian rams-horn, and tadpole physa (*Physella gyrina*), and one native bivalve; striated fingernail clam (Spring Rivers, 2002).

Special-status Aquatic Species

Two special-status fish species are present within the project area. Hardhead, a FSS and a CSC, has been documented in the tailrace of the Belden powerhouse. The Sacramento perch (*Archoplites interruptus*), a FSS and the only centrarchid native to California, also occurs in project waters. The CSC designation is intended to encourage CDFG and other agencies to focus attention on a potentially imperiled species to help avert the need for costly listing under federal and state endangered species laws and associated recovery efforts that might ultimately be required. The FS has designated Sacramento perch as a sensitive species as part of its threatened, endangered, and sensitive species program, which was initiated to conserve and recover species that are management priorities for individual forests.

Hardhead are an omnivorous species that feed on plankton, aquatic plants, and invertebrates. Hardhead are typically most abundant in larger, middle, and low elevation well-oxygenated stream reaches where summer temperatures typically exceed 20°C (Moyle, 2002). Hardhead can colonize reservoirs, but persist only if exotic species, especially centrarchid basses, are not present.

Historically, Sacramento perch were widespread in the Sacramento, San Joaquin, Pajaro, and Salinas rivers and in Clear Lake (Lake County), but it has been extirpated from most of its historic range (Moyle, 2002). Today, Sacramento perch are restricted to farm ponds or reservoirs where they have been introduced. Preferred habitat consists of beds of rooted and emergent aquatic plants, which are critical for food and cover for juveniles. The species was introduced by an unknown source into project waters and was most recently documented in Lake Almanor (2000) and Butt Valley reservoir (1996-1998).

Fish Entrainment

To determine whether fish were being transported through project facilities as a result of normal operations, PG&E performed hydroacoustic and tailrace netting entrainment surveys at the Belden, Caribou No. 1, Caribou No. 2, and Butt Valley powerhouses in 2001. A total of 133,718 individual fish were collected in the tailraces,

of which 99.9 percent were wakasagi (ECORP, 2002a). The entrainment of wakasagi likely provides a substantial forage base to Butt Valley, and may contribute to the presence of its trophy trout fishery. Neither hardhead nor Sacramento perch, both species of concern inhabiting the project area, were collected during entrainment sampling efforts. The only hardhead documented in the relicensing studies were observed in the tailrace of the Belden powerhouse during the entrainment study. Because hardhead have not been documented above the Belden powerhouse, entrainment of this species is not likely to occur within the project. Because Sacramento perch tend to occupy shallow littoral zones, the potential for their entrainment from Lake Almanor or Butt Valley reservoir is not substantial. The low occurrence of other entrained species collected during the sampling (e.g., rainbow trout) indicates that these populations are only marginally affected by entrainment.

3.3.2.2 Environmental Effects

Minimum Flows

In the SA, PG&E and the settlement parties propose minimum instream flows based on water year type for the preservation and improvement of aquatic resources in the Seneca and Belden reaches of the NFFR (tables 3-16 and 3-17). The FS in its final Section 4(e) condition no. 25 specifies releases identical to the SA. In its Section 10(j) recommendation no. 1, Interior recommends similar, but somewhat higher minimum instream flows based on water year type for the Seneca and Belden reaches (tables 3-16 and 3-17). PG&E, and the FS in its final Section 4(e) condition no. 27, propose a method to classify water year type by January 10 and notify the FS, CDFG, FWS, SWRCB, Plumas County, and other signatories to the SA. The project would then be operated based on that forecast for the remainder of the month until the next forecast is issued on or about the tenth of February, March, April, and May. If the precipitation increases and water year type needs to be reclassified, operational changes would be adjusted accordingly.

For all recommended instream flow regimes, flows into Seneca reach would be released from Canyon dam and be monitored at gage NF-2. Flows into Belden reach would be released from Belden dam and monitored at gage NF-70.

In the SA, PG&E and the settlement parties do not propose any modifications to the existing flow conditions in lower Butt Creek. Interior concurs in its 10(j) recommendation no. 1, and suggests that PG&E make no efforts to reduce existing dam leakage, tunnel leakage, or spring or other natural flows that currently provide inflow to lower Butt Creek below Butt Valley dam.

Table 3-16. Recommended minimum flow releases from Canyon dam (Seneca reach) as measured at gage NF-2. (Source: SA and Interior letter, December 1, 2003, as modified by staff)

		Month											
WY Type		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Critically Dry	SA	75	75	90	90	90	80	75	60	60	60	60	70
	Interior	90	90	90	90	90	90	60	60	60	60	60	60
Dry	SA	90	100	110	110	110	110	80	70	60	60	60	75
	Interior	90	100	110	110	110	110	80	70	60	60	60	75
Normal	SA	90	100	125	125	125	125	90	80	60	60	60	75
	Interior	90	100	150	150	150	125	90	75	75	75	75	75
Wet	SA	90	100	125	150	150	150	95	80	60	60	60	75
	Interior	105	130	170	170	170	150	95	85	85	85	85	90

Note: WY -- water year

Table 3-17. Recommended minimum flow releases from Belden dam (Belden reach) as measured at gage NF-70. (Source: SA and Interior letter, December 1, 2003, as modified by staff)

		Month											
WY Type		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Critically Dry	SA	105	130	170	180	185	90	80	75	75	75	85	90
	Interior	130	130	150	150	150	130	100	100	100	100	100	100
Dry	SA	135	140	175	195	195	160	130	110	100	100	110	115
	Interior	135	140	175	185	195	160	130	110	110	110	110	120
Normal	SA	140	140	175	225	225	225	175	140	140	120	120	120
	Interior	140	140	175	225	225	225	170	140	120	120	120	120
Wet	SA	140	140	180	235	235	225	175	140	140	120	120	120
	Interior	140	140	225	250	250	250	175	140	140	130	130	130

Note: WY -- water year

Our Analysis

PG&E, in consultation with the resource agencies (FWS, FS, CDFG, and SWRCB), performed instream flow studies for the Seneca, Belden, and lower Butt Creek bypassed reaches using the Physical Habitat Simulation (PHABSIM) technique as applied under the structural framework of the Instream Flow Incremental Methodology (IFIM) (Bovee et al., 1998; Milhous et al., 1984, 1989). During the IFIM study design and scoping process, the resource agencies stated that their goal was to manage the NFFR

within the project area as a coldwater rainbow trout fishery with flows that are capable of sustaining a fully functional ecosystem (TRPA, 2002a). The objectives of the PHABSIM study were to describe existing habitat conditions for fish and other aquatic species and to develop the incremental relationship between stream flow and the weighted useable area (WUA) index to physical habitat. WUA is a quantitative index of habitat suitability used as a component of PHABSIM studies to express the amount of available habitat per thousand feet of linear river mile.

Fish species selected for the analyses were rainbow trout and Sacramento sucker, as was benthic macroinvertebrate community diversity. Rainbow trout and Sacramento sucker are two of the dominant species in the bypassed reaches (ECORP, 2003a; TRPA, 2002b). Site-specific habitat suitability criteria (HSC) were developed from field data collected in the Seneca and Belden bypassed reaches for the following life stages of the selected species: juvenile rainbow trout, adult rainbow trout, spawning rainbow trout, and adult Sacramento sucker. For the evaluation of macroinvertebrate habitat at modeled flows, HSC curves for macroinvertebrate community diversity were used from Gore et al. (2001). A similar but more limited study effort was conducted in lower Butt Creek.

As part of the IFIM study, PG&E placed transects in representative riffle, run, pocket water, and pool habitats in seven segments (49 transects) of the Seneca reach, five segments (29 transects) of the Belden reach, and two segments (13 transects) of lower Butt Creek. PG&E measured depths and velocities along transects at calibration flows to model hydraulic conditions up to a maximum flow of 2000 cfs for both the Seneca and Belden reaches and 35 cfs for lower Butt Creek. PG&E presented results for riffle, run, pocket-water, and pool habitats combined for each reach.

Seneca and Belden Reaches[23]

The flow schedules proposed in the SA and recommended by Interior (tables 3-16 and 3-17) for the Seneca and Belden reaches are more variable than existing conditions because they are designed to mimic the seasonal variability that occurs within a natural hydrograph over an annual period. In addition, the flow schedules take into account water year type (critically dry, dry, normal, and wet), which affects the distribution and abundance of aquatic habitat types.

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[23] The IFIM study provided separate results for the upper and lower sections of the Belden reach. For our analysis of recommended flow regimes for the Belden reach, we used the IFIM study results for the upper reach because this 7-mile section of habitat is not influenced by the unregulated flow of the EBNFFR, which enters at the start of the lower Belden reach.

Adult Rainbow Trout

For adult rainbow trout in the Seneca reach, WUA would increase rapidly up to approximately 250 cfs and then increase more gradually to a maximum at 800 cfs. At flows greater than 800 cfs, WUA would gradually decline (figure 3-10). In the Belden reach, WUA for adult rainbow trout increased steadily up to 300 cfs and then remained stable at all higher flows modeled (figure 3-11).

Both recommended flow regimes for the Seneca and Belden reaches would increase suitable habitat for adult rainbow trout during normal and wet water year types. The 60 cfs minimum flow as proposed by PG&E in the Seneca reach for the drier fall months would increase maximum WUA from 39 percent under existing conditions to 55 percent. Releases of 150-170 cfs in the spring would increase WUA to 82 percent of maximum. The flows recommended by Interior would result in a maximum available WUA of 62 percent of in the drier fall months and a maximum available WUA of 85 percent in the spring. In the Belden reach, habitat suitability would increase from 39 percent of the maximum WUA under existing conditions to 56 to 75 percent and 58 to 75 percent of maximum WUA under the proposed measures in the SA and Interior's recommendations, respectively.

During dry and critically dry water year types the available habitat for adults would be 55 to 67 percent (SA) and 55 to 73 percent (Interior) of the maximum WUA for the Seneca reach and 48 to 70 percent (SA) and 52 to 70 percent (Interior) of the maximum WUA for the Belden reach. Although the increase in habitat during dry and critically dry water year types would be less than for normal and wet water year types, they represent an increase over the existing conditions, especially during the winter.

Both proposed measures for minimum instream flows would improve habitat suitability for adult rainbow trout in each reach over that which exists under current flows.

Rainbow Trout Spawning

PG&E gathered site-specific habitat suitability information for spawning rainbow trout in 2001. Figures 3-12 and 3-13 show the expected quantity of WUA for rainbow trout spawning and egg incubation expected under varying flow conditions. Because rainbow trout spawning habitat is typically composed of unembedded gravel substrates at pool-tail outs and at point bar riffles, a reduction in suitability is likely at higher flows as these habitats become less available due to increased depth and velocity. However, the ratio and proximity of such habitat to downstream young-of-year habitat is more important to maintaining trout populations than the total amounts of spawning WUA (Bovee, 1982).

Maximum spawning and egg incubation WUA for rainbow trout in the Seneca reach occurs at 225 cfs, rapidly declines until a flow of 600 cfs, and then fluctuates

between WUA values of 57 and 92 at higher flows (figure 3-12). Spawning habitat suitability in the Belden reach achieves a plateau between 100 to 400 cfs, with a peak at 125 cfs and then steadily declines at higher flows (figure 3-13).

During wet and normal years the recommended flows in March and April[24] for the Seneca reach would provide 71 to 100 percent of the maximum WUA (SA) and 71 to 98 percent (Interior) of maximum rainbow trout spawning WUA in the reach compared to 39 percent under existing conditions. In the Belden reach, flows in March and April would provide 95 to 96 percent (SA) and 96 to 98 percent (Interior) of maximum rainbow trout spawning WUA in the reach, compared to 58 percent under existing conditions.

During dry and critically dry years for the Seneca reach, proposed (SA) and recommended (Interior) flows in March and April would provide 71 to 84 percent of the maximum spawning WUA compared to 39 percent under existing conditions. In the Belden reach, recommended flows in March and April would provide 95 to 96 percent (SA) and 96 to 98 percent (Interior) of the maximum spawning WUA compared to 58 percent under existing conditions.

In summary, the IFIM analyses show that both the proposed (SA) and recommended (Interior) flow regimes would provide for increases in spawning and incubation habitat in all water year types compared to existing flows. The predicted WUA increases over existing conditions are similar in the SA and Interior's recommendations.

Juvenile Rainbow Trout

Juvenile rainbow trout habitat suitability peaks at 50 and 75 cfs in the Seneca and Belden reaches, respectively (figures 3-10 and 3-11). After maximum WUA is attained in each of the reaches, habitat suitability rapidly declines as shallow stream margins decrease in aerial extent and water velocities increase.

The existing year-round minimum flow of 35 cfs in the Seneca reach provides 99 percent of the maximum WUA for juvenile rainbow trout on an annual basis. The proposed (SA) and Interior recommended flow regimes during the late summer/fall period (September through November) would continue to provide 99 percent and 97 to 99 percent of the maximum juvenile WUA, respectively. From December through August, the proposed (SA) and recommended (Interior) flows would provide 89 to 99 percent and 88 to 99 percent of the maximum juvenile WUA, respectively.

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[24] Rainbow trout spawning was documented in the Seneca and Belden reaches from late March through April (TRPA, 2002b).

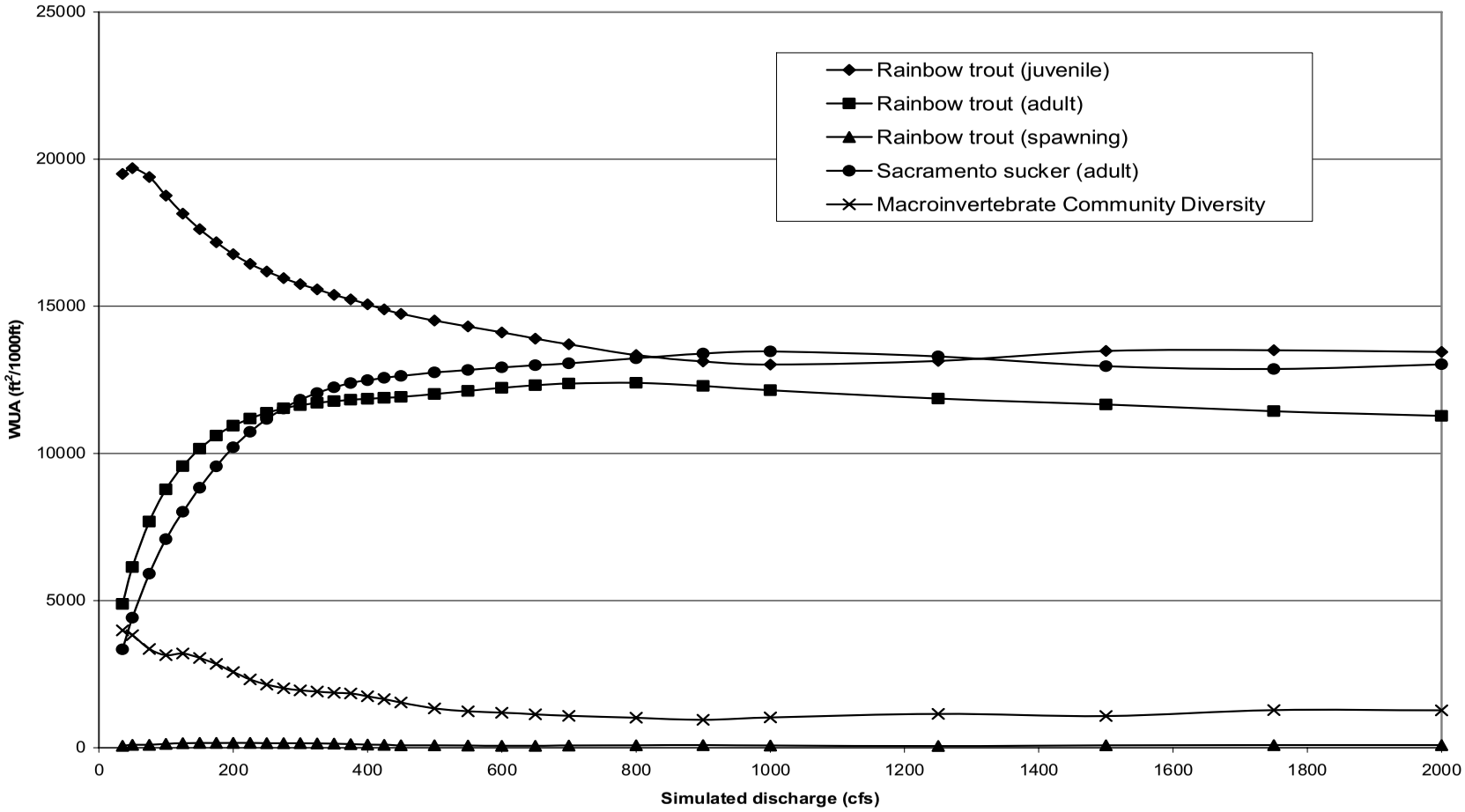

Figure 3-10. Total WUA values for species and life stages evaluated (one velocity calibration method) in the Seneca reach. (Source: TRPA, 2002a, as modified by staff)

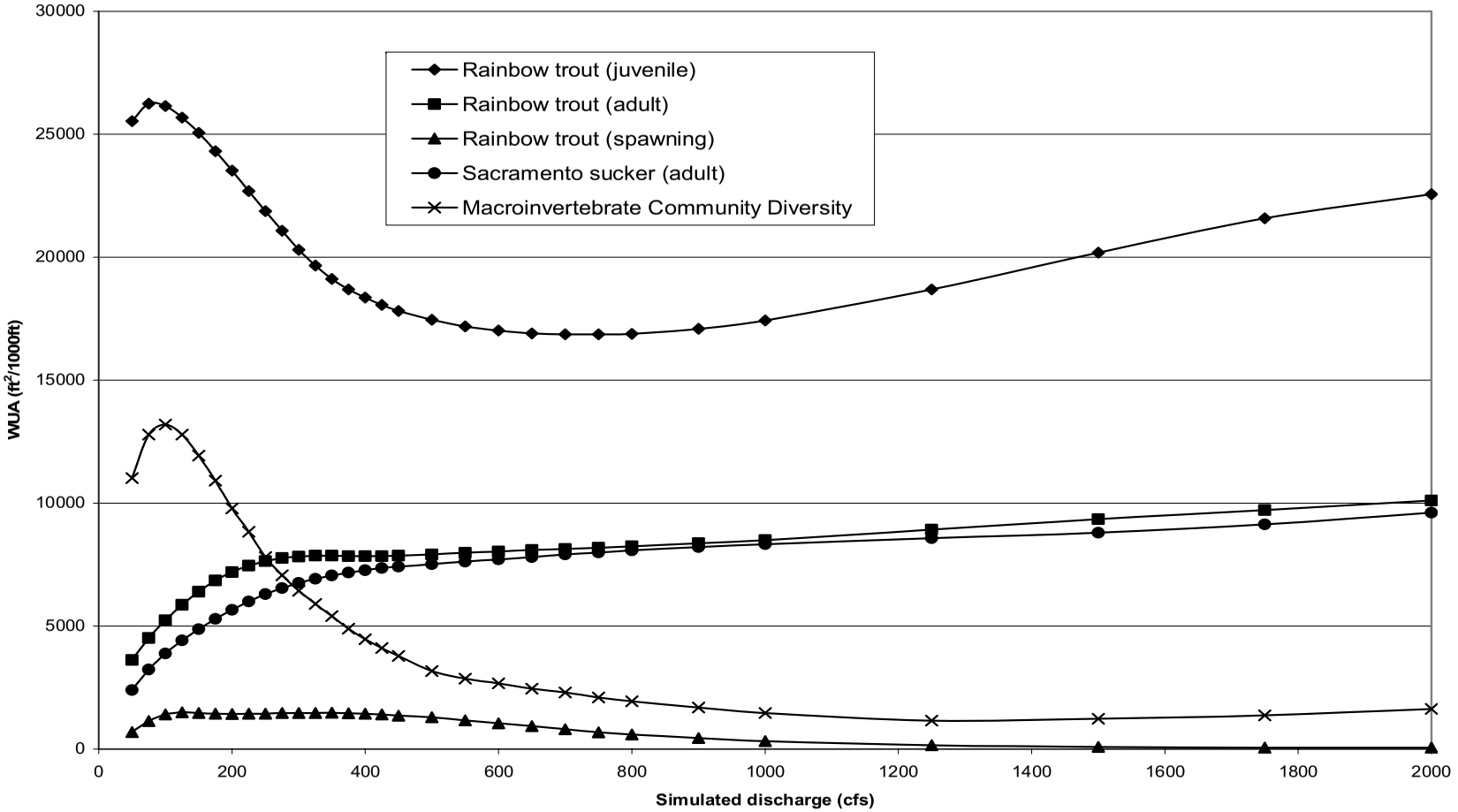

Figure 3-11. Total WUA values for species and life stages evaluated (one velocity calibration method) in the upper Belden reach. (Source: TRPA, 2002a, as modified by staff)

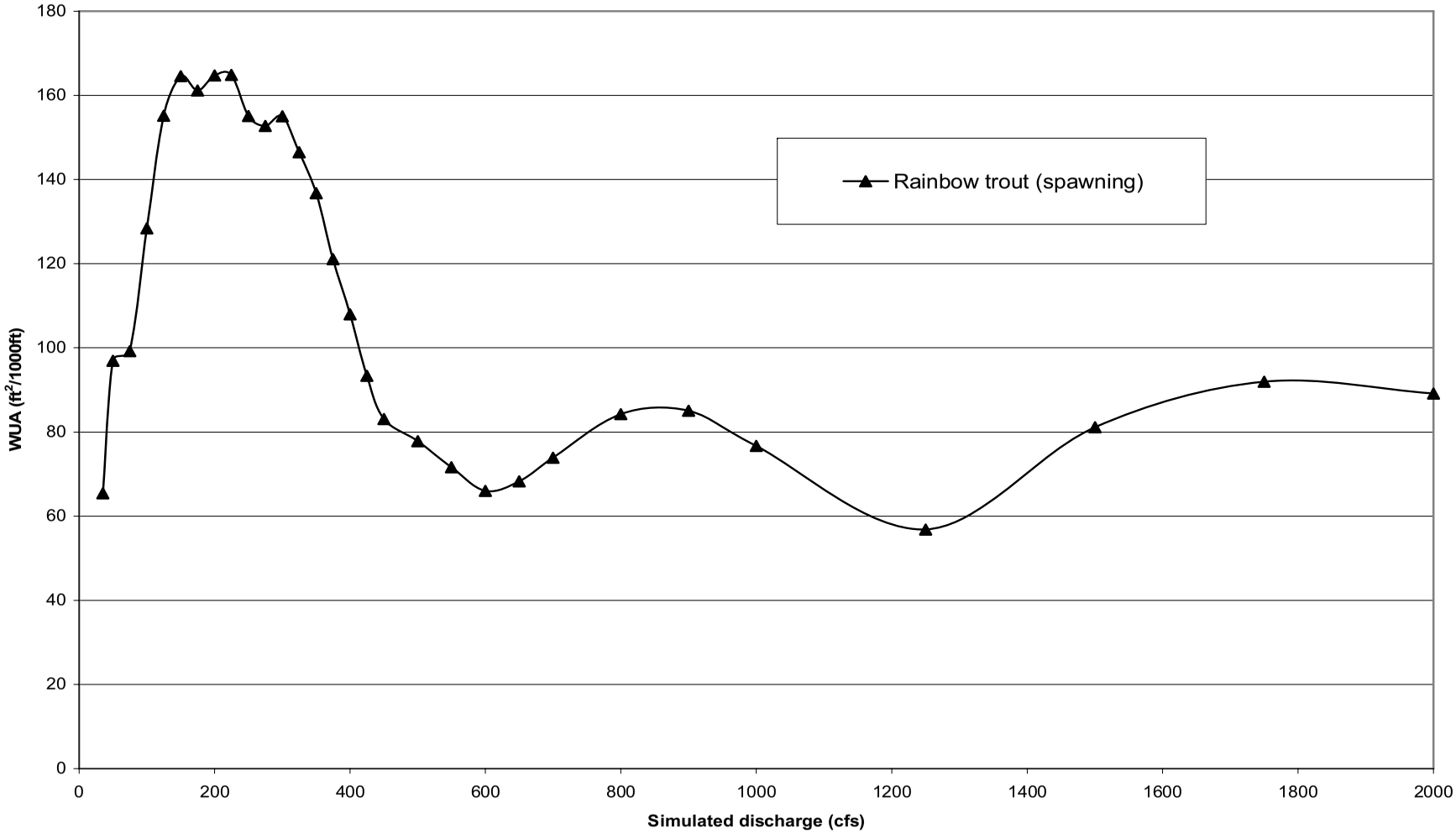

Figure 3-12. Total WUA values for rainbow trout spawning as evaluated (one velocity calibration method) in the Seneca reach. (Source: TRPA, 2002a, as modified by staff)

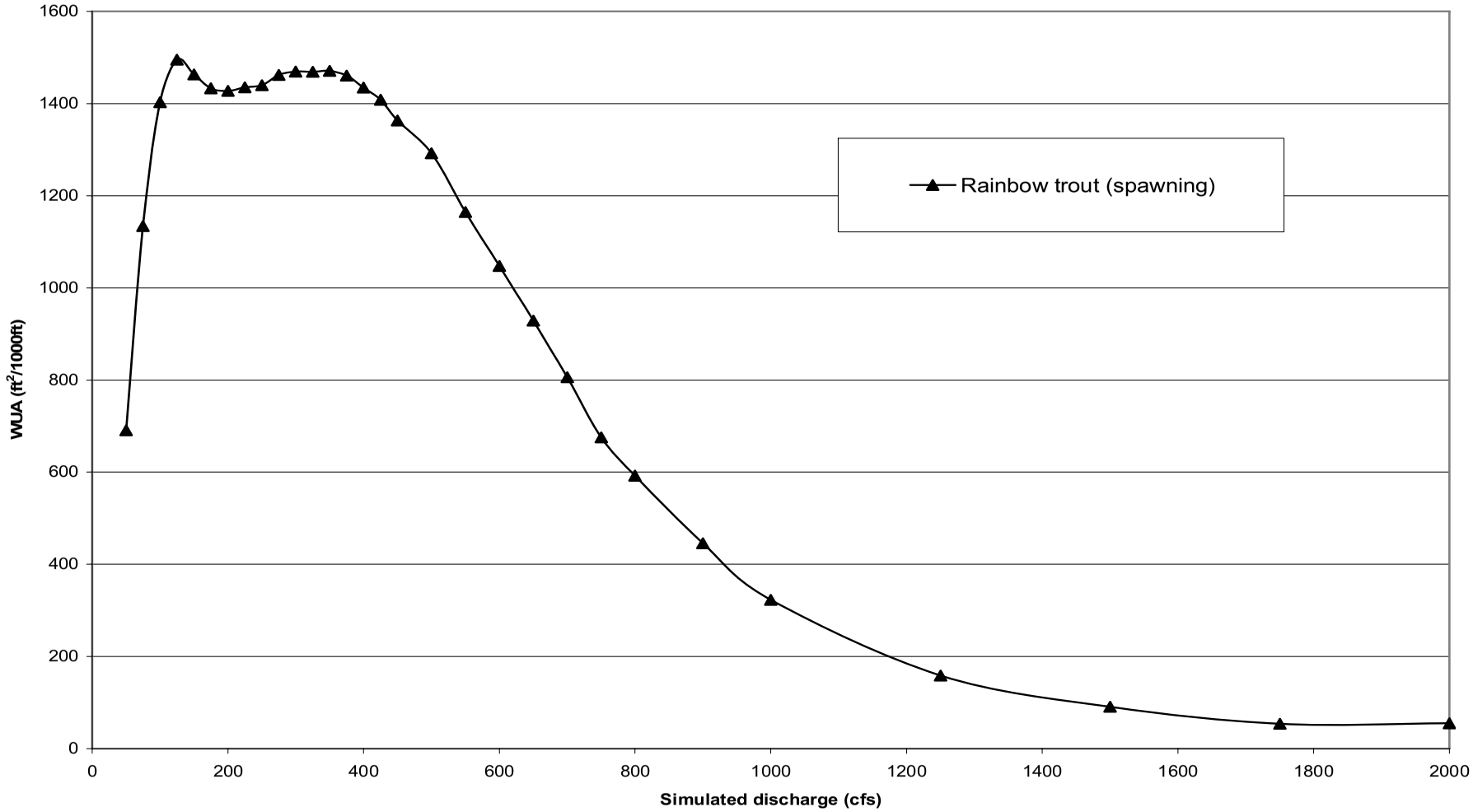

Figure 3-13. Total WUA values for rainbow trout spawning as evaluated (one velocity calibration method) in the upper Belden reach. (Source: TRPA, 2002a, as modified by staff).

The existing minimum flow regime in the Belden reach provides 96 percent of the maximum juvenile WUA from the last Saturday in April to Labor Day and 99 percent the remainder of the year. For normal and wet water year types, the proposed (SA) and recommended (Interior) flows would continue to provide substantial habitat for juvenile rainbow trout, representing 85 to 98 percent and 83 to 98 percent of the maximum juvenile WUA, respectively. During dry and critically dry water year types, the proposed flows would range between 75 and 195 cfs, providing juvenile rainbow trout with 90 to 100 percent of the maximum juvenile WUA. Interior's recommended flows ranging between 100 and 195 cfs would provide 90 to 99 percent of the maximum juvenile WUA.

In summary, the proposed (SA) and recommended (Interior) flow regimes for all water year types would provide essentially the same juvenile rainbow trout habitat suitability as the existing flow regime.

Adult Sacramento Sucker

WUA for Sacramento sucker adults increases steadily up to a flow of 300 cfs in the Seneca reach and 350 cfs in the Belden reach, then slowly increases at higher flows for both reaches (figures 3-10 and 3-11).

Under the recommended Seneca reach flow regimes, total available suitable habitat for adult Sacramento sucker would range between 38 and 68 percent (SA) and 38 and 72 percent (Interior) of maximum habitat suitability, compared to 26 percent under the current instream flow regime. Proposed and recommended flows in the Belden reach should provide 45 to 63 percent (SA) and 45 to 65 percent (Interior) (normal and wet water year types) and 33 to 58 percent (SA) and 40 to 58 percent (Interior) (critically dry and dry water year) of adult Sacramento sucker maximum habitat suitability. Current Belden reach instream flows provide 49 percent of maximum habitat suitability from the last Saturday in April to Labor Day, and 28 percent during the rest of the year.

In summary, the increases in adult Sacramento sucker habitat suitability would occur in all water year types under the proposed (SA) and recommended (Interior) flow regimes for the Seneca and Belden reaches compared to existing flow conditions.

Macroinvertebrate Community Diversity

Habitat suitability for macroinvertebrates is maximized at 35 cfs in the Seneca reach and at 100 cfs in the Belden reach (figures 3-10 and 3-11). In each reach, habitat suitability steadily decreases as flow increases above the flow providing maximum WUA. The proposed and recommended flow regimes would provide 76 to 91 percent (SA) and 72 to 91 percent (Interior) of maximum habitat suitability in the Seneca reach, and 64 to 97 percent (SA) and 59 to 100 percent (Interior) in the Belden reach. Though the recommended flows would decrease habitat suitability for macroinvertebrates during the spring and early summer over existing flows, a major amount of the habitat relative to the maximum potential would still be preserved, while at the same time providing higher

quality habitat for the other members of the aquatic community represented in the PHABSIM model. Further, increased wetted stream perimeter would increase the area available for epifaunal and infaunal colonization, and improve over wintering conditions by providing greater water depths, which would reduce the likelihood that ice formation would encroach on the substrate colonized by these organisms.

We conclude from these data that both the proposed (SA) and recommended (Interior) flow regimes would be benign to this component of the river ecosystem while benefiting the fish species, which is consistent with the resource agency study goals.

Hardhead

The IFIM study did not analyze the flow requirements for hardhead within the Belden reach, but focused on the fish species of interest (rainbow trout and Sacramento sucker) that were identified by PG&E, in consultation with CDFG, FWS, FS, and SWRCB. The only hardhead documented in relicensing studies were observed in the tailrace of the Belden powerhouse during the entrainment study conducted in 2001. Preferred hardhead habitat is riverine environments with deep pools (>1 m) composed of sand-gravel-boulder substrates, slow water velocities (< 40 cm sec-1), with water temperatures ranging from 17 to 28°C (Moyle, 2002). Spawning is presumed to occur in the spring in gravel riffle habitats (Moyle, 2002). The minimum flow regimes for the Belden reach proposed in the SA and recommended by Interior would not adversely affect hardhead because the aquatic habitat characteristics would be similar to what currently exists.

Water Temperatures

As described in section 3.3.1, *Water Resources*, PG&E performed 5 years of summer water temperature monitoring (2000 through 2004) in the Seneca and Belden reaches (see table 3-7). In the Seneca reach, daily average water temperature ranged from 9.4–22.5°C below Canyon dam (NF2), 10.8–19.9°C at the Seneca Bridge (NF3A), and 11.4–18.1°C upstream of the Caribou powerhouses (NF4). However, the temperature data presented by PG&E does not necessarily reflect conditions that occur under typical operations because it includes temperature data collected during 2004, when one of the Canyon Dam outlet tower upper gates was used instead of the low-level gates (used under typical operations) (table 3-7). Under typical operations, the maximum daily mean temperature that was measured in the Seneca reach was 17.2°C, which occurred immediately upstream of the Butt Creek confluence; all values for the reach were below 20.0°C. We suspect that the cooler conditions monitored at the lower end of the reach (station NF4) are largely due to cool water inflow from Butt Creek. None of the daily average temperatures reported for the Seneca reach exceeded 20.0°C.

In the upper Belden reach, daily average water temperature above the Gansner Bar fish barrier ranged from 13.9 to 21.8°C (NF5). Daily average temperature as measured in the middle section of the Belden reach ranged from 14.0 to 21.4°C and 14.7 to 21.3°C

(NF6 and NF7). In the lower Belden reach, downstream of the confluence with the EBNFFR, water temperature ranged from 15.1 to 22.9°C due to the addition of warmer water from the EBNFFR. PG&E also conducted additional analyses to assess the likely temperature changes in the bypassed reaches and reservoir outflows that would be expected as a result of the proposed SA flows and proposed modifications to the Prattville intake (Bechtel and TRPA, 2004).

By comparing the results of PG&E's SNTEMP model runs and the Bechtel and TRPA (2004) report to baseline monthly mean summer water temperatures in the bypassed reaches, we have determined that the increased minimum flow schedule as proposed in the SA would likely reduce stream temperatures by as much as 1.6°C in the Seneca reach, depending on water year type and month. For all water year types modeled, the water temperatures within the Seneca reach would remain below 16°C for the recommended flow regimes. We do not anticipate that the flows recommended by Interior would result in summer water temperature reductions substantially greater than that proposed in the SA or a more favorable temperature regime for salmonids than the SA.

The Belden reach water temperature-flow relationship modeling conducted by PG&E included two varying conditions: (1) flow within the Seneca and Belden reaches, and (2) configuration (existing or modified) of the Prattville intake. In this section, we analyze the results of the modeling (specifically those for the existing Prattville intake, with a flow release of 75 cfs in the Seneca reach, and a flow of 140 cfs in the Belden reach (see section 3.3.1.2) to approximate the effects of the recommended summer flow release schedule on water temperatures within the Belden reach. Results of the modeling indicate that, in average water years and with normal meteorological activity, monthly median water temperatures from June to September would range from 17.6 to 20.5°C (PG&E, 2003c), which is similar to expected temperatures under existing instream flow conditions (see figure 3-7). Further downstream, below the confluence with the EBNFFR, similar conditions would likely result in water temperatures ranging from 17.9 to 21.4°C, which do not differ substantially from baseline conditions (see figure 3-7).

For the Belden reach, PG&E's SNTEMP model and Bechtel and TRPA (2004) indicate that the water temperature in the Belden bypassed reach is expected to remain below 20.2°C from June through September in all water year types and could be as much as 2°C cooler than existing conditions as a result of the implementation of the flows proposed in the SA. Any reduction in stream temperatures in the bypassed reaches is considered to be beneficial to the system because these streams support coldwater riverine fisheries. Section 303 of the Clean Water Act authorizes the designation of beneficial uses for the navigable waters of the United States. The Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River basins defines cold freshwater habitat as a beneficial use of the Feather River.

Rainbow trout prefer ambient temperatures between 15 and 18°C, Sacramento sucker prefer temperatures between 15 and 25°C, and hardhead prefer temperatures above 20°C (Moyle, 2002). Under the existing Prattville intake configuration, the proposed (SA) and Interior-recommended flow regimes would reduce or maintain water temperatures within the Seneca and Belden reaches. This would retain preferred temperatures for rainbow trout and Sacramento sucker in both reaches, and in the lower Belden reach it would provide temperatures at the lower end of the preferred range for hardhead.

Conclusion

We expect the flow regime proposed in the SA to maintain or improve existing aquatic resources in both the Seneca and Belden bypassed reaches. Specific effects of the proposed minimum instream flows would (1) maintain rainbow trout juvenile habitat suitability near or at existing high levels; (2) improve adult and spawning rainbow trout and adult Sacramento sucker habitat suitability; (3) maintain significant macroinvertebrate habitat suitability; (4) maintain suitable water temperatures within both reaches for rainbow trout and Sacramento sucker; (5) maintain water temperatures in the Belden reach that are within the preferred range of hardhead, and (6) enhance geomorphic and channel functionality of the bypassed reaches through the movement of sediment and debris. The flow regime recommended by Interior, though providing somewhat higher flows during certain seasons for different water year types, would not provide for a substantial increase in habitat suitability for the evaluated species' life stages over the flow regime proposed in the SA.

Lower Butt Creek

Based on the results of the instream flow study conducted in lower Butt Creek, the maximum WUA for spawning, adult, and juvenile rainbow trout is provided at 18, 23, and 16 cfs over the range of flows that that were modeled (5 to 35 cfs) (figure 3-14). Habitat suitability changes gradually across the range of flows modeled with no distinct peaks or inflection points; a relatively wide range of flows would provide similar levels of habitat suitability for most species and life stages modeled. The flow regime is not necessarily a limiting factor to habitat suitability in lower Butt Creek.

Flows under existing conditions range from 14 to 21 cfs and average 18 cfs. The average flow provides 100 percent of the maximum WUA for rainbow trout spawning, 98 percent of the maximum WUA for rainbow trout adults, and 99 percent of the maximum WUA for rainbow trout juveniles. In addition, the average flow provides 96 percent of the maximum WUA predicted for macroinvertebrate community diversity.

Currently, summer water temperatures in lower Butt Creek range from 10 to 13°C. The preferred temperature range for rainbow trout is 15 to 18°C (Moyle, 2002). The relatively high density of trout redds (171 per mile), many of which were found below

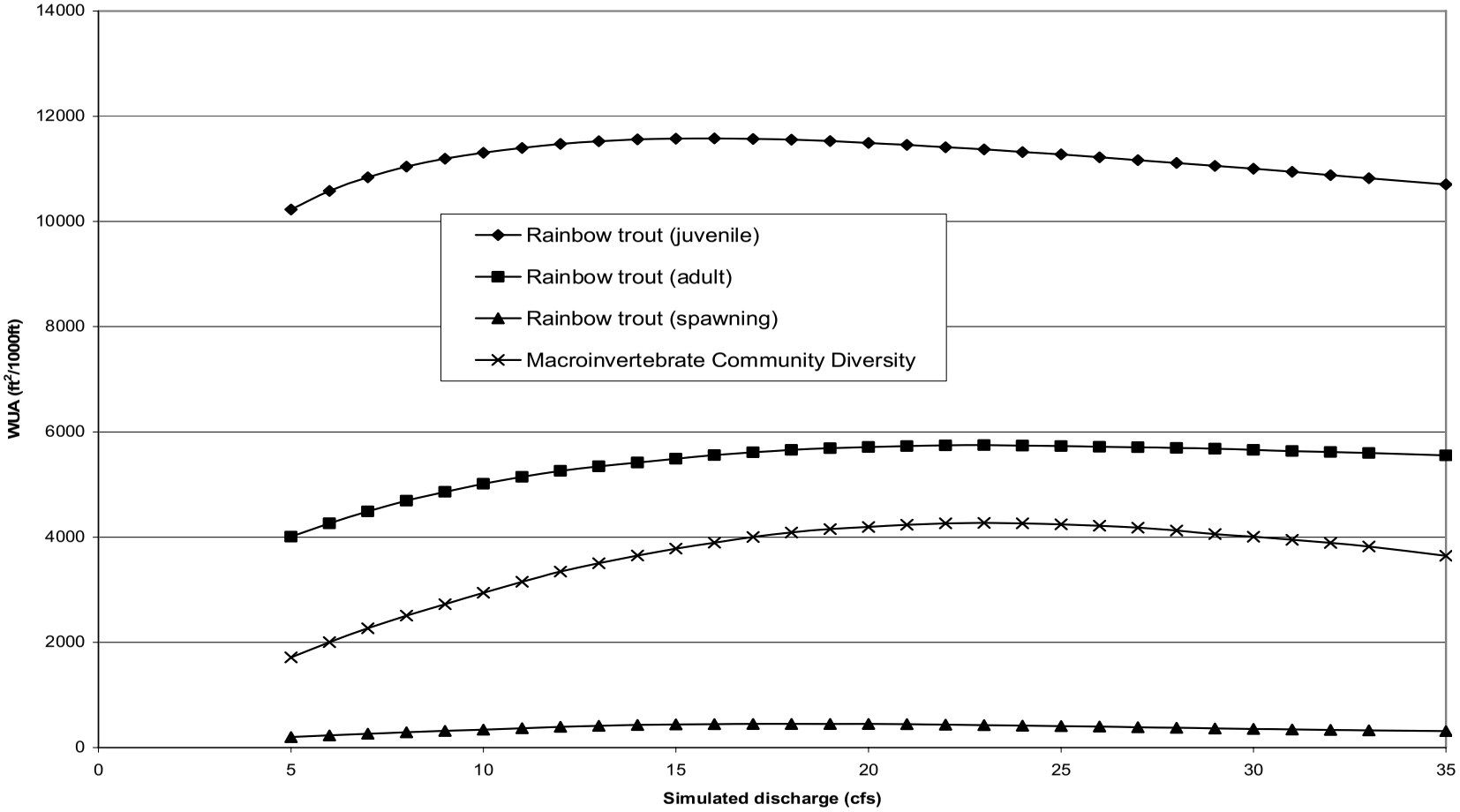

Figure 3-14. Total WUA values for species and life stages evaluated (one velocity calibration method) in lower Butt Creek. (Source: TRPA, 2002a, as modified by staff)

gage NF-9 (TRPA, 2002b) and young trout throughout lower Butt Creek (ECORP, 2003) indicates that, during the spring, adult trout are currently successful in moving into Butt Creek to spawn. During the summer, the relatively cool water temperature, which is actually below the preferred range for trout, may induce some percentage of juvenile and adult trout populations to move downstream into the Seneca reach where the water is slightly warmer, and ranges from approximately 10 to 17°C (see table 3-7), and more often in the preferred range for trout. Because the Seneca reach is more accessible to anglers than Butt Creek, our hypothesized movement pattern would make trout produced in lower Butt Creek more accessible to anglers.

In summary, the continuation of the current flow regime in lower Butt Creek would provide near optimal physical habitat conditions for trout and macroinvertebrates. This would maintain the native rainbow trout fishery and provide high quality spawning habitat for rainbow trout inhabiting the creek as well as for trout from the Seneca reach that might spawn in lower Butt Creek.

Pulse Flows

Within riverine systems, periods of high flow entrain, transport, and redeposit sediments, detritus, and woody debris along the stream channel, floodplain, and within tributary confluence areas. These events provide substrates used by fish during spawning and rearing, provide habitat for the development of prey and food items for aquatic species, and maintain the quality and diversity of mesohabitats. The presence of dams and the diversion of flow to powerhouses can reduce or eliminate such seasonal high flow events, which may reduce the quality of aquatic habitat in affected bypassed reaches.

Seneca and Belden Reaches

In the Seneca and Belden bypassed reaches, PG&E proposes the release of one pulse flow in January, February, and March in water years classified as wet and normal to assist in the enhancement of riverine habitat in the UNFFR Project area (table 3-18). The pulse flows would consist of releases from both Canyon dam (Seneca reach) and Belden dam (Belden reach). No pulse flows are proposed by PG&E during water years classified as dry or critically dry. The FS (in its final Section 4(e) condition no. 25(3)A) specifies and CDFG (in its November 26, 2003 filing) recommends similar measures. Pursuant to its authority under Section 10(j), Interior recommends that PG&E release pulse flows of a higher magnitude than those proposed in the SA during wet and normal years, and that pulse flows of 700 cfs be implemented in March of water years classified as dry (table 3-18). To protect trout spawning, Interior also recommends that pulse flows not be required in March in the respective reaches if 2 successive days of mean daily water temperature greater than 10°C are measured at gages NF-2 (Seneca reach) or NF-70 (Belden reach), or if rainbow trout spawning in the Seneca or Belden reaches is observed and reported to PG&E by either CDFG or the FS.

Table 3-18. Recommended pulse-flow releases for the Seneca and Belden reaches. (Source: SA CDFG letter dated November 27, 2003, the FS, letter dated December 1, 2003, and Interior, letter filed December 1, 2003)

Water Year Type	Recommending Party	Pulse Flow Release
Wet	SA, the FS, CDFG	One release per month in January (675 cfs), February (1,200 cfs), and March (1,200 cfs)
	Interior	One release per month in January, February, and March of 1,500 cfs. (2,200 acre-feet volume[a])
Normal	SA, the FS, CDFG	One release per month in January (675 cfs), February (1,000 cfs), and March (1,000 cfs)
	Interior	One release per month in January, February, and March of 1,200 cfs. (1,800 acre-feet volume[a])
Dry	SA, the FS, CDFG	No pulse flows
	Interior	One release in March of 700 cfs, only if no other pulse was released in January or February. (1,000 acre-feet volume[a])
Critically Dry	SA, the FS, CDFG	No pulse flows
	Interior	No pulse flows

[a] Estimated volume only; each release would be 12 hours, plus period of ramping at a standard rate.

The pulse flows proposed in the SA would be released at a ramping rate of 0.5 foot per hour until the maximum volume is attained. Peak releases would be held for 12 hours, after which the release volume would be reduced at 0.5 foot per hour. March pulse flows in the Seneca reach would be scheduled such that after peak flow releases, discharge would be ramped down at 0.5 foot per hour to 400 cfs and held there for 6 hours between 9 a.m. and 3 p.m. on weekends to provide recreational boating opportunities (see section 3.3.5, *Recreational Resources*). After recreational flow conditions are met, reductions would occur at the 0.5 foot per hour ramping rate until the specified minimum stream flow is reached.

In its letter filed with the Commission on November 1, 2004, Interior stated that, as a modification of its original Section 10(j) recommendation, the Commission could assume that the additional dry year pulse flows recommended by Interior would be subject to the temperature criteria described in the SA (no pulse flow would occur if water temperature exceeded 10°C for two consecutive days in March) to protect recently constructed rainbow trout redds from scour by pulse flows. During the Section 10(j)

teleconference on February 3, 2005, Interior described the likely ecologic, geomorphic, and sedimentologic benefits it believed would occur due to increased flow to the bypassed reaches. Interior also expressed its concern with the potential for consecutive years without any pulse flows in project reaches and cautioned that, if insufficient frequency of spring pulse flow is allowed for benefits to the ecosystem, there may be potential for a negative impact on organisms and ecosystem processes that rely on such pulse flows. Interior also expressed its desire to see a pulse flow of some magnitude in dry years, especially since the draft EIS and SA allow for recreation flows in dry and critically dry years. Interior reiterated its modified Section 10(j) recommendation, which provides for a pulse flow of 700 cfs in March of dry years, but qualifies that no pulse flow would occur if water temperature exceeded 10°C for two consecutive days in March, or if pulse flow releases of a similar magnitude have occurred in January or February.

Monitoring of Substrates and Spawning Gravels

To evaluate the effects of pulse flows on the availability, distribution, and recruitment of substrates in the bypassed reaches, PG&E proposes to develop and implement a gravel monitoring plan in consultation with CDFG, SWRCB, the FS, and FWS. Although the emphasis of this program would be on spawning-sized gravel, it is expected that information on smaller- and larger sized materials would also be gathered. The gravel monitoring plan would be approved by the FS and filed with the Commission for final approval before implementation. If, after review of the data collected through gravel monitoring efforts, the FS, CDFG, FWS, and SWRCB determine that the pulse flow schedule could be improved to enhance the availability and distribution of spawning-sized gravel or enhance riparian function, the agencies may propose revisions to the magnitude, duration, or frequency of pulse flows.

In its Section 10(j) recommendation nos. 6 and 8, Interior recommended that two monitoring plans be developed to document geomorphic and sedimentologic changes that may occur in the bypassed reaches as a result of pulse flows. These two plans were:

1. a geomorphologic monitoring plan (10(j) recommendation no. 6) to monitor streambed cross-sections, longitudinal profiles, and overall channel dynamics, including mesohabitat dimensions, distribution, and net channel changes in years 1, 5, 10, and 20 of the license; and
2. a coarse sediment management plan (10(j) recommendation no. 8), which includes (a) a program for monitoring spawning gravel quantity and quality, (b) contingency actions for improving the quality and availability of such gravels, (c) triggers for the implementation of contingency actions, and (d) a special study of pulse flows.

The FS specifies in its final Section 4(e) condition no. 25(3B) and NOAA Fisheries, in its Section 10(j) recommendation no 1, recommends that PG&E provide

gravel monitoring and gravel augmentation plans for the UNFFR. The FS specifies that PG&E provide a gravel monitoring plan within 12 months of license issuance to evaluate the movement and recruitment of gravels in the Belden and Seneca bypassed reaches during pulse and other high flow events. NOAA Fisheries recommends, in conjunction with its modified Section 18 fish passage prescription, that within 12 months of license issuance, PG&E submit a plan to evaluate the amount of gravel needed to support anadromous fish in the Seneca reach. Upon approval of a plan submitted to NOAA Fisheries, PG&E would be required to implement gravel augmentation within 3 years of license issuance.

During the Section 10(j) teleconference on February 3, 2005, and in letters filed with the Commission on October 27, 2004, and November 1, 2004, Interior indicated that, while it prefers its original recommendation for a geomorphological monitoring plan, as an alternative, it would be satisfied with geomorphological monitoring once during the license term (approximately mid-term) instead of four times (in years 1, 5, 10, and 20) as it originally recommended, in addition to spawning gravel monitoring as described in the SA. However, Interior would like to see standard monitoring conducted, including longitudinal profiling and mesohabitat measurements, as well as monitoring of changes resulting from the modified minimum flow schedule or pulse flows, vegetation encroachment (or lack of), and cumulative effects due to the project or other large-scale events.

During the Section 10(j) teleconference, Interior also indicated that it would be agreeable to the gravel monitoring plan as recommended in the draft EIS if contingency actions for gravel management (e.g., gravel supplementation, vegetation management) are more clearly defined in the final EIS.

Our Analysis

We reviewed information on peak flows recorded in the Seneca reach (USGS gage No. 113995) and the Belden reach (USGS gage No. 11401112). Our review of the data for the 31 water years extending from 1970 through 2001 indicates that in the Seneca and Belden reaches, peak flows exceeded 1,000 cfs in 9 years and 1 year, respectively.

Median sediment size among transects ranged from 22 to 362 mm in the Seneca reach and 32 to 256 mm in the Belden reach (Entrix, 2002). Sediments are actively transported through the Seneca reach and deposited in Belden reservoir. Sediment in the reservoir has a median size of 50 mm 0.3 mile below the Caribou powerhouse tailraces, with sediments in the lower end of the reservoir being much finer silts and sands that have a median size ranging between 0.02 to 0.1 mm.

Several sediment sources are present in each reach that could contribute to sediment recruitment. These sources include mining sites, tributary streams, and hill-slope landslides in the Seneca reach. Along the Belden reach, sediment sources include

major project spoil sites and hill-slope landslides. Boulder is the dominant substrate associated with hill-slope landslides in both reaches primarily due to a few large rockfalls. Outside of rockfalls, sand (particles 0.06 to 2 mm in diameter) is the most frequently observed dominant particle size followed by cobble (64 to 256 mm in diameter) and gravel (2 to 64 mm in diameter) in deposits adjacent to the channel within both the reaches (Entrix, 2002).

Surveys relating to the development of habitat suitability criteria for spawning rainbow trout documented 229 redds within the study sections of lower Butt Creek, Seneca reach, and Belden reach. Survey results showed that gravel used for spawning ranged from 6.4 to 76 mm (TRPA, 2002b).

The existing minimum flow in the Seneca reach (35 cfs) is sufficient to mobilize particles of up to 10 mm in diameter. This flow allows sand to remain lodged in most spawning-sized gravel degrading the quality of this habitat for rainbow trout spawning. Such particles would be flushed from the gravel with the proposed and Interior-recommended pulse-flow releases, which would enhance the quality of the spawning gravel.

The existing winter (60 cfs) and summer (140 cfs) minimum flows in the Belden reach are sufficient to mobilize particles up to 4 and 7 mm in diameter, and these flows allow sand to remain lodged in most spawning-sized gravel degrading the quality of this habitat for rainbow trout spawning. Such particles would be flushed from the gravel with the proposed and Interior-recommended pulse-flow releases, which would enhance the quality of the spawning gravel.

The existing, proposed, and Interior-recommended minimum flow regimes specified in tables 3-16 and 3-17 are not sufficient to mobilize most gravel that would be suitable for trout spawning. Seasonal pulse-flow releases sufficient to mobilize spawning gravel would enable material that is potentially available for transport by stream flow (estimated to be 880 cubic yards per mile adjacent to the Seneca reach and 3,580 cubic yards per mile adjacent to the Belden reach) to actually be transported. Some of this material would be gravel suitable for trout spawning, and would serve to replenish gravel that may be washed out of both reaches during flood events of much greater magnitude than the recommended pulse flows. Pulse flows also would enable redistribution of spawning gravel already in the reaches. This could represent a positive effect, if the surface area of gravel is increased or the gravel is more accessible to spawning by adult trout. If such gravel redistribution results in less overall surface area or gravel deposits being less accessible to adult trout, pulse flows could represent a negative effect.

The pulse flows proposed for the Seneca reach by PG&E of 1,000 cfs (normal water years) and 1,200 cfs (wet water years) would likely entrain gravel up to approximately 130 mm in diameter, allowing for the transport and redistribution of a wide range of particles, including 6.4- to 76-mm diameter gravels that are appropriate for

trout spawning in project reaches (Entrix, 2002). PG&E's proposed pulse flows also would increase turbidity as fine sediments from the channel bottom and along the banks are entrained. We anticipate that turbidity would quickly increase to peak levels within the first few hours after increasing the flow followed by a rapid decrease and then a more gradual decrease to near baseline levels. The recreational flows likely would result in peak turbidity levels that are greater than 5 NTU over baseline conditions and would exceed the limits set in the Basin Plan. Interior's recommended pulse flows of 1,200 cfs (normal water years) and 1,500 cfs (wet water years) would likely initiate movement of particles approximately 150 mm in diameter, and produce similar increases in turbidity as the proposed pulse flows. In general, substantially greater flows would be required in the Seneca reach to initiate motion of the median bed sized materials in both the bypassed reaches.

In the Belden reach, the pulse flows proposed in the SA would likely enable the movement of substrates up to 140 mm during wet water years and up to 130 mm in normal water years (Entrix, 2002). As in the Seneca reach, PG&E's pulse flows would increase turbidity to peak levels that are greater than 5 NTU above baseline being reached within a few hours of increasing the flow, and then turbidity would initially decrease rapidly and then more slowly as time passed. Interior's recommended pulse flows of 1,200 cfs (normal water years) and 1,500 cfs (wet water years) would likely initiate movement of particles approximately 150 mm in diameter during wet water years and up to 140 mm during normal water years. The relatively slight difference in particle-size entrainment indicates that the implementation of Interior's recommendation may not result in a substantial increase in riverine sediment movement and distribution or turbidity. The pulse flow schedule proposed by PG&E would also be of sufficient level to inundate some of the floodplain and cause movement of LWD in the bypassed reaches, thereby restoring geomorphic characteristics that have not been in place under current project operation.

The approximated minimum flow needed to mobilize the median bed material from representative sites in both the Seneca and Belden reaches would be 1,600 to 3,600 cfs (Entrix, 2002). Based on the presence of established mature vegetation on mid-channel bars at several of the study transect that were able to survive the 1997 floods of 2,160 cfs in the Seneca reach and 3,500 cfs in the Belden reach, it is likely that it would take flows of even greater magnitude to modify mid-channel bars and to alter the mature vegetation present on these mid-channel bars.

A pulse flow of 700 cfs in March of dry water years in the Seneca and Belden reaches would ensure that periodic flows are provided to flush fine substrates from spawning gravels, redistribute organic materials and small gravels (primarily in the 25 to 50 mm size class), and activate floodplain habitat in the Seneca reach (PG&E, 2002a). These actions would improve conditions for the aquatic resources in the bypassed reaches, especially during periods of drought, by creating or modifying physical habitat

and by stimulating overall riverine productivity through the influx of nutrients from the floodplain.

The gravel monitoring plan proposed by PG&E (SA; section 1, item 3B) and specified by the FS would ensure that the effectiveness of these pulse flows can be assessed. If the amount of gravel transported out of either the Seneca or Belden reaches is greater than the amount of gravel that enters the reaches from the material known to be available for transport adjacent to each reach, pulse releases could result in a decrease in trout spawning habitat. We consider it especially important to monitor the status of gravel within the Seneca reach because the material available for transport per mile is about a quarter of that available to the Belden reach. Although the existing density of redds in the Seneca reach is high (128 per mile), our review of figure 3-10 reveals relatively low quantities of available spawning habitat. We interpret this to mean that the trout spawning habitat in Seneca reach may be susceptible to extensive changes with the implementation of pulse flows, or other altered flow regimes. Monitoring of gravel at representative locations in both reaches would provide data to assess whether unintended consequences from pulse flows are occurring and quantify the actual benefits of pulse-flow releases, and, as PG&E proposes, enable contingency actions to be developed and implemented, if needed.

We conclude that the pulse flows proposed by PG&E and the settlement parties in the SA would likely achieve the overall habitat objectives for the bypassed reaches, including recruitment of new substrates into the active channel, downstream movement of sediment, activation of the floodplain, and movement of detritus and woody debris. In addition, the flushing of fine substrates from gravel beds and the redistribution of gravel within the stream channel would likely enhance spawning habitat availability, abundance, and distribution for salmonids and other fish that spawn in gravel beds. Enhancement of macroinvertebrate habitat may also occur as the interstices of larger substrates (gravel, cobble, and boulders) would be annually flushed of fines thereby creating more habitat within the substrates. The release of a 700 cfs pulse flow in March of dry years, if a flow of that magnitude has not occurred in the preceding January or February, would ensure that some geomorphic and sedimentological processes occur in the bypassed reaches in dry years, which would benefit fish and other aquatic biota by increasing nutrient influx and modifying riverine habitat. Additionally, we conclude that the gravel monitoring plan and coarse sediment management plan proposed by PG&E in the SA would allow for a sufficient assessment of spawning gravel availability for anadromous fish as requested by NOAA Fisheries in its 10(j) recommendation no. 1. The adaptive nature of both the gravel and coarse sediment management plans would allow for modifications to pulse flows to be made and the development of contingency actions to supplement gravel if necessary.

Lower Butt Creek

In the SA, PG&E and the settlement parties propose that pulse flows not be released into lower Butt Creek unless the results of habitat monitoring indicate that they are necessary (SA, section 1, item 4–Pulse Flows in Lower Butt Creek and item 8–Lower Butt Creek Streamflow and Habitat Monitoring). The FS (final Section 4(e) condition no. 25(4) specifies and CDFG (in its November 26, 2003, filing) recommends similar measures. If pulse flows are required based on results of the habitat monitoring, PG&E would provide them via use of the Butt Valley Reservoir spillway or an acceptable alternative. The magnitude, ramping, and duration of the pulse flow(s) would be determined in consultation with CDFG, SWRCB, the FS, and FWS. The timing of any pulse would be coordinated and occur simultaneously with pulse flows in the Seneca reach.

In its Section 10(j) recommendation no. 3, Interior recommended that within 6 months of license issuance, PG&E develop a Lower Butt Creek pulse flow plan in consultation with CDFG, SWRCB, the FS, and FWS, which would be implemented within 5 years of license issuance. Interior's recommendation included measures to assess the frequency, magnitude, and duration of high flows that exist in this reach and include actions such as loosening of woody debris and excavation of excess vegetation. Components of the test flow study also include pre- and post-monitoring of mesohabitat, surveys to assess LWD and vegetation density, substrate characterization, longitudinal and cross-sectional profiling, and tracer gravel implementation. Interior states that the need for a one-season test pulse flow is based on "a larger than historical width to depth ratio, a higher proportion of fine to very fine sediments in surface samples, a very high density of large wood, and encroachment of vegetation onto bars, further stabilizing sediments."

In its letter filed with the Commission on November 1, 2004, Interior agreed that the actions called for in the SA would be acceptable, as long as adaptive management remained a viable and attainable component of the proposal. Interior also suggested two modifications to our recommendation: (1) modify the criterion determining the need for pulse flows so that it is based on the expectation that the flow would provide a benefit, rather than just be provided in response to a degraded condition, and (2) delegate the final decision on the need for pulse flows to the Commission if the agencies and PG&E disagree on the need for pulse flows. During the Section 10(j) teleconference on February 3, 2005, PG&E described the problems associated with providing pulse flows to lower Butt Creek: Butt Valley dam has no low-level outlet and, at present, the only way to release pulse flows would be through the spillway. During the Section 10(j) teleconference, Interior restated its agreement with our recommendation if adaptive management is a component of it.

Our Analysis

Recent fishery, mollusc, habitat mapping, and IFIM studies conducted in lower Butt Creek document high quality coldwater habitat that shows no sign of impairment, and there is no evidence of a need for pulse flows (ECORP, 2003a; Spring Rivers, 2002; TRPA, 2002a, b). Pulse-flow releases, even on a trial basis, have the potential to result in adverse effects on water quality and aquatic resources, and, given the existing high quality habitat for aquatic biota, we conclude that there is no need to evaluate pulse-flow releases.

Although, the geomorphic study conducted in the 1-mile-long reach below Butt Valley dam showed that a larger than expected width to depth ratio currently exists (24.2 vs. 15), the study characterized this finding as "not unexpected for areas with large boulder channel materials (PG&E, 2002a, appendix E3.1-12, page 4-41). Additionally, the study found that sediment transport under existing conditions is not substantially different than under historical conditions. Furthermore, the incipient motion analysis conducted by PG&E concluded that particles 25 mm in diameter are mobilized at a flow of 10 cfs in lower Butt Creek. Existing flows within lower Butt Creek exceed 10 cfs 90 percent of the time for all months (see table 3-2), therefore, current flows are likely sufficient to flush fines from larger substrates and transport gravels within the creek. The IFIM study conducted by PG&E indicated that lower Butt Creek had the highest density of rainbow trout redds (171 redds per mile) amongst the three bypassed reaches (TRPA, 2002b), indicating that sufficient spawning gravel currently exists in lower Butt Creek.

Following the Section 10(j) teleconference on February 3, 2005, we evaluated the feasibility of designing and providing a siphon system at Butt Valley dam. Because of the steep slope at the dam, and the distance necessary to move water over the dam, we also considered a pumping plant. After considering the expected benefits of providing a pulse flow in lower Butt Creek, we determined that the installation of a siphon system or pumping plant to provide future pulse flows is not warranted at this time.

In summary, we conclude that because lower Butt Creek contains high-quality aquatic habitat, functioning sedimentologic and geomorphic processes, and a diverse and healthy fish community, a pulse flow test plan as recommended by Interior is not warranted. However, if the results of monitoring indicate that the quality of the habitat has degraded, or that aquatic habitat could be enhanced and that pulse flows are necessary, the implementation of these flows would proceed as indicated in the SA and FS final Section 4(e) conditions, whereby the applicant would provide pulse flows through the use of the spillway or other acceptable alternative. The magnitude, timing, duration, and ramping of any agreed upon pulse-flow releases into lower Butt Creek would be determined by PG&E in consultation with the FS, FWS, CDFG, SWRCB, and other parties as described in the SA (section 1, item 4) and after approval by the Commission.

Ramping Rates and Block Loading

As flows rapidly change (either up or down), areas of suitable habitat shift back and forth across the river channel (Bovee et al., 1998). If the rate of habitat movement during upramping exceeds the ability of aquatic organisms to move into areas containing suitable velocities, the organisms may either drift downstream (e.g., fish larvae, macroinvertebrates) or die (e.g., fish eggs) as a result of displacement from a redd or nest (Vehanen et al., 2000; Bovee et al., 1998). Downramping (rapidly decreasing flows) can strand organisms when flows subside more quickly than organisms can respond. Potential impacts from stranding include desiccation, increased predation, and deteriorating water quality conditions. Non-mobile life stages, such as fish eggs, and organisms with low-mobility (macroinvertebrates and molluscs) are typically more affected by downramping because they are either physically unable to move or unable to move fast enough in response to receding flows. As high flow releases in the bypassed reaches are typically of short duration, on the order of hours or days, only more mobile life stages, such as juvenile and adult fish, would be able to use newly submerged habitat and potentially be subjected to possible stranding as flow recedes.

Interior's 10(j) recommendation no. 20, recommends that, within 6 months of license issuance, PG&E develop a ramping rate plan for lower Butt Creek in consultation with CDFG, SWRCB, the FS, and FWS. Interior's plan would include specified rates of release change (up and down) from project facilities, and the rationale for selection of these rates. PG&E proposes, the FS (final Section 4(e) condition no. 25(6) specifies, and CDFG (in its letter dated November 26, 2003) recommends that, for the preservation and improvement of aquatic resources in the project area, PG&E would control river flows by ramping regulated streamflow releases from project dams. During periods when ramping could be controlled by the project, ramping rates would apply to releases made from Canyon and Belden dams for winter pulse flows, summer recreation flows, and all other releases from dams that PG&E makes for operational purposes. The basic ramping rate at Canyon and Belden dams would be 0.5 foot per hour in all months as measured immediately downstream of the dams (gaging stations NF-2 and NF-70, respectively). Changes in Canyon dam streamflow releases because of gate size and other factors may exceed the ramping rate in any particular hour, but PG&E would make a good faith effort to return to the overall basic ramping rate in the next and subsequent hours.

PG&E did not directly evaluate the potential effects of upramping and downramping in its license application. We consider gradual ramping (either up or down) of flows to the Seneca and Belden bypassed reaches to be more preferable than a non-ramping situation because the impacts associated with not ramping on non-mobile and low-mobility organisms (fish larvae, molluscs, macroinvertebrates) would be minimized. The ramping rates proposed by PG&E for Canyon and Belden dams would allow organisms in the Seneca and Belden reaches to more effectively relocate to suitable habitat as flows are adjusted.

Block loading of Belden powerhouse would allow PG&E's downstream Rock Creek and Cresta projects to comply with the required ramping rates that were developed to mitigate for the effects of unregulated increases and decreases associated with project operation in the Rock Creek and Cresta bypassed reaches. Block loading would likely provide flow changes that would be similar to those that occur in the unregulated EBNFFR.

Emergency and Planned Maintenance Outage Spill Plan

The FS, in its preliminary Section 4(e) condition no. 30, specified that PG&E develop a notification and minimization of emergency and planned outage spill plan for the purpose of minimizing the negative ecological effects of uncontrolled high flows into the project bypassed reaches resulting from emergency and planned hydropower facilities maintenance outages. However, in its final 4(e) conditions submitted on November 4, 2004, the FS removed this condition, indicating that the objectives of its preliminary condition were met by the Belden block loading and ramping protocols.

Recreational Flows—Belden Reach

In the SA, PG&E proposes to implement recreational flow releases in the Belden reach during the summer to provide for recreational boating opportunities (table 3-19). FS final Section 4(e) condition no. 28 specifies that PG&E should implement recreational flow releases as specified in the SA and, CDFG (in its letter dated November 26, 2003), and Interior (10(a) condition no. 1) also recommend the implementation of recreational flow releases (discussed in greater detail in section 3.3.5, *Recreational Resources*). As a condition of the SA and FS final Section 4(e) condition no. 28, PG&E would establish, within 6 months of license issuance, a recreation river flow TRG to assist with the design of recreation and resource river flow management and monitoring plans. The TRG would also be responsible for review and evaluation of recreation and resource data, and the development of recreation river flow release schedules in the Belden reach. The TRG would consist of representatives from CDFG, SWRCB, FWS, NPS, Plumas County, AW, and PG&E. The TRG would evaluate the existing available ecological information regarding recreation river flows and effects on aquatic resources, determine if recreation flows would negatively effect aquatic resources, and conduct test flows for a three year period. A monitoring plan to determine the effects of test flows on aquatic resources would be developed, with monitoring conducted during the test flow period. Based on the monitoring, a determination as to whether to continue recreation flow releases would be made. Additionally, in its Section 10(j) recommendation no. 14, Interior recommends that PG&E develop a recreational activities monitoring plan within 6 months of license issuance to assess the effects of flow releases (in addition to camping, angling, and public access) on fish and wildlife resources.

Table 3-19. Recommended Belden reach recreational flow schedule. (Source: SA, CDFG letter dated November 27, 2003, the FS, letter dated December 1, 2003, and Interior letter dated December 1, 2003)

	Release amount (cfs)		Release Days per Month				Use Day Triggers	
Month	Dry/ Critical Dry	Normal/ Wet	Critical Dry Start	Critical Dry Cap	Dry/ Normal/ Wet Start	Dry/ Normal/ Wet Cap	Wet & Normal/Dry Up	Down
July	650	750	1 day	1 day	1 day	2 days	>100	<100
August	650	750	1 day	1 day	1 day	2 days	>100	<100
September	650	750	1 day	1 day	1 day	2 days	>100	<100
October	650	750	1 day	1 day	1 day	2 days	>100	<100

AW, in a letter dated December 3, 2003, recommends recreational flow releases in the Belden reach similar to those in table 3-19, but with different trigger numbers. We discuss boater trigger numbers in section 3.3.5, *Recreational Resources*.

In its comments on the draft EIS filed October 27, 2004, Interior makes an additional Section 10(j) recommendation, which calls for a 6-year delay of recreational flow releases to ensure that biological data under the flow regime that may be specified in a new license can be collected and analyzed without being confounded by recreational releases. Because the new minimum and pulse flow schedules for the UNFFR would likely result in substantial changes to the biotic community, Interior recommends delayed recreational flow implementation and emphasizes the need to exercise caution in light of studies showing recreational flow disruption of macroinvertebrates, including those for the Rock Creek-Cresta Project license.

Our Analysis

Flow fluctuations and sustained high flows from recreation releases could result in adverse effects to water quality and the aquatic community in the Belden reach. Recommended recreational flows of 650 or 750 cfs are of a magnitude about four to five times greater than the instream flows recommended by Interior and proposed by PG&E in the SA for July through October. A substantial flow increase could increase turbidity, disrupt fish and amphibians, displace macroinvertebrates, and affect channel processes.

Increases to turbidity would likely occur immediately following increasing flow releases for each recreational release. As with the proposed and recommended pulse flows, we anticipate that peak turbidity would occur within a few hours of the initiation of the recreational flow releases followed by a rapid decrease in turbidity and then slowly drop back to near the level prior to the recreational flow release. The magnitude of

increases in turbidity would be dependent on recent hydrological and meteorological conditions, with the largest increases likely occurring after long dry periods with relatively low flows.

During collection of rainbow trout spawning habitat suitability criteria data in 2001, rainbow trout were observed spawning in the Belden reach from late March through April (TRPA, 2002b). During this period, water temperatures ranged between 8 to 14°C. At these water temperatures, rainbow trout eggs would hatch in 24 to 48 days (Piper et al., 1982), and fry would start appearing in the project reaches by mid to late May. During the first few months after hatching, trout require protective cover and low velocity areas (Behnke, 1992). If they were unable to find such low velocity areas, rainbow trout fry in the Belden reach could be washed downstream by the recreation flows during the months of July and August.

The monthly recreation flow releases during the summer could adversely affect the standing crop of macroinvertebrates at a time when food requirements of trout and other fish are at a maximum due to warmer summer water temperatures. A macroinvertebrate drift study was conducted in the fall of 2000 as a component of whitewater flow release evaluations in the Seneca and Belden reaches of the NFFR. Sampling results for the Belden reach demonstrated an increase in the abundance percentage of burrower and crawler behavioral groups collected during the test flow (approximately 600 cfs) release period (ECORP, 2002b). Organisms in these macroinvertebrate behavioral groups live in the interstices of substrate and are generally considered to be non-drifting organisms.

The overall effect of recreational flows on the aquatic community currently remains largely unclear as few detailed studies have been performed on such flows. The ERC for the Rock Creek – Cresta Project released results of biological monitoring performed in 2003 and 2004 to document the effects of recreational flow releases in the Rock Creek and Cresta reaches of the NFFR, which are located downstream of the UNFFR Project. This on-going study will be of significance in evaluating the effects of recreational flows in reaches throughout the UNFFR. The monitoring conducted in 2003 and 2004 investigated the stranding of aquatic organisms (fish, macroinvertebrates, and foothill yellow-legged frog [FYLF]), displacement of juvenile fishes, impacts on all life stages of FYLF, and macroinvertebrate drift. The study results demonstrated that recreational flow releases have some effects on aquatic resources within the study reaches. Stranding of benthic macroinvertebrates (n=932 in 2003 and 204 in 2004), fish (n=156 in 2003 and 137 in 2004), and FYLF tadpoles (n=2 in 2003 and zero in 2004) occurred during downramping of recreational flow events with most instances of stranding occurring during the June recreational flow release (ERC, 2004; 2005). Displacement studies found that resident fish, specifically fry and juvenile life stages, were able to avoid being displaced by the recreational flow releases by avoiding areas of high water velocities. Documented impacts on the macroinvertebrates within the Rock

Creek reach, the selected study reach due to lower thresholds for sediment mobilization, included displacement of benthic organisms from their preferred velocity regime immediately following flow events, an overall decline in the benthic community measures from June through October which is a trend contrary to what would be expected as part of natural seasonal variability, and an eventual re-equilibration (after flow releases) of the benthic community to a degraded state (fewer taxa and displacement/shift in abundance) (ERC, 2004). The ERC (2005) reported that peak turbidity levels measured during the recreational flow releases in 2004 were 34 NTU in the Rock Creek reach and 20.4 NTU in the Cresta reach, in comparison to baseline levels of 0.1 to 2.1 NTU. These results were similar to conditions monitored in 2003. The results of continuing this recreational flow effects study at the Rock Creek-Cresta Project would help to more fully evaluate the overall effect of recreational flows on the aquatic community within the Belden reach.

As discussed, the recommended recreational flows could have adverse effects on the aquatic resources in the Belden reach. Monitoring the effects of recreational flows on aquatic resources within the Belden reach, if the 3-year test period is conducted, utilizing information from the evaluation of recreation flows in the Rock Creek and Cresta reaches of the NFFR, and incorporating the results of other pertinent studies would provide a better understanding of how recreation flows affect turbidity, substrate conditions, macroinvertebrates, amphibians, and fish populations in the reach. The adaptive approach to recreation river flow management as outlined in the SA and by Interior would allow for the identification of any potential negative impacts on water quality or the aquatic community from existing studies or literature prior to the release of the test recreation flows and provide for the adequate protection of aquatic resources if negative impacts are found to result from the release of test recreation flows.

Delaying the implementation of recreational test flows would have no adverse effect on the existing aquatic community. The biotic community would have the opportunity to adapt to the revised instream flow schedule without being disrupted by recreational release flows, which would improve the likelihood of enhancing macroinvertebrate and fish populations. The delay also would allow PG&E to implement monitoring to assess changes to the biotic community that may have resulted from implementation of the new flow schedule without the confounding effects of recreational flow releases.

Monitoring of Aquatic Resources in Bypassed Reaches

For the Seneca and Belden reaches, PG&E proposes to develop an aquatic monitoring plan, in consultation with CDFG, SWRCB, the FS, and FWS. Habitat monitoring would be initiated between 10 and 12 years after license issuance, with sampling occurring every 2 years over a 6-year period, for a total of three sampling periods. The FS final Section 4(e) condition no. 26 specifies a sampling plan similar to that proposed in the SA. The plan proposed in the SA would include monitoring of fish

populations and benthic macroinvertebrates (including population robustness, feeding group, and tolerance/intolerance trend monitoring) in at least three sites in each reach. Sampling could be deferred to the following year in the event of a critically dry year.

PG&E proposes to provide the results of monitoring and any flow change recommendations to the Commission, the FS, FWS, SWRCB, CDFG and other interested parties in a draft technical report prepared by June of the year following completion of each sampling effort. PG&E would finalize the technical report by the following December. In addition to describing the results, the report would compare the results with those of previous surveys. The fisheries sampling report would discuss trends in fish abundance. The benthic macroinvertebrate sampling report would enumerate any changes over time regarding the composition of functional feeding groups, overall population heterogeneity and robustness, and pollution tolerance/intolerance trends.

At the conclusion of the monitoring program, PG&E, the FS, CDFG, FWS, SWRCB, Plumas County, and other interested parties would meet to review the results of the monitoring. If, after review of the data collected during the monitoring, the parties specified determine that aquatic species or other ecological attributes may benefit from modifications to the minimum streamflows, the parties would evaluate and determine whether such modifications: (1) can be implemented within PG&E's operational capabilities; (2) would maintain the total annual volume of water that has been allocated for minimum streamflows in any given water year; and (3) would not adversely impact other beneficial uses, including hydroelectric power generation, Lake Almanor surface water elevation, and recreation. If all parties concur and propose revised minimum streamflows that meet these criteria, PG&E would file the proposal with the Commission for approval.

For lower Butt Creek, PG&E proposes to develop, in consultation with CDFG, SWRCB, the FS, and FWS, a plan to monitor and assess aquatic habitat quality in lower Butt Creek between Butt Valley dam and its confluence with the NFFR. Monitoring of habitat quality would occur at intervals of 3 to 5 years, depending on water year type and other appropriate factors. If the monitoring results conclude that habitat quality has degraded, PG&E, in consultation with CDFG, SWRCB, the FS, and FWS, would initiate a pulse flow program if it is concluded such a flow would provide a significant benefit.

In 10(j) recommendation no. 10, Interior calls for development of a comprehensive fish monitoring plan by PG&E that includes a program to monitor all project bypassed reaches, impoundments, impoundment tributaries, and bypassed reach tributaries to determine the species status and size composition of the fish community, assess trout spawning activity, and track fish planting information and recreational use (angler surveys). Assessments would be performed in years 1 through 3, 8 through 10, 15, 20, and 25 of a new license, with reports issued 6 months following completion of studies and distributed to CDFG, SWRCB, the FS, and FWS. Further, a

macroinvertebrate monitoring plan for the bypassed reaches would be developed and surveys conducted upon license issuance and at 5-year intervals thereafter.

Our Analysis

New environmental measures, such as instream flow regimes, pulse flows, recreation flows, and ramping rates proposed by PG&E and recommended by Interior would likely affect aquatic resources in the Seneca, Belden, and lower Butt Creek bypassed reaches. It would be appropriate to collect biological data to document the response of the aquatic community (fish and macroinvertebrate populations) to changes in project operation. This information would allow for a determination to be made as to whether the expected benefits of the new flow regime are occurring and, if not, whether any adjustments to the flow regime are necessary. Because the measure proposed in the SA does not call for monitoring until years 10–12, we are concerned that changes, negative or positive, to the fish, amphibian, and macroinvertebrate communities would not be evident in a timely manner under this proposed monitoring program. Interior's recommended sampling protocol calls for biological monitoring to begin in years 1–3, which may be too early to detect responses of the community to the changes in flow regimes and pulse flows. Adequate baseline studies of the fish populations in the Seneca and Belden reaches, under existing conditions, have been conducted by PG&E in 2000 through 2002 and they provide a reference for comparison with future monitoring results.

PG&E does not propose to monitor fish populations and macroinvertebrates in lower Butt Creek but instead proposes a plan to monitor and assess aquatic habitat between Butt Valley reservoir and the confluence of lower Butt Creek with the NFFR. Recent studies in lower Butt Creek conducted by PG&E (2002a, appendix E3.1-1, appendix E3.1-4) document high fish density, naturally reproducing populations of riffle sculpin and rainbow trout, high redd density, and high mussel diversity. There are no plans by any party for modifying the existing flow regime. Therefore, we conclude that the habitat monitoring plan proposed in the SA (section 1, item 8) is sufficient and would document habitat trends in this reach of the project. PG&E's proposal would provide a quantitative analysis of the aquatic habitat in lower Butt Creek, and an indirect assessment of project operation effects on fish and macroinvertebrate communities by assessing available spawning gravel, embeddedness of substrates, mesohabitat characteristics, and available LWD. The adaptive nature of the lower Butt Creek monitoring plan would allow for modifications to be made to project operations if it is determined to be necessary by the cooperating resource agencies (see discussion on *Pulse Flows* above). Monitoring every 3 to 5 years, as proposed in the SA (section 1, item 8), would provide PG&E and resource agencies a comparative dataset that would ensure that the high quality aquatic habitat and its associated aquatic community in lower Butt Creek are maintained.

Woody Debris Management Plan

Interior's 10(j) recommendation no. 9 is that within 6 months of license issuance that PG&E develop, in consultation with CDFG, SWRCB, the FS, and FWS, a woody debris management plan that includes: (1) a program for monitoring bypassed reaches for LWD, (2) woody debris placement program sufficient to determine if placement is feasible, and (3) a plan for maintaining adequate amounts of woody debris throughout the bypassed reaches. PG&E would consider and test two woody debris placement options: (1) the recovery and transport of LWD around the project dams; and (2) the placement of individual pieces of LWD at selected locations. The tests would determine residence time as a function of piece size, flow (particularly pulse flows of different magnitude), methods of introduction, and also monitor changes in mesohabitat in the vicinity of the test material. Interior recommends the management and addition of woody debris as a means to help restore missing ecosystem functions because it believes there is currently a lack of sufficient LWD within the bypassed reaches.

Our Analysis

PG&E documented the distribution and occurrence of LWD within the Seneca, Belden, and lower Butt Creek bypassed reaches in its geomorphic study (Entrix, 2002). It reported that LWD was present throughout the reaches, and there was continual recruitment from dead and dying trees along the channel margins. LWD deposits tended to be within the active channel, but above the low-flow channel in the Seneca and Belden reaches. PG&E found a total of 21 LWD occurrences, all individual logs in the Belden reach. The Seneca reach had 141 LWD occurrences (including individual pieces as well as debris jams). At Belden dam, PG&E annually removes about four to five truckloads of LWD, mostly alder, which is subsequently burned.

Lower Butt Creek had 224 LWD occurrences, of which 47 were debris jams. LWD, in both individual and jam form, was uniformly distributed throughout lower Butt Creek, with 45 percent of the LWD features associated with the formation/maintenance of scour pools, creating areas of sediment retention, or providing bank protection. The estimated recruitment potential for LWD for all of lower Butt Creek was rated as high overall. Based on the high abundance and even distribution of LWD throughout lower Butt Creek, we conclude that there is no identified need for managing LWD within this reach.

Implementation of the woody debris management plan would allow for an increase in the abundance of LWD within the Belden reach where it is currently limited, by collecting and transporting LWD around Belden dam. The review and testing of methods and the subsequent placement of LWD within the low-flow channels of the Seneca and Belden reaches could benefit the aquatic resources by providing further habitat complexity. If placement of LWD at specific locations is implemented, safeguards, such as erosion control measures, should be implemented to reduce the impact on both the riverbed and riparian zone from construction and anchoring activities.

Adaptive Management

Interior's 10(j) recommendation no. 13 is that PG&E, in consultation with CDFG, SWRCB, the FS, and FWS, periodically review the results of monitoring and studies to facilitate adaptive management of environmental measures over the term of the license. A review would be conducted every 5 years for the term of the license and would examine monitoring results to comprehensively assess the effectiveness of monitoring plans, identify adverse effects on fish and wildlife resources, and assess whether agency-specified conditions are being met. If it is determined that there are adverse effects as a result of project operation, the review process would allow the resource agencies and PG&E to identify whether actions can be taken through an alternative flow schedule or lake storage level. However, any adjustments to PME related operations would require that the same annual volume of water is released via instream or pulse flow.

Our Analysis

Changes to the flow regime in the bypassed reaches could affect many resources including water quality, fisheries, macroinvertebrates, amphibians, riparian vegetation, and recreational use. Although individual resources would be monitored in a number of resource-specific plans, a periodic comprehensive review would allow PG&E to evaluate the effects of project operations on all resources and make adjustments to project operations if necessary.

Reservoir Operations and Lake Levels

In the SA, PG&E proposes to operate the project such that reservoir levels in Lake Almanor meet ecological and recreational objectives. The FS (in its final Section 4(e) condition no. 30) specifies and CDFG (in its letter filed November 26, 2003) and Interior (in its 10(j) recommendation no. 4), recommend the same measures. The SA proposes and Interior recommends that PG&E operate Lake Almanor as follows:

- Wet and Normal Water Years—By May 31, the water surface elevation would be at or above 4,485.0 feet[25] (908,000 acre-feet) and from June 1 through August 31, would remain at or above 4,485.0 feet (908,000 acre-feet).

- Dry Water Years—By May 31, the water surface elevation would be at or above 4,483.0 feet (859,000 acre-feet) and from June 1 through August 31, at or above 4,480.0 feet (787,000 acre-feet).

- Critically Dry Water Years—By May 31, the water surface elevation would be at or above 4,482.0 feet (835,000 acre-feet) and from June 1 through

[25] In this section the lake level is defined as the water surface elevation, expressed in PG&E datum, which is 10.2 feet lower than the USGS datum.

August 31, the water surface elevation is at or above 4,480.0 feet (787,000 acre-feet).

- Multiple Dry Water Years—In the event of multiple, sequential dry or critically dry water years, PG&E would be allowed to decrease surface water elevations below those specified above, as well as the current minimum elevations specified for the Butt Valley reservoir (4,120.0 feet from June through September and 4,115.0 feet for the rest of the year) and the Belden reservoir (2,905.0 feet).

Our Analysis

Currently, PG&E operates Lake Almanor such that, from the period January 1 through June 1, the reservoir stores water from snowmelt and spring rains. From June 1 through September 15, the water surface elevation is maintained above 4,475 feet. The year round minimum water surface elevation is 4,466.7 feet and the maximum 4,494 feet. The lake levels proposed by PG&E and recommended by Interior provide for water surface elevations from June 1 through August 31 that are 10 feet higher in wet and normal water years and 5 feet higher in dry and critically dry water years than under current operations.

Lake Almanor supports both warmwater and coldwater fisheries. Maintaining lake levels during the late spring and summer at higher elevations would increase the lake's surface area by approximately 12 percent during wet year types and 6 percent during normal year types as compared to existing conditions. This increased surface area would provide additional shallow water habitat in areas of the lake that are currently not watered, providing spawning habitat for centrarchids, such as smallmouth bass, largemouth bass, and Sacramento perch, which generally prefer shallow water habitat (Moyle, 2002; Robison and Buchanan, 1988; Mathews, 1965). An increase in the surface area of Lake Almanor during summer months would also likely promote the development of littoral zone vegetation and associated macroinvertebrate communities.

Potential Measures for the Reduction of Water Temperature in the Rock Creek-Cresta, Poe, and UNFFR Project Bypassed Reaches

Because SWRCB targeted a 20^{o}C maximum summer water temperature in the NFFR to provide for coldwater fish habitat, and pursuant to the SA, PG&E investigated the feasibility of conveying colder water from Lake Almanor to downstream bypassed reaches of the NFFR. Under this scenario, releases of colder water would be made to improve summer conditions for the riverine coldwater fish community. Lake Almanor is the primary water storage facility in the NFFR and is drafted for the operation of downstream facilities. The Prattville intake, located on the western shore of Lake Almanor, releases water to the Butt Valley powerhouse, where it is subsequently conveyed downstream via a combination of reservoirs, power generation penstocks and

the NFFR channel to the Rock Creek-Cresta Project. Under current operating conditions, the Prattville intake draws water from throughout the Lake Almanor water column, which can result in the release of water that regularly exceeds 20°C in the summer and thereby likely increases downstream water temperatures (see table 3-7). The methods evaluated by PG&E to draft cold water from Lake Almanor focus primarily on the installation of a thermal curtain, physical modifications to the Prattville intake, and alterations to project operations (see section 3.3.1.2, *Water Resources,* and appendix D, for a more detailed description and evaluation of the proposed modifications). Because conveying colder water to the NFFR bypassed reaches would result in changes to the hydrologic and limnologic conditions of UNFFR Project waters, we have analyzed the potential effects of such actions on aquatic resources as part of this EIS.

In 2004, IIHR Hydraulic and Engineering, College of Engineering, University of Iowa, performed hydraulic modeling studies to determine the potential effectiveness of a thermal curtain in Lake Almanor and of physical modifications to the Prattville intake. Of the six configurations for a thermal curtain in Lake Almanor that were modeled, two were considered in greater detail: Curtain 4 and Curtain 4 configuration with levee removal (Ettema et al., 2004). If implemented, a thermal curtain would be suspended from the lake surface near the Prattville intake to draft a higher volume of cold hypolimnetic water and to reduce the amount of warm epilimnetic water released into downstream project waters. The levees referred to are remnants of past construction (excavation) undertaken to better channel water from the Big Springs area to the Prattville intake area (TRPA, 2004b). The current configuration of the submerged levees may restrict lateral movement of hypolimnetic water and therefore levee removal could allow colder water to be drafted for downstream release.

Specific physical modifications evaluated consist primarily of adjustments to the hood and piping system of the intake structure to enable more effective withdrawal of colder water. Various flow release strategies have also been considered by the applicant as a means to provide colder water downstream including: modifications to dam and reservoir operations, blending of outflows from Canyon dam lower and upper gates, changing the minimum instream flows in summer and fall months, and piping water from Yellow Creek and Bucks Creeks into the NFFR (see appendix D for a complete list of the alternatives considered by the applicant).

We evaluated the potential effects the following proposed measures would have on aquatic resources:

- Proposed MIF
- Proposed MIF with thermal curtain
- Proposed MIF with thermal curtain and removal of levees

- Proposed MIF with thermal curtain, removal of levees, and Canyon dam blending

Our Analysis

For our evaluation of the potential effects of the thermal curtain with or without levee removal on aquatic resources in project reservoirs, we relied primarily on the TRPA (2004a) and the Jones and Stokes (2004) reports, which were provided by PG&E pursuant to our December 17, 2004 AIR. We also used PG&E's MITEMP3 and SNTEMP modeling studies to determine what effects hydrologic changes in Lake Almanor, Butt Valley reservoir, and the bypassed reaches would have on the associated coldwater fishery habitat. The MITEMP3 model simulated vertical water temperature profiles in the reservoirs and patterns of thermal stratification over time. The SNTEMP model was used to predict daily average stream temperature in the project bypassed reaches by calculating heat fluxes among all substantial heat sources. Because shading is also a significant factor, the SNTEMP model takes into consideration the effects of canyon topography and existing vegetation on water temperature (PG&E, 2002a).

Lake Almanor and Butt Valley Reservoirs

A combination of adequate water temperature and DO levels at the thermocline defines the boundaries of available summer habitat for coldwater fish in Lake Almanor. Data from PG&E indicate that, in the summer months, temperature and DO begin to stratify around a depth of 30 to 35 feet (PG&E, 2002a). As a result, the conditions required to support coldwater fish (< 20^{o}C and >6.5 mg/l of DO) are suboptimal above or below the thermocline. Generally, this results in a relatively thin band of suitable habitat that is available for species that require cold, well-oxygenated water (e.g., salmonids, wakasagi). With the existing Prattville intake configuration, available coldwater fish habitat during summer stratification includes coldwater refuge habitat within or near the thermocline or areas that contain sources of inflowing colder freshwater or springs (PG&E, 2002a). Under existing summertime conditions, the amount of suitable coldwater habitat in Lake Almanor is reduced to approximately seven percent of total reservoir volume through naturally occurring limnological stratification processes. The installation of a thermal curtain is expected to further reduce the amount of coldwater habitat to approximately four percent of total reservoir volume during summer stratification, a decrease of 38 percent (TRPA, 2004a). The installation of a thermal curtain would also likely change the location of the summer thermocline in the water by lowering it as much as 10 feet in normal or warm summers (TRPA, 2004a). As well as reducing overall habitat availability habitat, these changes would also likely increase inter- and intra-specific competition and predation among fish populations utilizing this portion of the reservoir. During cooler summers, the thermal curtain is expected to have little effect on coldwater habitat in Lake Almanor.

The TRPA report also indicates that in years when lake surface levels are high, modifications to the Prattville intake would likely reduce or eliminate the number of wakasagi entrained through the Butt Valley powerhouse by altering water flow patterns at the intake structures of the Butt Valley powerhouse and through resultant modifications to the dissolved oxygen and temperature of water drafted (TRPA, 2004a). Wakasagi are the prime forage for a trophy trout fishery in Butt Valley reservoir, which would likely be affected by a reduction in wakasagi entrainment, potentially affecting the current fishery, trophic structure, and ecological processes (e.g., predator-prey relationships) in Lake Almanor and the Butt Valley and Belden reservoirs. The TRPA (2004a) study predicts a reduction in wakasagi entrainment that ranges from 14 to 100 percent depending on the dissolved oxygen concentration in water drafted into the Butt Valley powerhouse. A reduction in wakasagi entrainment would not be expected in years when reservoir levels are low. Our analysis focuses primarily on salmonids and wakasagi because data gathered from reservoir and entrainment studies indicate that the potential direct effects of Prattville intake modifications would be related to changes in the thermocline and in turn to species that are closely associated with this component of the Lake Almanor ecosystem. The availability of coldwater fish habitat would not be adversely affected by a thermal curtain during the winter and spring, when the lake is not stratified.

Jones and Stokes (2004), using the U.S. Army Corps of Engineers CE-QUAL-W2 water quality model in concert with suitability index and volume threshold methods, report that the installation of a thermal curtain is expected to have little effect on coldwater fish habitat as it pertains to Lake Almanor water quality because the thermal curtain is not expected to significantly alter dissolved oxygen concentrations or water temperature in Lake Almanor. However, similar to the TRPA (2004a) report, Jones and Stokes (2004) indicate that the volume of available coldwater fish habitat would be decreased substantially by the installation of a thermal curtain. Their study also reports that the installation of a thermal curtain is expected to increase the depth of the thermocline by up to 10 feet. If habitat availability is currently a limiting factor to salmonid species in Lake Almanor, further reductions in habitat availability would likely exacerbate the situation.

To further assess potential changes to Lake Almanor's aquatic habitat and coldwater fishery that could result from modifications to the Prattville intake, we evaluated PG&E's MITEMP3 temperature model scenarios ANEB, ANMB, DNEB, and DNMB (table 3-20).

Table 3-20. Naming convention matrix for modeled scenarios in Lake Almanor. (Source: PG&E, 2002a, as modified by staff)

	Lake Almanor Modeling Scenarios			
Water Year	**Meteorology**	**Prattville Intake**	**Canyon Dam Release**	**Scenario ID**
Normal	Normal	Existing	B (75 cfs)	ANEB
Normal	Normal	Modified	B (75 cfs)	ANMB
Dry	Normal	Existing	B (75 cfs)	DNEB
Dry	Normal	Modified	B (75 cfs)	DNMB

We selected a release flow of 75 cfs from Canyon dam because it was the closest flow that simulated the releases proposed in the SA for Seneca reach during the summer months (July through September). Scenarios ANEB and ANMB provided results during normal water year types. The hypolimnion[26] under scenario ANEB has a minimum upper limit elevation of 4,445 feet, which correlates to a volume of approximately 156,000 acre-feet during mid-June. With the modified Prattville intake, scenario ANMB, the hypolimnion's minimum upper limit elevation is approximately 4,435 feet, also occurring in mid-June, which correlates to approximately a volume of 57,000 acre-feet, a reduction of 64 percent from the existing intake configuration (PG&E, 2002a).

To investigate the impacts on the hypolimnion during a dry water year, we used scenarios DNEB and DNMB. The hypolimnion under scenario DNEB has a minimum upper limit elevation of 4,435 feet, which correlates to a volume of approximately 57,000 acre-feet in mid-June. With the modified Prattville intake, scenario DNMB, the hypolimnion's minimum upper limit elevation is approximately 4,430 feet also occurring in mid-June, which correlates to a volume of approximately 21,000 acre-feet, a reduction of 64 percent from the existing intake configuration (PG&E, 2002a).

Upper North Fork Feather River

The installation of a thermal curtain would likely have mixed results on the fish assemblages in the bypassed reaches of the UNFFR Project. At the 50 percent exceedance level, Bechtel and TRPA (2004) indicate that the installation of a thermal curtain combined with levee removal could maintain temperatures less than 20 ^{o}C and reduce temperatures in normal water years by as much as 2.4^{o}C in the Belden reach

[26] The hypolimnion is the lower stratum of cold water, extending from the thermocline (upper limit) to the lake's bottom (lower limit), that exists during summer stratification.

during the summer months as compared to water temperatures that would likely result from implementation of the minimum flows only (figure 3-7). A temperature-conditioned relative habitat suitability study for the bypassed reaches of the NFFR was conducted to determine the percent change in suitable habitat that would be expected for rainbow trout, hardhead, Sacramento pikeminnow, and Sacramento sucker in normal and critically dry water years based on changes in water temperature (TRPA, 2004b). Although reductions of 2.4^{o}C would likely increase available suitable habitat for rainbow trout, it is also likely that warmwater species of fish (e.g., hardhead and Sacramento pikeminnow) would see a substantial loss of suitable habitat. This could have negative implications for the sustainability of localized populations or force them to seek preferential conditions elsewhere (TRPA, 2004b). Hardhead are classified as FS and a CSC, and therefore warrant consideration in our analysis as to the effects of modifying water temperature in the NFFR.

The blended-release approach, which would change project operations so that water would be released into the Seneca reach from both the lower and upper gates of the Canyon dam outlet tower, is also being considered as a means to create colder riverine conditions in project bypassed reaches. Releasing warmer surface water into the Seneca reach from the upper Canyon dam gates would likely increase the volume of cold water in Lake Almanor that would be available for release through the Prattville intake with a thermal curtain installed. Currently, releases from Canyon dam occur primarily from the low-level gate. This results in the release of water that is typically colder than 12^{o}C, which is below the temperature preference of rainbow trout and hardhead, as well as Sacramento pikeminnow and Sacramento sucker (TRPA, 2004b). The TRPA (2004b) study indicates that in normal water years the blended-release approach in combination with a thermal curtain could result in increased summer water temperatures of up to 4.4^{o}C in the Seneca reach (figure 3-7). As a result, suitable habitat would likely be improved by approximately 30 percent for rainbow trout, hardhead, Sacramento pikeminnow, and Sacramento sucker in the Seneca reach in June. Increases in suitable habitat of approximately 15-20 percent for all species would also be likely in July and August, while values in September would not change significantly from existing conditions (figure 3-7).

For the Belden reach, the TRPA (2004b) study indicates that the installation of a thermal curtain, levee removal, and the blending of Canyon dam releases would likely increase the availability of suitable habitat for juvenile and adult rainbow trout in most summer months. Alternatively, these actions also have the potential to cause a shift in the spatial distribution of native non-game fish warmwater species (e.g., hardhead and Sacramento pikeminnow) by reducing the amount of habitat available due to a reduction in water temperature. Suitable habitat for hardhead, Sacramento pikeminnow, and Sacramento sucker in the Belden reach is predicted to decrease in all months in both normal and critically dry water years. Upstream of the East Branch Feather River confluence, suitable habitat for rainbow trout would likely increase by 8.5 percent in

August, however, the model predicts a reduction of 14.7 percent in June of normal water years as temperatures are predicted to fall below the optimum temperature range for rainbow trout of 17-20^{o}C (TRPA, 2004b) (figure 3-7). Suitable habitat would likely remain stable in July and September for juvenile and adult rainbow trout. Downstream of the East Branch Feather River confluence, increased availability of suitable habitat for rainbow trout would be expected in July and August in normal water years, and in all summer months in critically dry water years, although substantial reductions would be expected for hardhead, Sacramento pikeminnow, and Sacramento sucker in all months of both water year types due to the influx of colder water.

In summary, alterations to the limnological and hydrological processes in the UNFFR Project reservoirs and bypassed reaches as a result of efforts to convey colder water downstream could have a substantial effect on aquatic resources. Because the volume of available coldwater habitat in Lake Almanor is likely already a limiting factor under current conditions during summer stratification (TRPA, 2004a), the installation of a thermal curtain could adversely affect salmonids and other coldwater fish by further reducing the availability of coldwater refugia habitat and increasing inter- and intra-specific competition and predation. Under existing summertime conditions, the amount of suitable coldwater habitat in Lake Almanor is reduced to approximately seven percent of total reservoir volume through naturally occurring limnological stratification processes. The installation of a thermal curtain is expected to reduce the amount of coldwater habitat to approximately four percent of total reservoir volume during summer stratification, a decrease of 38 percent (TRPA, 2004a). Additionally, the results of the MITEMP3 modeling efforts indicate that modifications to the Prattville intake would likely accelerate the depletion of Lake Almanor's coldwater pool (water less than 20^{o}C) throughout the summer by 10 to 15 percent in July, 15 to 20 percent in August, and 20 to 25 percent in September as a result of drafting water into Butt Valley reservoir via the Prattville intake (PG&E, 2002a). Decreasing the volume of the coldwater pool would likely further affect coldwater fish by concentrating them is a narrower band of habitat, which would increase the likelihood of competition and subject them to intensified angling pressure. Additionally, entrainment studies conducted in 2001 as part of the relicensing efforts documented entrainment of over 130,000 individual wakasagi into Butt Valley reservoir (PG&E, 2002a). These forage fish support a popular trophy trout fishery in Butt Valley reservoir that would likely be affected by a reduction in wakasagi numbers. The installation of a thermal curtain is expected to significantly reduce or eliminate entrainment of wakasagi by altering water flow patterns at the intake structures of the Butt Valley powerhouse (TRPA, 2004a).

It is also likely that a reduction in available riverine habitat for hardhead, Sacramento pikeminnow, and Sacramento sucker in the bypassed reaches would occur as a result of efforts to reduce temperature downstream as part of the Rock Creek – Cresta Project. Although the implementation of the proposed minimum instream flows would be expected to increase overall habitat availability in the riverine reaches of the UNFFR,

it likely would not reduce riverine water temperatures significantly with or without modification of the Prattville intake (see figure 3-7).

We conclude that structural or operational modifications to the Prattville intake that were evaluated would likely have detrimental effects on the coldwater fishery in Lake Almanor and Butt Valley reservoir, and would provide only limited benefit to the coldwater fish populations in Seneca and Belden reaches of the UNFFR and even less benefit to the downstream Rock Creek, Cresta, and Poe reaches.

Fish Passage

On November 26, 2003, NOAA Fisheries filed its original Section 18 fish passage prescription for the UNFFR Project, which included the construction of pool-weir passage systems at Belden and Butt Valley dams in addition to positive barrier-screening devices for the intakes at the Belden and Caribou powerhouses.

On March 14, 2005, NOAA Fisheries submitted a modified Section 18 fishway prescription for the UNFFR Project to the Commission. The prescription calls for the release of adult Central Valley spring-run Chinook salmon and Central Valley steelhead into the Seneca bypassed reach and into Yellow Creek, an unregulated stream that enters the UNFFR in the vicinity of the Belden powerhouse. Both species are listed as threatened under the ESA, but do not currently occur in the project area. The prescription also calls for the trap and transfer of outmigrants (e.g., smolts and post-spawned steelhead) from the Seneca bypassed reach and Yellow Creek to below Oroville dam, part of FERC Project No. 2100. The upstream migration of anadromous fish in the Feather River is currently blocked at the Fish Barrier dam, a facility associated with the Feather River Fish Hatchery, located approximately 5 miles downstream of Oroville dam. NOAA Fisheries plans to file a preliminary prescription for the Oroville Project by October 2005, which would likely specify that the CDWR (licensee for the Oroville Project) implement a program to capture adult anadromous fish at or below the Fish Barrier dam and transport (truck) them to areas upstream of the Oroville facilities (letter from R. McInnis, Regional Administrator, NOAA Fisheries, Long Beach, CA, to the Commission, dated March 11, 2005).

Specifically, the prescription submitted for the UNFFR Project calls for PG&E to:

- submit within 1 year of license issuance, design drawings for appropriate release sites for adult anadromous fish transported from the Oroville Project;
- construct receiving structures and implement water-to-water transfer of adult anadromous fish from the Oroville Project within 3 years of NOAA Fisheries approval of facility design;
- monitor adult fish, their interactions with existing project fish and wildlife species, including disease monitoring, and submit an annual report to appropriate resource agencies;

- submit within 1 year of license issuance, design drawings for approval by NOAA Fisheries for the construction and operation of a screening device to capture outmigrating salmonids at or above the intake of Belden powerhouse. The screening device would meet the criteria specified in NOAA Fisheries "Fish Screening Criteria for Anadromous Salmonids," which specifies variables such as approach velocity, material quality, and bypass entrance design;
- implement downstream fish passage collection within 3 years of license issuance in the Seneca reach unless NOAA Fisheries approves an implementation delay as a result of integration with fish passage efforts prescribed for the Oroville Project;
- submit within 5 years of license issuance, design drawings for approval by NOAA Fisheries for the construction and operation of a screening device to capture outmigrating salmonids above the Belden powerhouse on Yellow Creek. The screening device would meet the criteria specified in NOAA Fisheries "Fish Screening Criteria for Anadromous Salmonids," which specifies variables such as approach velocity, material quality, and bypass entrance design;
- implement downstream fish passage collection within 10 years of license issuance in Yellow Creek unless NOAA Fisheries approves an implementation delay as a result of integration with fish passage efforts prescribed for the Oroville Project;
- include provisions for the transportation of emigrating fish to temporary holding facilities for marking and tagging purposes and for transport to downstream release areas;
- target 99.5 percent survivability for trap and transfer efforts of outmigrating salmonids in the Seneca reach and in Yellow Creek;
- maintain and document 98 percent survivability for trap and transfer efforts of outmigrating salmonids in the Seneca reach and in Yellow Creek; and
- submit within 1 year of license issuance, a plan to NOAA Fisheries identifying means to monitor safe, timely, and effective anadromous fish passage, and the potential effects of this PM&E measure upon the environment.

In its reply comments to NOAA Fisheries' Section 18 modified prescription, PG&E states that the trap-and-transfer methods as proposed would be technically infeasible and would fail to produce a self-sustaining population of anadromous salmonids in the UNFFR (letter from T. Jereb, PG&E, UNFFR Relicensing Project Manager, to M.R. Salas, Secretary, FERC, Washington, DC, May 2, 2005). Furthermore, PG&E indicated that the modified NOAA Fisheries prescription would not assist in the recovery of Central Valley spring-run Chinook salmon and Central Valley steelhead nor

would it create a wild or natural fishery. As such, passage and restoration efforts as proposed by NOAA Fisheries would likely require a substantial amount of long-term maintenance and human intervention. PG&E also pointed out that the genetic integrity of salmonid stocks and disease transmission in the UNFFR watershed are major issues that would require additional research. PG&E indicated that there is a strong consensus in the region for restoration efforts and that it would be a willing party in anadromous fisheries restoration efforts in watersheds that are more likely to produce large and sustainable populations of Chinook salmon and steelhead.

The Commission also received comments on NOAA Fisheries Section 18 fishway prescription from Bobby Kempkes (letter from B. Kempkes, San Diego, CA, to M.R. Salas, Secretary, FERC, Washington, DC, May 2, 2005), the Carmel River Steelhead Association (letter from R.L. Thomas, President, Carmel River Steelhead Association, Monterey, CA, to M.R. Salas, Secretary, FERC, Washington, DC, May 3, 2005), the Fisherman's Alliance of California (letter from F. Emerson, president, Fisherman's Alliance of California, Monterey, CA, to M.R. Salas, Secretary, FERC, Washington, DC, May 3, 2005), the State Water Contractors (letter from T.L. Erlewine, General Manager, State Water Contractors, Sacramento, CA, to M.R. Salas, Secretary, FERC, Washington, DC, May 5, 2005), Erik Kolstoe (letter from E. Kolstoe, San Francisco, CA, to M.R. Salas, Secretary, FERC, Washington, DC, May 7, 2005), and CDWR (letter from M.A. Swiger, Counsel, CDWR, Washington, DC, to M.R. Salas, Secretary, FERC, Washington, DC, May 16, 2005).

The Carmel River Steelhead Association, the Fisherman's Alliance of California, Mr. Kempkes, and Mr. Kolstoe all provided comments in support of the NOAA Fisheries Section 18 fishway prescription. The State Water Contractors and CDWR both pointed out that settlement negotiations regarding fish passage are currently underway at the downstream Oroville Project and stated their concerns with prescribing fish passage upstream of the Oroville Project before those negotiations are complete. CDWR expressed many of the same concerns with the fishway prescription that PG&E did. CDWR indicated that fish passage at Oroville Project is unlikely to be successful, is highly experimental, and is not based on sound scientific principles. Furthermore, CDWR stated that before substantial resources are expended on a highly questionable trap-and-haul program, further investigation is required. CDWR also suggested that the Commission defer issuing a new project license for the UNFFR Project until settlement negotiations for the Oroville Project have concluded. The State Water Contractors indicated that there is still considerable disagreement among the participants in the Oroville Project relicensing settlement discussions as to the likelihood of success or implementation of fish passage, which would affect the implementation of fish passage measures at UNFFR. The State Water Contractors also indicated that NOAA Fisheries has not provided substantial evidence in support of the fish passage prescription it is imposing in the licensing proceedings upstream of Oroville dam and that the risk of upstream disease transmission outweighs any biological benefits associated with the proposed fish passage program. In addition, the State Water Contractors indicated that

the environmental conditions in upstream reaches (e.g., aquatic habitat, water temperature) would likely result in a net loss of anadromous fish resulting from passage efforts.

Our Analysis

NOAA Fisheries' fishway prescription for the UNFFR Project appears to be a part of its larger strategy to reintroduce anadromous salmonids into historical habitat from which they have been absent for almost 100 years (since the construction of Big Bend dam in 1910). During that time, numerous events have occurred, primarily the construction of additional dams and associated reservoirs (culminating with the completion of Oroville dam and its 16,000-acre reservoir in 1968) which make such a reintroduction a daunting task.

From an engineering standpoint, we agree that a trap-and-haul approach, such as that prescribed by NOAA Fisheries for the UNFFR Project, in conjunction with a complementary prescription for the Oroville Project, would likely, for the foreseeable future, be a more effective means of providing access for anadromous salmonids to the UNFFR than more traditional fish passage measures such as fish ladders and downstream bypass systems at each of the dams. That said, the success of any such program involves many more factors other than the trap and transport of fish. For example, sufficient instream flows, water temperature, suitable spawning and rearing habitat, the potential for the spread of pathogens, interspecific competition, and injury and mortality of transported fish are just some of the factors that would affect the success of spawning and the availability of juveniles for downstream transport.

At the outset, we must note that the fishway prescription for the UNFFR Project is completely dependent upon the issuance and implementation of a complementary prescription for the Oroville Project. Absent that, there are no adult salmonids for PG&E to stock into the Seneca Reach and Yellow creek, and consequently no outmigrants, either smolts or post-spawned steelhead, to capture and transport downstream of Oroville. While NOAA Fisheries has indicated that it will file such a fish passage prescription for the Oroville project, it has yet to do so. In addition, NOAA Fisheries indicated that settlement negotiations for the Oroville Project may affect the specific conditions and timing of their prescription for that project, which in turn would likely affect the implementation of fish passage for the UNFFR Project. Under the current schedule for the Oroville Project, the final fishway prescription is due January 30, 2006.

On August 12, 2005, pursuant to the ESA, NOAA Fisheries issued its final designation on critical habitat for Central Valley spring-run Chinook salmon and Central Valley steelhead (Federal Register, 50 CFR Part 226). The designation includes approximately 3,500 miles of riverine habitat in California for the conservation and protection of these species. These areas are considered by NOAA Fisheries as currently occupied riverine reaches that contain the physical and biological features essential to the conservation of the species, which may require special management considerations or

protection. However, we note that the designation did not include habitat above the Oroville Project. In previous assessments of the conservation value of river reaches upstream of Oroville, the NOAA Fisheries' Technical Recovery Team, formulated to evaluate habitat requirements for Central Valley spring-run Chinook salmon and Central Valley steelhead, concluded specifically that within the Feather River watershed, only inaccessible stream reaches of the NFFR upstream of Lake Almanor were to be considered as "unoccupied habitat outside the Evolutionarily Significant Unit (ESU) range that may be essential to conservation*"* (Federal Register, 50 CFR Part 226). Despite this conclusion by NOAA Fisheries, the modified prescription as submitted would not provide for fish passage above Lake Almanor. It is interesting to note that NOAA Fisheries did not designate Seneca reach or Yellow Creek (the focus of its Section 18 prescription) either as critical habitat or as areas outside the current range that are essential to the conservation of the species.

The introduction of Central Valley spring-run Chinook salmon and Central Valley steelhead into project waters would provide them access to approximately 15 miles of riverine habitat; 10.8 miles in the Seneca reach and 4.1 miles in Yellow Creek. NOAA Fisheries, in its March 14, 2005 modified Section 18 prescription, and PG&E in its license application indicate that spawning gravel in the lower 7.3 miles of the Seneca reach has the potential to support 172 pairs of steelhead and 96 pairs of Chinook salmon. The substrate quality in the upstream portion of Seneca reach above Seneca Falls was not evaluated. There is no data available on the availability of spawning gravels for steelhead or Chinook salmon in Yellow Creek.

The IFIM study conducted by PG&E indicates that the flow schedules proposed by PG&E and the resource agencies would substantially improve conditions for rainbow trout as compared to current conditions in the Seneca reach. Because juvenile steelhead, Chinook salmon, and rainbow trout have similar freshwater habitat requirements and are often sympatric in distribution (Raleigh et al, 1984, 1996; Moyle, 2002), it is likely that the flows proposed by PG&E and the resource agencies would provide suitable conditions for juvenile anadromous salmonids in the Seneca reach. However, because the habitat requirements for adult Chinook salmon, steelhead, and rainbow trout differ, it is not certain if suitable habitat for adults of each species would be made available by the flows proposed by PG&E and the resource agencies. In its modified prescription for the UNFFR, NOAA Fisheries provides anecdotal evidence indicating that suitable water depths were present in the reaches targeted for fish release. Additionally, improvements of the depth, velocity, substrate, and temperature conditions for coldwater fish are expected from the flows proposed by PG&E and recommended by the resource agencies. Therefore, the aquatic habitat in the Seneca reach would likely be usable by adult and juvenile Chinook salmon and steelhead in the Seneca reach, although there is little site-specific date available that empirically describes habitat suitability for anadromous salmonids. Little information is available regarding the suitability of habitat in Yellow Creek, but because it supports a wild rainbow trout fishery, it is likely that the creek

would support juvenile steelhead and juvenile Chinook salmon, provided that adult spawning was successful.

Assuming that adult anadromous fish are introduced into the Seneca reach and Yellow Creek and that physical habitat in those reaches can support successful adult anadromous salmonid spawning and juvenile rearing, we must consider the effects of the fishway prescription on other resources. The introduction and subsequent collection of these fish and the construction of the physical facilities specified in the prescription have the potential to adversely affect several facets of the currently existing aquatic biota in the UNFFR Project area including:

1. the population dynamics of the existing fish community through predation, competition, and habitat partitioning;
2. populations of federally threatened California red-legged frogs, CSC and FSS (e.g., hardhead) through predation or interspecific competition;
3. the transport, range, and intensity of fish-borne disease including infectious hematopoietic necrosis virus (IHN), *Ceratomyxa shasta* (CS), and whirling disease (*Myxobolus cerebrali*s);
4. riparian habitat, instream habitat, and aquatic biota at from construction of adult release and juvenile collection facilities and associated construction;
5. behavior and migratory patterns of existing fish populations in and around Yellow Creek and the Seneca reach where downstream collection and upstream release facilities are prescribed;
6. hydrological and geomorphic riverine processes in and around Yellow Creek and the Seneca reach where downstream collection and upstream release facilities would be constructed;
7. spawning gravel availability for resident trout species in the Seneca reach and in Yellow Creek; and
8. current fishery harvest management objectives, enforcement of fishing regulations, and recreational angling opportunities in the Seneca reach and in Yellow Creek.

Populations of sculpin, rainbow trout, and Sacramento suckers currently account for approximately 99 percent of the fish community in the Seneca reach (PG&E, 2002a). The introduction of anadromous salmonids into the Seneca reach could potentially disrupt the population dynamics of the currently existing fish community through competition and predation. Although rainbow trout and steelhead do often occur in the same system, the tendency is for either the steelhead or the non-migratory rainbow to dominate a given population (Moyle, 2002). Therefore, the introduction of steelhead into the UNFFR has the potential to affect the population structure of the currently existing rainbow trout population and associated fishery in both Yellow Creek and Seneca reach.

Additionally, the aggressive nature of juvenile rainbow trout often leads to their dominance over juvenile life stages of other sympatric salmonids (Moyle, 2002). This behavioral interaction could affect the success of efforts to establish Central Valley spring-run Chinook salmon in the UNFFR because of the dominant role that rainbow trout currently play in the UNFFR and in Yellow Creek.

The introduction of anadromous salmonids also has the potential to affect hardhead, a CSC species, which although not reported in the Seneca reach by PG&E, may occur in Yellow Creek. Hardhead, which are reported in the Belden reach, could be affected through competition and predation if the range of introduced anadromous fish in the UNFFR expands to include areas not specifically targeted by the NOAA Fisheries Section 18 prescription.

Although little information is available regarding the existing fish community in Yellow Creek, we assume that the fish composition is similar to the Seneca and Belden bypassed reaches and that it is dominated by rainbow trout, Sacramento sucker, and sculpin. Yellow Creek is a CDFG-designated wild trout stream with flows ranging from 40 to 170 cfs during June through September. The introduction of anadromous salmonids into Yellow Creek could disrupt the population dynamics of the currently existing fish community through competition and predation as well as negatively affect the recreational trout fishery through the legal restrictions imposed by implementation of the ESA.

The potential exists for both FYLF and CRLF to inhabit waters associated with the UNFFR Project. Juvenile anadromous fish prey on certain life stages of amphibian species and therefore have the potential to adversely affect these species. Although data from relicensing studies indicates that these species have not been observed in the Seneca reach (PG&E, 2002a), the presence of anadromous fish in the Seneca reach could potentially affect populations of FYLF and CRLF if their range expands or if they are found to occur in Yellow Creek.

Several fish diseases and pathogens are known to occur in the Feather River basin, including the IHN virus and the CS parasite, which are both known to kill significant numbers of salmonids (CDWR, 2004b). It is possible that hydroelectric facilities within the NFFR may have contributed to a decline in the range of IHN by blocking the virus from upstream transmission, although little is known about its current distribution in the NFFR (CDWR, 2004b). There is disagreement among the various agencies involved with this proceeding as to what effect the introduction of anadromous fish into the UNFFR would have on the transmission of fish borne pathogens. In its modified Section 18 fish passage prescription, NOAA Fisheries has indicated that it is likely that whirling disease and CS are widespread throughout the NFFR. Additionally, NOAA Fisheries states that the spread of IHN is less likely in wild stocks of Chinook as compared to hatchery fish, which are currently stocked in Lake Almanor. However, CDFG has expressed concerns indicating that disease transmission could be expected from the transport of anadromous salmonids to project waters (notes from the Fish Passage Focus

Group meeting, December 2, 2004, submitted by T. Jereb, PG&E, UNFFR Relicensing Project Manager, to M. Salas, Secretary, FERC, December 20, 2004). NOAA Fisheries indicates that water disinfection devices would be required at Oroville, which would likely aid in reducing the spread of disease. Because whirling disease and CS most likely already occur in the NFFR watershed, and because NOAA Fisheries has prescribed preventative measures (e.g., disinfectants, containment of fish in specific reaches), the introduction of anadromous salmonids to upstream reaches of the NFFR would likely have little effect on the overall spread of these diseases in the watershed.

The construction and installation of specific facilities for receiving and trapping anadromous fish as specified in the NOAA prescription (e.g., water-to-water release sites for upstream migrants and downstream screening structures) would likely have both short- and long- term effects, including: restricting the migratory patterns of resident fishes, blocking sediment movement, altering large-woody debris movement patterns, and changing the hydrologic flow patterns through and around screening devices. Road building and construction activities would likely increase sedimentation and affect riparian vegetation in the immediate vicinity of areas slated for construction, but these effects would likely only be short-term. If wetlands are affected by construction activities, it is expected that mitigation for these effects would be required by the Commission. In addition, although NOAA Fisheries does not indicate where on the Seneca reach or on Yellow Creek the release and recapture facilities would be located, the siting and construction of these facilities may be difficult from a land ownership perspective. NOAA Fisheries has stipulated that PG&E should acquire the legal right to access lands outside of the current boundary or modify existing project boundaries to implement anadromous fish passage at the UNFFR Project. Because the majority of the Seneca reach and the Yellow Creek watershed lie within Plumas National Forest, implementation of NOAA Fisheries fish passage prescription would likely require cooperation and facilitation from the FS.

NOAA Fisheries has specified that PG&E target 99.5 percent survivability and maintain and document 98 percent survivability during the transport of outmigrating salmonids in the Seneca reach and in Yellow Creek. A targeted survivability criterion for transport of adult fish was not specified; that would likely be contained in the complementary prescription for the Oroville project. Although truck transport of juvenile and adult salmonids is a common and extensively used management practice by fisheries agencies, mortality associated with truck transfer can occur and is generally associated with the initial loading of fish into a transfer vehicle (CDWR, 2004a). In fact, studies indicate that large-scale transport efforts undertaken in the Columbia and Snake Rivers in the 1970s and 1980s may not have substantially contributed to the recovery of protected salmonids and that mortality rates can average around 15 percent (Ward et al., 1997). Appendix A of CDWR's Fish Passage Model for the Oroville Project indicates that survivability for juvenile Chinook salmon ranges from 1 percent to 12 percent. Matthews et al. (1986) observed high levels of stress in Chinook salmon juveniles, especially if transported concurrently with steelhead juveniles. Additionally, NOAA Fisheries 98

percent survivability criteria is based on a fish passage prescription established for the Baker River Project (P-2150) in northern Washington. The Baker River Project has a different set of Section 18 requirements, and does not include a tagging and storage component as is specified for the UNFFR Project. Transport of fish in the UNFFR Project area would cover a longer distance, which could also affect survivability. Additionally, because Chinook salmon and steelhead would likely be transported together, overall Chinook survivability would likely be diminished upon release as a result of competition at release sites. We conclude that overall survivability of salmonids associated with the fish passage measures prescribed for the UNFFR Project would likely be lower than the 98 percent survivability level targeted by NOAA Fisheries and do not consider those targets realistic.

The introduction of federally listed salmonids into waters associated with the UNFFR Project and in Yellow Creek has the potential to adversely affect the existing trout fishery because project waters would then contain species protected under the ESA. Because angling for these two species would likely be prohibited, we assume there would be changes in fishing regulations to ensure that ESA take prohibitions are not violated. Furthermore, poaching and incidental takes could hamper efforts to establish populations of anadromous fish in these reaches. Because access to the Seneca reach is made difficult by mountainous terrain, it is likely that the effects of introducing federally protected species on the recreational fishery may be more prevalent in Yellow Creek, which is a recognized wild trout fishery and is subject to increased fishing pressure. Further complications could arise if anglers are not able to differentiate between wild steelhead and rainbow trout, which may adversely affect both angler compliance with the ESA and introduction efforts in the Seneca reach or in Yellow Creek.

As part of the Oroville relicensing studies, the Oroville Fish Passage Model was developed to assess the likelihood of successfully establishing self-sustaining populations of Chinook salmon upstream of Oroville dam to the first impassable barrier (CDWR, 2004a). The model is an interactive tool that allows users to adjust input parameters such as survival at various life stages, homing rate, capture rates, etc., to predict how variation in these parameters might affect the return rate of adults. The model output reports a range of values assessing the best case, worst case, and expected results to describe the feasibility of potential fish passage efforts. One of the critical output parameters in the model is the ratio between returning adult fish and the number of adult fish passed upstream. If the ratio is less than 1:1, fewer adult fish would return than were passed over a migratory obstruction and the fish passage effort would not be considered sustainable. If the ratio is greater than 1:1, then fish passage efforts would be considered successful and sustainable, with adult returns exceeding adults released.

In its March 14, 2005 prescription, NOAA Fisheries utilized the model in support of its contention that the trap and haul program specified in their prescription would result in a feasible fish passage program. They modified a model run previously conducted by the Oroville Facilities Environmental Working Group (EWG) by adjusting the numerical value for the variable “juvenile release to adult return for the stream-type

life history" from 0.46% to 1.41% based on Odenweller's (2004) data for winter-run Chinook salmon in the Sacramento River. The value used by the EWG (0.46%) was based on adult returns of coded wire tagged spring-run Chinook salmon in the Feather River (CDWR 2004a) and resulted in an adult return to adult passed ratio of 0.74 (i.e., fewer adults returning than passed upstream of Oroville). NOAA Fisheries' value of 1.41% resulted in an adult return to adult passed ratio of 1.72 (i.e., more adults returning than were passed upstream of Oroville, which represents a sustainable fish passage program for the "Expected Case" scenario).

The Oroville Fish Passage Model, and other similar models, are often powerful tools for decision making, particularly when basin wide decisions on fish passage issues are being considered. However models, or other data interpretive tools, are limited by the quality and representation of the data they are built upon and the expertise of those individuals involved in the exercise. NOAA Fisheries states that by adjusting one sensitive assumption within the model, the results of the modeling exercise indicate that a fish passage program is feasible. PG&E provides arguments that NOAA Fisheries use of data from the Odenweller model is not appropriate because it does not incorporate all sources of loss to the population, is based on winter-run Chinook salmon and not spring-run fish, and is derived as an estimate of estimates. In this case, NOAA considers data from winter-run fish of the Sacramento River as representative of conditions on the Feather River, whereas PG&E feels that data from studies on spring-run fish from the Feather River is more appropriate. While no empirical data is available for juvenile release to adult returns for the North Fork of the Feather River, we believe that the use of data derived from studies of spring-run fish from the Feather River is more appropriate and that the NOAA Fisheries calculated value likely results in an overestimation of the expected adult return to adult passed ratio.

In summary, although it is likely that the implementation of NOAA Fisheries' Section 18 prescription for the UNFFR would provide access to approximately 15 river miles of spawning and juvenile rearing habitat for Central Valley spring-run Chinook salmon and Central valley steelhead (assuming the prescription and implementation of a complementary prescription for the Oroville project), the overall degree of success of the program would be highly dependent on the effects of many other factors. However, the introduction of these fish has the potential to negatively affect a number of resources in the UNFFR Project area, including resident trout populations and the fisheries they support, populations of sensitive amphibian and fish species, and geomorphic processes.

Mining Activities

NOAA Fisheries recommends that PG&E "partially offset impacts to anadromous fish caused by the inundation of habitats and minimize adverse effects to the safe, timely and effective passage of anadromous fishes, by providing suitable compensation from active mining interests in the Seneca Reach or Yellow Creek through conservation easements and the purchase and rehabilitation of sites used for mining operations.

NOAA fisheries contends that the project, by reducing flows, enables mining operations to occur that would otherwise be impeded by unimpaired flows.

Our Analysis

We agree that mining has historically and, to a lesser degree, is currently impacting aquatic habitat in the project area. Historically, mining activities in the NFFR have contributed to a decline in water quality, increased sedimentation rates, affected geomorphic processes through the alteration of natural channel configurations and removal of substrates, and adversely affected anadromous and resident fish species as well as other components of the aquatic biota in the NFFR (Yoshiyama, 2001). At present, 206 active mining claims exist in the NFFR, many of which occur in the Seneca reach. However, since mining in the watershed predated construction of the project by over 50 years, we do not agree that there is a nexus between project operation and mining. We also note that this mining is regulated by the state of California and outside the jurisdiction of the Commission.

Fish Barriers

The NF-9 gage and weir were historically operated and maintained by PG&E to monitor lower Butt Creek stream flow. They are no longer operational and PG&E has proposed to rehabilitate, operate, and maintain them in the LA. The gage and weir are located in lower Butt Creek approximately 0.2 mile upstream of its confluence with the NFFR. In the SA, PG&E also proposes to develop, in consultation with CDFG, SWRCB, the FS, and FWS, a plan to monitor and assess aquatic habitat quality as well as upstream fish passage at the NF-9 gage weir in lower Butt Creek between Butt Valley dam and its confluence with the NFFR. If it is determined during monitoring that the existing gaging weir is acting to block fish passage, then removal or modification of the weir would be undertaken.

In the SA, PG&E and the settlement parties propose to remove the Gansner Bar fish barrier located in the lower Belden reach to allow rainbow trout from downstream waters to migrate into the upper Belden reach for spawning. The Gansner Bar fish barrier is located in the Belden reach of the NFFR about 0.2 miles upstream from the confluence with the EBNFFR. It was originally constructed in 1975 by PG&E under direction by CDFG to protect the upstream rainbow trout fishery by eliminating spawning access to the upper Belden reach by Sacramento sucker and other non-game fish species.

Our Analysis

During the May 2003 site visit, Commission staff inspected the existing gage NF-9 weir in lower Butt Creek. The gaging weir may potentially be a barrier to upstream movement of both juvenile and adult life stages rainbow trout under low flow conditions. The concrete apron extending below the weir may limit the ability of rainbow trout to successfully ascend the structure. Rainbow trout redds and spawning adults have been

documented upstream and downstream of the gage (TRPA, 2002a, b). In our review of the information contained within PG&E's license application, fishery reports, and the HSC development report, no conclusive evidence was provided that spawning rainbow trout and redds upstream of the weir were comprised of rainbow trout that reside in the Seneca reach. We conclude that monitoring the ability of adult and juvenile rainbow trout to ascend upstream of the weir would provide the data necessary for PG&E to determine the need, if any, to modify the structure to improve rainbow trout upstream passage.

PG&E noted that, during several site visits in the spring of 2001, multiple rainbow trout were observed repeatedly attempting to jump over the Gansner Bar fish barrier, without success. Neither the chemical treatment of the upper Belden reach in 1971 nor the construction of the Gansner Bar fish barrier were effective in completely removing non-game fish from this river reach because Sacramento sucker and Sacramento pikeminnow, both species endemic to the UNFFR, currently inhabit the reach (ECORP, 2003). The removal of the barrier would allow adult rainbow trout and other endemic species in lower Belden reach and Rock Creek reservoir to access the upper areas of the reach and associated tributaries and to utilize habitat above the barrier. Additionally, if the barrier was removed, juvenile rainbow trout that are either hatched downstream of the barrier or move below the barrier would be able to regain access to habitat, forage, and coldwater refugia found in the upper reach and its associated tributaries.

A wild, naturally reproducing rainbow trout population currently exists upstream of the Gansner Bar fish barrier in the presence of non-game species. Therefore, the removal or modification of the barrier would not result in a change to the existing fish community, but would likely improve the overall condition of the coldwater fishery in this reach of the river by restoring ecological and hydrologic connectivity.

Fish Pathogens

CDFG, in its letter dated, June 17, 2003, stated that CS, a parasite that afflicts salmonids, is endemic to the NFFR and the relationship between project operations and the occurrence of the disease should be reviewed. CS is a microscopic myxosporean protozoan parasite that infects the internal organs of affected fish. Natural transmission occurs when susceptible salmonids are exposed to water or sediments containing the infective stage; fish to fish transmissions have not been documented in either natural or laboratory environments (Bartholomew et al., 1989). Research indicates that the infection potential is enhanced when water temperatures are high, water flow is low, and/or numbers of infectious CS actinospores are relatively high (Bartholomew, 2001). There is no known treatment for reducing or eliminating CS spores in a natural environment. As CS is endemic to the NFFR, spores and actinospores likely are present within the bypassed reaches and reservoirs.

Our Analysis

High water temperatures (above 20^0C) during summer in the Belden reach and downstream waters likely increase the susceptibility of rainbow and brown trout to infection by CS. Because CS already occurs in the NFFR, changes in project operations are not likely to increase its transmission. In fact, proposed modifications to the Belden reach instream flow schedule, combined with any other measures that may be implemented (such as blending of Canyon dam releases), would likely provide colder water to the Belden, Rock Creek, and Cresta bypassed reaches, which could reduce CS infection rates of salmonids (CDWR, 2004b).

Effects of Proposed Recreation Measures on Aquatic Resources

In its June 17, 2003, letter to the Commission, The Anglers Committee against Artificial Whitewater Flows requested an evaluation of the effects of proposed recreation related activities, particularly those contemplated in the SMP, on aquatic habitats, fisheries, and angling opportunities.

Our Analysis

Recommended recreational enhancements (see section 3.3.5, *Recreational Resources*) would have minimal effects on aquatic habitat and fisheries. In the SA, PG&E proposes dredging a boat channel from the North Shore campground public boat launch to provide access to approximately 4,480 feet elevation that would be approximately 1,000 feet long, 50 feet wide, and 6 feet deep (PG&E datum). The dredging would alter the depth and potentially the substrate type of approximately 1 acre of aquatic habitat. This represents approximately 0.003 percent of all aquatic habitat found within Lake Almanor at the maximum water surface elevation. Scheduling dredging activities during fall, when the lake level is typically lower and centrarchid spawning is not occurring, would reduce potential impacts on fish utilizing habitat within the dredge zone. In fact, it appears that much of this work could proceed "in the dry," since the 4,480 foot elevation is well within the historical range of seasonal lake level fluctuation. Performing the work when the lake is below the 4,480 elevation would also simplify the protection of any cultural resource sites that may be in the area.

The proposed SMP, once approved by the Commission, would require PG&E to institute permitting processes that would analyze the effects of any proposed actions, such as rehabilitating swimming beaches, construction of waterside trails, and construction of fishing platforms, on aquatic and other resources.

Potential scheduled recreation flow releases into the Belden reach could adversely affect the aquatic community and are discussed earlier in this section under *Recreation Flows—Belden Reach.*

3.3.2.3 Cumulative Effects on Aquatic Resources

Construction of the UNFFR Project reservoirs and downstream reservoirs (Rock Creek, Cresta, Poe, and Oroville) has reduced the total amount of riverine habitat in the NFFR. Between the West Branch and Hamilton Branch of the NFFR, riverine habitat has been reduced from approximately 90 miles under historic conditions to 41 miles (PG&E, 2002a). Current riverine habitat availability is divided among the Seneca, Belden, Rock Creek, Cresta, and Poe bypassed reaches. Although some of the reservoirs in the Feather River basin provide suitable rearing habitat for rainbow trout, the habitat created by the construction of dams has allowed coolwater fish populations to become established in reservoir impoundments. Diversion of water for hydroelectric generation has substantially reduced flow volumes and altered temperature regimes in the bypassed reaches, but trout fisheries remain in good condition, especially in the Seneca, Belden, and lower Butt Creek reaches.

Several measures proposed by PG&E and recommended by the agencies are expected to provide benefits to the aquatic biota in the Seneca and Belden bypassed reaches. These include: providing pulse flow releases in both bypassed reaches for gravel entrainment and recruitment to improve spawning habitat for trout and enhance channel functionality; increasing minimum flows in these bypassed reaches to increase the amount of physical habitat that is available and to improve summer water temperatures in the Belden bypassed reach; and finalizing a plan for ramping spill flows to avoid rapid onset and termination of spill flows that may flush aquatic biota downstream, if sufficient opportunity to seek cover from high velocities is not provided, or strand trout and invertebrates.

PG&E's proposed minimum flows to the Seneca and Belden bypassed reaches would improve conditions for rainbow trout adults and provide near-optimal conditions for rainbow trout spawning, although juvenile habitat would decrease slightly compared to existing conditions with the flow schedule proposed in the SA (figures 3-11 and 3-12). Consequently, there would not be much of an increase in production of the number of rainbow trout in the Seneca and Belden bypassed reaches. However, because of the near-optimal flow conditions, and slight decrease in the prevailing water temperature in these reaches, the growth and condition of the rainbow trout would be expected to improve. This could result in anglers catching larger trout from the Seneca and Belden bypassed reaches downstream from Canyon and Belden dams, respectively. Monitoring fish and macroinvertebrate populations would enable determinations of trout responses to new project operations and evaluation of the need to implement adaptive management measures.

Providing scheduled whitewater flows in the Belden reach, if implemented, could adversely affect trout populations and macroinvertebrate communities. Recreational flow releases could result in the continued modification of aquatic habitat through the release of artificial flows in the bypassed reaches. Recreational flow releases could continue to

alter the habitat availability, spatial distribution, and behavioral patterns of aquatic fauna in the bypassed reaches. Algae scour, movement of leaf-litter and substrates, redistribution of macroinvertebrates, and entrainment of juvenile fish could occur in the late-summer months as a result of recreational flow releases. Ecological monitoring during such events would enable agencies and PG&E to identify any substantial effects and provide a basis for taking corrective actions.

Modifying the configuration of the Prattville intake pursuant to the Rock Creek-Cresta SA and using project operations to maintain water temperature criteria in river reaches outside the project boundary represents a cumulative effect that would likely cause a reduction in the amount of coldwater habitat in Lake Almanor, which would affect the existing coldwater fish community. Modifications, as modeled, to the Prattville intake would cause a substantial depletion of the hypolimnion (64 percent), which would negatively affect salmonid (rainbow trout, brown trout, and stocked Chinook salmon), and wakasagi populations in Lake Almanor by decreasing available coldwater habitat during the summer. This decrease in coldwater habitat would concentrate fish that prefer such habitat into a substantially smaller area. Currently, wakasagi provide forage to predacious fish in the lake and, when entrained in the Prattville intake, a substantial forage base for trout inhabiting both Butt Valley and Belden reservoirs. Any modifications to the intake that reduce the coldwater habitat could increase entrainment of wakasagi if they become more concentrated in the vicinity of the Prattville intake. This could affect salmonids in Lake Almanor, Butt Valley reservoir, Belden reservoir, and the waters of the Rock Creek-Cresta Project, at least on a short-term basis, by increasing the available forage base. By reducing downstream temperatures, implementation of some of the proposed modifications to the Prattville intake would likely enhance habitat suitability for coldwater fish species in the Rock Creek – Cresta bypassed reaches.

3.3.2.4 Unavoidable Adverse Effects

Continued operation of the UNFFR Project with proposed and recommended measures would result in unavoidable adverse effects on aquatic resources, including the continued replacement of riverine with reservoir habitat, blockage of upstream fish movement by project dams, losses of fish through entrainment, and interruption of sediment transport processes. Lake Almanor and Belden reservoir would continue to inundate approximately 50 percent of the riverine habitat that existed between Hamilton Branch and the current location of the Rock Creek reservoir.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

The project area's varied elevation and geological characteristics support a diversity of vegetation types. Plant communities include mixed coniferous forest, riparian, oak woodland, chaparral, and meadow. We describe specific information on

vegetation associated with the tributaries, UNFFR, reservoirs, and other project features in the following section.

The project area is situated within the California Floristic Province (Hickman, 1993) at the northern edge of the Sierra Nevada Mountains. In the Lake Almanor area, granite and metamorphic rocks of the northern end of the Sierra Nevada are buried beneath young volcanic deposits, and the topography is level to gently sloping. Vernally wet volcanic flats and wet meadows are common in the Almanor region. The upper reaches of Lake Almanor contain large, grassy meadows subject to flooding at high water levels. Vegetative cover in the vicinity of Lake Almanor and Butt Valley is generally mixed conifer forest except in populated areas where development has occurred. The project area between Butt Valley and Caribou is also generally mixed conifer forest with outcrops of serpentine in a steep, eroded landscape. Between Caribou and Belden, the vegetation varies between mixed conifer forest and chaparral. The steep, rocky slopes are dominated by canyon live oak forests. Seeps and springs are fairly common in the area around the Belden forebay, and many rare plants associated with the serpentine outcrops are present.

PG&E identified and mapped seven upland cover types and four riparian vegetation series within the project boundary (table 3-21). In general, upland vegetation in the project area can be characterized as mixed conifer forest and oak woodland. The most common species in the mixed conifer stands are Douglas fir, white fir, Jeffrey and ponderosa pine, lodgepole pine, and incense cedar. Common shrubs include several species of ceanothus and manzanita, vine maple, leather oak, and deer brush. Oak woodland species include canyon live oak and black oak with an understory of deer brush, poison oak, toyon, western mock orange, and pipevine.

Table 3-21. Vegetation series mapped within the UNFFR Project boundary. (Source: GANDA, 2000)

Vegetation Series	General Description and Dominant Species
Upland Series	
Canyon live oak	Open canopy with diverse shrub and herbaceous layers, including introduced annuals; canyon live oak, western mock orange, whiteleaf and Indian manzanita, deer brush, poison oak, and California pipevine
Mixed conifer	Densely shaded by Douglas fir, ponderosa pine, incense cedar, and white fir, poorly developed shrub and herbaceous layer of leaf litter and saprophytes

Vegetation Series	General Description and Dominant Species
Lodgepole pine	Single species forest of lodgepole pine found at higher elevations along edges of wet montane meadows, low diversity and sparse understory
Leather oak	Leather oak and wedgeleaf ceanothus found in mixed serpentine chaparral along with whiteleaf manzanita, rubber rabbitbush, and prickly phlox
Greenleaf manzanita or montane chaparral	Dense chaparral to about 15 feet in height found often in disturbed areas; greenleaf manzanita, mountain whitethorn, Sierra gooseberry, bloomer's goldenbush, and Mahala mat
Dry montane meadow	Herb dominated community found at the periphery of Last Chance Marsh, along the north and west shore of Lake Almanor, and behind Chester Airport; Kentucky bluegrass, tufted hairgrass, common yarrow, meadow penstemon, beaked sedge, Jones' muhly, long-stalked clover, sheep sorrel, and cinquefoil
Tufted hairgrass	Herb dominated community found in a band of seasonally moist meadow at Last Chance Marsh; tufted hairgrass, bluegrass, field mint, timothy, and Baltic rush
White alder	Narrow, discontinuous montane riparian forest found throughout the NFFR corridor; white alder, some black cottonwood, arroyo willow, and redtwig dogwood
Wetland Series	
Freshwater seeps	Herb dominated community associated with wet meadows or fractured serpentine on steep slopes or cliff faces, found in Last Chance Marsh and Caribou and Belden areas; native sedges and rushes, seep-spring monkeyflower, big-leaved avens, meadow barley, leopard lily, white-flowered bog orchid, and wild azalea
Freshwater marsh	Aquatic and emergent species found along the fringes of marsh habitat at Lake Almanor and Butt Valley reservoir and a disturbed site behind Chester Airport; pondweeds, water smartweed, common waterweed, inflated sedge, water sedge, common

Vegetation Series	General Description and Dominant Species
	bladderwort, hairy-leaved meadow arnica, American brooklime, creeping spikerush, mountain spikerush, and mannagrass
Wet montane meadow	Highly diverse herbaceous community found at Last Chance Marsh; woolly sedge, small-fruited bulrush, mountain spikerush, water plantain buttercup, tinker's penny, Baltic rush, field mint, Nevada rush, and primrose monkeyflower

The UNFFR Project area contains abundant riverine and lacustrine open water wetlands associated with the NFFR, its tributary streams, and the project reservoirs. Palustrine scrub-shrub wetlands are found along the shoreline of the river and its tributaries and are usually dominated by deciduous shrubs like willow and alder. Persistent emergent wetlands are found to a limited extent along the west shore and causeway arm of Lake Almanor and are characterized by bull rush, cattails, and sedges. Other common riparian and wetland vegetation includes grasses, sedges, willows, rushes, alders, cottonwoods, and ferns. Freshwater seeps and wet meadow habitats also occur locally.

Special-status Plant Species

PG&E's review of information published by the FS, FWS, CDFG, and the California Native Plant Society (CNPS) indicated that 118 special-status species could potentially occur in the project area. PG&E conducted field surveys for rare plants during the spring and summer of 2000 along the NFFR corridor from Lake Almanor dam to the Belden powerhouse at the confluence with Yellow Creek. Surveys were also conducted around Butt Valley reservoir, Lake Almanor, and associated project facilities and recreational sites. Surveyors identified and mapped 114 occurrences of 12 rare plants that are known to occur in the project vicinity or are documented within the project area (table 3-22). No federal- or state-listed threatened, endangered, or candidate plant species were documented within the project area.

Table 3-22. Special-status plant species that are known to occur within the UNFFR Project area. (Source: GANDA, 2000)

Species	Status	Habitat and Location Where Found
Geyer's sedge (*Carex geyeri*)	CNPS 4, FSI	Open mixed conifer forest. Documented during PG&E's surveys at Skinner Flat and approximately 1 mile downstream of Canyon dam.
Starry clarkia (*Clarkia stellata*)	FSS	Mixed conifer forest; road embankments or open areas. Documented during PG&E's surveys on the southeast shore of Lake Almanor and along Butt Valley reservoir Road.
California lady's slipper (*Cypripedium californicum*)	CNPS 4, FSI	Seeps and springs on serpentine rock outcrops. Documented during PG&E's surveys at Caribou No. 1 and No. 2; and at a permanent spring approximately 1 mile north of Queen Lily campground.
Round-leaved sundew (*Drosera angelica)*	FSI	Bogs and swamps, mixed conifer forest. Documented during PG&E's surveys at Last Chance Marsh.
Cantelow's lewisia (*Lewisia cantelovii*)	CNPS 1B, FSS	Broadleaf upland forest; chaparral, cismontane woodland; steep, north to northeast-facing cliffs, rocky outcrops, often mossy sites. Documented during PG&E's surveys in the Caribou area, 2 miles north of Queen Lily campground and the confluence of NFFR and EBNFFR.
Quincy lupine (*Lupinus dalesiae*)	CNPS 1B, FSS	Dry slopes in mixed conifer, often on phyllite. Lower coniferous and upper coniferous forests. Documented during PG&E's surveys at Butt Valley reservoir.
Northern bugleweed (*Lycopus uniflorus*)	CNPS 4, FSI	Lake margins, wet meadows, and floating bogs and fens. Documented during PG&E's surveys at Last Chance Marsh.

Species	Status	Habitat and Location Where Found
Stebbin's monardella (*Monardella stebbinsii*)	CNPS 1B, FSS	Broadleaf upland forest; chaparral, lower coniferous forest; rocky serpentine slopes and outcrops. Documented during PG&E's surveys in the Caribou area.
Marsh skullcap (*Scutellaria galericulata*)	CNPS 2, FSI	Swamps and wet places, 4,000 – 7,000 feet elevation; lower montane coniferous forest, meadows (mesic). Documented during PG&E's surveys at Last Chance Marsh.
Feather River stonecrop (*Sedum albomarginatum*)	CNPS 1B, FSS	Crevices and ledges on steep, serpentine cliff faces, partially shaded. Chaparral, lower coniferous forest. Documented during PG&E's surveys in the Caribou area.
Flat-leaf bladderwort (*Utricularia intermedia*)	CNPS 2, FSI	Shallow water; 4,000-7,500 feet elevation. Bogs and meadows, marshes, and swamps (lake margins). Documented during PG&E's surveys at Last Chance Marsh.
Cream-flowered bladderwort (*Utricularia ochreleuca*)	FSI	Shallow water; 1,435-1,440 meters elevation. Meadows (mesic); marshes, and swamps (lake margins). Documented during PG&E's surveys at Last Chance Marsh.

Notes: FSS – FS sensitive species
FSI – FS special interest
CNPS 1B – rare or endangered in California and elsewhere
CNPS 2 – rare or endangered in California, but more common elsewhere
CNPS 3 – plants for which more information is needed
CNPS 4 – plants of limited distribution

Noxious and Invasive Weeds

The California Department of Food and Agriculture (CDFA) lists 135 plants as noxious weeds in California (CDFA, 2002). Based on literature review and information obtained from CDFA, the California Exotic Pest Plant Council (CalEPPC), and the FS, PG&E determined that 38 of these could potentially occur in the project area. PG&E conducted surveys for noxious weeds in the project area together with surveys for rare plants in 2000. Surveyors identified and mapped 145 occurrences of eight noxious weed

species (table 3-23). A ninth species, Himalayan blackberry, was not mapped because it was found to be so widespread in the project area. Although not listed by CDFA as "noxious," it is widely accepted as an invasive exotic plant. It was found throughout the NFFR corridor from the Belden powerhouse to approximately 4,200 feet elevation at Butt Valley reservoir.

Most weed populations were observed along project access roads, around the powerhouses, and at recreational facilities, where vehicle and foot traffic serve as vectors for the spread of weed seed. However, weed infestations were also documented at low use areas, such as the northern tip of Lake Almanor, suggesting that plant fragments and seed are also spread by a combination of high flows or water levels and by recreationists.

Table 3-23. Noxious and invasive weeds documented in the UNFFR Project area. (Source: GANDA, 2000)

Species	Status	Documented Occurrences
Cheat grass (*Bromus tectorum*)	CalEPPC A-1, CDFA C	Common throughout project area, particularly on access roads and near facilities.
Hairy whitetop (*Cardaria pubescens*)	CDFA B	West side of Lake Almanor near the 4,510 elevation contour; also at the north end of Butt Valley reservoir and Belden forebay.
Spotted knapweed (*Centaurea maculosa*)	CalEPPC Red Alert, CDFA A	Highway 36 embankment on west side of bridge over Lake Almanor.
Yellow star-thistle (*Centaurea soltitialis*)	CalEPPC A-1, CDFA C	Common throughout project area along access roads and near facilities.
Canada thistle (*Cirsium arvense*)	CalEPPC B, CDFA B	Mud Creek Rim Road; east shore north end of Lake Almanor.
Klamathweed (*Hypericum perforatum*)	CalEPPC B, CDFA C	Large occurrences at Butt Valley reservoir in vicinity of sensitive species plants. Common along access roads, facilities, and recreation areas.
Dalmation toadflax (*Linaria genistifolia*)	CDFA A	West side of Lake Almanor; colonizing edge of montane meadow habitats.

Species	Status	Documented Occurrences
Bouncing-bet (*Saponaria officinalis*)	CalEPPC A-2, CDFA C	Near confluence of NFFR and EBNFFR.
Himalayan blackberry (*Rubus discolor*)	CalEPPC A-1	Intermittent band of riparian vegetation on NFFR from Seneca to Belden powerhouse.

Notes: **CalEPPC List Designations:**
A-1 – most invasive wildland pest, widespread
A-2 – most invasive wildland pest, regional
B – wildland pest plants of lesser invasiveness
Red Alert – pest plants with the potential to spread explosively CDFA List:
A – targeted for eradication or containment
B – more widespread, counties determine control efforts
C – very widespread, control efforts typically targeted only in nurseries or seed lots

Wildlife

The UNFFR Project area provides habitat for a variety of wildlife species that use the mixed conifer forests of varying stand ages, oak woodlands, riparian areas along the NFFR and its tributaries, and project reservoirs. The coniferous forest in the project area supports various species of upland game birds including blue grouse, California and mountain quail, ring-necked pheasant, mourning dove, and wild turkey. Mammals expected to occur include mule deer, black bear, Douglas' squirrel, snowshoe hare, western gray squirrel, raccoon, gray fox, and ermine. The most important game species in the project vicinity are deer, including black-tailed deer and California mule deer. At lower elevations, the UNFFR Project area serves as the winter range for the Bucks Mountain Herd and the summer range for the East Tehema Deer Herd.

Riparian habitats are of particular importance, because they support a greater density and diversity of wildlife than any other terrestrial habitat in California. Waterfowl such as mallard, wood duck, wigeon, common mergansers, common goldeneye, cinnamon teal, canvasback, and Canada goose occur in the project area. Great blue heron, osprey, and belted kingfisher are often observed near the project reservoirs and along the NFFR. Furbearers such as beaver, muskrat, and mink also benefit from the project's abundant riparian habitat. Reptiles and amphibians known to occur in the vicinity of the project area include bullfrog, garter snake, treefrog, Pacific rattlesnake, western toad, and California newt.

Special-status Wildlife

A number of sensitive wildlife species are known to, or have potential to, occur in the project vicinity including several FS sensitive species. We address species that are

listed as threatened or endangered under the ESA in section 3.3.4, *Threatened and Endangered Species*.

PG&E's consultation with the FS, FWS, and CDFG indicated that 18 species with special status could occur in the project area. Three additional species, the VELB, CRLF, and bald eagle, are federally listed as threatened, and are discussed in section 3.3.4, *Threatened and Endangered Species*. The amphibians, reptiles, birds, and mammals shown in table 3-24 include federal species of concern; sensitive species in FS Region 5; and state-listed threatened, endangered, or species of concern. We evaluated the likelihood of occurrence of these species in the project area based on their historical range, known occurrences, habitat associations documented in the literature, and the results of PG&E's field surveys. The current status of each species was identified after reviewing CDFG's current list of special-status animals (CDFG, 2002a).

Table 3-24. Special-status species that could occur or are documented to occur in the project vicinity. (Source: PG&E, 2002a; CDFG, 2002a).

Species	Status	Optimum Habitat
Amphibians and reptiles		
Cascades frog (*Rana cascadae*)	FSC, CSC, FSS	Breeds in ponds or bogs at elevations above 3,000 feet NGVD; associated with wet meadows, moist forests, along forested small streams or pond edges in summer
Foothill yellow-legged frog (*Rana boylii*)	FSC, FSS, CSC	Typically found close to tributaries, with cobble/boulder substrate and exposed rock for sunning; permanent foothill streams
Mountain yellow-legged frog (*Rana muscosa*)	FSC, CSC, FSS	Typically found at high elevation ponds, lakes, and streams
California red-legged frog (*Rana aurora draytonii*)	CSC, FT	Typically found in perennial ponds or pools with deep, still or slow moving water containing dense emergent or riparian vegetation
Northern leopard frog (*Rana pipiens*)	CSC, FSS	Typically found near quiet water with emergent or submergent vegetation for breeding and overwintering

Species	Status	Optimum Habitat
Western pond turtle (*Clemmys marmorata*)	FSC, FSS, CSC	Typically found near still or slow-moving water of ponds, marshes, streams, rivers, and reservoirs containing substrates for aerial or aquatic basking
Birds		
American peregrine falcon (*Falco peregrinus anatum*)	FSC, FSS, SE	Montane hardwood-conifer, cliff sites for nesting
California spotted owl (*Strix occidentalis occidentalis*)	FSS, CSC	Montane hardwood-conifer
Greater sandhill crane (*Grus canadensis tabida*)	FSS, ST	Wet meadows interspersed with emergent wetlands. Irrigated pastures are important for resting during migration and through the winter
Northern goshawk (*Accipiter gentilis*)	FSC, FSS, CSC	Montane hardwood-conifer, middle and higher elevations
Willow flycatcher (*Empidonax traillii*)	FSS, SE	Montane hardwood-conifer, wet meadow
Mammals		
California wolverine (*Gulo gulo luteus*)	FSC, FSS, ST	Montane hardwood-conifer, montane riparian
Pacific fisher (*Martes pennanti pacifica*)	FSC, FSS, CSC	Montane hardwood-conifer, montane riparian
Pine marten (*Martes americanus*)	FSS	Montane hardwood-conifer
Sierra Nevada red fox (*Vulpes vulpes necator*)	FSC, FSS, ST	Montane hardwood-conifer, montane riparian
Pallid bat (*Antrozous pallidus*)	FSS, FSM, CSC	Montane hardwood-conifer, montane riparian; uses caves, tunnels, abandoned mine shafts, and sometimes buildings
Townsend's big-eared bat (*Plecotus townsendii pallescens*)	FSC, FSS, CSC	Montane hardwood-conifer, montane riparian; typically found in caves, mines, tunnels, attics and other human-made structures

Species	Status	Optimum Habitat
Western red bat (*Lasiurus blossevillii*)	FSS, CSC	Montane hardwood-conifer, strongly associated with riparian forest, uses tree foliage for day roosting

Notes: FSC – federal species of concern
FT/FE – federally threatened or endangered
FSS – FS sensitive species, Region 5
FSM– FS survey and manage species
SE – state endangered
ST – state threatened
CSC – state species of concern

Several of the wildlife species discussed above and shown in table 3-24 as having special FS or state status are also considered FS Management Indicator Species (MIS). MIS do not necessarily have special status, but are important in representing certain habitats and other species or guilds associated with such habitats. The FS uses MIS to evaluate the effects of various management actions on wildlife populations. For its analysis of the impacts of relicensing the UNFFR Project, the FS selected nine wildlife MIS that were identified in the Plumas and Lassen National Forest land and resource management plans: osprey, woodpeckers (pileated and hairy), bear, deer, bufflehead duck (Lake Almanor), mallard, Canada goose, and western gray squirrel (FS, 1988; FS, 1992). Currently little or no information is available about the numbers of these species, and some occurrences within the project area likely fluctuate yearly with annual migration.

Special-status Amphibians and Reptiles

Six amphibians and aquatic reptiles were considered to have potential for occurring in the NFFR watershed (see table 3-24). Amphibian and aquatic reptile surveys, performed by Garcia and Associates in 2001, identified a range of suitable habitat for target special-status species. While the NFFR provides suitable habitat for many water- or wetland-dependent species, PG&E concludes that the UNFFR Project area does not appear to currently support populations of Cascades frog, mountain yellow-legged frog, foothill yellow-legged frog (FYLF), CRLF, or other special-status amphibians and aquatic reptiles (GANDA, 2002). Likely causes for species' absence include destruction or disruption of habitat, predation, changes in water level elevations and flow, and general low to moderate habitat suitability.

Special-status Bird Species

The FS has identified five special-status bird species as being of particular interest in the project area (PG&E, 2002a). These include the American peregrine falcon, California spotted owl, greater sandhill crane, northern goshawk, and willow flycatcher. Below, we provide additional information about these species.

American peregrine falcon (*Falco peregrinus anatum*)—The American peregrine falcon was removed from the federal list of threatened and endangered species in 1999, due to the success of recovery efforts throughout its range (64 FR 46,541-46,558). However, the peregrine continues to be protected under the Migratory Bird Treaty Act, and is considered sensitive in FS Region 5.

Peregrine falcons nest on steep and inaccessible cliffs that offer protection from predators. They prey almost exclusively on birds captured in flight. Cliffs along the NFFR reaches may provide suitable nesting habitat for peregrine falcons. One known eyrie located in the NFFR canyon on cliffs just upstream of the confluence with Ohio Creek was documented during helicopter surveys for bald eagles in 2001. No other peregrine falcon breeding areas were documented. Limited availability of suitable nest sites and other historical effects resulting from human activity due to logging, grazing, and recreation may contribute to the paucity of nesting peregrines.

California spotted owl (*Strix occidentalis occidentalis*)—The California spotted owl is an FS sensitive species and is not currently protected under provisions of either the state or federal ESA. Spotted owls typically occur in dense, old-growth, multi-layered, mixed coniferous forest and oak woodland habitats. Key habitat requirements for this species include blocks of mature forest with permanent water and dense, multi-layered canopy cover for roost seclusion. Nesting territories are often found in narrow, steep-sided canyons on north-facing slopes. Open areas are usually avoided by these owls, although they may occasionally make hunting forays into secondary forest. The largest threat facing the spotted owl is the loss of habitat from logging.

The FS maintains 300 acres of Protected Activity Centers (PACs) for the California spotted owl on Plumas National Forest lands. One PAC has been established near the Butt Valley dam and another is located adjacent to the east shore of the reservoir. PG&E used FS protocols to conduct surveys for spotted owls in the project area during the 1994 and 1995 breeding seasons. Surveyors received responses from spotted owls in the two previously identified FS PACs, but did not observe any owls or nests during a daylight follow-up survey. However, database searches and agency consultation in 1999 identified 18 area records for spotted owl within a one-mile radius of the reach between Canyon and Belden dams. The status of these sites remains unknown.

Greater sandhill crane (*Grus canadensis tabida*)—Suitable habitat for this state threatened species exists in the open water areas and shallow lakes of the project area. Fresh emergent wetlands for nesting and open shortgrass plains, grain fields, and open water wetlands for foraging occur along and adjacent to the western shoreline of Lake Almanor. One pair of adult cranes with young was observed in 1981 during ground reconnaissance in a large meadow immediately north of Lake Almanor. Four other records exist within the project vicinity.

Northern goshawk (*Accipiter gentilis*)—The project area provides suitable habitat for the northern goshawk. The northern goshawk typically nests on the Plumas National Forest in mature or older mixed conifer stands, but uses a variety of stand ages during foraging. Nests are well built stick nests located high in a hardwood tree. The nest is often built in the crotch of the tree.

PG&E conducted northern goshawk surveys in 1994 according to FS survey protocol and conducted database searches in 1999. No goshawks were found nesting in the immediate vicinity of the project in 1994. The nearest confirmed recently active northern goshawk nesting area is located on private land south of the town of Chester and approximately 10 miles northwest of Canyon dam.

Willow flycatcher (*Empidonax traillii*)—The state endangered willow flycatcher breeds in California from Tulare County north, along the western side of the Sierra Nevada and Cascades and along the northern coast. This species is strongly associated with large wet meadow complexes that support willow or willow/alder thickets at elevations between about 2,000 to 8,000 feet, but breeding habitat may be extremely variable (RHJV, 2000).

PG&E did not document any willow flycatchers during ground reconnaissance or database searches. The nearest records found were located approximately 3 miles west of Butt Valley reservoir and 10 miles northeast of Lake Almanor. Suitable large stands of willow habitat are not found in the project area, making it unlikely that the species occurs here.

Special-status Forest Carnivores

Although the California wolverine, Pacific fisher, pine marten, and Sierra Nevada red fox have not been documented in the project area, suitable habitat is present in the vicinity, and the FS has categorized them as sensitive species (PG&E, 2002a). We describe these species below.

California wolverine (*Gulo gulo luteus*)—The California wolverine occurs in mixed conifer, fir, and lodgepole forests at elevations between about 4,300 to 7,300 feet, but may also use lower elevations in areas where it is undisturbed by development and human activity (Banci, 1994). The California wolverine uses caves, hollows in cliffs or rock outcrops or ground burrows in dense forest stands for den sites, but forages in more open areas.

The current range of the California wolverine extends from Del Norte and Trinity counties through Shasta County, and south through the Sierra Nevada to Tulare County. However, no wolverines were detected during forest carnivore surveys in 1994 and 2000 or winter carnivore surveys in 1998. The presence of roads, facilities, residential development, and recreation may limit habitat potential for the California wolverine.

Pacific fisher (*Martes pennanti pacifica*)—The Pacific fisher is typically found in late-successional conifer forests and riparian areas, and avoids open, hardwood-dominated stands (Powell and Zielinski, 1994). Stand attributes that appear to be important for the Pacific fisher include a diversity of tree sizes and shapes, openings that allow for the growth of understory vegetation, abundant dead and down material, and limbs close to the ground (Powell and Zielinski, 1994). Very few dens have been found in the western United States, but fishers typically den high in cavities in large-diameter live trees or snags. In California, fishers prey on small- to medium-sized mammals, including mice, voles, shrews, moles, squirrels, birds, snowshoe hare, and porcupines, and fisher foraging habitat coincides with forested and riparian habitats where these species are abundant (Powell and Zielinski, 1994).

At one time, the range of this species extended from British Columbia to Central California, but populations declined dramatically around the turn of the last century, due to trapping and logging. In the south-central Sierra Nevada, the Pacific fisher is reported from habitats between about 3,300 to 6,600 feet NGVD; the Southern Sierra Fisher Conservation Area encompasses the known occupied range in the Sierra Nevada, which is considered to be an elevational band from 4,500 to 8,000 feet (Golightly, 1997). No fishers were detected during forest carnivore surveys conducted in 1994 and 2000 or during winter carnivore surveys conducted in 1998. As with the wolverine, presence of roads, facilities, residential development, and recreation may limit habitat potential for this species.

Pine marten (*Martes americanus*)—The pine marten is an FS sensitive species that occurs in dense fir, lodgepole pine, and mixed coniferous forest. Suitable marten habitat is present throughout the project area, particularly at the higher elevations. However, no individuals were detected during forest carnivore surveys conducted in 1994 and 2000 or during winter carnivore surveys conducted in 1998. As with the wolverine and fisher, the presence of roads, facilities, residential development, and recreation may limit habitat potential for this species.

Sierra Nevada red fox (*Vulpes vulpes necator*)—The Sierra Nevada red fox is typically found in late-successional coniferous forest interspersed with riparian and meadow habitat and in brush fields. Its range extends from the California Cascades east to the Sierra Nevada Mountains in northern California, with most sightings reported between 5,000 and 7,000 feet NGVD. Although habitat may exist in the higher elevations of the project vicinity, no Sierra Nevada red fox were detected during forest carnivore surveys in 1994 and 2000 or winter carnivore surveys in 1998. However, one individual was sighted near the town of Chester on the west shore of Lake Almanor in 1973. As with the other forest carnivores, the presence of roads, facilities, residential development, and recreation may limit habitat potential for this species.

Special-status Bats

In addition to surveys for general forest and riparian biota, PG&E conducted specific surveys for bats in the project area in 2001. Using a variety of methods, biologists documented the presence of four different species of bats that use project features to roost. None, however, were special-status bats (i.e., pallid bat, Townsend's big-eared bat, and western red bat).

Below, we provide additional information about the three special-status species. General information about their range, distribution in California, foraging or roosting patterns is based on species accounts presented in California's Wildlife, Volume III: Mammals (Zeiner et al., 1990), with updates from CDFG's Wildlife and Habitat Data Analysis Branch website (www.dfg.ca.gov/whdab/html/cawildlife.html). Site-specific information was obtained through field studies conducted in the project vicinity in 2001 by Garcia and Associates (PG&E, 2002a). Important roost sites for non-target species bats (where several hundred bats were observed at the locations) were documented at Belden dam, Caribou No. 1 powerhouse, Caribou No. 1 and No. 2 intake towers, Caribou No. 2 valve house, Butt Valley powerhouse, upper penstock portal, and Canyon dam and Butt Valley intake towers.

Pallid bat (*Antrozous pallidus*)—The pallid bat occurs throughout California. In central California, the pallid bat occurs in a variety of habitats, including oak woodland, ponderosa pine, and mixed conifer forest at elevations below 6,000 feet. The pallid bat uses rock outcrops, caves, tree hollows, and human-made structures as day-roosts. Night roosts may be located under bridges or in caves or mines, where temperatures do not exceed 40°C (104°F). During the 2001 surveys, biologists did not detect pallid bats using project facilities or other human-made structures at the 58 project survey stations.

Townsend's big-eared bat (*Corynorhinus townsendii*)—The Townsend's big-eared bat occurs throughout California, from low desert to mid-elevation forests. It relies on caves, mines, tunnels, or attics, where it roosts in clusters on open surfaces. While this species occasionally uses human-made structures that resemble caves, none of the powerhouses, dams, or associated project features provide suitable day roosting habitat. It is most readily detected by surveying potential roost sites, but is not easily captured or acoustically recorded. During the 2001 surveys, biologists did not detect Townsend's big-eared bats using project facilities or other human-made structures at the 58 project survey stations. However, probable evidence of its presence was documented in the Caribou Clubhouse at a single site, but this facility was never confirmed as an active roost site.

Western red bat (*Lasiurus blossevillii*)—The western red bat is found throughout California at low elevations. Most occurrences of breeding females are from low elevations along major drainages in the Central Valley, but males and non-reproductive females may use elevations up to about 8,000 feet. The western red bat uses tree foliage

for day-roosting and is strongly associated with riparian forest. During the 2001 acoustical surveys, biologists did not obtain any acoustic records of red bats, nor did they detect the bats using project facilities or other human-made structures.

3.3.3.2 Environmental Effects

Vegetation Management

Vegetation management at project facilities, including recreational sites, transmission line corridors, and access roads, has the potential to beneficially or adversely affect native plant communities, rare plants, and wildlife habitat. Vegetation management also may create conditions that decrease or increase the risk of establishment and spread of non-native plants and invasive weeds.

Recreational and other land use activities may adversely affect vegetation in the project area, as well. ORV traffic may cause erosion, soil compaction, and loss of vegetative cover. Vehicles, anglers, hikers, and even domestic pets can serve as vectors for the spread of weeds at both formal and dispersed recreational sites.

To address these concerns, PG&E proposes, in cooperation with interested parties, to design and implement a resource management plan that would benefit sensitive biological resources at the UNFFR Project. The plan would include measures to enhance and protect rare plants, wetlands, riparian communities, cultural resources, and sensitive wildlife habitats in the causeway area of Lake Almanor, from Last Chance campground south along the west shore of the lake to approximately the northern edge of the flood control channel south of the Chester airport. The plan would examine current land use and project-related effects and would provide enhancement opportunities to improve habitat suitability, grazing and land use practices, riparian zone revegetation, and weed control. In addition, PG&E proposes to include BMPs in the planning of all new construction activities within the project boundary to help prevent the introduction and spread of invasive weeds in the watershed.

The SA and FS final Section 4(e) condition no. 31 would require PG&E to develop a habitat enhancement plan within 1 year of license issuance. The plan would be developed in consultation with FS, FWS, CDFG, SWRCB, and Plumas County. This recommended plan would include the same enhancement measures proposed in PG&E's resource management plan discussed above. FS final Section 4(e) condition no. 5 specifies that PG&E would provide the FS with a minimum of 60 days to review and approve the plan before filing it with the Commission. According to the SA, the primary elements of the plan would include fencing and vehicle exclusion measures that would allow continued public foot access to the area. These measures would be implemented within 2 years of license issuance.

In addition to the habitat enhancement plan, the FS recommends that PG&E file an FS-approved visual management plan prior to conducting any ground-disturbing activity

on NFS lands within the project boundary, as specified in final Section 4(e) condition no. 40. PG&E, in its January 15, 2004, response to the FS Section 4(e) conditions, does not object to this recommendation. In addition, FS final Section 4(e) condition no. 41 specifies that PG&E develop a vegetation management plan that addresses the assessment and treatment of hazardous vegetative conditions that surround project facilities and may accelerate the spread of a wildfire onto NFS lands. FS final Section 4(e) condition no. 5 specifies that PG&E would provide the FS with a minimum of 60 days to review and approve the plan before filing it with the Commission.

Interior's 10(j) recommendation no. 7, included in its December 1, 2003, filing, called for PG&E to develop a comprehensive vegetation management plan to evaluate and implement actions to improve channel function during various flows, reduce the spread of exotic vegetation, and protect and monitor special-status species. Interior indicates that the plan should be developed in consultation with the FS, FWS, CDFG, and SWRCB within 6 months of license issuance. The plan and results of vegetation management activities and monitoring would be described in an annual report to be submitted to the agencies for review and comment before filing with the Commission for approval.

In its response to Interior, filed with the Commission on January 15, 2004, PG&E states that it disagrees with some of the measures included in Interior's recommended vegetation management plan, stating that there are too many highly involved tasks to be collectively included in the plan. However, some of Interior's recommended weed control measures would be addressed in the invasive weed management plan (discussed below) specified by the FS and agreed to by PG&E.

Currently, PG&E is engaged in a long-term riparian monitoring program and BMPs for prevention of the introduction and spread of noxious weeds immediately downstream of the UNFFR Project on the Feather River as part of the license requirements of the downstream Rock Creek-Cresta Project. PG&E does not expect to see substantial changes to the riparian vegetation resulting from proposed UNFFR Project instream flows and pulse flows and therefore does not agree that additional monitoring of riparian vegetation at the UNFFR Project is needed. PG&E is currently conducting annual noxious weed surveys and monitoring all known populations of noxious weeds at the downstream Rock Creek-Cresta Project. In addition, comprehensive project area surveys for noxious weeds are repeated at 3- to 5-year intervals to document any new populations and update the status of populations for which control measures were not initially recommended.

PG&E opposes Interior's recommendation to mechanically excavate riparian vegetation from banks and bars as a control method. PG&E indicates that such manipulation would compromise any attempts to monitor flow-related effects by altering baseline channel conditions or could lead to the further spread of noxious weeds, such as Himalayan blackberry, to other areas of the watershed.

PG&E also disagrees with the need to submit annual vegetation management activity and monitoring reports to the agencies, stating that quantifying and annually reporting the results of maintenance activities associated with routine vegetation management would be burdensome, costly, and unwarranted.

In its letter filed with the Commission on November 1, 2004, Interior expressed its concern that staff's recommended vegetation management plan did not include its pilot test for control of encroached vegetation. Interior recommends an additional test measure to control excess encroached vegetation for the purpose of enhancing riparian and riverine habitat. During the Section 10(j) teleconference on February 3, 2005, Interior proposed an approach to test vegetation management in the riparian corridor with a pilot plan to monitor four modest-size sites: two for invasive weeds/native replanting, and two specifically designed to create low velocity river edge habitat through such techniques as recontouring and/or vegetation thinning or removal. The FS offered to work with Interior to fully develop this proposal.

FS final Section 4(e) condition no. 44 specifies that PG&E annually review the current list of special-status plant and wildlife species (species that are listed as endangered or threatened by the federal government, species that are listed as sensitive by the FS, or species that occur on the watch lists for the Lassen and Plumas National Forests) that might occur within the UNFFR Project boundary in consultation with the FS. When a species is added to one or more of the lists, the FS specifies that PG&E, in consultation with the FS, would determine if the species or unsurveyed suitable habitat for the species is likely to occur within the UNFFR Project boundary. If the FS determines that a newly added species is likely to occur, the FS specifies that PG&E would develop and implement a study plan in consultation with the FS to reasonably assess the effects of the UNFFR Project on the species. The FS specifies that PG&E would prepare a report on the study including objectives; methods; results; recommended resource measures, where appropriate; and a schedule of implementation, and provide a draft of the final report to the FS for review and approval. The FS further specifies that PG&E would file the FS-approved report, including evidence of consultation, with the Commission and would implement those resource management measures required by the Commission.

In addition, the FS specifies that PG&E would resurvey areas within the UNFFR Project boundary that have suitable habitat or known occurrences of selected special-status wildlife or plant species every 10 years to (1) determine if special-status plant or wildlife species have changed in location (i.e., migrated into or moved within the project boundary) and (2) monitor for impacts caused by ongoing project activities. The FS specifies that PG&E would consult with the FS to determine which species need to be resurveyed. The FS specifies that the survey interval may be adjusted based on the amount of movement or impacts on the species that are observed. The FS specifies that PG&E would provide the FS with the survey results. If the FS determines that negative

impacts have occurred, the FS specifies that PG&E would submit a proposal to the FS for actions to reduce or eliminate impacts on special-status species. The FS specifies that PG&E would file the report, including evidence of consultation, with the Commission and would implement those resource management measures required by the FS and approved by the Commission.

FS final Section 4(e) condition no. 45 specifies that PG&E prepare a threatened, endangered, proposed for listing, and sensitive species protection plan to assess the potential effects on federally proposed or listed species or FS sensitive species, of any actions to construct (including, but not limited to, proposed recreational developments), operate, or maintain project facilities, and submit it to the FS for approval. This recommendation would cover plants, fish, and wildlife, and their habitats. FS final Section 4(e) condition no. 5 specifies that PG&E would provide the FS with a minimum of 60 days to review and approve the plan before filing it with the Commission.

FS final Section 4(e) condition no. 46 specifies that PG&E develop a plan to control and contain the spread of project-related invasive weeds on PG&E and NFS lands, which might be related to project activities. The invasive weed management plan would be approved by the FS and filed with the Commission within 1 year of license issuance. FS final Section 4(e) condition no. 5 specifies that PG&E would provide the FS with a minimum of 60 days to review and approve the plan before filing it with the Commission. PG&E has agreed to address control of existing known populations of weeds as well as ensure that BMPs would be followed during all ground-disturbing activities for the prevention of new invasive weed infestations.

Our Analysis

Vegetation management encompasses a wide variety of activities, such as roadside mowing, weed control, and revegetation of eroding soils. Vegetation management can have adverse or beneficial effects, or both, on natural resources, cultural values, recreation, aesthetics, health and safety, and socioeconomics. Field surveys have identified numerous sensitive plant populations throughout the project area. In addition, numerous populations of noxious and invasive plants have been documented. For this reason, consultation with the FS, FWS, CDFG, and California Department of Parks and Recreation (CDPR) to develop and implement a plan that would include measures to enhance and protect rare plants, wetlands, riparian communities, and sensitive wildlife habitats is reasonable. In the following section, we address development of a vegetation management plan, and focus on two aspects of vegetation management having to do with terrestrial resources: protection of special-status plants and control of noxious and invasive weeds. Vegetation management at recreational sites is addressed in section 3.3.5, *Recreational Resources*.

Protection of Special-Status Plants

During field surveys in spring and summer of 2000, biologists documented the occurrence of 12 special-status plants (GANDA, 2000). Most of these plants were found well above the high water mark, and are not threatened by project flow regimes or reservoir water level management. Although no federal- or state-listed plant species were found within the project area, special-status plants were found in the Last Chance Marsh area and could be influenced by widely fluctuating water levels. A few species could also potentially be threatened by noxious and invasive weed populations that are in proximity and share the same habitat, such as Geyer's sedge and Klamathweed found in a recently logged area. Since these are sites that could be affected by the spread of noxious and invasive weeds or a variety of vegetation management activities (e.g., brushing, mowing, herbicide application, replanting projects), recreation-related activities (e.g., camping, wood-cutting, ORV use), and other ground disturbances, we conclude that consultation with the FS, FWS, and CNPS to identify any measures that may be needed to protect these species is appropriate. Presently, PG&E maintains a project GIS data base that allows PG&E to map and track occurrences of special-status plants and animals in order to assist in evaluating plans for management, siting for new recreational facilities, and considering other activities that would cause ground disturbance or habitat alteration. Revisiting the database on an annual basis to assess the current status of special-status plant and wildlife species would ensure that it remains current and any special needs are addressed appropriately. With appropriate measures in place, relicensing the project should not adversely affect special-status plants.

The SA measure to design and implement a wildlife habitat enhancement plan, to be developed in consultation with the FS, FWS, CDFG, SWRCB, and Plumas County, would benefit sensitive biological resources at the UNFFR Project. Such a plan should include measures to enhance and protect rare plants, wetlands, riparian communities, cultural resources, and sensitive wildlife habitats, including fencing and vehicle exclusion measures. Any plan should also examine current land use and project-related effects and provide enhancement opportunities to improve habitat suitability; grazing and land use practices, riparian zone revegetation, and weed control. Implementation of this plan would provide a reasonable level of protection to sensitive resources in the project area.

Measures that would be included in the FS-specified threatened, endangered, proposed for listing and sensitive species protection plan would serve to protect federally listed or FS sensitive species from potential effects associated with project-related site-specific construction, operation, and maintenance activities. Having a plan in place that includes consultation would protect sensitive vegetation (as well as fish and wildlife) and should enable such activities to comply with the Northwest Forest Plan, current FS direction, and the two applicable forest land and resource management plans. However, the measures that are likely to be specified in this plan should be closely coordinated with measures specified in a wildlife habitat enhancement plan, discussed in the previous

paragraph. Additionally, this plan could include measures addressing an annual review of the current list of special-status plant species (species that are listed as endangered or threatened by the federal government, species that are listed as sensitive by the FS, or species that occur on the watch lists for the Lassen and Plumas National Forests) that might occur within the UNFFR Project boundary as specified in FS Section 4(e) condition no. 44. Additionally, the plan also could include provisions for resurveying those areas within the UNFFR Project boundary that have suitable habitat or known occurrences of selected special-status plant species every 10 years and addressing any negative impacts that may have occurred as a result of project operations.

Because development of such a plan to manage wildlife habitat would require the same type of systematic, cooperative approach that would be needed for development of a plan to manage and protect threatened, endangered, proposed for listing, and sensitive species and would involve consultation with the same resource agencies, landowners, and other interested parties, consideration should be given to combining the two plans into a single habitat enhancement and protection plan. A separate section within the plan could address protective measures for FS-sensitive or special interest plant species. Incorporating the threatened, endangered, proposed for listing, and sensitive species protection plan as one element of wildlife habitat enhancement plan would prove more practical and cost effective than development of a separate plan.

Control of Noxious and Invasive Weeds

Noxious weeds are a growing threat to California's environment, because of their potential to degrade native plant communities, outcompete rare species, and reduce wildlife habitat values. Both federal and state laws require landowners to manage noxious weeds within their ownerships. Currently, the species of greatest concern are spotted knapweed, identified as a CalEPPC "red alert" species and designated as a Class A weed by CDFA; and Himalayan blackberry, identified as a CalEPPC Class A-1 species.

Successful weed control requires a cooperative effort by all landowners and land managers in the vicinity, since untreated weeds on adjacent lands provide a ready seed source for infestation by new species and re-infestation after treatment of existing problem weeds. Development of an invasive weed management plan as part of the vegetation management plan would facilitate an integrated approach to control effects, and is appropriate for all project lands. Implementation of weed control measures on its adjacent non-project lands would help reduce the risk of spread of weed infestations.

The FS specifies detailed identification, control, and monitoring measures for invasive weed management in its final Section 4(e) condition no. 46. As such, any invasive weed management plan should, *at a minimum*, include: (1) periodic inventory and mapping of existing and new populations of invasive weeds; (2) actions/strategies to prevent and control the spread of known populations or introductions of new populations;

(3) treatment of all new infestations (any class) and existing infestations of California class A and B rated weeds; (4) and monitoring of known populations of noxious weeds to evaluate the effectiveness of revegetation and noxious weed control measures and BMPs. Eradication may be attainable for species that are currently limited in distribution, but attempts to eradicate species that are already well-established and widespread, such as Himalayan blackberry, would not be likely to succeed, except at unacceptably high cost to other resource values.

Noxious and invasive weeds can interfere or degrade ecological function of native species or impair recreational experiences. As such, noxious and invasive weed monitoring could be included as an element within other plans that could entail monitoring for erosion, such as the erosion and sedimentation control plan and the spoil pile management plan (both discussed in section 3.3.1, *Water Resources*), the recreation management plan (discussed in section 3.3.5, *Recreational Resources*), and the road and facilities management plan (discussed in section 3.3.6, *Land Use and Aesthetic Resources*).

Effects of Flow Releases on Riparian Habitat

The UNFFR Project contains abundant riverine and lacustrine open water wetlands associated with the NFFR, its tributary streams, and the project reservoirs. Riparian habitat in the project area occurs in narrow bands along the shorelines of project reservoirs and waterways. Under the current flow regime, riparian vegetation is encroaching into the active stream channel onto formally active gravel bar, floodplain, and bank surfaces. Higher stem densities may reduce water velocities, allowing increased sediment deposition and further encroachment of vegetation.

Measures in the SA are intended to improve riparian habitat by providing flows that would remove vegetation that has encroached into the active channel, while promoting the establishment of vegetation on gravel bars, floodplains, and terraces. To accomplish these objectives, the SA calls for increasing minimum instream flows and shaping them seasonally. The SA's proposed flow regime is described in detail in section 3.3.2, *Aquatic Resources*.

The FS and Interior recommend PG&E develop an adaptive management plan to evaluate the degree of success associated with the various flow improvements. As part of this plan, PG&E would need to evaluate the response of riparian vegetation and aquatic species to changes in the flow regime and recreational use and activity.

Interior further recommends, for the conservation and development of fish and wildlife resources, within 6 months of license issuance, PG&E develop in consultation with FWS, NPS, the FS, CDFG, and SWRCB, a recreational activities monitoring plan. The purpose of the plan would be to monitor the potential effects of recreational activities on fish and wildlife resources. Elements of the plan would include a comparison of data

on recreational activities use, distribution, and expanded fisheries and raptor monitoring data. In addition, the plan would include elements to assess the effects of recreational use and facility development on local vegetation resources.

PG&E states that a similar draft RRMP, already been developed for the license, contains a monitoring program and resource integration and coordination program that addresses Interior's concerns. As part of the monitoring program, PG&E would monitor recreation activities and distribution on project lands and waters over the license period. This monitoring effort would include monitoring ecological capacity indicators such as site size, litter and debris, sanitation, erosion, vegetation damage, proximity to wetlands, and proximity to riparian vegetation, at developed and dispersed recreation sites. Additionally, if recreational river flows are provided on the Belden reach, as part of the SA, PG&E would monitor the amount of recreational boating use and impacts on other recreation and natural riverine resources. Furthermore, PG&E would conduct consultation and coordination meetings, at least annually, with the resource agencies and other stakeholders to discuss recreation monitoring results and other inter-related resource issues as part of the RRMP resource integration and coordination program.

Our Analysis

Proposed and recommended recreation flows may indirectly promote or affect riparian vegetation in the project bypassed reaches. Recreational use monitoring, as recommended by Interior, would be a means for evaluating the effects of proposed flows and associated recreational use on biological resources within the project area. A plan for avoiding or minimizing the biological effects of current and proposed project recreational facilities and related activities would provide a reasonable level of protection to biological resources in the project area. A more detailed discussion of recreation monitoring plans can be found in section 3.3.5, *Recreational Resources*.

Bypassed reach flows proposed in the SA more accurately mimic the natural hydrograph in seasonality by allowing for larger flows in the spring and lesser flows in the summer and fall. The increases in flows that are proposed in the UNFFR reaches would likely result in small changes in the amount of riparian vegetation growing along the river margins. Under the current flow regime, riparian vegetation is encroaching into the active stream channel onto formally active gravel bar, floodplain, and bank surfaces. Higher stem densities may reduce water velocities, allowing increased sediment deposition and further encroachment of vegetation.

Proposed flows would increase water velocities, decrease sediment deposition, and reduce further encroachment of vegetation in the stream channel while promoting the establishment of beneficial vegetation on gravel bars, floodplains, and terraces. The amount of vegetation that would become established would likely vary from site to site along the affected stream reaches, depending on factors such as aspect, slope, width of the floodplain, substrate, stream gradient, and existing plant community, in addition to

flow volumes. However, as the areas of new riparian vegetation become established, the existing vegetation could be lost as higher flows inundate the habitat. The final proposed flow regime is described in detail in section 3.3.2, *Aquatic Resources*.

Higher minimum instream flows than are currently provided to project-affected reaches would have both positive and negative effects on riparian habitat. We agree that flows proposed in the SA that more closely mimic the natural hydrograph would promote more active riverine processes in terms of surface water and groundwater interactions, instream habitat complexity, and primary productivity. We also note that existing riparian vegetation supports unique plant communities and provides important habitat for wildlife.

Riparian vegetation occupies a very small proportion of the landscape, and the loss of this habitat type as a result of increased flows in the UNFFR reaches could adversely affect amphibians, reptiles, songbirds, small mammals, and aquatic furbearers that depend on riparian plant communities for foraging, hiding, nesting, or denning. Loss of riparian vegetation could also reduce bank stability and increase the risk of establishment and spread of noxious and invasive weed populations on exposed soils. Riparian vegetation established as a result of the new higher flows would ultimately replace these functions and values. In considering these positive and negative effects, we conclude that long-term benefits of higher instream flows are likely to outweigh the adverse effects of short-term habitat loss and alteration. Additionally, monitoring the response of riparian vegetation to the flow regime specified in any license issued for this project, would ensure that sufficient re-establishment of riparian vegetation consistent with the new flow regime occurs to support the dependent beneficial aspects of the aquatic and wildlife communities.

Effects of Flows on Special-status Amphibians and Reptiles

Declines in several native frog populations have been observed in California (Jennings, 1996). Reasons for decline may include habitat loss or alteration, disease, climate change, or a combination of these factors. Declines have been notable for the foothill yellow-legged frog, especially in the west slope drainages of the Sierra Nevada (Jennings, 1996). The FS maintains that habitat for the foothill yellow-legged frog has been lost as a result of reservoir inundation and lower stream flows. Additionally, the FS contends that habitat has been degraded by channel sediment, loss of edgewater habitat, and fragmentation of populations by dams and reservoirs. Changes in the flow regime in the project reaches (including increases in minimum flows, implementation of pulse flows, restricted ramping rates, and whitewater boating releases) may also affect aquatic and riparian habitat that currently supports potential habitat of FYLF and CRLF.

To evaluate project effects on special-status amphibians, FS final Section 4(e) condition no. 26 specifies that PG&E, within 1 year of license issuance, develop and implement an amphibian monitoring plan, concurrent with the Seneca, Butt Valley Creek,

and Belden reaches biological monitoring, in consultation with other agencies, that is approved by the FS, and filed with the Commission. FS final Section 4(e) condition no. 5 specifies that PG&E would provide the FS with a minimum of 60 days to review and approve the plan before filing it with the Commission.

Interior's 10(j) recommendation no. 12 calls for PG&E to develop an amphibian monitoring plan for the Belden and Seneca reaches in consultation with the FS, FWS, CDFG, and SWRCB. This plan would be filed with the Commission within 6 months of license issuance. The plan would evaluate possible changes in amphibian numbers and diversity in response to changes in instream flow, water temperature, or other actions associated with project operations and required license conditions. Amphibian surveys would be conducted upon license issuance and at 5 year intervals thereafter.

PG&E, in its responses to the FS and Interior (letters filed with the Commission on January 15, 2004), and in the SA, agreed to develop an amphibian monitoring plan. As described in the SA, the plan would be developed in consultation with the FWS, the FS, CDFG, and SWRCB, as part of the Seneca, Butt Creek, and Belden reaches biological monitoring plan. The amphibian monitoring plan would include targeted monitoring of FS sensitive and special-status amphibians, such as FYLF and CRLF, conducted at 3-year intervals beginning no later than 3 years following license issuance. If target amphibians are located in project reaches, focused annual monitoring of population health, life stages, reproductive success, and distribution would be required.

FS final Section 4(e) condition no. 44 specifies that PG&E annually review the current list of special-status plant and wildlife species (species that are listed as endangered or threatened by the federal government, species that are listed as sensitive by the FS, or species that occur on the watch lists for the Lassen and Plumas National Forests) that might occur within the UNFFR Project boundary in consultation with the FS. When a species is added to one or more of the lists, the FS specifies that PG&E, in consultation with the FS, would determine if the species or unsurveyed suitable habitat for the species is likely to occur within the UNFFR Project boundary. If the FS determines that a newly added species is likely to occur, the FS specifies that PG&E would develop and implement a study plan in consultation with the FS to reasonably assess the effects of the UNFFR Project on the species. The FS specifies that PG&E would prepare a report on the study including objectives; methods; results; recommended resource measures, where appropriate; and a schedule of implementation, and provide a draft of the final report to the FS for review and approval. The FS further specifies that PG&E would file the FS-approved report, including evidence of consultation, with the Commission and would implement those resource management measures required by the Commission.

In addition, the FS specifies that PG&E would resurvey areas within the UNFFR Project boundary that have suitable habitat or known occurrences of selected special-status wildlife or plant species every 10 years to (1) determine if special-status plant or

wildlife species have changed in location (i.e., migrated into or moved within the project boundary) and (2) monitor for impacts caused by ongoing project activities. The FS specifies that PG&E would consult with the FS to determine which species need to be resurveyed. The FS specifies that the survey interval may be adjusted based on the amount of movement or impacts on the species that are observed. The FS specifies that PG&E would provide the FS with the survey results. If the FS determines that negative impacts have occurred, the FS specifies that PG&E would submit a proposal to the FS for actions to reduce or eliminate impacts on special-status species. The FS specifies that PG&E would file the report, including evidence of consultation, with the Commission and would implement those resource management measures required by the FS and approved by the Commission.

Our Analysis

Although no special-status amphibian species were documented in the project area, certain reaches in the UNFFR may provide some potential habitat for special-status species such as FYLF and CRLF. Habitat requirements and effects of flow on the threatened CRLF are discussed in section 3.3.4, *Threatened and Endangered Species*. The effects of instream flow increases on a year-round basis on amphibian habitat in the Belden reach, for instance, are expected to be minimal at the proposed flow release level. In riverine environments, breeding habitat for the foothill yellow-legged frog typically consists of low-velocity, shallow water and rocky substrates, near sparsely vegetated gravel and cobble bars (Hayes and Jennings, 1988).

The recreational boating flow study (PG&E, 2002a) included an evaluation of the effects of potential recreational releases on amphibian habitat and found that, in the Seneca reach, a release of 250 cfs did not result in a substantial change in the overall quality at potential sensitive species habitat sites. At 400 cfs, however, the depth and velocity were substantially increased, resulting in decreased overall amphibian habitat quality. In the Belden reach, the 350 cfs release resulted in a slight decrease in the overall quality of habitat at potential sensitive species habitat sites with the exception of one site where habitat quality remained generally the same. At 600 and 850 cfs, the depth and velocity were substantially increased, resulting in decreased overall habitat quality.

Reducing rapid flow fluctuations, as proposed in the SA, would benefit potential foothill yellow-legged frogs, and other amphibian species, since abrupt changes in water velocity and water surface elevation have the potential to reduce the abundance of the aquatic invertebrate prey base, dislodge or desiccate egg masses, and impair the development of eggs and juveniles through changes in water temperature.

We anticipate that higher minimum flows and reduction of flow fluctuation as outlined in the SA would be adequate to maintain and possibly improve habitat for the foothill yellow-legged frog and other amphibian species, but conclude it would be

reasonable to monitor the effects of changes in the flow regime, including effects of minimum flows, pulse flows, ramping rates, and whitewater boating flows. Initial surveys would be used to evaluate population abundance, distribution, and habitat use following implementation of a new flow regime. An amphibian monitoring plan would serve as a means for detection of new species in the project area and serve as a basis for adaptive management. If previously unknown populations of federally listed or special-status species are discovered during the term of the license, the adaptive management plan should specify the process by which consultation with FWS and others would be initiated. A more detailed discussion of adaptive management can be found in section 3.3.2, *Aquatic Resources*.

If PG&E develops, in consultation with FWS, the FS, CDFG, and SWRCB, an amphibian monitoring plan for listed, sensitive, and special-status amphibian species in the Belden, Seneca, and Butt Creek bypassed reaches within 1 year of license issuance, the plan would serve to determine effects of the proposed changes in minimum flows, pulse flows, and other project operations on amphibian habitat. The first set of surveys are not needed until 5 years after license issuance, since extensive surveys in the project area were completed as part of project relicensing studies, and no sensitive amphibians were found. We expect that a new flow regime that may be included in a new license would enhance the quality of the habitat for amphibians, but it may take at least 5 years for populations to become established to the point where they are likely to be detected by monitoring. We conclude that the amphibian monitoring plan also should include provisions for annually reviewing the current list of special-status wildlife species (species that are listed as endangered or threatened by the federal government, species that are listed as sensitive by the FS, or species that occur on the watch lists for the Lassen and Plumas National Forests) that might occur within the UNFFR Project boundary and, if a species of amphibian or reptile is likely to occur within the project boundary, addressing that species in the amphibian monitoring plan to assess the effects of the UNFFR Project on the species. Additionally, the amphibian plan also should address the need to resurvey those areas within the UNFFR Project boundary that have suitable habitat or known occurrences of selected special-status amphibians or reptiles every 10 years and addressing any negative impacts that may have occurred as a result of project operations.

Effects on Special-status Birds and Mammals

Existing project facilities and on-going project operations have the potential to affect some special-status birds and mammals. Proposed changes (such as construction of new recreational facilities, increases in minimum flows, and vegetation management measures) could also affect special-status birds and mammals.

As discussed under the Vegetation Management subheading, PG&E proposes to develop and implement a resource management plan that would benefit sensitive

biological resources at the UNFFR Project. This plan would include measures to enhance and protect sensitive wildlife habitats.

Interior's 10(j) recommendation no. 18 calls for PG&E to also develop a plan for the annual monitoring of active peregrine falcon eyries and suitable nesting habitat in the project area. The plan would be developed in consultation with the FS, FWS, and CDFG upon issuance of a new license. Interior indicates that, if new eyries are identified during the monitoring efforts, consultation with the aforementioned agencies would be appropriate to determine if protective measures are necessary. The results of the monitoring would be submitted to the agencies for review and comment prior to being filed with the Commission.

PG&E agrees that some monitoring of existing and potential peregrine falcon nesting in the project area is appropriate and proposes to include this activity with monitoring required for the nesting bald eagle population, discussed in section 3.3.4, *Threatened and Endangered Species*.

Interior's 10(j) recommendation no. 21 called for PG&E to develop a wildlife monitoring plan. The plan would be developed in consultation with the FS, FWS, and CDFG within 6 months of license issuance and would evaluate changes in wildlife use in response to changes in flows, lake levels, implementation of the vegetation management plan, and other activities associated with project operations and required license conditions.

In its response to Interior, filed with the Commission on January 15, 2004, PG&E states that, although it believes there is a need for wildlife management at the UNFFR Project, Interior's recommended wildlife management plan lacks definition and clarity and is poorly focused on addressing any ongoing effects of the project on wildlife populations. PG&E indicates that any wildlife monitoring that is needed at the project should be specifically focused on identifiable project effects on specific special-status wildlife species (e.g., bald eagles), groups of species (e.g., waterfowl), or their habitat.

In its letter filed with the Commission on November 1, 2004, Interior revised its initial recommendation to wildlife monitoring focusing on changes in habitat types and avian surveys for PG&E-owned lands as specified by the FS in its preliminary Section 4(e) condition no. 37. During the Section 10(j) teleconference on February 3, 2005, Interior further refined its recommendation to a more focused request for wildlife studies specific to the causeway area (between Last Chance Creek Campground and the Chester Airport). Interior explained that this area is sensitive to water levels, and, under the new license, water levels would be slightly higher and less variable. The causeway area is important for wading birds and waterbirds, and Interior believes a focused study here would be appropriate. Interior pointed out that this area is approximately the same area specified by the FS in its final 4(e) recommendation no. 31: "lands owned by the licensee on the shoreline of Lake Almanor from Last Chance Campground westward to

approximately the northern edge of the flood control channel south of the Chester Airport."

The FS final Section 4(e) condition no. 31 specifies that PG&E develop a wildlife habitat enhancement plan within 1 year of the date of license issuance. Implementation of this plan would benefit sensitive biological resources at the UNFFR Project and would include measures to enhance and protect riparian communities and sensitive wildlife habitats. The plan would be developed in consultation with FS, FWS, CDFG and Plumas County.

FS final Section 4(e) condition no. 44 specifies that PG&E annually review the current list of special-status plant and wildlife species (species that are listed as endangered or threatened by the federal government, species that are listed as sensitive by the FS, or species that occur on the watch lists for the Lassen and Plumas National Forests) that might occur within the UNFFR Project boundary in consultation with the FS. When a species is added to one or more of the lists, the FS specifies that PG&E, in consultation with the FS, would determine if the species or unsurveyed suitable habitat for the species is likely to occur within the UNFFR Project boundary. If the FS determines that a newly added species is likely to occur, the FS specifies that PG&E would develop and implement a study plan in consultation with the FS to reasonably assess the effects of the UNFFR Project on the species. The FS specifies that PG&E would prepare a report on the study including objectives; methods; results; recommended resource measures, where appropriate; and a schedule of implementation, and provide a draft of the final report to the FS for review and approval. The FS further specifies that PG&E would file the FS-approved report, including evidence of consultation, with the Commission and would implement those resource management measures required by the Commission.

In addition, the FS specifies that PG&E would resurvey areas within the UNFFR Project boundary that have suitable habitat or known occurrences of selected special-status wildlife or plant species every 10 years to (1) determine if special-status plant or wildlife species have changed in location (i.e., migrated into or moved within the project boundary) and (2) monitor for impacts caused by ongoing project activities. The FS specifies that PG&E would consult with the FS to determine which species need to be resurveyed. The FS specifies that the survey interval may be adjusted based on the amount of movement or impacts on the species that are observed. The FS specifies that PG&E would provide the FS with the survey results. If the FS determines that negative impacts have occurred, the FS specifies that PG&E would submit a proposal to the FS for actions to reduce or eliminate impacts on special-status species. The FS specifies that PG&E would file the report, including evidence of consultation, with the Commission and would implement those resource management measures required by the FS and approved by the Commission.

On January 25, 2005, Interior filed a biological opinion with the Commission. Interior recommended that PG&E include Western and Clark's grebes (*Aechmophorus* grebe) conservation measures in the Wildlife Habitat Enhancement Plan as one of the conservation recommendations included in the biological opinion. Interior also recommended that PG&E incorporate management considerations outlined in the "Conservation Assessment and Management Plan for Breeding Western and Clark's Grebes in California" (Ivey, 2004) in its Wildlife Habitat Enhancement Plan.

No specific measures were proposed or recommended by any entity for forest carnivores such as California wolverine, Pacific fisher, pine marten, or Sierra Nevada red fox, or other mammals that may occur within the project boundary.

Our Analysis

We concur with Interior that some monitoring of existing and potential peregrine falcon nesting in the project area is appropriate because some project-related activities (e.g., construction, operation, maintenance, and recreational activities) have the potential to disturb peregrines during the breeding season. We conclude that such monitoring could be combined with monitoring of the nesting bald eagle population, discussed in section 3.3.4, *Threatened and Endangered Species*, and should be consistent with the strategy FWS outlines in its monitoring plan for the American Peregrine Falcon (FWS, 2003).

We did not concur with Interior's original recommendation for development of a wildlife management plan, as it was written. Hundreds of wildlife species may occur in the project area, but other than recommending special emphasis on special-status species, Interior did not identify which populations it believes PG&E should monitor or explain why monitoring is needed. However, during the Section 10(j) teleconference on February 3, 2005, Interior recommended wildlife studies specific to the causeway area (between Last Chance Creek Campground and the Chester Airport). Interior explained that this area is sensitive to water levels and, under the new license, water levels would be slightly higher and less variable. The causeway area is important for wading birds and waterbirds, and Interior believes a focused study here would be appropriate. We conclude that it would be beneficial to have a broader plan to guide the interpretation of monitoring results and consideration of potential effects on all resources, if any measures are adjusted via adaptive management, and agree that the wildlife habitat enhancement plan management plan should include the additional monitoring recommended by Interior.

Implementation of the FS recommendations for wildlife habitat enhancement for special-status species that may occur in the project area and that could be affected by the project should protect such species is appropriate. Because habitat protection and enhancement measures for wildlife, vegetation, and fish are frequently inter-related, including such measures in an overall natural resource management plan, as proposed by

PG&E, would facilitate coordination and cross-referencing of related measures. We conclude that any recommended enhancement and protection measures should be restricted to those species known to occur in the vicinity of the project. Suitable habitat for sensitive species of wildlife occurs in the vicinity of the project. We conclude that monitoring for the presence of those species with suitable habitat in the project should be included in a natural resource management plan, and if the presence of new sensitive species is established, consultation with FS, FWS, and CDFG should occur to determine the nature of any protective measures, if any are needed.

Western and Clark's grebes are covered under the Migratory Bird Treaty Act, which protects migratory birds and their nests. Western and Clark's grebes have previously nested on the northwest shore of Lake Almanor. Including these species in the wildlife habitat enhancement plan would possibly reduce nest mortality and disturbance, resulting in a beneficial effect on the population.

Relicensing the project as proposed would likely maintain habitat at current levels or close to current levels for all FS-selected wildlife MIS. These include mallard, osprey, pileated woodpecker, hairy woodpecker, deer, black bear, and gray squirrel.

Preferred habitat for forest carnivores such as California wolverine, Pacific fisher, pine marten, or Sierra Nevada red fox exists within the project area. However, the presence of roads, facilities, residential development, and recreation may limit habitat potential for these species.

3.3.3.3 Unavoidable Adverse Effects

None.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

Three federally threatened listed species of wildlife have been identified as potentially occurring within the project area: VELB (*Desmocerus californicus dimorphus*), CRLF (*Rana aurora daytoni*), and bald eagle (*Haliaeetus leucocephalus*) (letter from W.R. Taylor, Interior, to the Commission, dated December 1, 2003). FWS also indicated that the threatened slender Orcutt grass (*Orcuttia tenuis*) could also occur in the project area (letter from D.L. Harlow, FWS, to the Commission, dated June 19, 2003). However, relicensing studies indicate that there are no populations of, or suitable habitat for, this threatened grass within the UNFFR Project area (GANDA, 2000). For the purpose of consultation under the ESA, this EIS constitutes our Biological Assessment for these federally listed species. We describe each species' life history below.

Valley Elderberry Longhorn Beetle

The VELB was listed as a threatened species in 1980 (45 FR 52,803). The range of the VELB extends throughout California's Central Valley and associated foothills from generally below the 3,000-foot elevation contour on the east to the watershed boundary of the Central Valley on the west. The project features located upstream of the Belden forebay are above 3,000 feet in elevation (USGS datum), and features located below 3,000 feet include the Oak Flat and Belden powerhouses. The beetle relies entirely on its host plant, the elderberry (*Sambucus* spp.). Elderberry shrubs are a common component of riparian forests in the Central Valley, and optimal habitat is usually considered moist valley oak woodlands or hardwood stands with a large variety of species, such as cottonwood, sycamore, Oregon ash, or willow. The VELB is a wood-boring insect and lays its eggs in the stems of elderberry shrubs that are at least 1 inch in diameter at ground level. Frequently, there is no sign of the VELB except for the exit holes that the larvae create as they emerge just prior to the pupal stage. For this reason, surveys for the VELB focus on searching for elderberry shrubs.

We conducted a California Natural Diversity Database search, which indicated that to date there have been no recent documented occurrences of the VELB in the project area or in Plumas County (CDFG, 2002a). One potential host plant[27] was identified along Caribou Road south of Oak Flat powerhouse during 1999 surveys, but there was no indication of VELB presence. The project lies at the upper elevation limit of this species, and habitat suitability here is considered low. Surveys completed in 1998 for the downstream Rock Creek-Cresta Project and associated transmission lines identified a number of host plants in the vicinity of Camp Creek, north of Pulga (outside the UNFFR Project boundaries). These records are the only known records of VELB habitat in the project vicinity.

California Red-legged Frog

The CRLF is the only sensitive amphibian species federally listed as threatened within the project area. On March 13, 2001, the FWS formally designated critical habitat for this species. The NFFR and selected tributary drainages were included in critical habitat Unit 1 – North Fork Feather Unit. However, on June 8, 2001, a lawsuit challenging the designation was filed in the U.S. District Court for the District of Columbia, and on November 6, 2002, the court entered a consent decree remanding the designation to the FWS and vacating most of the 2001 designation. On April 13, 2004, the FWS proposed designating critical habitat for the CRLF identical to the configuration of the previously published final designation of critical habitat (which included the NFFR

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[27] PG&E uses the term "host plant" in its application, which we assume to mean an elderberry shrub that has stems at least 1 inch in diameter at ground level.

and selected tributary drainages). The FWS accepted comments on this proposal until July 14, 2004.

Critical habitat Unit 1, the North Fork Feather Unit, includes areas as far upstream as the Butt Creek confluence with the NFFR in the Seneca reach and the upper Mosquito Creek drainage east of Butt Valley reservoir (69 FR 19,619–19,642). Historically, CRLF populations were found at the western slope of the Sierra Nevada Mountains at elevations below 4,900 feet. The current range is greatly reduced, with a few, highly restricted populations in the Sierra Nevada, and most remaining populations occurring along the coast from Marin County to Ventura County.

The primary constituent elements of CRLF habitat include essential aquatic habitat, associated uplands, and dispersal habitat connecting essential aquatic habitat (66 FR 14,625–14,674). Breeding sites are varied, including marshes, springs, permanent and semipermanent natural ponds, ponded and backwater portions of streams, as well as artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds (66 FR 14,625–14,674). Dense, shrubby, or emergent riparian vegetation closely associated with deep (> 2.3 feet), still or slow-moving water is needed during the November to March breeding season for attachment of egg masses and escape cover (Hayes and Jennings, 1988). Rocks, boulders, small mammal burrows, organic litter such as downed trees or logs, and leaf litter within 300 feet of riparian areas provide estivation habitat and refugia at any time of the year (61 FR 25,813–25,833).

Potential habitat for CRLF was found in four locations during the 2001 herpetofauna surveys (Sites #3, #38, #45, and Lippy Lake) (GANDA, 2002). Sites #3, #38, and #45 represented good potential habitat, while Lippy Lake had a low habitat potential for CRLF. Sites #38, #45, and Lippy Lake contain trout, which limits the possibility they would successfully be used by CRLF. Site #3 is a small pond located along a small ephemeral drainage that flows northeast into Lake Almanor, near the access road into Butt Valley reservoir. This site does not appear to be hydraulically influenced by project flows. Site #38 is located on China Bar along the NFFR about 3 miles downstream of Seneca. Site #45 is located below the surge chamber for the Butt Valley Tunnel near the beginning of the penstock that feeds the Butt Valley powerhouse. Lippy Lake is adjacent to the NFFR at the old mining town of Seneca. The field surveys were conducted using FWS protocol (FWS, 1997) with one FWS pre-approved modification. No individuals were documented within the project area during the 2001 amphibian and aquatic reptile survey, the 2001 visual encounter survey, or the 2000 recreational boating flow study (PG&E, 2002a). The nearest known occurrence of CRLF to the UNFFR Project area is approximately 20 miles southwest of Belden powerhouse (GANDA, 2002).

Bald Eagle

In 1999, FWS proposed to remove the bald eagle from the list of threatened and endangered species, due to the success of recovery efforts throughout the United States (64 FR 36,453–36,464). Overall recovery goals for the bald eagle in the Pacific Region (which includes California) were met in 1990 and have been reached or exceeded in every year since. Goals for nest productivity and wintering population stability in the region also have been met or exceeded. Although the recovery goal of 800 breeding pairs has not yet been reached in California, the number of breeding pairs has increased dramatically. About 30 pairs were documented in 1977, whereas surveys in 1999 indicated the number had increased to over 150 (CDFG, 2002b). In addition to increasing in numbers, bald eagles are recolonizing their former range in California. In 1977, bald eagles were known to nest in 8 of the 58 counties in the state, and as of 1999, bald eagle nests were documented in 28 counties.

There are currently 14 known bald eagle nesting territories in the UNFFR Project vicinity: 9 at Lake Almanor, 3 at Butt Valley reservoir, and 2 at Mountain Meadows reservoir (table 3-25). Of these, 12 were confirmed active in 2001. However, no bald eagle nests are located within the project boundary. Between 1988 and 2001, PG&E's reports show the number of young per occupied territory averaged 1.0, and an average of about 61 percent of the occupied territories were successful each year (table 3-25).

In California, bald eagles forage primarily on fish (Jackman et al., 1999). Studies in the project area showed that bald eagles preyed primarily on carp, brown bullhead, and Sacramento sucker. Carp accounted for 82 percent of the prey biomass for eagles in the NFFR project area. Birds were found to account for 7.4 percent of the prey biomass.

In 1988, PG&E developed bald eagle management zones for the seven nesting territories occurring at that time. Nesting territory management plans with specific protection measures have been developed and would continue to be implemented for most of the existing active nest sites within the project area.

Table 3-25. Reproduction in 14 bald eagle nesting territories in the UNFFR Project vicinity, 1988-2001. (Source: PG&E, 2002a)

Nest Territory	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	1988-2001 (yng/ occ.yr.)
Butt Valley 1	ONS	NO	1	ONS	ONS	2	1	ONS	2	1	2	ONS	ONS	ONS	(0.7)
Cool Springs	2	ONS	NO	NO	1	2	2	ONS	2	ONS	ONS	ONS	ONS	ONS	(0.8)
Butt Valley 2	2	2	2	1	OSU	2	2	ONS	2	2	1	1	1	2	(1.5)
Rocky Point	ONS	ONS	ONS	SU	ONS	NO	ONS	ONS	ONS	1	2	1	1	2	(0.6)
Switchback										2	ONS	1	2	1	(1.2)
Rock Lake									ONS	1	1	2	1	1	(1.0)
Collins Pine South	SU	OSU	NO	1	2	SU	NO	2	2	2	2	2	ONS	1	(1.6)
Collins Pine North	ONS	ONS	NO	ONS	ONS	OSU	ONS	1	ONS	NO	ONS	2	ONS	NO	(0.3)
Chester (Church)								2	2	2	NO	1	2	1	(1.7)
Mud Creek Rim	SU	1	2	1	ONS	ONS	2	NO	ONS	2	1	1	1	2	(1.1)
Catfish Beach														ONS	(0.0)
Eastside											2	2	2	1	(1.8)
Mountain Meadows West	ONS	ONS	OSU	OSU	ONS	SU	SU	ONS	1	2	1	ONS	ONS	ONS	(0.4)
Mountain Meadows East	2	OSU	SU	NO	NO	SU	SU	NO	NC	ONS	NO	NO	NO	NO	(1.0)
No. Occupied Territories of Known Outcome	7	6	4	5	7	4	6	8	10	11	11	12	12	12	115
Total Young Produced	6	3	5	3	3	6	7	5	11	15	12	13	10	11	110

Nest Territory	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	1988-2001 (yng/ occ.yr.)
Young per Occupied Territory	0.9	0.5	1.3	0.6	0.4	1.5	1.2	0.6	1.1	1.4	1.1	1.1	0.8	0.9	1.0
No. of Successful Territories	3	2	3	3	2	3	4	3	6	9	8	9	7	8	70
% Successful Occupied Territories	43%	33%	75%	60%	29%	75%	67%	38%	60%	82%	73%	75%	58%	67%	61%

ONS – occupied, not successful
NO – not occupied
OSU – occupied, success unknown
SU – success unknown
NC – not checked

3.3.4.2 Environmental Effects

Valley Elderberry Longhorn Beetle

PG&E proposes no specific measures for protection of the VELB. Although the FS recommends no specific measures for protection of the VELB, it recommends development of protective measures in a land management and visual resource protection plan, as well as development of a vegetation management plan prior to ground-disturbing activities, as specified in final Section 4(e) condition nos. 40 and 41 (discussed in section 3.3.3, *Terrestrial Resources*). The FS recommends that PG&E perform necessary surveys prior to ground-disturbing activities in locations for which current information about population occurrence for some species is lacking (e.g., VELB). In final Section 4(e) condition no. 45, the FS specifies that PG&E prepare a biological evaluation (BE) in consultation with other appropriate agencies evaluating the potential impact of an action on any species listed or proposed for listing or any special-status species. The FS recommends that the BE should include: (1) developing procedures to minimize adverse effects on listed species; (2) ensuring that project-related activities meet restrictions included in site management plans for listed species; and (3) developing implementation and effectiveness monitoring of measures taken or employed to reduce effects on listed species.

Interior, in its December 1, 2003, filing with the Commission, makes a 10(j) recommendation that PG&E develop and implement a vegetation management plan that incorporates FWS' July 9, 1999, Conservation Guidelines for the Valley Elderberry Longhorn Beetle (FWS, 1999). As part of this plan, PG&E would detail the types and schedules of planned road and project-related maintenance activities that may affect vegetation resources, develop survey methods for the protection of listed species, and develop contingency measures to avoid and minimize effects on special-status species. The plan would provide environmental awareness training for employees and contractors conducting work in sensitive areas.

PG&E, in its response to Interior's December 1, 2003, 10(j) recommendation, states that it maintains a geographic information system that contains the known locations of sensitive plant and animal resources and PG&E employees are already required to take annual training on environmental laws and protection of sensitive species and habitats. PG&E feels that these measures, along with pre-activity surveys prior to construction of all new project features (e.g., recreation facilities), are adequate to provide a reasonable level of protection to sensitive species in the project area.

Additionally, PG&E states that Interior's reference to the FWS conservation guidelines is not relevant because PG&E is currently operating under an incidental take statement issued by FWS on June 27, 2003, for VELB throughout PG&E's service territory. The incidental take statement already provides for mitigation and monitoring related to O&M that could affect the VELB. PG&E feels that it is not necessary or

appropriate for the Commission to consult with FWS regarding the VELB in the relicensing proceeding, nor is it appropriate for FWS to impose conditions that differ from those set forth in the June 27, 2003, incidental take statement.

Interior, in its biological opinion filed with the Commission by letter dated January 25, 2005, pursuant to Section 7 of the ESA, states that PG&E previously consulted with FWS for routine operations and maintenance activities that occur on all PG&E lands within the range of the beetle and that the incidental take statement authorized take for a term of 30 years. As a result, Interior has determined that the project is not likely to adversely affect the VELB.

Our Analysis

Only one elderberry shrub that would be suitable as a VELB host plant was located in the project area, along Caribou Road, south of Oak Flat powerhouse, during the 1999 surveys, but there was no indication of VELB presence. We conclude that potential habitat for the VELB in the project area is extremely limited, and occurrences of this species are unlikely. A vegetation management plan that includes FWS Conservation Guidelines (FWS, 1999) and addresses PG&E's management of activities affecting vegetation, including maintenance, construction, or other ground-disturbing activities, with consideration for their potential to affect elderberry shrubs, would be protective of VELB habitat at sites within the project boundary that either contain elderberry shrubs, or may not have been previously surveyed (i.e., sites where recreation facilities would be constructed). Such a plan would be consistent with FS final Section 4(e) condition no. 45. Examples of project-related activities that could affect elderberry shrubs include: mowing, brushing, herbicide application, culvert replacement, and other road repairs; ground-clearing needed to improve or expand recreation sites; and thinning or burning for fire fuels management.

FWS (1999) specifies that complete avoidance is required to assume no adverse effects would occur. Complete avoidance is defined as protection of a 100-foot (or wider) buffer around elderberry plants containing stems measuring 1.0 inch or more in diameter at ground level. Based on available information, such a buffer would only be necessary around a single plant. Pre-construction surveys to identify the presence of previously unknown potential host plants or verify the absence of such plants, and PG&E's continuing to provide training and education for maintenance crews, would ensure that incidental observations of potential habitat for the VELB can be reported and appropriate actions can be taken that would provide additional protection to the VELB, if needed. To the extent that the existing incidental take statement measures, which have not been filed with the Commission, address provisions of a vegetation management plan, they can be incorporated into such a plan.

Our determinations regarding the three federally listed species that may occur in the vicinity of the project, including the VELB, are specified in section 5.5.4, *Endangered Species Act*.

California Red-legged Frog

Although PG&E proposes no specific measures for the protection of the CRLF, the SA proposes an amphibian monitoring plan for FS sensitive species. The plan would include sampling within the Seneca, Butt Creek, and Belden bypassed reaches to be conducted at 3-year intervals beginning no later than 3 years following license issuance. If target amphibians are located in project reaches, focused annual monitoring of population size, health, life stages, reproductive success, and distribution would be required.

Neither the FS nor Interior recommend specific measures for the protection of the CRLF, however, they both recommend amphibian monitoring plans. Although one of the amphibians for which presence would be monitored would be the CRLF, we discuss the amphibian monitoring plan in section 3.3.3, *Terrestrial Resources*.

Interior, in its biological opinion filed with the Commission by letter dated January 25, 2005, pursuant to Section 7 of the ESA, states that the project is not likely to adversely affect the CRLF because surveys were conducted in suitable habitat and no CRLFs were detected, and the PG&E-proposed amphibian monitoring plan would include continuing surveys for the CRLF.

Our Analysis

Although suitable habitat exists for the CRLF at the downstream end of the project, no individuals were documented within the project area during the 2001 amphibian and aquatic reptile survey, the 2001 visual encounter survey, or the 2000 recreational boating flow study (PG&E, 2002a). Bypassed reach flows proposed in the SA more accurately mimic the natural hydrograph in seasonality, and magnitude, by allowing for larger flows in the spring and lesser flows in the summer and fall, and higher base flows throughout the year. Additionally, pulse flows proposed in the SA would be released in January, February, and March depending on the water year type (wet, normal, dry, critically dry), potentially flooding some additional pools. However, because the CRLF requires deep (> 2.3 feet), still or slow-moving water for attachment of egg masses and escape cover during the November to March breeding season (Hayes and Jennings, 1988), these flows may not increase the availability of appropriate habitat for the CRLF at the appropriate time of year, and may negatively affect the quality of the habitat by increasing velocity in the pools.

The recreational boating flow study (PG&E, 2002a) studied the effects of the recreational releases on amphibian habitat. Lippy Lake was the only potential CRLF site studied. The 250-cfs release did not result in a substantial change in the overall quality of

habitat at the Lippy Lake site. At 400 cfs, however, the depth and velocity were substantially increased, resulting in decreased overall habitat quality. Site #3 does not appear to be directly hydraulically connected to the project waters, so we assume that a change in project operations would not affect its potential as CRLF habitat. Site #38 has not been studied to determine how they would be affected by recreational releases. Site #45 would not be affected by recreational flow releases. No potential CRLF habitat sites were identified in the Belden reach. However, potential habitat was only assessed under the existing flow regime. Under a new flow regime that would be specified in any license that may be issued for this project, potential CRLF habitat may develop in alternative and additional locations, especially following the adjustment of riparian vegetation to the new flow regime (which could take up to 10 years for shrubs).

The development of an amphibian monitoring plan to determine what effects the proposed changes in minimum flows, pulse flows, and other project operations have on amphibian, including CRLF, habitat in the Belden and Seneca reaches, as discussed in section 3.3.3, *Terrestrial Resources*, would ensure long-term protection for the CRLF. The surveys included in any plan should be designed to detect the presence of the CRLF and determine how potential CRLF habitat is affected by the proposed changes in project operations. However, based on our review of PG&E's survey results, potential CRLF habitat that could be influenced by changes in the project flow regime is limited (Lippy Lake and Site #38). Consequently, we conclude that specific sites to be monitored for CRLF presence should be identified in any amphibian monitoring plan that may be developed, along with the rationale for monitoring the identified sites. Additional sites may need to be monitored besides the sites that represent potential habitat under the existing flow regime, and provisions for doing so should be included in an amphibian monitoring plan as well as how the influence of the new flow regime on this habitat would be addressed.

Bald Eagle

PG&E has previously established bald eagle protection policies and management zones in the UNFFR Project vicinity for all nest sites occurring at that time (1988). These management zones provide up to a 0.5-mile buffer zone around existing nesting trees, less if sheltered by topography, to protect the nest from human disturbance and development, and to provide suitable habitat for future nesting opportunities.

Based upon its 1988 findings, PG&E proposes the following management recommendations for each bald eagle nesting territory currently found in the project vicinity:

1. Limit habitat alterations within the management zone to those that would enhance bald eagle nesting habitat and pose no hazard to eagles. For example, silvicultural practices that encourage long-term regeneration of large pines and reduction of fuel loading where necessary.

2. Between January 1 and July 31 of each year, no compatible habitat alterations would be allowed within a management zone with the exception of emergencies. If a nesting attempt fails during a certain year, this restriction may be eased at the approval of the land or wildlife manager.

3. Discourage new recreational developments or policy changes that would alter the current use of the nesting area by public users and prohibit new permanent access roads within a management zone.

4. Schedule non-emergency maintenance of power lines, such as vegetation removal or trimming operations, outside of the bald eagle nesting season.

5. Managers should consider the effects of any proposed alterations to the operation or configuration of existing water facilities on the abundance of bald eagle prey species and availability of eagle foraging habitats at Lake Almanor, Butt Valley reservoir, and Mountain Meadow reservoir.

None of the bald eagle nests in the project vicinity are located on project lands or PG&E-owned lands. The lands within the 0.5-mile buffer zone around each nest are primarily owned by United States (and managed by the FS), PG&E, and private timber companies.

FS final Section 4(e) condition no. 47 specifies that PG&E develop a new bald eagle management plan for the project area within 2 years of license issuance. The plan would be developed in consultation with the FS, and other appropriate agencies; consultation would be initiated within 90 days of license issuance. The FS indicates that this bald eagle management plan would assist in the ongoing bald eagle recovery efforts and would be a tool for future management of all lands around these projects. At a minimum, the FS believes the plan should include: (1) periodic monitoring of human use patterns to discern human/bald eagle interaction conflicts; (2) annual monitoring of bald eagle reproduction around Lake Almanor; (3) coordination of any plans for timber harvest or mining on PG&E lands within the project boundary with the FS and other appropriate agencies to reach the goals and requirements of this plan; and (4) coordination of woodcutting activities on PG&E lands. FS final Section 4(e) condition no. 5 specifies that PG&E would provide the FS with a minimum of 60 days to review and approve the plan before filing it with the Commission.

Because changes in project operations, management, and visitor use are proposed by PG&E, Interior feels that disturbance from these activities may adversely affect bald eagle productivity and survival (letter filed December 1, 2003). Although the eagles are currently doing well in the project vicinity with the current level of human interaction, the tolerance threshold is unknown. Interior makes a 10(j) recommendation that PG&E should develop an interagency bald eagle management plan within 6 months of license issuance in consultation with FWS, the FS, and CDFG. Interior states that this plan should address land and resource management strategies to promote the conservation and

recovery of bald eagles associated with Butt Valley reservoir, Mountain Meadows reservoir, and other project lands and waters.

Interior states that the interagency bald eagle management plan should identify steps to minimize eagle disturbance and ensure that proposed changes in project operations, management, and visitor use does not impair bald eagle productivity and survival. Interior feels this plan is necessary because the FS's September 2003 "Bald Eagle Management Plan, Lake Almanor and the Upper Feather River, Recovery Zone 26, Lake Almanor Basin Area" only applies to FS lands in the Lake Almanor area. Interior feels that the interagency bald eagle management plan would address management of recreation, timber harvesting, housing development, and fisheries management on project lands and waters and other private lands in the basin.

Interior also makes a 10(j) recommendation that PG&E conduct bald eagle monitoring in order to ensure that sufficient and effective protection measures are in place. Interior recommends the development of a bald eagle monitoring plan, within 180 days of license issuance, in consultation with FWS, the FS, and CDFG. Interior states that this plan should include annual bald eagle surveys on project and waters, monitoring bald eagle reproductive success, eagle distribution and abundance, and human use to evaluate eagle/human interactions. Interior adds that these annual surveys should be conducted according to protocols acceptable to the consulting agencies and submitted to the agencies for review and comment prior to being filed with the Commission.

The biological opinion filed by Interior with the Commission on January 25, 2005, finds that relicensing the project would not be likely to jeopardize the continued existence of the bald eagle, and no critical habitat would be adversely modified or destroyed. However, Interior also states that the proposed project could cause the incidental injury or death of one bald eagle while foraging or perching in the area at some time during the term of any new license issued. The biological opinion requires the Commission to implement the project description as described in the draft EIS and final FS Section 4(e) conditions and requires that any new buyers of any lands in the project area previously owned by PG&E must abide by the same terms and conditions as the licensee, report the finding of any listed species not addressed in the biological opinion or unanticipated harm to the bald eagle, and report compliance on an annual or quarterly basis.

The biological opinion also contains two conservation recommendations. These recommendations state that PG&E should continue to assist FWS in recovery efforts for the bald eagle and include *Aechmophorus* grebe conservation measures in the wildlife habitat enhancement plan.

PG&E, in its responses to the FS Section 4(e) conditions and Interior's 10(j) recommendations (letters filed with the Commission on January 15, 2004), agrees with the need to develop an interagency bald eagle management plan in the project area. PG&E would cooperate with FWS, the FS, and CDFG to incorporate project-related

activities into the existing FS September 2003 Bald Eagle Management Plan for Lake Almanor. PG&E believes the 2-year schedule recommended by the FS is more reasonable than the 6-month schedule recommended by Interior due to the magnitude and complexity of this plan. PG&E agrees that initial consultation regarding this plan with the appropriate agencies could occur more quickly, as the FS recommends. PG&E also feels that the monitoring requirement detailed in Interior 10(j) recommendation no. 17 should be included with the management plan and developed in cooperation with the participating agencies.

Our Analysis

Since 1995, five new bald eagle breeding territories have been established in the project vicinity for a total of 14. Overall productivity of the nests in the project vicinity (1.0 young per occupied territory) was at or near the statewide averages of 1 young per occupied territory from 1988 to 2001. The FWS bald eagle recovery plan (1986, as cited in the letter from Interior filed with the Commission on December 1, 2003) specifies a goal of 16 occupied territories for the project vicinity. Based upon this information, the bald eagle population in the project vicinity appears to be doing well under existing operating conditions. However, several changes in operating conditions and facilities are proposed in the SA, including those that are designed to enhance recreation opportunities and experiences.

Fish make up the vast majority of the bald eagles' diet in the project vicinity. Studies in the project area showed that bald eagles preyed on carp, brown bullhead, and Sacramento sucker. Carp accounted for 82 percent of the prey biomass for eagles in the NFFR project area. For this reason, proposed changes in reservoir operation or the flow regime (including implementation of higher minimum flows, pulse flows, more restrictive ramping rates, and recreation releases) that affect fish populations or foraging conditions would have the potential to affect bald eagles.

The proposed raising of lake levels during the late spring/summer period over existing conditions would provide for increases in the available habitat for spawning centrarchids, such as smallmouth bass, largemouth bass, and Sacramento perch. Carp have a propensity to flourish in most lakes and reservoirs where they have been introduced, regardless of the water level management regime that is in place. This often results in carp populations reaching nuisance proportions, which may serve to detract from the native fish populations and associated fisheries, but should continue to provide an abundant prey source for bald eagles. Although few carp would be expected to occur in the bypassed reaches, most operating conditions (higher minimum flows, pulse flows and more restrictive ramping rates) proposed in the SA would generally enhance fish habitat for other potential fish prey species. In particular, Sacramento sucker populations in the bypassed reaches should increase, thus enhancing the prey base. Sacramento suckers are a common prey for eagles in California that reside near hydroelectric projects where carp have not yet been introduced (FERC, 2004).

Effects of implementing recreation flows, as PG&E proposes in the SA, would depend to a large extent on the timing (both time of day and time of year) of release flows. Restricting boaters to the 10:00 a.m. to 4:00 p.m. period of the day would help to avoid disturbance during prime foraging hours. Since bald eagles are thought to be less sensitive to disturbance after fledging is complete (WDFW, 2004), restricting the program to the months of August, September, and October would have a lower potential for harm than would be the case earlier in the season. Although, the timing of the proposed recreation flows would be dependent upon approval of the Recreation River Flow Technical Group (CDFG, SWRCB, FWS, NPS, Plumas County, and AW), the flows currently proposed include releases in July. These flows would be more likely to adversely affect the latter stages of bald eagle nesting.

The proposed recreational releases could have an adverse effect on aquatic resources. However, the adaptive approach to recreation river flow management, as outlined in the SA, should allow for the identification of any potential negative effects prior to the release of the test recreation flows. If negative effects are found after the release of test recreation flows, the adaptive approach should provide for the protection of aquatic resources. (Further discussion of the effects of proposed flows on fishery resources is contained in section 3.3.2, *Aquatic Resources*.) As a result, with implementation of the adaptive approach, the proposed operating conditions are unlikely to have a long-term adverse effect on bald eagle prey populations.

Bald eagles could also be affected by increases in recreational activities, because they are sensitive to disturbance. PG&E proposes a number of recreational enhancements and development throughout the project area. These include new campsites, access routes, boat launching facilities, trails, and parking areas, as well as improvements, relocations, and expansion of existing facilities. FS Section 4(e) condition 44 (filed with the Commission on December 1, 2003) also calls for similar recreational enhancements. Some of these recreation areas, such as Rocky Point and Almanor campgrounds, are in close proximity to bald eagle foraging areas. In these cases, the construction, maintenance, and use of the facilities could create human disturbance to eagles during the nesting season. The recommended recreation resource measures are discussed in more detail in section 3.3.5, *Recreational Resources*.

Recreational use which has the potential to disturb bald eagles is highest during the summer, when recreation use is at its highest. Boating, fishing, and hiking during spring and early summer months would coincide with the time of year when eagles are laying eggs and feeding young at the nest. Eagles may be slightly less sensitive to disturbance during June and early July than they are earlier in the nesting stage, but forage availability and undisturbed access to forage can strongly affect rearing success (Johnsgard, 1990).

Construction projects, including improvements to roads and existing facilities and development of new facilities, could probably be timed to occur outside the breeding

season to prevent disturbance to nesting birds, but several of these proposals have the potential to cause long-term disturbance to bald eagles. Special care would be needed to prevent adverse effects where proposed recreational sites overlap with areas that are known to provide important foraging opportunities for bald eagles (such as Rocky Point and Almanor campgrounds).

The bald eagle population in the project vicinity is currently being protected from recreational development by the existing PG&E bald eagle protection policies. The development of an interagency bald eagle management plan, as recommended by the FS and Interior, would address changes in project operations and recreational facilities and flows. This plan would appropriately identify possible adverse effects to bald eagles resulting from changes in project operations, facilities, and human disturbance resulting from recreation use and provide a mechanism to enforce protection measures. Compliance with the management measures specified in an interagency bald eagle management plan could be monitored by implementing a bald eagle management plan as described by the FS. An interagency bald eagle management plan would also facilitate assistance of the FWS in the implementation of recovery efforts of the FWS for the bald eagle, as specified in the conservation recommendations.

However, we conclude that some elements of the bald eagle management plans recommended by the FS and Interior are beyond the jurisdiction of the Commission. In order for the Commission to have jurisdiction, there must be a nexus of a measure to project purposes. The Commission would not be able to enforce measures that pertain to timber harvesting, mining, and housing development outside the project boundary, whether the land affected is owned by PG&E or private entities, unless a connection to project purposes is established. Because existing management practices are already in place on PG&E lands, and also because the FS has already developed a bald eagle management plan that PG&E can use as a guide, and PG&E has experience in developing such bald eagle management plans at some of its other hydroelectric projects (e.g., the Pit 3, 4, 5 Project [FERC No. 233]), we believe that this plan could be developed within less than 2 years of license issuance. However, consulting with many different entities to produce a plan poses significant time-related challenges, so we do not believe that development of the plan within 6 months of license issuance is realistic.

Condition 1.b of Interior's biological opinion would require any new owners of lands in the project area previously owned by PG&E, including holders of any conservation easements, to agree in writing to abide by the terms and conditions of the biological opinion. The Commission has the authority to enforce the terms and conditions of a license, including provisions of the biological opinion to the extent that those provisions would be included in a new license. If PG&E sells or transfers any project lands, it would not be relieved of complying with license conditions as long as those lands remain within the project boundary.

For land that would be removed from the project boundary, the Commission would consider the potential for adverse effects on project purposes, including protection of endangered species. The Commission, however, can neither impose nor enforce any conditions on that removal, including any covenants running with the land. To receive protection from incidental take of listed species, PG&E and perhaps any new landowners would have to comply with the provisions of the biological opinion.

3.3.4.3 Cumulative Effects on Bald Eagles

Construction of several dams downstream of the UNFFR Project, including the Big Bend dam (1908-1910), Cresta dam (1949), Rock Creek dam (1950), Poe dam (1957 – 1958), Oroville dam (1961-1968), and Thermalito diversion dam (1962-1967) blocked the upstream migration of anadromous fish that once may have provided a large, concentrated food resource for bald eagles. However, construction of the UNFFR Project and other reservoirs in the Feather River watershed has provided a stable and abundant warmwater prey base for the bald eagle, and regulated flows in the NFFR maintain foraging opportunities in smooth, shallow water. Modest increases in flows, such as those proposed in the SA, would be likely to maintain or increase the prey base, as well as foraging opportunities, and result in a cumulative benefit to the bald eagle.

3.3.4.4 Unavoidable Adverse Effects

None.

3.3.5 Recreational Resources

3.3.5.1 Affected Environment

The UNFFR Project is located in northeastern California in a sparsely populated area composed of forest and river canyon and valley landscapes. The project lies partially within and adjacent to the Lassen National Forest and the Plumas National Forest, which both provide a variety of formal and informal recreational facilities and opportunities; much of the NFS lands are open to the public for recreation. Chester, California, a full-service community with a year-round population of 2,316 (Census, 2000), is located at the northern end of the project area (see figure 1-1).

Because the project location is remote and there are no developed winter recreation facilities, recreation use at the UNFFR Project occurs primarily during summer months. During the summer recreation season, recreationists in the region participate in walking, hiking, motor boating, fishing, canoeing, watersports, bicycling, equestrian use, camping, picnicking, wildlife viewing, off-highway vehicle use, and whitewater boating. During the fall, hunters visit the area, and during the winter season, visitors participate in snowmobiling, cross-country skiing, snowshoeing, ice skating, and ice fishing. However, because winter use is minimal, PG&E has not studied winter recreation use.

Recreation opportunities at the UNFFR Project are varied, and recreationists can access different areas around the project for different experiences and activities. Recreationists who prefer opportunities with developed recreation facilities tend to visit Lake Almanor and Butt Valley reservoir.

Three reservoirs, Lake Almanor, Butt Valley reservoir, and Belden reservoir, are located within the project area. Lake Almanor, with a surface area of 27,000 acres and approximately 52 miles of shoreline, has abundant access in the form of state highways, FS and county roads, and many privately owned lands developed with homes and businesses. Lake Almanor provides a setting for local, community-based year-round recreation activities as well as seasonal tourist-based activities. Butt Valley reservoir, which is just under 5 miles long and almost a mile wide with a surface area of 1,600 acres, is surrounded by undeveloped NFS land, and is more remote with access by county and FS roads, some of which have a dirt or gravel surface. Belden reservoir, or forebay, is small with a surface area of 42 acres and a daily water surface elevation that can fluctuate between 5 and 10 feet, depending on power operations. There are no developed recreation facilities at the Belden reservoir.

Recreational Access and Facilities

Table 3-26 lists the developed recreation facilities for project reservoirs, and figure 3-15 shows their locations. In addition to the developed sites, PG&E documented a total of 25 dispersed recreation sites in the area of the project reservoirs: 22 sites at Lake Almanor and three sites at Butt Valley reservoir.

Lake Almanor Recreation Facilities

All public developed recreation facilities at Lake Almanor are owned and operated by either PG&E or the FS. Most of the FS facilities on Lake Almanor are on the Lassen National Forest. Facilities at the southeast end of Lake Almanor are on the Plumas National Forest.

FS Facilities—The Almanor Family Campground, which is located outside of the UNFFR Project boundary on the west shore of Lake Almanor, is owned by the FS. A concessionaire operates and maintains the campground for the FS under a special-use permit. The campground comprises two loops. The north loop has 49 campsites, each of which includes a picnic table and a fire ring/cooking grill; there are eight vault toilets in the north loop of the campground. The Lake Almanor Recreation Trail (LART) passes through the north loop of the campground and provides opportunities for walking, hiking, and bicycling. In addition there is an outdoor amphitheater that is shared with the south loop of the campground. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the north loop of the Almanor Family Campground are generally in good condition with the exception of the older toilets, which should be replaced. PG&E also determined that some of the picnic tables and the amphitheater are in need of some maintenance. Through its ADA-accessibility study,

Table 3-26. Public recreation sites on UNFFR Project reservoirs. (Source: PG&E, 2002a)

Facility	Lake Almanor	Butt Valley Reservoir
Boat Ramps/Lanes	Almanor boat launch (FS) Canyon dam boat launch and day-use area (FS)	Alder Creek day-use area and boat launch
Car-top Boat Access	None	None
Picnic Areas/Tables	Almanor picnic area (FS) Almanor scenic overlook Canyon dam boat launch and day-use area Canyon dam day-use area East shore day-use area	Alder Creek day-use area and boat launch
Angler Access Sites	Almanor boat launch (FS) Almanor beach (FS) Canyon dam boat launch and day-use area (FS) Canyon dam day-use area Dyer View day-use area East shore day-use area Rocky Point campground	Alder Creek day-use area and boat launch Cool Springs campground
Trailheads	Dyer View day-use area (FS) Lake Almanor recreation trail (FS)	
Campgrounds/Campsites or (Bunkhouses)	Rocky Point campground (Loops 1, 2, and 3) Camp Connery group camp Last Chance campground and group camp Almanor Family campground Almanor group campground	Cool Springs campground
Swimming Areas	Almanor beach (FS) Canyon dam day-use area Dyer View day-use area (FS) Rocky Point campground	Alder Creek day-use area and boat launch Cool Springs campground

Non-Internet Public

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

Page 3-202
Figure 3-15

PG&E determined that none of the campsites or water faucets at this facility are ADA-accessible. Each of the four toilet buildings has one accessible toilet, but they do not have accessible access routes or accessible trash receptacles.

The south loop of the Almanor Family Campground has 53 campsites, each with a picnic table and fire ring/cooking grill. Nine of the sites can be reserved, while the remaining 44 sites are available on a first-come, first-served basis. There are 12 vault toilets in the south loop of this facility. The LART is adjacent to the west side of the south loop of the campground and is available for walking, hiking, and bicycling. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the south loop of the campground are generally in good condition with the exception of the older toilets, which should be replaced. Through its ADA-accessibility study, PG&E determined that none of the campsites or water faucets in the south loop of this facility are ADA-accessible. Only one of the vault toilets is accessible and also has an accessible access route. The trash receptacles are an accessible type, but most do not have accessible access routes. The Almanor picnic area is located approximately 10 miles south of the town of Chester adjacent to SR 89 on NFS land outside of the UNFFR Project boundary. There are two vault toilets, a paved parking area, a picnic area with seven picnic tables and cooking grills, two interpretive signs, and an informational sign. This facility was constructed by and is operated and maintained by the FS. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor picnic area are generally in good condition with the exception of the picnic tables and cooking grills, which need some maintenance, and the water faucet and the water pump, which need to be repaired. Through its ADA-accessibility study, PG&E determined that the two vault toilets at this facility are new and ADA-accessible. None of the other elements at this facility are ADA-accessible.

The FS owns and operates a primitive group camping area located outside of the UNFFR Project boundary on NFS land adjacent to the Almanor picnic area known as the Almanor Group Campground. The site contains enough room for approximately 10 sites, each with a picnic table, and fire ring or cooking grill. There are no amenities at the site. Campers use the vault toilets at the adjacent rest area. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the Almanor Group Campground are generally in good condition with only the picnic tables and fire rings in need of maintenance. The FS plans to relocate the entire facility to a more suitable location away from the highway. Through its ADA-accessibility study, PG&E determined that none of the elements at this facility are ADA-accessible. Group campers may use the two ADA-accessible toilets at the Almanor picnic area.

An overflow camping area is also adjacent to the Almanor picnic area along State Route 89. The FS used to manage this area, which is outside of the UNFFR Project boundary, as overflow for RV and tent camping during peak usage in the Lake Almanor area. According to comments on the draft EIS filed by the FS on November 1, 2004, the

FS recently closed this area. There are no developed campsites. Previous users of the area constructed 40 fire rings and campers used the two ADA-accessible toilets in the nearby rest area. Through its ADA-accessibility study, PG&E determined that none of the elements at this facility were ADA-accessible.

The Dyer View day-use area is located on NFS land outside of the UNFFR Project boundary, along the west shore of Lake Almanor. The FS operates and maintains this facility which has paved parking, interpretive signs, benches, and a vault toilet. The site provides views of Mount Lassen to the north and Dyer Mountain to the south and functions as a trailhead for the LART and a shoreline beach. Through its recreation facility condition inventory, PG&E determined that all of the facilities at Dyer View day-use area are generally in good condition. Through its ADA-accessibility study, PG&E determined that the new vault toilet at this facility is fully accessible and the access route to the adjacent paved portion of the LART is also accessible. There are no accessible access routes between the parking area and the primary activity areas, or to the accessible trash receptacles. The benches located at this facility are also not ADA-accessible.

The Almanor boat launch is located outside of the UNFFR Project boundary on the west shore of Lake Almanor adjacent to Almanor campground north on NFS land. A concessionaire operates and maintains the facility for the FS under a special-use permit. The facility has two concrete boat launching lanes, a wooden courtesy dock, a large paved area with space for 53 vehicles and trailers, a flush restroom, a single vault toilet, and an accessible picnic table. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor boat launch are in good condition with the exception of the access road and the parking area, which are in need of repair; the ramp, which needs to be resurfaced; and the restroom and courtesy dock, both of which need to be replaced. Through its ADA-accessibility study, PG&E determined that there is an accessible restroom with four flush toilets at this facility and a new accessible vault toilet on the road leading to the boat launch. However, there are no accessible access routes from the parking area to the primary activity areas, or to the accessible trash receptacles. None of the other elements at this facility are ADA-accessible.

Almanor beach is located on the west shore of Lake Almanor adjacent to the Almanor boat launch on NFS lands. A concessionaire operates and maintains the facility for the FS under a special-use permit. The facility has seven picnic tables, cooking grills, a vault toilet, a flush restroom, and a large swimming beach with a buoy safety line. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor beach are generally in good condition with the exception of the vault toilet, which is in need of some maintenance, and the flush restroom, which is old and is not accessible. Through its ADA-accessibility study, PG&E determined there is one accessible picnic table available at this location; however, it is segregated from the rest of the facility. None of the remaining elements at this facility are ADA-accessible.

The Canyon dam boat launch/day-use area is located on the south end of Lake Almanor on NFS land. O&M of the facility is accomplished by a concessionaire under a special-use permit from the FS. The facility has two concrete boat launching lanes, five picnic tables with cooking grills, two vault toilets, one flush restroom, and a paved parking area with 13 single vehicle spaces and 51 vehicle with trailer spaces. The site also has a paved ADA accessible trail and fishing pier near the boat launch. Through its recreation facility condition inventory, PG&E determined that some of the facilities at the Canyon dam boat launch/day-use area are in good condition while others are in need of maintenance, including the beach area, the picnic tables, and the parking area. PG&E also determined that the large informational sign at the entrance is in disrepair and should be repaired or replaced. Through its ADA-accessibility study, PG&E determined that the new shoreline fishing station is accessible and meets ADA guidelines and there is one accessible flush restroom. There are three accessible parking spaces provided at this facility but there are no accessible access routes to the picnic tables, barbecues, or the accessible trash receptacles. The water faucets and picnic tables at this facility are not ADA accessible.

The FS manages the LART, a paved, 10-foot-wide trail on the southwest side of Lake Almanor that is currently 9.5 miles long. This multi-use trail, which extends from a gravel road opposite Humbug Road, just off State Highway 89 to Rocky Point Road, adjacent to the southern end of Loop 3 of PG&E's Rocky Point campground, is open to walking, hiking, bicycling, and cross-county skiing. Most of the LART is located outside of the UNFFR Project boundary, but the section that goes through the Rocky Point campground is located within the UNFFR Project boundary. Motorized use of the trail is not permitted. The trail passes through campgrounds and public and private properties and near private residences. Through its recreation facility condition inventory, PG&E determined that most of the recreational elements associated with the LART are in good condition, including the trailheads and parking areas, signs, and bollards. PG&E also determined that the trail surface is in need of maintenance and repair in approximately 20 locations along the trail. Through its ADA-accessibility study, PG&E determined there is no ADA-accessible access route from the trailhead parking areas to the LART, except at the Dyer View day-use area. The LART is paved and generally accessible in most segments; however, in some areas, the trail is too steep and does not include rest areas. Additionally, the informational signs at the trailheads do not provide basic accessibility information, such as maximum grade, length, width, maintenance practices, and types of surface materials. The FS anticipates extending the LART 1.5 miles to the FS Canyon dam boat launch and day-use area.

PG&E Facilities—PG&E owns and operates the Camp Connery group camp, which is a reservation-only facility located within the UNFFR Project boundary east of Canyon dam and inland from the reservoir approximately 0.25 mile. The group camp can accommodate groups of up to 50 persons and includes five bunkhouses, an indoor/outdoor central group meeting and food service facility, a large campfire area, a

paved parking lot, a volleyball court and an area for basketball. RVs are allowed to park in the parking area, but there is no designated RV camping area. Through its recreation facility condition inventory, PG&E determined that all of the developed facilities at Camp Connery group camp are in good condition including the bunkhouses, the group meeting facility, the picnic tables and the restrooms. However, portions of the access road are in need of maintenance. Through its ADA-accessibility study, PG&E determined that none of the elements at this facility are ADA-accessible except for the trash receptacles, which do not have accessible access routes.

PG&E manages the Rocky Point Campground, which was previously known as the Lake Almanor Campground. The public often confused the Lake Almanor Campground with Almanor Campground, which is located just north on Highway 89, so the name was changed in 2003. This facility is located on the west shore of Lake Almanor within the UNFFR Project boundary on PG&E-owned land. The campground is comprised of three loops. Loop One, the northernmost loop, consists of 68 campsites, each with a picnic table, cooking grill, fire ring, paved spurs, a camp cupboard, and tent pads in some cases. Loop One also has 10 overflow campsites. Through its ADA-accessibility study, PG&E determined that four of the campsites in Loop 1 are ADA-accessible, but many of the elements at the four campsites are not actually accessible. All of the toilets in Loop 1 are accessible. The telephone and water faucets are not accessible and there are no accessible access routes to the host's site, the shoreline, the entry sign, the pay station, the camp library box, or to the accessible trash receptacles. Loop Two has 41 campsites with similar amenities as the campsites described for Loop One. Through its ADA-accessibility study, PG&E determined that two of the campsites in Loop 2 are ADA-accessible, but many of the elements at the two campsites are not actually accessible. All of the toilets and one water faucet in Loop 2 are accessible. The telephone is not accessible and there are no accessible access routes to the host's site, the shoreline, the entry sign, the pay station, the camp library box, or to the accessible trash receptacles. Loop Three consists of 22 campsites, with 20 overflow campsites. The LART ends on the south side of Loop Three. Through its ADA-accessibility study, PG&E determined that two of the campsites in Loop 3 are ADA-accessible, but many of the elements at the two campsites are not actually accessible. All of the toilets in Loop 3 are accessible as is one of the water faucets. The telephone is not accessible and there are no accessible access routes to the host's site, the shoreline, the entry sign, the pay stations, the camp library box, or to the accessible trash receptacles. Through its recreation facility condition inventory, PG&E determined that most of the elements at the Rocky Point Campground are generally in good condition with the exception of many of the older Klamath stoves, which should be replaced.

The upper arm of Lake Almanor transitions from lake to lacustrine wetland and includes the Last Chance Marsh. The Last Chance Campground/group camp, is located within the UNFFR Project boundary, on the edge of the Last Chance Marsh and is owned and operated by PG&E. The facility has a family campground area with 12 campsites and a group camping area with 13 campsites. Each campsite has a picnic table, camp

cupboard, fire ring, cooking grill, and graveled parking spur. PG&E maintains four vault toilets in two separate buildings at the campground. In addition to the campsites, there are two horseshoe pits at the site. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the Last Chance Campground are generally in good condition with the exception of a few recreation elements within the developed campsites, including several older picnic tables, many of the older Klamath stoves, and some water faucets, only in need of maintenance. PG&E also determined that the playground area was in need of maintenance. Through its ADA-accessibility study, PG&E determined that none of the campsites at this facility are ADA-accessible. The interior design of the existing toilets does not meet draft proposed ADA guidelines, and one restroom does not have an accessible access route, even though signage indicates that they are both accessible. There are also no accessible access routes from the main access gravel roadway to the primary activity areas at this facility.

PG&E owns and operates the East Shore day-use area which is located along the eastern shore of Lake Almanor on PG&E-owned land outside of the UNFFR Project boundary. PG&E maintains nine picnic tables and two vault toilets. Anglers can access the shoreline via a steep, unmarked trail. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the East Shore day-use area are generally in fair condition with the exception of the picnic tables, which are in need of maintenance, the user-defined shoreline access trail, which is currently undeveloped and eroding, and the existing hand-pumped water spigot, which should be removed or replaced. Through its ADA-accessibility study, PG&E determined that one vault toilet at this facility is fully accessible. There are no accessible access routes from the parking area to the picnic area, or to the accessible trash receptacles. None of the other elements at this facility are ADA-accessible.

PG&E owns and operates the Almanor Scenic Overlook which is located on PG&E-owned land within the UNFFR Project boundary on the east shore of Lake Almanor near Canyon dam. This facility has a paved parking area and two vault toilets. The site offers views of Canyon dam to the south and of Lake Almanor, and formerly provided a view to the north of Mt. Lassen, which has become obscured by vegetation. Through its recreation facility condition inventory, PG&E determined that the parking area at the Almanor scenic overlook is generally in good condition but the vault toilets are in need of maintenance. Through its ADA-accessibility study, PG&E determined that there is one accessible vault toilet at this facility; however, it does not have an accessible access route. The paved parking area is accessible, but there are no designated accessible spaces.

PG&E owns and operates the Canyon dam day-use area, which is located within the UNFFR Project boundary just east of Canyon dam on the north side of SR 89. This facility has 19 picnic tables, cooking grills, an undeveloped swimming beach, two vault toilets, a circular drop-off and parking area, and a separate parking lot further upslope.

Through its recreation facility condition inventory, PG&E determined that some facilities at the Canyon dam day-use area are in good condition while others are need of maintenance including the beach area, the picnic tables, and the parking area. PG&E also determined that the large informational sign at the entrance was in disrepair and should be replaced or repaired. Through its ADA-accessibility study, PG&E determined that the two vault toilets at this facility are fully accessible as are two picnic tables, which have a firm and stable access route. There are accessible access routes from the parking area to the primary activity areas. However, there are no accessible access routes to the shoreline, the informational sign at the entrance, or to the accessible trash receptacles. None of the other elements at this facility are ADA-accessible.

Other Facilities—Visitors to Lake Almanor also use 22 dispersed undeveloped recreation sites. Visitors at these sites enjoy fishing, relaxing, swimming, sunbathing, and camping. Fires are not permitted by county ordinance except in developed sites. Potable water and restrooms are not provided at any of these sites. These dispersed sites are located on lands owned by a variety of entities including PG&E, the FS, and private entities.

In addition to the public facilities on Lake Almanor, there are 22 privately-owned recreation facilities. These entities provide lodging, tent and RV camping, picnic facilities, swimming beaches, stores, fishing access, boat launching, and boat slip use/rental.

Butt Valley Reservoir Recreational Facilities

All of the public developed recreation facilities at Butt Valley reservoir are owned and operated by PG&E.

PG&E owns and operates the Ponderosa Flat Campground located within the UNFFR Project boundary on PG&E-owned land at the north end of Butt Valley reservoir. The facility has 61 campsites and an overflow area with 20 campsites. Each campsite has a picnic table, fire ring, cooking grill, camp cupboard, paved spur, and some have tent pads. There are 10 vault toilets at the campground. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the main Ponderosa Flat Campground are in good condition with the exception of the water faucets and several of the older Klamath stoves, which are in need of maintenance. In the less-used overflow area of the campground, PG&E found that the older vault toilets need replacement and several other recreational elements have broken or missing components, structural damage, or are otherwise in obvious disrepair. Through its ADA-accessibility study, PG&E determined that four of the campsites in the main campground are ADA-accessible, but many of the elements at the four campsites are not actually accessible. All of the vault toilets in the main campground area are accessible. The water faucets and the shoreline area are not accessible and there are no accessible access routes to the accessible trash receptacles.

PG&E owns and operates the Cool Springs Campground located within the UNFFR Project boundary on PG&E-owned land on the east shore of Butt Valley reservoir. There are 30 campsites at this campground, each with the same amenities as listed for the Ponderosa Flat Campground. There are eight vault toilets at the site. Through its recreation facility condition inventory, PG&E determined that some of the facilities at the Cool Springs Campground are in good condition while others are in need of maintenance, including the pay station, several of the older Klamath stoves, and the water faucets. Through its ADA-accessibility study, PG&E determined that two of the campsites at this facility are ADA-accessible, but they do not have accessible water faucets. All of the vault toilets at this facility are fully accessible. The water faucets and the shoreline area are not accessible and there are no accessible access routes to the accessible trash receptacles.

PG&E owns and operates the Alder Creek day-use area/boat launch, which is located within the UNFFR Project boundary on PG&E land on the east shore of Butt Valley reservoir. There are three picnic tables, cooking grills, a single boat launching lane and a paved parking area at this site. Guests camping at the Ponderosa Flat campground must launch their boats at the Alder Creek boat launch to access Butt Valley reservoir. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the Alder Creek day-use area/boat launch are in good condition. Through its ADA-accessibility study, PG&E determined that the vault toilet at this facility is accessible. The picnic tables and the shoreline at this facility are not accessible, and there are no accessible access routes to the accessible trash receptacles.

Visitors to Butt Valley reservoir also use three dispersed, undeveloped sites. These undeveloped sites are primarily used by anglers for fishing access. There are no facilities at any of the dispersed recreation sites.

Recreational Use at Project Reservoirs

The primary recreational activities occurring at the project reservoirs during the summer period include wildlife viewing, picnicking, swimming, canoeing, motorboating, fishing, hiking, backpacking, camping, equestrian use, and sightseeing. During the winter, the primary activities include: snowshoeing, cross-country skiing, ice-skating, and ice-fishing. Since there are no facilities in the project area that have been developed exclusively for winter activities such as groomed trails or commercial ski areas, these activities all take place in a dispersed manner on unplowed roads and trails.

As a part of the FERC Form 80 recreational monitoring process, in 2002 PG&E estimated that Lake Almanor receives 1,214,000 visits annually and Butt Valley reservoir receives 40,900 visits annually.

Camping

There are three developed campgrounds at Lake Almanor and two developed campgrounds at Butt Valley reservoir. PG&E studied camping use at the public campsites during 2001.

PG&E estimated total annual camping use at Lake Almanor public, developed campsites to be 53,471 recreation days (PG&E, 2001). Recreation day is defined as "each visit by a person to a development for recreational purposes during any portion of a 24 hour period." Table 3-27 includes a breakdown of the numbers by campsite and season. In addition to the total number of camping days, PG&E investigated the number of times that the campgrounds were at or above capacity. On Lake Almanor, PG&E determined that the Last Chance Campground was the only campground that reached capacity; this was noted on two occasions in 2001.

PG&E estimated total camping use in 2001 at Butt Valley reservoir public, developed campsites to be 18,970 recreation days. Table 3-27 includes a breakdown of the numbers by campsite and season. In addition to the total number of camping days, PG&E investigated the number of times that the campgrounds were at or above capacity. On Butt Valley reservoir, PG&E determined that both the Cool Springs campground and the Ponderosa campground reached capacity on eight and two occasions, respectively in 2001.

Table 3-27. Recreation visits to campgrounds at the project reservoirs in 2001. (Source: PG&E, 2002a)

Campground	Total Recreation Days	Percent of visitation during peak season	Number of days at or above capacity
Lake Almanor			
Rocky Point	34,921	80	0
Last Chance Creek	1,693	58	2
Almanor Family	16,857	79	0
Butt Valley Reservoir			
Cool Springs	4,180	86	8
Ponderosa Flat	14,790	82	2

Boating

Lake Almanor and Butt Valley reservoir offer a variety of boating opportunities. When Lake Almanor is at full pool (4,494 feet PG&E datum), recreationists have access to 27,000 acres of surface water for boating, fishing, swimming, waterskiing,

wakeboarding, and personal watercraft use. Boating access to Lake Almanor is provided at public boat ramps, private marinas, and on private land adjacent to the project. PG&E observed boat use on the reservoir during the summer of 2001. PG&E counted the total number of boats on Lake Almanor on 14 days between May 12 and October 13, 2001. PG&E has provided information about the number of boats by type across a number of seasons. Table 3-28 contains information regarding boat use on Lake Almanor.

Table 3-28. Average daily boating use on Lake Almanor between May 12 and October 13, 2001. (Source: PG&E, 2002a)

	Boats At-One-Time					
Season	**Powerboat**	**PWC**	**Canoe/Kayak**	**Sailboat**	**Float-tube**	**Total**
Non-Peak Season	47.8	1.4	2.2	0.2	1.2	52.8
Peak Season	101.7	29.8	5.5	1.5	0.3	138.7
Peak Holiday Season	103	37.3	12.7	4.3	2	159.3

Butt Valley reservoir at full pool, 4,140 feet (PG&E datum) consists of 1,600 acres of surface water for boating, fishing, and swimming. Boating access to Butt Valley reservoir is provided at one public boat ramp located at the Alder Creek day use area. Due to a requirement of the current FERC license, the reservoir contains many stumps, which are more obvious in the shallower upper end of the reservoir. Personal watercraft and water skiing are not allowed on this reservoir due to safety hazards presented by the stumps and posted regulations limit boat speeds on Butt Valley reservoir to 25 miles per hour.

PG&E observed boat use on the reservoir during the summer of 2001. PG&E counted the total number of boats on Butt Valley reservoir on 14 days from May 12 through October 13, 2001. PG&E reported that use of Butt Valley reservoir was low with counts ranging from 1 to 10 boats at one time, with the highest number of boats reported during observations conducted between 4:00 and 7:00 pm.

Recreational Use in River Reaches

Recreational Access and Facilities

Table 3-29 contains information about the developed public recreation sites on the Belden and Seneca reaches (9.3 and 10. miles long, respectively), and figure 3-15 shows the location of these sites.

Table 3-29. Public recreation sites on UNFFR Project River reaches. (Source: PG&E, 2002a)

Facility	Seneca Reach	Belden Reach
Boat ramps/lanes	None	None
Car-top boat access	None	None
Picnic areas/tables	None	Belden rest stop
		Gansner Bar campground
Angler access sites	None	Belden rest stop
		North Fork campground
		Queen Lily campground
Trailheads	North Fork fishing trail	Belden rest stop
Campgrounds/campsites or (bunkhouses)		Gansner Bar campground
		North Fork campground
		Queen Lily campground
Swimming areas	None	Ponderosa Flat campground

Seneca Reach Recreational Facilities—The North Fork fishing trail begins within the UNFFR Project boundary at the Caribou No. 1 powerhouse. Access around the powerhouse is provided via steel stairs and a narrow, metal catwalk which extends across the face of the powerhouse, above the tailrace. The trail then continues down to the NFFR, eventually paralleling the river and leaving the UNFFR Project boundary, and extending for approximately two miles upstream of the Caribou powerhouse to Butt Creek. The trail includes two single span footbridges over the NFFR. The FS maintains the North Fork fishing trail, including the maintenance and repair of the two trail suspension bridges, with the exception of the metal catwalk that crosses the powerhouse. PG&E does not provide parking at the powerhouse. Anglers who use the trail must use small roadside pull-outs along Caribou Road or park at the Belden forebay and walk up Caribou Road.

There are two dispersed campsites in the Seneca reach. There are no facilities at the sites and they appear to receive low levels of use.

Belden Reach Recreational Facilities—The FS owns and operates three campgrounds outside of the UNFFR Project boundary along the Belden reach. At each of the campgrounds, each campsite has a picnic table, cooking grill, paved spur, and some have tent pads. The Queen Lily campground is located on the west branch of the NFFR along Caribou Road and has 12 campsites, a flush restroom, and potable water. The North Fork Campground is located on the west branch of the NFFR along Caribou

Road approximately 1 mile from the Queen Lily campground. This facility has 20 campsites, a flush toilet, and potable water. The Gansner Bar campground is located on the west branch of the NFFR along Caribou Road approximately 1 mile from the North Fork campground and approximately 2 miles from the Queen Lily campground. This facility has 14 campsites, a flush restroom, and an amphitheater. Through its recreation facility condition inventory, PG&E determined that most of the facilities along the Belden reach are in good condition.

PG&E owns and operates the Belden rest stop, which is located within of the UNFFR Project boundary adjacent to the Belden powerhouse. There are four picnic tables, informational and interpretive signs, a vault toilet, and a paved parking lot at this site. Visitors can access three recreational trails from this site: Yellow Creek Trail, Indian Springs Trail, and the Pacific Crest Trail. Through its recreation facility condition inventory, PG&E determined that some of the facilities at the Belden Rest Stop are in good condition while others need maintenance, including the vault toilets, the picnic tables, signs, and the cooking grills. PG&E also determined that the two water faucets near the open pavilions are broken, and since there is no longer water at the site, they should be removed. Through its ADA-accessibility study, PG&E determined that the two vault toilets and the trash receptacles at this facility are fully accessible and meets ADA guidelines and there is one accessible flush restroom. The picnic tables at this facility are not accessible and there is no accessible route to the adjacent creek.

In addition, there is a well-defined, but undeveloped site that provides access to the Belden forebay. Anglers use a small gravel parking area within the UNFFR Project boundary off of Caribou Road at the northwest end of the forebay and follow a steep trail to the forebay shoreline. There are no formal facilities at the site and boats are currently not allowed on the forebay.

There are 20 dispersed sites in the Belden reach used primarily for dispersed camping. Some of the sites serve as overflow areas for the developed FS campgrounds. PG&E documented camping at 16 of the 20 sites in 2001, while the remaining sites appear to be used to access the shoreline for angling and hiking.

In addition to the public sites on the Belden reach, there are two privately-owned campgrounds on the Feather River just below the project.

Recreational Use at Project Reaches

The primary recreational activities occurring at the project river segments during the summer include: wildlife viewing, picnicking, swimming, canoeing, motorboating, fishing, hiking, backpacking, camping, equestrian use, and sightseeing. During the winter, the primary activities include: snowshoeing and cross-country skiing. Since there are no facilities in the project area that have been developed exclusively for winter activities such as groomed trails or commercial ski areas, these activities all take place in a dispersed manner on unplowed roads and trails.

Camping

The Belden reach has 3 public developed campgrounds owned and operated by the FS. PG&E studied camping use at these campgrounds in 2001.

PG&E estimated total camping use at Belden reach public, developed campsites to be 14,020 recreation days. Table 3-30 includes a breakdown of the numbers by campground and season. In addition to the total number of camping days, PG&E investigated the number of times that the campgrounds were at or above capacity. On the Belden reach, PG&E determined that all three of the campgrounds exceeded capacity; Queen Lily campground on 18 occasions, Gansner Bar campground on 35 occasions and North Fork campground on 10 occasions.

Table 3-30. Recreation visits to campgrounds in the project reaches in 2001. (Source: PG&E, 2002a)

Campground	Total recreation days	Percent of visitation during peak season	Number of days at or above capacity
Queen Lily	3,252	69	18
Gansner Bar	5,396	56	35
North Fork	5,372	65	10

Whitewater Boating

The Seneca reach of the UNFFR begins below Lake Almanor dam and runs south approximately 11 miles to Caribou No. 1 powerhouse. The Seneca reach has limited access because of the steep, rugged terrain and private land ownership along the river.

The Belden reach of the UNFFR begins at Caribou No. 1 powerhouse and runs southwesterly approximately 9 miles to the confluence with the EBNFFR near State Route 70. Caribou Road runs parallel to the Belden reach, which makes it relatively accessible.

PG&E conducted a whitewater controlled flow assessment in September/October 2000. PG&E scheduled three boating releases on each of the two reaches. The Seneca reach was assessed at 210, 325, and 410 cfs and the Belden reach was assessed at 350, 600, and 850 cfs.

For the whitewater controlled flow study, nine boaters participated in the study on the Seneca reach. Participants were asked to evaluate the flows that they experienced. PG&E reported that boaters would prefer flows higher than 210 and 325 cfs and a majority of participants would prefer flows at 410 cfs or slightly higher. Additionally, PG&E determined that, based on the participants' responses to specified flow questions, if they were to provide a single release, a flow of 400 cfs would be recommended until

locations of rapids and lines became better known. After these became known, a single release of about 450 cfs would provide quality boating.

On the Belden reach, 24 boaters participated in the study. PG&E reported that all of the participants considered the 350 cfs flow to be too low and a majority of the participants considered the 600 cfs to also be too low. A majority of the participants preferred the 850 cfs flow and those who did not prefer it were roughly split as to whether the flow was too high or too low. Additionally, PG&E determined that, based on the participants' responses to specified flow questions, if it was to provide a single release, a flow of 750 cfs would be appropriate to provide quality standard kayaking and rafting opportunities and 850 cfs would be needed to provide some higher challenge boating.

Participants were asked to compare the runs in comparison to other northern California Rivers. Nearly two-thirds of the respondents rated the Seneca reach as "better than average" or "excellent"; while participants were split for the Belden reach with half indicating that the run is "worse than average" or "average" and half indicating that the run is "better than average" or "excellent."

Angling

Angling is a popular activity at the project reaches and reservoirs. The shoreline fishing opportunities along the Seneca and Belden reaches were assessed at various flows by PG&E in a fishability study during May of 2001.

PG&E evaluated flows of 700, 300, and 100 cfs in the Seneca reach on separate days. In addition, researchers evaluated the reach at 35 cfs. At the end of each day, participants were asked to indicate their preferences for similar, higher, or lower flows. All participants considered the 700 cfs flow to be too high and two-thirds of the participants would definitely not return to fish at that flow. At 300 cfs, all of the participants preferred lower flows. In response to items regarding likelihood of return, one-third of the participants would not return and two-thirds would possibly return at the 300 cfs flow. At 100 cfs, all anglers reported that they preferred flows at about this level and two-thirds of the participants indicated that they would definitely return, while one-third indicated that they would possibly return. The core participants were asked to rate a range of flows that would be suitable for fishing. The 4 study participants who were fly anglers indicated a range of 50 to 200 cfs, with an optimal flow of 100 cfs. The study participant who was a bait/spin angler on the panel indicated an acceptable range of 100 to 300 cfs, with the optimal range from about 150 to 250 cfs.

PG&E provided flows of 700 and 300 cfs in the Belden reach on separate days. In addition, researchers evaluated the reach at 100 cfs. At the end of each day, participants were asked to indicate their preferences for similar, higher, or lower flows. All participants considered the 700 cfs flow to be too high and two-thirds of the participants

indicated that they would definitely not return to fish at that flow. At 300 cfs, three-quarters of the participants preferred lower flows, while the remainder indicated that they preferred flows at about this level. In response to likelihood of return at the 300 cfs flow, one-quarter of the participants would not return, half would possibly return, and one-quarter would definitely return. Participants were asked to rate a range of flows for fishing. The 4 study participants who were fly anglers indicated a range of acceptable flow levels between 50 and 250 cfs, with an optimal flow of about 150 cfs. The study participant who was a bait/spin angler on the panel indicated a range of 275 to 600 cfs with an optimal flow of 300 cfs.

Accessibility

PG&E conducted a field assessment of both FS and PG&E-owned public recreation facilities at Lake Almanor, Butt Valley reservoir, and Belden reach to determine present adequacies and future accessibility needs for persons with disabilities who may use public recreation facilities and use areas associated with the project, or who may participate in primary recreation activities (i.e., camping, fishing, picnicking, swimming, shoreline access and boating) occurring in the project area. The current guidance for accessibility is the ADA. ADA-related elements at each site include: restrooms, toilets, picnic areas, campsites, group sites, water sources, trash receptacles, fishing areas, boating and swimming areas/shoreline access, outdoor recreation access routes to primary elements, and recreation trails to non-primary elements.

PG&E determined that the North Fork Feather Trail is not accessible and likely could not be made accessible due to topography. Likewise, PG&E determined that the shoreline was too steep for accessible fishing access at Belden forebay. PG&E also determined that none of the dispersed recreation use areas along the two bypassed reaches are accessible for persons with disabilities.

Table 3-31 summarizes the accessibility of existing PG&E and FS facilities and indicates whether the FS facilities are located on the Lassen National Forest (LNF) or the Plumas National Forest (PNF).

Both the FS and PG&E have provided opportunities for persons with disabilities to participate in primary recreational activities in the project area and each has emphasized different activities, to help fill gaps in access.

Table 3-31. Summary of the accessibility of existing public, FS, and licensee recreation facilities. (Source: PG&E, 2002a)

Facility	Toilets/ Restrooms	Telephones	Trash Receptacles	Water faucets	Picnic Tables	Swimming Areas/ Shoreline Access	Fishing Sites	Parking Areas	Boat Launches	Campsites	Recreation Trails
FS Facilities											
Almanor Family Campground (LNF)	X		X								X
Almanor boat launch (LNF)	X		X								
Almanor beach (LNF)					X						
Canyon dam boat launch/day-use area (LNF)	X		X		X		X	X			
Almanor picnic area (SR 89) (LNF)	X										
Almanor group campground (LNF) (SR 89)	X										
Dyer View day-use area (LNF)	X		X					X			X
Lake Almanor recreation trail (LART) (LNF)											X
Gansner Bar campground (PNF)	X		X							X	
North Fork campground (PNF)	X		X							X	
Queen Lily campground (PNF)			X								

Facility	Toilets/ Restrooms	Telephones	Trash Receptacles	Water faucets	Picnic Tables	Swimming Areas/ Shoreline Access	Fishing Sites	Parking Areas	Boat Launches	Campsites	Recreation Trails
PG&E Facilities											
Rocky Point campground loop 1	X		X							X	
Rocky Point campground loop 2	X		X	X						X	
Rocky Point campground loop 3	X	X	X	X						X	
Camp Connery group camp											
Canyon dam day-use area	X		X		X						
Almanor scenic overlook	X							X			
East shore day-use area	X		X					X			
Last Chance campground/group camp											
Ponderosa Flat campground	X		X	X						X	
Alder Creek day-use area/boat launch	X		X								
Cool Springs campground	X		X							X	
Belden rest stop (SR 70)	X		X	X				X			

Notes: X – the existing recreational element in the corresponding column is fully or partially accessible at that facility. However, the number of accessible facilities may not be fully adequate.
LNF – Lassen National Forest
PNF – Plumas National Forest

3.3.5.2 Environmental Effects

Recreation Resource Management Plan

PG&E presented a draft RRMP in the final license application, which provides both existing and future recreation resource needs associated with the UNFFR Project and PG&E's proposed involvement and responsibilities in managing those identified needs over the term of the new license. PG&E prepared the draft RRMP in consultation with the Recreation, Land Use, and Aesthetics Work Group (RLA Work Group). The RLA Work Group included representatives of federal, state, and local agencies; adjacent landowners; shoreline homeowner and country and community club associations; and other stakeholders. The RLA Work Group participated in the development and review of technical studies, proposals included in the final license application, and the preparation of the draft RRMP.

In the SA, PG&E proposes to finalize the draft RRMP in consultation with the FS and Plumas County within 1 year of license issuance.

In its November 4, 2004, filing with the Commission, the FS specifies in its final Section 4(e) condition no. 32, that PG&E finalize the draft RRMP in consultation with the FS and Plumas County.

In the draft RRMP, PG&E proposes both site-specific and programmatic measures and the details for implementing them. A brief description of the six programs included in the draft RRMP defining PG&E's roles and responsibilities for recreation resources over the term of the new license is presented here:

- A recreation facilities development program that defines PG&E's proposed responsibilities related to construction, including details of proposed recreation development projects, estimated costs, and schedules.

- A recreation O&M program that defines PG&E's proposed existing and future recreation O&M responsibilities, including annual maintenance costs and maintenance standards to be used. The O&M program also details programmatic costs for draft RRMP implementation.

- An I&E program that defines how hydroelectric energy production, environmental, cultural, and informational I&E would be coordinated and conducted by PG&E at project facilities.

- A recreation monitoring program that defines how PG&E proposes conducting recreation resource monitoring, including monitoring standards and indicators, and how the monitoring information would be used in decision-making.

- A resource integration and coordination program that defines how PG&E would integrate recreation resource needs with other resource management needs over time, such as cultural, wildlife, and aquatic resources and discusses how actions would be coordinated through annual meetings.

- A RRMP review and revision program that defines how the RRMP would be updated or revised over the term of the new license.

Our Analysis

The draft RRMP would provide a framework for PG&E to implement recreational site improvements and coordinate management of recreational resources with the FS and Plumas County. The proposed recreation facilities development program includes measures that are extensive and provide substantial improvements to existing recreational resources associated with the project and significant development of new resources at the project to address visitor demand and reduce the potential for overcrowding. The operations and maintenance program clearly defines PG&E's responsibilities related to operating and maintaining the project facilities, and describes how PG&E intends to accomplish them. The interpretation and education program provides a means to disseminate information regarding project-area resources, facilities, and management issues to members of the public who either currently use the project area or may be interested in using the area. The recreation monitoring program would help PG&E identify changing recreational needs during the term of any new license. The resource coordination and integration program allows for a variety of parties with interests in various natural resources to express their individual concerns and resolve potential conflicts among resources. The RRMP review and revision program provides an opportunity to modify the RRMP, if necessary, and presents guidance on the timing and frequency of any modifications.

The terms of the draft RRMP, as well as all of the proposed site-specific measures, were developed in close coordination with the RLA Work Group and are consistent with the Lassen and Plumas National Forest Land and Resource Management Plans (LRMPs). As specified in the LRMPs, the recreational sites would continue to provide developed recreational opportunities for the public, including day-use areas, campgrounds, parking areas, and boat ramps, while protecting and improving the natural forest setting surrounding these facilities and providing future recreational opportunities that meet changing recreational demand.

Recreational Facility Development Program

As a component of the draft RRMP and identified in the SA, PG&E proposes to develop a recreation facilities development program to help meet existing and future recreation facility needs identified in the project area during the term of the license. PG&E proposes to focus on upgrading existing recreation facilities and constructing new recreation facilities when appropriate, based on demonstrated need. PG&E proposes that

this program would address (1) proposed recreation facility development measures and upgrades in the project area, (2) locations of the proposed recreation facilities or use area improvements, (3) recreation facility design guidelines and approvals, (4) ADA compliance and facility upgrades, (5) compliance with NEPA and CEQA as well as acquisition of all necessary permits and approvals prior to construction of any of the proposed recreation facilities, (6) agency and public review of planned recreation development, and (7) facility construction coordination, scheduling, and phasing. PG&E proposes to implement a number of recreational facility enhancement measures after initial license issuance and during the license term based on target completion dates and monitoring triggers (standards) included in the draft RRMP in the license application. PG&E also proposes to improve accessibility at various sites in accordance with the ADA.

In its November 4, 2004, filing with the Commission, the FS specifies in its final Section 4(e) condition no. 32, that PG&E implement a variety of recreation facility enhancement measures and improvements after license issuance and during the license term, based on target completion dates provided in the facility enhancement description and recreation monitoring indicators and standards included in the draft RRMP. The FS specifies that all FS recreation facilities be constructed in accordance with ADAAG guidelines at the time the recreation facilities are upgraded or constructed.

Some portions of FS final condition no. 32 are not under FS jurisdiction because the facilities they address are not located on NFS lands. These facilities are the Last Chance Family and Group campgrounds; the Rocky Point Campground and day-use area; the East Shore Group Camp Area, Family Campground, and day-use area; the North Shore public boat launch; the Stover Ranch day-use area; Marvin Alexander Beach; the Canyon Dam day-use area; Westwood Beach; Stumpy Beach; Catfish Beach; the Almanor Scenic Overlook; Camp Connery; Butt Valley powerhouse trails; Ponderosa Flat Campground; Cool Springs Campground; the Alder Creek boat launch; and the Belden Rest Stop. The FS fully supports all elements of condition no. 32, even those parts pertaining to facilities outside of its jurisdiction, and recommends including all parts in the license under Section 10(a) of the FPA.

Our Analysis

The recreation facility development program is one of the components of PG&E's draft RRMP and would provide direction for the coordination of the development, management, and maintenance of recreational opportunities and facilities associated with the project. All of the measures outlined provide improvements to facilities that are either within the project boundary or are proposed to be added to the project boundary, or provide access to recreation opportunities that are within the project boundary. Additionally, PG&E has developed the proposals in consultation with a number of appropriate parties as a part of settlement discussions. PG&E's implementation schedule targets high priority needs first, including ecological and safety concerns, excess

recreation site capacity, ADA needs, and distribution of access sites around the reservoir shorelines. Campground and day use facilities which would be significantly modified or newly built would conform with ADA, increasing the number of accessibility related opportunities. For future improvements to facilities, PG&E has developed monitoring triggers that would ensure that such improvements are necessary for public use of the areas. Facilities would be made safer due to replacement of old stoves and grills and accordingly, by implementing the proposed recreation measures, PG&E would be responsible for ensuring that the recreational needs of the public are met throughout the licensing period.

Section 2.7(b) of the Commission's regulations requires a project licensee to consider the needs of the physically disabled in the design and construction of public recreational facilities on project lands and waters, including public access to such facilities. The Commission has no statutory role in implementing or enforcing the ADA as it applies to its licenses. A licensee's obligation to comply with the ADA exists independent of its project license. In this regard, the RRMP developed by PG&E for project recreational facilities should include a discussion of how the licensee considered the needs of physically disabled individuals in the design and construction of the proposed recreational enhancements.

Staff lists PG&E's and FS specific recreation facility development proposals in the following sections. Figure 3-16 shows the location of these facilities.

Proposed Recreation Facilities and Improvements

Lake Almanor Recreational Facilities and Access

Last Chance Family and Group Campground

In accordance with ADA guidelines, PG&E proposes to modify two campsites and existing toilet buildings and provide a 150-foot access route leading to the nearby creek. PG&E intends to initiate and complete the implementation of this measure within 1 to 3 years after license issuance. FS Section 10(a) condition no. 32(1) A.1.a recommends the same proposal as PG&E, including the same implementation timeline.

Non-Internet Public

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

Page 3-223
Figure 3-16

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov.

Rocky Point Campground and Day-Use Area

Within 5 to 10 years after license issuance, PG&E proposes to convert the Loop 3 overflow camping area into a day-use swim area containing an approximately 1-acre sand beach above the high water level (4,494 feet elevation, PG&E datum), a swimming delineator, a paved parking area to accommodate 35 to 40 vehicles, and a double vaulted restroom; relocate the 20 Loop 3 overflow campsites to the Loop 1 camp overflow area and provide a new double vaulted toilet building at this location; provide a new entrance kiosk at the campground, three fee-based shower facility buildings (one for each loop) with hot water, and bear-proof food lockers at each campsite (151); replace older Klamath stoves with campfire rings; and revegetate or harden areas significantly disturbed by pedestrian or vehicle traffic. PG&E also proposes the following accessibility improvements in accordance with ADA guidelines: modify 10 campsites (four at Loop 1, three at Loop 2, and three at Loop 3); an accessible access route to the high water level (4,494-foot elevation, PG&E datum) at the sandy beach; improvements to existing recreation facilities as needed, such as the campground library box, telephones, and the envelope box at the pay station and provide appropriate ADA-accessible access routes; modify existing water faucets near accessible elements, such as toilets and campsites, to be ADA-accessible; accessible routes to the toilet buildings near the campground entrance and near campsite # 100); and relocate the interior pay station directly across the road on a level, firm, and stable surface (Loop 2). FS Section 10(a) condition no. 32(1) A.1.b also recommends the same proposal as PG&E, including the same implementation timeline.

Forest Service Almanor Shoreline Facilities

Within 1 to 13 years after license issuance, PG&E proposes to partner with the FS and provide approximately 40 percent of matching funding up to a maximum of $5,000,000 (2004 dollars) for the FS to complete recreation improvements, including reconstruction of existing facilities and construction of new facilities, at the following FS-owned recreation facilities: the Almanor Family Campground, the Almanor Group Campground, the Almanor amphitheater, the Almanor picnic area, and the Almanor beach. According to the SA, the FS would provide the remaining 60 percent of the cost to construct the recreation improvements. PG&E also proposes to apply to the Commission to adjust the UNFFR Project boundary to include the Almanor Family Campground, the Almanor Group Campground, the Almanor amphitheater, and the Almanor beach within 6 months after the FS has completed construction of all of the recreation improvements it has planned for each of these facilities.

If PG&E has not paid the FS the maximum $5,000,000 (2004 dollars) at the end of the thirteenth year after the license is issued because the FS has been unable to obtain its corresponding share of the matching funds, then PG&E proposes to use the remaining funds (the difference between the amount PG&E has already paid the FS in matching funds and the $5,000,000 cap [2004 dollars]) for recreation improvements at the Almanor

beach and the East Shore family campground, which would include the addition of up to 28 campsites in a third loop as funding permits. The recreation improvements anticipated to be completed with the matching funding are described in the following section.

Almanor Family Campground and Amphitheater

Within 1 to 13 years after license issuance, reconstruction of the north and south loops of the Almanor Family Campground including general improvement of travel ways and campsite spurs, upgrading sanitation facilities, providing utility hookups, and constructing an amphitheater, would be completed.

The FS specified, in preliminary Section 4(e) condition no. 44A.1, that within 5 years of issuance of a new license, or no later than January 1, 2009, PG&E provide matching funding for the FS to rehabilitate the Almanor Family Campground by converting those campsites in proximity to existing underground utilities (approximately one-half of the sites in the south loop) to accommodate RVs with longer level spurs, to provide water and power hookups, and to be ADA-accessible; reconstructing the main access roads and spurs to improve traffic flow and to accommodate modern recreational vehicles, including leveling, lengthening, and widening of campsite spurs; replacing all non-accessible vault toilets; constructing shower buildings with showers and toilet facilities (possibly flush, vault and/or composting toilets) at both the north and south campground loops; and paving small vehicle parking areas to provide additional vehicle parking for campground visitors to access recreation facilities. Additionally, the FS specified that PG&E take over full O&M of the Almanor Family Campground under an annual agreement with the FS.

FS final Section 4(e) condition no. 32(1)A.1.c specifies that PG&E provide matching funding to reconstruct the north and south loops of the Almanor Family Campground, including general improvement of travel ways and spurs, upgrading sanitation facilities, providing utility hook ups, and constructing an amphitheater.

FS final Section 4(e) condition no. 32(3) specifies that within 6 months after the FS has completed all of the recreation improvements at the Almanor Family Campground and Amphitheater, PG&E would (1) apply to the Commission to adjust the project boundary as needed to incorporate this facility into the project boundary, and (2) assume responsibility for the operational maintenance and heavy maintenance of the Almanor Family Campground and Amphitheater. FS final Section 4(e) condition no. 33 defines operational maintenance as maintenance or reconditioning that neither materially adds to the value of the property nor appreciably prolongs its life and serves only to keep the facility in an ordinary, efficient operating condition. Operational maintenance includes work that may be expensed. FS final Section 4(e) condition no. 33 defines heavy maintenance as maintenance or reconditioning that arrests deterioration and appreciably prolongs the life of the property and includes expenditures may be capitalized.

Almanor Group Campground

Within 1 to 13 years after license issuance, PG&E proposes that construction of camping loops, a group gathering area including a pavilion, and a trailer dump station, and rehabilitating, restoring, and revegetating the decommissioned overflow and group camp at the Almanor Group Campground, would be completed.

FS final Section 4(e) condition no. 32(1)A.1.c specifies that PG&E provide matching funding to the FS to construct camping loops, a group gathering area including a pavilion and a trailer dump station, and to rehabilitate, restore and revegetate the decommissioned overflow and group camp at the Almanor Group Campground.

FS final Section 4(e) condition no. 32(3) specifies that, within 6 months after the FS has completed all of the recreation improvements at the Almanor Group Campground, PG&E would (1) apply to the Commission to adjust the project boundary as needed to incorporate this facility into the project boundary, and (2) assume responsibility for the operational maintenance and heavy maintenance of the Almanor Group Campground.

Almanor Picnic Area

Within 1 to 13 years after license issuance, PG&E proposes that defining and upgrading picnic sites, shade structures, and interpretation/orientation facilities at the Almanor picnic area, would be completed.

FS final Section 4(e) condition no. 32(1)A.1.c specifies that PG&E provide matching funding to the FS for redevelopment of the Almanor picnic area by defining and upgrading picnic sites, shade structures, and interpretation/orientation facilities. FS final Section 4(e) condition no. 33 explicitly specifies that PG&E would not be responsible for the operational maintenance and heavy maintenance of the Almanor picnic area.

Almanor Beach

Within 1 to 13 years after license issuance, PG&E proposes to provide matching funding for the FS to expand the sandy beach area and parking area, and construct a swim buoy at the Almanor beach.

FS final Section 4(e) condition no. 32(1)A.1.c specifies that PG&E provide matching funding to expand the sandy beach area, expand the parking area, and construct swim buoy at the Almanor beach.

FS final Section 4(e) condition no. 32(3) specifies that within 6 months after the FS has completed all of the recreation improvements at the Almanor beach, PG&E would (1) apply to the Commission to adjust the project boundary as needed to incorporate this facility into the project boundary, and (2) assume responsibility for the operational maintenance and heavy maintenance of the Almanor beach.

East Shore Group Camp Area

Within 1 to 3 years after license issuance, PG&E proposes to convert the existing East Shore picnic area to a group reservation camp area that would accommodate one group of 16 RVs or two groups of eight RVs; widening the entrance road; improving internal road circulation to accommodate RVs; provide one ADA-accessible parking space near the existing double-vaulted toilet building and an ADA-accessible access route to the nearby trash receptacles; provide bear-proof food lockers at 16 sites; providing a paved, non-accessible trail down to the shoreline with switchbacks and stairs; and institute erosion control measures. PG&E also proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 10(a) condition nos. 32(1)A.1.d and 32(3) recommend the same proposal as PG&E, including the same implementation timeline.

East Shore Day-Use Area

Within 1 to 5 years after license issuance, PG&E proposes to designate a day-use swim area in the existing cove adjacent to the proposed new East Shore campground, which would include up to five picnic tables, non-paved shoreline access trails, a single vaulted toilet building, and parking for 10 to 20 vehicles. PG&E also proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 10(a) condition nos. 32(1)A.1.i and 32(3) recommend the same proposal as PG&E, including the same implementation timeline.

East Shore Family Campground

Over the term of the project license period, contingent on reaching the recreation monitoring standards contained in the RRMP during the new license term, PG&E proposes to provide a new two-loop family campground on PG&E-owned land along the east shore of Lake Almanor. PG&E proposes to construct the campground in two phases with a total of approximately 63 new tent and RV campsites, bear-proof food lockers at each campsite, two user fee, indoor hot shower buildings with flush toilets, approximately 20 boat moorage slips/buoys, and a camp host site. PG&E also proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 10(a) condition nos. 32(1)2.A.2 and 32(3) recommend the same proposal as a potential future recreation enhancement measure.

North Shore Public Boat Launch

Within 3 to 5 years after license issuance, PG&E proposes to provide a new and expanded public boat launching facility at the North Shore campground, including paved parking for 40 single vehicles with trailers and 12 single vehicles, a double vaulted toilet building, and a boarding float. Additionally, PG&E proposes dredging and maintaining along the existing submerged river channel to provide an approximate 1,000 foot long, 50

foot wide, and 6 foot deep boat channel that provides boat access to approximately the 4,480-foot elevation (PG&E datum). PG&E proposes that the boat launch would be open for public use from April 1 to December 1 when the lake's elevation is at or above the 4,480 foot elevation (PG&E datum) and as snow on the ground permits. PG&E proposes to provide public access to the boat launch facility along an abandoned portion of Highway 36 located along the north side of the campground, in order to reduce traffic impacts at the campground, and relocate 22 campsites within the project boundary that would be affected by the expanded boat launch facility.

FS final Section 10(a) condition no. 32(1)A.1.e recommends the same proposal as PG&E, including the same implementation timeline.

In its November 29, 2004, comments on the draft EIS, EPA mentions potential environmental impacts from dredging activities at this site and the need to consider Section 404 of the Clean Water Act.

Stover Ranch Day-Use Area

Within 3 to 5 years after license issuance, PG&E proposes to develop the Stover Ranch day-use area to provide improved Lake Almanor shoreline access for Chester residents including gravel parking for 10 to 20 vehicles, a double-vaulted toilet building, four picnic tables, a non-paved trail to the shoreline, an interpretive sign, and an RV site to accommodate a new Lake Almanor caretaker. PG&E would coordinate these developments with the Chester Public Utility District and the Almanor Recreation and Park District. PG&E also proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 10(a) condition nos. 32(1)A.1.f and 32(3) recommend the same proposal as PG&E's, including the same implementation timeline.

Marvin Alexander Beach

Within 1 to 3 years after license issuance, PG&E proposes to assume management responsibility of the PSEA swim beach and expand and improve the existing sandy beach to a 0.4 acre area above the high water level (4,494-foot elevation, PG&E datum), provide an improved gravel parking area for 30 to 45 single vehicles, replace the site's two single-vault toilet buildings and 10 picnic tables, and provide a swim delineator. PG&E also proposes changing the name of the site to the "Marvin Alexander Beach" to eliminate any public perception that this is a private beach. FS final Section 10(a) condition no. 32(1)A.1.g recommends the same proposal as PG&E, including the same implementation timeline.

Canyon Dam Day-Use Area

Within 1 to 3 years after license issuance, PG&E proposes to provide an approximately 0.3-acre sandy beach above the high water level (4,494-foot elevation, PG&E datum), a swim area delineator, an informational kiosk, improved vehicle

circulation, and eight new ADA-accessible picnic tables; and in accordance with ADA guidelines, modify eight existing picnic tables to make them accessible, provide an accessible parking space, and provide an accessible route to the high water level (4,494 foot elevation, PG&E datum) at the swim beach area in accordance with ADA guidelines. Additionally, PG&E proposes to reserve approximately 1 acre of land adjacent to the Canyon dam day-use area for potential future recreation development during the term of the new license. FS final Section 10(a) condition no. 32(1)A.1.h recommends the same proposal as PG&E, including the same implementation timeline.

Westwood Beach Day-Use Area

Within 1 to 3 years after license issuance, PG&E proposes to provide a gravel parking area for 10 vehicles, six picnic tables, an ADA-accessible single vaulted toilet building, an approximately 0.1 acre sandy beach, a swim delineator, directional signage, and erosion control measures to protect the shoreline from wind-caused wave action at the Westwood beach. PG&E also proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 10(a) condition nos. 32(1)A.1.j and 32(3) recommend the same proposal as PG&E, including the same implementation timeline.

Stumpy Beach Day-Use Area

Within 1 to 3 years after license issuance, PG&E proposes to provide five picnic tables, directional signage, an approximately 0.7 acre sandy beach above the high water level (4,494 foot elevation, PG&E datum), a swim delineator, eight to 10 paved parking spaces parallel to Highway 147 with trails connecting to the northern and southern portions of Stumpy beach (the southern trail would be ADA-accessible where feasible and the northern trail would be non-paved), four benches at the roadside parking area for viewing Lake Almanor and the surrounding mountains, and erosion control measures to protect the shoreline from wind-caused wave action. PG&E also proposes providing a single vaulted toilet building if allowed by Plumas County and the California Department of Transportation set back regulations; otherwise, PG&E proposes providing a seasonal portable toilet building. PG&E also proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 10(a) condition nos. 32(1)A.1.k and 32(3) recommend the same proposal as PG&E, including the same implementation timeline.

Catfish Beach

Within 3 to 5 years after license issuance, PG&E proposes to make a good faith effort to negotiate a reasonable easement across private lands to provide public road access to the Catfish beach area. If PG&E's negotiations are unsuccessful, PG&E would not be required to seek to condemn the easement. PG&E also proposes to provide a single vaulted toilet building at this site and monitor and maintain the toilet building and the site's cleanliness through appropriate means. PG&E proposes to apply to the

Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 10(a) condition nos. 32(1)A.1.l and 32(3) recommend the same proposal as PG&E, including the same implementation timeline.

Almanor Scenic Overlook

Within 1 to 5 years after license issuance, PG&E proposes to provide an ADA-accessible route connecting the existing accessible double vaulted toilet building at the overlook with a new ADA-accessible parking space, and conduct vegetative brushing and clearing to restore the views of Lake Almanor, Mt. Lassen, and Canyon dam. FS final Section 10(a) condition no. 32(1)A.1.m recommends the same proposal as PG&E, including the same implementation timeline.

Southwest Shoreline Access Zone

Within 1 to 5 years after license issuance, PG&E proposes to provide four shoreline access points at existing informally used areas along Lake Almanor's southwest shoreline between Prattville and Canyon dam in consultation with the FS. These shoreline access areas would provide vehicle access at or above the 4,494 foot elevation (PG&E datum) and serve as pedestrian access areas to the adjacent shoreline. PG&E proposes to provide four gravel parking areas that provide parking for up to four to eight vehicles at two of the areas and 10 to 20 vehicles at the other two areas; vehicle barriers; regulatory, interpretive, and informational signs; gravel access roads; and, if appropriate, single vaulted toilet buildings at these access areas. PG&E proposes to assume responsibility for operational maintenance and heavy maintenance for each facility as it is constructed. PG&E also proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary as needed to incorporate these facilities. PG&E also proposes to close and restore to natural conditions other degraded user-created vehicular access routes along the southwest shoreline in consultation with the FS.

FS final Section 4(e) condition no. 32(1)A.1.n specifies the same proposal as PG&E, including the same implementation timeline. FS final Section 4(e) condition no. 32(3) specifies that PG&E apply to the Commission to adjust the project boundary as needed to incorporate those portions of the southwest shoreline access zone facilities currently outside of the project boundary into the project boundary. FS final Section 4(e) condition no. 33 specifies that PG&E would assume responsibility for the operational maintenance and heavy maintenance of the southwest shoreline access zone facilities as each facility is constructed.

Camp Connery Reservation Group Camp Area

Within 1 to 5 years after license issuance, PG&E proposes to provide an ADA-accessible parking space and a new bunk house cabin with an ADA-accessible toilet and a user fee based hot shower and retrofit the existing telephone position and water faucet features to meet the ADA guidelines. FS final Section 10(a) condition no. 32(1)A.1.o

also recommends the same proposal as PG&E, including the same implementation timeline.

Over the term of the project license period, contingent on reaching the recreation monitoring standards contained in the draft RRMP during the new license term, PG&E proposes to provide a new group reservation camping area adjacent to the existing Camp Connery group camp, which would either provide space for two groups of approximately eight self-contained RVs or one group of approximately 16 self-contained RVs, a centrally located bear-proof food facility, and two user fee, indoor shower buildings with hot water and flush toilets. PG&E also proposes to repair and resurface the existing access road. FS final Section 10(a) condition no. 32(1)2.A.1 also recommends the same proposal as a potential future recreation enhancement measure.

Lake Almanor Recreation Trail Easements

The FS specified, as preliminary Section 4(e) condition no. 44B.2, that within 5 years of issuance of a new license, or no later than January 1, 2009, that PG&E provide easements to the FS and Plumas County for non-motorized recreational trails across PG&E-owned project lands surrounding Lake Almanor. The FS specified that the conditions of the proposed trail easements would be similar to those previously provided to the FS. The FS originally specified extending the LART all the way to the Canyon dam boat launch and day-use area, adding another few miles to the LART. The FS final Section 4(e) conditions did not include any specifications related to the LART.

Our Analysis

Lake Almanor, the largest reservoir at the UNFFR Project, has induced high concentrations of human use around the lake shoreline. Only 11 percent of the perimeter of Lake Almanor is composed of NFS lands, and the remaining shoreline consists of private land owned by either PG&E or private owners. The majority of the non-PG&E private land is occupied by private dwellings so public access at Lake Almanor is limited to NFS lands, PG&E lands, and a limited number of private marinas and other points of access.

The Last Chance family and group camp currently has no ADA-accessible elements. Based on draft ADA guidelines, this facility should have three accessible campsites, but the modification of both two campsites and the two toilet buildings to ADA standards would improve accessibility at the facility. Providing an ADA-accessible access road to the nearby creek would also enhance accessibility.

Loop One of the Rocky Point campground is one of only two facilities in the project that provides the minimum number of accessible campsites as required in the draft ADA guidelines. PG&E's proposal to modify several elements to ADA standards at this facility would greatly improve accessibility. Replacing the older Klamath stoves with campfire rings at all of the campsites would improve safety at the facility. The other

improvements proposed at this facility would make the facility more desirable to recreation users.

Most of the recreation facilities on NFS lands along Lake Almanor are located adjacent to PG&E-operated facilities. Unfortunately, most of these recreation facilities do not meet current FS standards including LRMP standards and guidelines and current ADA accessibility standards. PG&E proposes providing 40 percent of the matching funds up to a maximum of $5,000,000 to the FS to assist with making major improvements to its Lake Almanor facilities. Many of these facilities have very few, if any, ADA-accessible elements and the elements that are there are in need of modification. PG&E has set a limit on the amount of money it would provide to the FS to assist with reconstruction and modifications of these facilities. Improvement of the FS facilities would bring them up to the current standards of the PG&E facilities.

PG&E's proposed modification of the East Shore picnic area into a group camp area would increase the number of group camping areas available at Lake Almanor. Likewise, PG&E's proposal to modify several elements to ADA standards at this facility would improve accessibility at Lake Almanor. Formalizing the trail down to the shoreline and completion of erosion control measures would improve the recreation experience at this site, as well as protect it and water quality in Lake Almanor.

PG&E's proposal to create a swimming area adjacent to the new East Shore group camp area would increase recreational opportunities for visitors to the East Shore campground, as well as day use visitors.

PG&E proposes to provide a new two-loop family campground on the east shore of Lake Almanor once use levels or other indicators reach a defined capacity threshold level. PG&E proposes monitoring campground utilization at Lake Almanor by calculating the capacity utilization of selected campgrounds during the managed use season (primarily mid-May to mid-September) and during the peak months (July and August at most sites). PG&E would annually assess whether use levels are approaching threshold standards to determine if demand warrants construction of another campground in the area.

PG&E's proposal to provide a new and expanded boat launching facility at North Shore campground on Lake Almanor would increase the number of free public launch facilities available on Lake Almanor and would also provide a launch facility at the northern end of the lake, allowing boat users to disperse themselves around the Lake Almanor shoreline. Currently, parking at this site is limited and increasing opportunities for parking at this facility would make this site more desirable and efficient. Dredging and maintaining the existing submerged river channel within the project waters would be necessary to provide an approximately 1,000 foot long, 50 foot wide, and 6 foot deep boat channel that provides boat access to approximately the 4,480-foot elevation (PG&E datum). Dredging activities can be undertaken with minimal effects on water quality as

long as best management practices are in place to control sedimentation and downstream transport of fine-grained sediment that may be resuspended at the dredging site. We anticipate that dredging activities would occur during the fall, when the lake level is typically lower and much, if not all, of the work could be conducted "in the dry."

PG&E's proposed development of the Stover Ranch into a day use area with parking, picnic tables, and a trail to the shoreline would provide easier and improved access to the Lake Almanor shoreline for Chester residents and visitors. Additionally, accommodating a seasonal caretaker at the site would help ensure that the site is maintained in a pleasing manner and should minimize the possibility of vandalism at the site.

PG&E's proposal to modify the existing PSEA swim beach would increase day-use beach opportunities for the public along the Lake Almanor shoreline. Renaming the site "Marvin Alexander Beach" would allow PG&E to pay tribute to a member of the community with a long-time, unwavering interest in Lake Almanor and should help eliminate any public perception that the facility is a private beach.

PG&E's modification of eight existing picnic tables and provision of eight new picnic tables to ADA standards would improve accessibility at the Canyon dam day-use area and bring the facility up to ADA standards. Providing an ADA-accessible parking space and an accessible route to the high water level would also enhance accessibility.

Westwood and Stumpy beaches are currently undeveloped dispersed sites along the eastern shoreline of Lake Almanor. PG&E's proposal to provide facilities at the Westwood and Stumpy beaches would increase day-use beach opportunities for the public along the Lake Almanor shoreline and should attract some of the day use from the western shore. PG&E's proposals to provide elements at these sites in compliance with ADA standards would improve accessibility at Lake Almanor. Additionally, PG&E's provision of erosion control measures would protect the shoreline and the newly created beaches at these sites, and should help maintain water quality in Lake Almanor.

PG&E proposes to attempt to acquire an easement across private lands to provide both public road access and a single vaulted toilet building at Catfish beach, which currently is an undeveloped dispersed site. According to studies conducted by PG&E, fly fishermen expressed concern over the current gated access to Catfish beach, which makes it difficult for older fly fisherman to reach the area they traditionally use to go fishing. This proposal would increase day use beach opportunities for the public along the Lake Almanor shoreline, may disperse some of the use from the western shore, and should address sanitation issues at Catfish beach.

PG&E's proposals for the Almanor scenic overlook would make the site more accessible and also improve the aesthetic appeal of the site for visitors.

PG&E's proposal for the southwest shoreline access zone would formalize some of the existing undeveloped dispersed use in this area. Defining the boundaries of this shoreline vehicular access area would minimize adverse impacts on water quality, cultural resources, and the flora and fauna in the area.

PG&E's proposal to modify several elements to ADA standards at Camp Connery would greatly improve accessibility at this site and allow a broader range of visitors to use the facility. PG&E also proposes to provide a new group camping area adjacent to the existing Camp Connery group camp once use levels or other indicators reach a defined capacity threshold level. PG&E proposes monitoring group campground utilization at Lake Almanor by calculating the capacity utilization of selected campgrounds during the managed use season (primarily mid-May to mid-September) and during the peak months (July and August at most sites). PG&E would annually assess if use levels are approaching threshold standards to determine if demand warrants construction of another group campground in the area.

The FS originally recommended that PG&E provide easements to them for the purpose of extending the LART to the north and to the south. Extending the LART would enhance trail opportunities at Lake Almanor and provide visitors with another means to access sites on the western shore of Lake Almanor without having to drive a vehicle. However, to extend the LART all the way to Canyon dam day-use area and boat launch to the south, the route would pass through sensitive plant and animal habitat and coordination with other resource specialists would be necessary prior to designing a trail in this area. Also, certain use restrictions in this sensitive area may apply. The FS no longer recommends that PG&E grant easements to the FS so that it may extend the LART. We conclude that extension of the LART is not appropriate at this time.

A connection exists between project operations and recreational use of formal and informal recreational sites at Lake Almanor. All of the facilities that PG&E proposes to either construct or provide funding to construct are used as primary access points to Lake Almanor. As such, a clear connection exists between project operations and recreational use of these facilities. Including all of these facilities in the project boundary would provide assurance that improvements would be consistent with project purposes and that PG&E, in cooperation with the FS, would continue to provide recreational access to project lands and waters. We conclude that the facilities proposed for improvement or construction should be included in the project boundary. The FS would own the facilities on NFS land but we consider it appropriate for PG&E to contribute annually to the O&M of project-related recreational facilities.

Butt Valley Reservoir Recreational Facilities and Access

Powerhouse Trails

Within 5 to 10 years after license issuance, PG&E proposes to provide two improved angler access trails to two locations near the Butt Valley powerhouse. One of the trails would be an approximately 200-foot, non-paved trail beginning at the existing gravel parking area next to the powerhouse down the steep slope east of the powerhouse to the levee below, with stairs, if needed. The second trail would be ADA-accessible (compact base rock) originating from an existing pullout along the Prattville-Butt Valley Road near the powerhouse, extending approximately 700 feet to the eastern shoreline of the inlet near the levee. PG&E proposes to develop a new compacted base rock trailhead parking area with barriers for this trail. FS final Section 10(a) condition no. 32(1)A.2.a specifies the same proposal as PG&E, including the same implementation timeline.

Ponderosa Flat Campground

Within 5 to 10 years after license issuance, PG&E proposes to provide a single person, non-heated outdoor shower at Ponderosa Flat campground, and, in accordance with ADA guidelines: modify four campsites and retrofit the existing designated accessible campsites to provide accessibility of the picnic table, fire ring, cooking grill, tent or RV area, and water faucet at each of these campsites; replace the vault toilets in the overflow area with one new accessible single vaulted toilet building and modify all of the other existing designated accessible toilet buildings to meet current ADA standards; provide an ADA-accessible access route to the toilet building near Site 45 and one ADA-accessible paved parking space near the toilet buildings; provide an ADA-accessible swimming area at the campground with an approximately 0.4 acre sandy beach above the high water elevation (4,132 foot elevation, PG&E datum) and a swim delineator; and provide a new ADA-accessible fishing access trail and pier or platform north of the overflow area. FS final Section 10(a) condition no. 32(1)A.2.b specifies the same proposal as PG&E, including the same implementation timeline.

Over the term of the project license period, contingent on reaching the recreation monitoring standards contained in the draft RRMP during the new license term, PG&E proposes to provide approximately 20 new primitive tent campsites, likely to the north of the current overflow area, and a new 100 person capacity group camp area in the existing overflow area. FS final Section 10(a) condition no. 32(1)2.B.1 specifies the same proposal as a potential future recreation enhancement measure.

Cool Springs Campground

Within 5 to 10 years after license issuance, PG&E proposes to provide a two-person, non heated outdoor shower at Cool Springs campground and one new ADA-accessible campsite by modifying the picnic table, the fire ring, the cooking grill, the tent

or RV space, and water faucet. FS final Section 10(a) condition no. 32(1)A.2.c recommends the same proposal as PG&E, including the same implementation timeline.

Alder Creek Boat Launch

Within 5 to 10 years after license issuance, PG&E proposes to expand the existing Alder Creek boat launch parking area to accommodate 10 to 20 additional vehicles with trailers and to improve circulation. PG&E proposes that new parking areas on the east side of the Butt Valley Reservoir Road would be gravel while the parking areas on the west side of this road would be paved. PG&E also proposes to modify the boat launch to be accessible, and provide one ADA-accessible parking space near the existing double vaulted toilet building. PG&E proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary as needed to include all of this facility. FS final Section 10(a) condition nos. 32(1)A.2.d and 32(3) specify the same proposal as PG&E, including the same implementation timeline.

Our Analysis

Butt Valley reservoir is located on the Plumas National Forest. There is no road access to the west side of the reservoir, and all developed facilities are located along the Caribou-Butt Valley Road on the east side of the reservoir. Recreation development at Butt Valley reservoir has focused on a more primitive recreation experience in an attempt to provide a wide spectrum of opportunity from highly developed at Lake Almanor to primitive at Butt Valley reservoir.

PG&E's proposal to provide two angler access trails near the Butt Valley powerhouse would formalize some of the existing user-defined trails in the area. One of the trails is proposed to be ADA-accessible, increasing the diversity of recreation experiences available.

Ponderosa Flat Campground is the second one of only two facilities in the project that provides the minimum number of accessible campsites as required in the draft ADA guidelines. PG&E's proposal to modify several elements to ADA standards at this facility would greatly improve accessibility. The other improvements proposed at this facility would make the facility more desirable to recreation users.

PG&E proposes to provide 20 new primitive tent campsites and a new 100 person capacity group camp area in the existing overflow area at the Ponderosa Flat Campground once use levels or other indicators reach a defined capacity threshold level. PG&E proposes monitoring campground utilization at Butt Valley Reservoir by calculating the capacity utilization of selected campgrounds during the managed use season (primarily mid-May to mid-September) and during the peak months (July and August at most sites). PG&E would annually assess if use levels are approaching threshold standards to determine if demand warrants construction of another campground in the area.

PG&E's proposal to provide a new, fully-accessible campsite at the Cool Springs Campground would bring this facility into compliance with ADA standards.

The new parking areas that PG&E proposes at the Alder Creek boat launch would help accommodate user demand at this facility. PG&E's proposal to modify the boat launch to be ADA-accessible and providing one accessible parking space would improve accessibility at this site. A connection exists between project operations and recreational use of this site and this site is used as a primary access point to Butt Valley reservoir. As such, a clear connection exists between project operations and recreational use of this facility. Including this facility in the project boundary would provide assurance that improvements would be consistent with project purposes and that PG&E, in cooperation with the FS, would continue to provide recreational access to project lands and waters. We conclude that this facility should be included in the project boundary.

Belden Forebay Recreational Facilities and Access

Belden Forebay Access

Within 5 to 10 years after license issuance, PG&E proposes to provide a car-top boat launch, a seasonal portable toilet building, and a gravel parking area for 10 single vehicles at the Belden forebay's existing undeveloped parking area, which also serves as the trailhead for the North Fork fishing trail; provide suitable access for launching small car-top watercraft at the Belden forebay; post signage referring to a Plumas County ordinance (once the ordinance is approved) limiting boat engines to 10 hp, boat speeds to 5 mph on small reservoirs such as the Belden forebay, prohibit swimming or boating within 0.25 mile of Belden dam and prohibit swimming or boating at night. FS final Section 4(e) condition no. 32(1)A.3.a also specifies the same proposal as PG&E, including the same implementation timeline.

North Fork Fishing Trail

Within 1 to 3 years after license issuance, PG&E proposes to improve the North Fork fishing trail from the Belden forebay parking area to the upstream side of Caribou powerhouse 1, including retrofitting the existing metal trail decking and railing at the powerhouse above the turbine outlets providing enhanced access and safety, trail directional signs, and a wider, more even non-paved trail base along the chain-link fencing at the powerhouse yard and along Caribou Road from the parking area. FS final Section 4(e) condition no. 32(1)A.3.b specifies the same proposal as PG&E, including the same implementation timeline.

Our Analysis

There are no developed boating-related facilities at the Belden forebay. PG&E's proposal to provide access for boaters to launch their car-top boats at the Belden forebay would address angler needs and user demand at this site. Providing a parking lot and a toilet building would address any sanitation concerns at the site. The North Fork fishing

trail is the only developed non-motorized trail on the project river reaches and receives regular use by anglers. Improving the trail would prevent site degradation and ensure the safety of trail users.

Bypassed River Reaches

Upper Belden Reach River Access

Prior to the initiation of any recreation release flows, PG&E proposes to provide a river access point at the upstream end of the Belden reach located at the spoil pile area which would include a seasonal portable toilet, a seasonal dumpster located over a concrete pad, and a non-paved parking area to accommodate 15 to 25 single vehicles. PG&E proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include this facility. FS final Section 4(e) condition nos. 32(1)A.4.a and 32(3) specify the same proposal as PG&E.

Belden Reach Trails

Within 1 to 3 years after license issuance, PG&E proposes to provide and maintain four trails to the Belden reach shoreline from existing informal parking areas where public access can be provided in a safe manner. PG&E proposes to apply to the Commission within 1 year of license issuance to adjust the UNFFR Project boundary to include these facilities. FS final Section 4(e) condition nos. 32(1)A.4.b and 32(3) specify the same proposal as PG&E, including the same implementation timeline.

Belden Rest Stop (SR 70)

Within 3 to 5 years after license issuance, PG&E proposes to relocate the existing picnic tables down to the rest stop's lower level and disperse them within the area from the Eby Stamp Mill to the gazebo near the creek; replace two of the tables with ADA-accessible tables; develop ADA-accessible routes to the gazebo, the overlook area next to the creek, and to the Eby Stamp Mill historical features; and provide improved I&E elements at the rest stop and erosion control measures on the slope between the parking lot and the upper picnic area. PG&E also proposes to remove the existing cooking grills from the upper level and closing that area. FS final Section 10(a) condition no. 32(1)A.4.c specifies the same proposal as PG&E, including the same implementation timeline.

Lower Belden Reach River Access

If a determination is made to proceed with scheduled river recreation flows, PG&E proposes to provide up to a maximum of $125,000 (2005 dollars) to the FS for construction of non-Project river access to the lower Belden reach. PG&E expects the FS to make a good faith effort to obtain matching funds to help offset the cost of these improvements.

FS preliminary Section 4(e) condition no. 44H.1 recommended that PG&E prepare a river recreation facilities plan in consultation with the Technical Review Group and approved by FS, if a determination is made to proceed with scheduled river recreation flows. The FS further recommended that PG&E provide up to $125,000 for construction of essential facilities including access facilities at a site determined by the FS, with paved parking, restroom, picnic table, bear-proof garbage disposal and reasonable access to launch and retrieve kayaks and rafts.

FS final Section 10(a) condition no. 32(1)A.4.d specifies the same proposal as PG&E except that the FS clarifies that the $125,000 is in constant dollars and not subject to escalation.

Our Analysis

The Seneca and Belden reaches provide many dispersed recreation use opportunities, especially the Belden reach. Formalizing access points at the upper and lower ends of the reach would address environmental concerns related to riparian areas at these locations. Likewise, providing and maintaining trails to the shoreline should discourage the formation of informal trails, thus addressing environmental concerns at this site. Regular maintenance of the trails to the shoreline of the Belden reach should also ensure user safety.

The Belden Rest Stop receives year-round use due to its location on SR 70, which is plowed in the winter. It is primarily used by motorists for short periods of time. PG&E's proposal to provide two ADA-accessible picnic tables would bring the facility into compliance with the draft ADA guidelines. PG&E's proposal to modify other elements at this facility to ADA standards would greatly improve accessibility at this site and allow a broader range of visitors to use the facility. Safety for all users would be enhanced with the closure of the upper picnic area. The other improvements proposed at this facility would make the facility more desirable to visitors and may encourage extended visits at the site. Additionally, PG&E's provision of erosion control measures would protect the environmental quality of the area, and should help maintain a pleasing aesthetic quality at the site.

Whitewater boating flows may be proposed in the Belden reach and there is potential for implementation of scheduled recreational boating releases there in the future. PG&E proposes providing an improved access point at the upper end of the Belden reach for a boater put-in location. This access point would accommodate use issues such as vehicle parking and sanitation issues at this location. Additionally, PG&E proposes providing funding to the FS for construction of a non-project river access point to provide a boater take-out location. Any amenities provided at this site, would be based on an assessment of user needs by the FS and PG&E.

A connection exists between project operations and recreational use of informal recreational sites in the Belden reach. All of the facilities that PG&E proposes to either construct or provide funding to construct are used as primary access points to the Belden reach. As such, a clear connection exists between project operations and recreational use of these facilities. Including all of these facilities in the project boundary would provide assurance that improvements would be consistent with project purposes and that PG&E, in cooperation with the FS, would continue to provide recreational access to project lands and waters. We conclude that the facilities proposed for improvement or construction should be included in the project boundary. The FS would own the facilities on NFS land but we consider it appropriate for PG&E to contribute annually to the O&M of project-related recreational facilities.

Recreation Operations and Maintenance Program

In the draft RRMP, PG&E states that it expects to allocate most of the day-to-day recreation facility management responsibility for its facilities to a PG&E-contracted concessionaire who would be responsible for all necessary personnel, equipment, materials, and management. PG&E also states that it expects that all existing and future recreation facilities owned and operated by entities other than PG&E would be operated and maintained by their current providers. However, as a component of the draft RRMP and identified in the SA, PG&E proposes assuming responsibility for operational maintenance and heavy maintenance of the following FS facilities prior to the start of the first recreation season following license issuance: the Dyer View day-use area, the Canyon dam boat launch and day-use area, and the Almanor boat launch. Additionally, as each recreation facility is individually constructed, PG&E proposes to assume responsibility for operational maintenance and heavy maintenance for the southwest shoreline access zone facilities described in the recreation facilities development program. Further, PG&E proposes that, within 6 months after the FS has completed construction of each of the recreation improvements it had planned for the FS Almanor Family Campground and Amphitheater, the FS Almanor Group Campground, and the FS Almanor beach, it would apply to FERC to incorporate these additional FS facilities within the FERC project boundary and to include these facilities in the O&M program.

PG&E proposes that its operational maintenance and heavy maintenance of FS facilities would be consistent with FS standards, applicable laws, regulations, codes and other legal direction. PG&E proposes that it would not be responsible for any future reconstruction of FS facilities.

PG&E proposes to be responsible for operational maintenance and heavy maintenance at FS facilities. To offset its operational and heavy maintenance costs and reasonable administrative costs, PG&E proposes to collect and retain 100 percent of FS-approved reasonable user fees at all FS recreational facilities that PG&E operates and maintains with the intent that the fees would be sufficient to cover PG&E's costs over the term of the license. These fees may also cover any matching contribution PG&E made

toward initial construction of recreation improvements at FS facilities. Collection of user fees would be done in accordance with FERC, FS, and applicable California Department of Boating and Waterways regulations. PG&E proposes to track costs and revenues in a balancing account and providing the FS with an annual accounting. PG&E proposes that funds derived from user fees may be accumulated from year to year to address larger heavy maintenance projects. At the end of the license term, PG&E proposes that any funds remaining in the balancing account would be used to offset its matching contribution toward initial construction of recreation improvements at FS facilities.

Prior to assuming responsibility for the operational maintenance and heavy maintenance of these FS facilities, PG&E proposes to enter into an FS-approved operation agreement or other appropriate authorization with the FS that addresses PG&E's obligations as defined in the SA. PG&E proposes to meet with the FS and Plumas County every 5 years, or as necessary, to determine whether the fees are sufficient to meet their proposed purposes, and if not, to make necessary adjustments. PG&E further proposes to meet with the FS and Plumas County at least annually to review the operational maintenance and heavy maintenance of FS facilities included in the license and to adjust maintenance levels as necessary.

As part of the O&M program, PG&E proposes to work with the Plumas County Sheriff's Department and its Marine Patrol to provide for adequate public safety on project lands and waters. PG&E proposes to develop a new Memorandum of Understanding with the Plumas County Sheriff's Department that would define activities proposed at the UNFFR Project. PG&E proposes to coordinate with the Plumas County Sheriff's Department to provide for continued seasonal marine patrols of Lake Almanor and land patrol of project lands within the project boundary. PG&E proposes that the Marine Patrol would be responsible for marking and/or removing floating hazards in the lake per the new MOU, enforcing existing county ordinances regarding watercraft speed limits and no-wake zones, and enforcing new vehicular access restrictions below the 4,500-foot elevation at Lake Almanor (once a new county ordinance is approved). The Marine Patrol would be assisted by land-based Sheriff's Department patrols to help enforce existing county campfire restrictions and new county vehicular access restrictions below the 4,500-foot elevation at Lake Almanor.

In its November 4, 2004, filing with the Commission, the FS reflects PG&E's proposal as described in the SA in its final Section 4(e) condition no. 33 and specifies that PG&E assume responsibility for operational maintenance and heavy maintenance of the following FS facilities prior to the start of the first recreation season following license issuance: the Dyer View day-use area, the Canyon dam boat launch and day-use area, and the Almanor boat launch. Additionally, as each recreation facility is individually constructed, the FS specifies that PG&E assume responsibility for operational maintenance and heavy maintenance for the southwest shoreline access zone facilities described in the recreation facilities development program. In its final Section 4(e)

condition no. 32(3), the FS further specifies that, within 6 months after the FS has completed construction of each of the recreation improvements it has planned for the FS Almanor Family Campground and Amphitheater, the FS Almanor Group Campground, and the FS Almanor beach, that PG&E would apply to FERC to incorporate these additional FS facilities within the FERC project boundary and to include these facilities in the O&M program.

FS final Section 4(e) condition no. 33 defines operational maintenance as maintenance or reconditioning that neither materially adds to the value of the property nor appreciably prolongs its life and serves only to keep the facility in an ordinary, efficient operating condition. Operational maintenance includes work that may be expensed. FS final Section 4(e) condition no. 33 defines heavy maintenance as maintenance or reconditioning that arrests deterioration and appreciably prolongs the life of the property and includes expenditures may be capitalized. FS final Section 4(e) condition no. 33 further specifies that PG&E's operational maintenance and heavy maintenance of FS facilities be consistent with FS standards, applicable laws, regulations, codes, and other legal direction. FS final Section 4(e) condition no. 33 specifies that PG&E would not be responsible for any future reconstruction of the FS facilities listed. The FS also specifies that PG&E collect and retain 100 percent of the FS-approved reasonable user fees at all FS recreation facilities that PG&E operates and maintains in accordance with Commission, FS, and applicable California Department of Boating and Waterways regulations. The FS specifies that these user fees be used to offset PG&E's operational maintenance, heavy maintenance, and reasonable administrative costs, with the intent that the fees would be sufficient to cover these costs over the term of the license,

Our Analysis

The O&M program is a component of the draft RRMP and has also been proposed by PG&E in the SA and recommended by the FS. Ongoing and adequate O&M of existing and future recreation facilities is critical to visitor enjoyment and effective recreation resource management. A partnership between PG&E and the FS for O&M of FS recreation facilities would be beneficial for a number of reasons: FS funding is often too low and unpredictable to adequately maintain facilities and meet growing needs; PG&E is able to provide more consistent management over the life of the license than the FS, which is subject to changing budgets based on Congressional appropriations; PG&E would be able to realize all receipts received from the recreational facilities which would provide substantially more revenues to invest in the facilities for maintenance and standard upgrades over the life of the license; adjacent project facilities would be managed more consistently, reducing visitor confusion over management practices; and funding for the facilities would be provided in a more efficient and consistent manner, which should result in improved public service and increased user satisfaction.

Interpretation and Education Program

As a component of the draft RRMP and identified in the SA, PG&E proposes to develop an I&E program for the project in consultation with the FS, Plumas County, and other stakeholders within 2 years after license issuance. PG&E proposes to submit the portion of the I&E program that pertains to FS facilities to the FS for its approval and to implement the program within 1 year of program approval by the Commission. PG&E proposes that the I&E program would provide information to enhance recreation experiences and encourage appropriate resource protection, cooperative and safe behaviors from project visitors. PG&E proposes that the I&E program would include themes, media, media design, prioritized sites, and prioritized services. Potential themes that PG&E proposes include fish and wildlife resources, volcanic history, hydropower, Native American cultures, pioneers, recreation activities and facilities available in the project area, and boating hazards. The program as PG&E proposes it in the SA would include improvements such as interpretive or informational signs, kiosks, reservoir boating safety and hazard information signs and brochures, and informational signs describing recreation facilities and opportunities in the area. PG&E proposes that development of improvements contemplated in the I&E program would be at recreation sites owned by PG&E and the FS that are to be included within the project boundary. PG&E also proposes that the I&E program would identify funding partnership arrangements with the FS and other interested parties, and would include a schedule for implementation. PG&E proposes to review facility naming practices with the FS and re-naming facilities with similar names to reduce visitor confusion. PG&E proposes that wording of entrance signs to facilities operated by PG&E but owned by the FS would be completed in agreement with the FS. PG&E also proposes to prepare a Lake Almanor bathymetric (underwater topographic) map within 1 year of license issuance, which would be available in pamphlet form to area boaters and posted on signs at Lake Almanor public boat ramps.

In its November 4, 2004, filing with the Commission, the FS specifies in final Section 4(e) condition no. 34, that PG&E develop an I&E program with the same elements as PG&E's proposed I&E program, including developing the program within 2 years of license issuance.

Our Analysis

The I&E program is a component of the draft RRMP and has also been proposed by PG&E in the SA. Development of an I&E program would help provide a means to disseminate information regarding project-area resources, facilities, and management issues to members of the public who currently use the project area and to members of the public who may be interested in using the area. This information would provide a means to help educate the public about safety factors to consider within the project area and the potential effects of recreational use on sensitive project-area resources. An I&E program

would also help with coordination of the types of information that should be provided to the public and the best methods for providing it.

The proposed bathymetric map would provide valuable information such as submerged hazards and pool depth to boaters that visit Lake Almanor. The map would be especially useful during times of the year when the water level of Lake Almanor is below full pool. PG&E's proposal to provide copies of the bathymetric map at the public boat ramps on Lake Almanor would ensure that the boaters who launch their watercraft there have been exposed to information included on the map such as underwater boating hazards, and may improve the recreation experiences of these individuals as well as enhancing safety.

Recreation Monitoring Program

As a component of the draft RRMP and identified in the SA, PG&E proposes to complete a recreation monitoring program in consultation with the FS, Plumas County, and other interested parties within 1 year after license issuance. PG&E proposes to submit that portion of the recreation monitoring program pertaining to FS facilities to the FS for its approval. In the recreation monitoring program, PG&E proposes adopting the limits-of-acceptable-change (LAC)-based monitoring approach as described in the October 2002 draft of the RRMP. This approach includes recreation monitoring indicators and standards that would initiate management action to help maintain desired recreation experiences and resource conditions at project recreation areas over the license term. PG&E proposes specifically monitoring the following recreation areas at a minimum: the water surface of project reservoirs, and PG&E and FS recreation facilities and shoreline areas within the project boundary. PG&E proposes including a schedule of information to be collected annually, every 6 years, or every 12 years in the recreation monitoring program. PG&E also proposes more in-depth monitoring, such as visitor questionnaire surveys and general assessment of regional recreation trends at 12-year intervals. PG&E proposes preparing periodic monitoring reports every 6 years in conjunction with FERC Form 80 recreation facility and use monitoring requirements. As part of the monitoring program, PG&E proposes conducting annual recreation planning and coordination meetings with other recreation providers in the project area to discuss recreation resource management decisions for the project area, implementation of project recreation enhancements, recreation monitoring results, potential grant applications, and other pertinent project-related recreation issues that may arise over the term of the new project license. If recreation test river flows are conducted, PG&E proposes to develop a study plan to monitor recreation use during the test flow period and producing a report on monitoring results in consultation with the FS and other interested parties.

In its December 1, 2003, filing with the Commission, the FS recommended, as preliminary Section 4(e) condition no. 42, that PG&E prepare a recreation monitoring and survey plan in consultation with the FS, Plumas County, and other interested parties that would be approved by the FS and filed with the Commission within 12 months of

license issuance. The FS also recommended that PG&E complete FS-approved reports on recreational resources and file them with the Commission. The FS wanted to reserve the right to require changes in the project and its operation, after notice and opportunity for comment and administrative review, through revision of the Section 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest resources identified in those surveys. The rest of preliminary Section 4(e) condition no. 42 is consistent with the proposal in the SA.

In its November 4, 2004, filing with the Commission, the FS specifies in final Section 4(e) condition no. 35 developing a recreation monitoring program with the same elements as PG&E's proposed recreation monitoring program, including development of the program within 1 year of license issuance.

Our Analysis

The recreation monitoring program is a component of the draft RRMP and has also been proposed by PG&E in the SA. Implementation of a recreation monitoring plan would provide measures to assess the adequacy of the recreational facilities, the effects of recreational use on the project area's resources, recreational-use capacity issues, and the opportunity to adjust recreational facility development and management over the term of a new license.

The proposed stakeholder consultation and annual recreation coordination and planning meetings would ensure that all of the recreation providers and managers are in agreement with regard to the necessary improvements at the project. Implementation of the recommended recreation monitoring plan and associated stakeholder consultation would provide the opportunity for the review of the recreational facilities and maintenance over the term of the license.

A report on the recreation monitoring and coordination would allow the Commission to review the proposed recreation facilities as they are planned or as modifications are required over the course of the license. Such a report would be best suited to a similar time schedule as the FERC Form 80 requirements. This report could include the recreational monitoring results, documentation of consultation, and a summary of planned recreational facility improvement measures or resources protection mitigation measures associated with the recreational facilities within the project boundary, schedule information, the party responsible for funding and implementing the measures, estimated costs for implementation, and the entity responsible for the long-term maintenance and management of the planned recreational facilities and/or mitigation measures.

Resource Integration and Coordination Program

As a component of the draft RRMP and identified in the SA, PG&E proposes to hold annual public meetings to coordinate recreation resource needs with other resource

management needs such as cultural, wildlife, and aquatic resources with appropriate agencies and stakeholders over the term of the new project license.

In its December 1, 2003, filing with the Commission, Interior recommended that PG&E develop a recreational activities monitoring plan, to monitor the potential effects of camping, angling, access, and boating flows (if adopted) on fish and wildlife resources. Interior would like for elements of the plan to include a comparison of data on recreational activities use, distribution, and expansion to fisheries and raptor monitoring data. Interior would also like for the plan to include elements to assess the effects of recreational use and facility development on local vegetation resources.

In its November 4, 2004, filing with the Commission, the FS specifies in final Section 4(e) condition no. 36, developing a resource integration and coordination program with the same elements as PG&E's proposed resource integration and coordination program.

Our Analysis

The resource integration and coordination program is a component of the draft RRMP and has also been proposed by PG&E in the SA. A similar program has been recommended by Interior. Results of the recreation monitoring conducted at the project would provide information on the effects of recreational use on the project area's resources and the opportunity to adjust recreational facility development and management over the term of a new license. Monitoring of recreation at the project should be designed so that effects on a variety of resources are addressed, not just recreation-related interests. This would help ensure that minimal adverse effects on the project area's sensitive resources, such as cultural resources, would occur as a result of project-area recreational use.

A number of parties have oversight for and an interest in various natural resources, commercial interests, and community interests that may be affected either positively or negatively by recreational pursuits. By holding specific coordination meetings, information obtained in previous years, as well as results of current surveys can be reviewed and discussed. Data obtained from ongoing recreation surveys would assist in making any needed changes in management of the area and for future planning.

Recreation Resource Management Plan Review and Revision Program

In the draft RRMP and in the SA, PG&E discusses unforeseen recreation needs, changes in visitor preferences and attitudes, and new recreation technologies that would likely occur over the term of the license. PG&E proposes that the frequency with which the RRMP is revised or updated should be dependent on significant changes to existing conditions, monitoring results, and management responses made over time. Therefore, PG&E proposes that the frequency of RRMP updates should not exceed every 12 years and should be based on consultation with the FS, other parties to the SA, and the

SWRCB, and other interested parties during monitoring and coordination meetings and through other appropriate sources.

In its November 4, 2004, filing with the Commission, the FS specifies in final Section 4(e) condition no. 37 developing a RRMP review and revision program with the same elements as PG&E's proposed RRMP review and revision program.

Our Analysis

The RRMP review and revision program is a component of the draft RRMP. Updating the RRMP at 12-year intervals allows for two FERC Form 80 reporting periods to take place before any changes to the RRMP may occur. Additionally, meeting every 6 years to review the data provided in the FERC Form 80 report would provide PG&E and interested stakeholders the opportunity to identify and assess changes and trends that have occurred or are occurring over time, and to distinguish them from simple annual variability. Therefore, any changes to the RRMP would be appropriate and would address needed change in the direction of the program. As stated above, the proposed stakeholder consultation, monitoring, and reporting would ensure that the needs of the public are met throughout the term of the license.

Final Recreation Resources Plan

In its December 1, 2003, filing with the Commission, Interior recommended, in its Section 10(a) condition no. 2, that PG&E develop a final recreation resources plan that provides for a diverse range of recreational opportunities on Lake Almanor and the river reaches including a comprehensive listing of capital investments, facility enhancements, and programmatic elements and delineate which entity is responsible for paying for such investments and improvements and have a schedule indicating when it would take place.

Our Analysis

PG&E proposes to finalize the draft RRMP in consultation with the FS and Plumas County within 1 year of license issuance. The six programs included in the draft RRMP, described in detail above, would address Interior's recommendation.

Fishery Programs

PG&E proposes to annually provide up to $50,000 (2004 escalated dollars) to: (1) reimburse CDFG for stocking approximately 5,000 pounds of catchable trout per calendar year in the waters of the NFFR between its confluence with the EBNFFR and the Belden diversion dam; and (2) to augment CDFG's existing Lake Almanor fisheries program. PG&E proposes that its cost for fish stocking in the NFFR should be the actual average hatchery production cost per pound to the CDFG, and any applicable distribution and planting costs. PG&E also proposes that any augmented fisheries program in Lake Almanor may include, but is not limited to, such projects as the expansion of the pen rearing program and the construction of rearing habitat for warmwater fish.

In its final Section 10(a) condition no. 32(4), filed November 4, 2004, the FS recommends the same proposal for funding the fishery programs as PG&E.

Our Analysis

Bank fishing is one of the most popular dispersed uses in the project's bypassed reaches. Also, the CDFG has a long history of developing and maintaining the popular reservoir fishery in Lake Almanor. The fishery in Lake Almanor is primarily for salmonids (trout and related species) and bass (smallmouth and largemouth). Since the salmonid fishery is not self-sustaining, CDFG annually stocks large numbers of hatchery-reared fish in Lake Almanor. According to PG&E's recreation visitor survey results, approximately 71 percent of the visitors to Lake Almanor have fished at Lake Almanor and fishing was the second most common activity enjoyed at Lake Almanor.

According to studies completed by PG&E, demand for fishing is currently high in California. In the UNFFR Project area, 71 percent of visitors participate in fishing either from the shoreline or from a boat. PG&E determined that fishing is increasing in demand in the project area annually at 0.6 percent for both boat angling and bank angling. Demand for each of these types of angling is expected to increase by 23 percent in the project area over the term of the license. However, fishing has been experiencing a decrease in the number of participants in California, based on the number of fishing licenses sold from 1996 to 2000. The sale of both resident and non-resident fishing licenses has decreased nearly 10 percent since 1996, with non-resident 10-day licenses experiencing the largest decrease (approximately 14 percent). PG&E conducted a study of overall fishing needs in the project area, and availability of catchable fish was not considered an issue. However, we believe that maintaining the current stocking program at the project is beneficial at this time. Visitors to the project currently enjoy fishing there and may tailor their fishing trip in anticipation of catching certain species of fish currently stocked in the project area. PG&E proposes monitoring recreational activities on the surface of project reservoirs and along the shoreline areas within the project boundary, as part of its recreation monitoring program included in the draft RRMP. Information on fishing use at the project would be determined though these activities, and the need to continue or modify the fish stocking program over the term of the license should be addressed as part of the monitoring program.

River Ranger Funding

PG&E proposes providing up to $25,000 (2004 dollars) to the FS by March 1 of each year of the new project license to assist in funding a river ranger position to provide additional light maintenance, visitor information/assistance, user safety, and law enforcement presence in the project's bypassed river reaches. PG&E further proposes that, by January 31 of each year during the term of the new license, the FS would provide it with a written summary of the previous year's expenditures and river ranger activities and the current year's planned expenditures and river ranger activities. FS final Section

4(e) condition no. 38, filed November 4, 2004, also specifies the same proposal as PG&E's.

Our Analysis

The addition of a river ranger along the project river reaches could enhance the recreation experiences of some of the visitors to the project river reaches. The implementation of a seasonal position would likely increase visitor awareness of federal, state, county, and local regulations and laws. This increase in awareness could lead to an increase in compliance with those laws and regulations, and a greater degree of resource protection resulting from increased compliance. In addition, the position would provide opportunities to increase visitor satisfaction by helping to disseminate project information at various recreation facilities throughout the project area.

However, law enforcement at the UNFFR Project is the responsibility of the FS and Plumas County. PG&E pays property taxes to Plumas County that relate to the operation of its UNFFR Project. A portion of the tax payment would be expected to fund law enforcement activities associated with continued project operation. The FS is responsible for enforcing the natural resource protection provisions of the Plumas National Forest LRMP. Neither Plumas County nor the FS has provided any data to indicate the need for PG&E to fund a river ranger position to patrol the UNFFR Project area. Security at the project development is the responsibility of PG&E.

We find no indication that law enforcement within the project area is inadequate, or that additional assistance is needed to complement the current levels of law enforcement. PG&E has proposed, and the FS has specified, that PG&E provide $25,000 a year to the FS to assist in funding a river ranger position in order to provide additional light maintenance, visitor information/assistance, user safety, and law enforcement presence in the project's bypassed river reaches. However, funding a river ranger position, as specified and proposed, provides no assurance that the river ranger would be used exclusively in the project area, in addition to the current levels of patrols in the project area. As such, there is no indication that the proposed measure would reduce any existing recreational conflicts or further protect project environmental resources for the term of the new license.

Recreation River Flow Management

Recreation River Flow Technical Review Group

PG&E proposes establishing a TRG within 6 months of license issuance for the purpose of consulting with PG&E in the design of recreation and resource river flow management and monitoring plans, reviewing and evaluating recreation and resource data, and in developing possible recreation river flows in the Belden reach. The TRG would include representatives of the FS, CDFG, SWRCB, FWS, NPS, Plumas County, and other parties to the SA. TRG meetings would be open to and accept comments from

the public. PG&E proposes maintaining, and making public, records of TRG meetings, and forwarding those records with any recommendations to the FS, SWRCB, and the Commission. PG&E also proposes establishing communication protocols in consultation with the TRG to facilitate interaction among TRG members, which would allow for open participation, consultation with independent technical experts, and communication among all TRG participants.

FS final Section 4(e) condition no. 28(1) also specifies the same proposal as PG&E's.

Recreation Flow Implementation Plan

PG&E proposes implementing the following RFIP:

1. Determination to Proceed with Test Flows—Within 6 months after license issuance, PG&E proposes convening the TRG to evaluate the existing available ecological information regarding recreation river flows to make a determination whether (a) sufficient information exists to conclude that recreation river flows would result in unacceptable impacts on sociological or ecological resources; or (b) recreation river test flows as prescribed in table 3-32 should be conducted to further evaluate the ecological and social effects of the recreation river flows in the Belden reach. If the TRG determines that recreation test flows should be conducted, it would not recommend any flow schedule that exceeds the frequency, magnitude, or duration of flows prescribed in table 3-32. Within 6 months of convening the TRG, PG&E proposes forwarding the TRG recommendations regarding recreation test river flows to the FS and SWRCB.
2. Approvals to Proceed with Test Flows—If the TRG recommends that recreation test river flows in the Belden reach should be conducted, the FS and SWRCB would consult with appropriate state and federal agencies, PG&E, tribal governments, and other interested parties prior to approving, denying, or modifying the TRG's proposal. If the FS and SWRCB approve a proposed schedule for recreation test river flows that does not exceed the frequency, magnitude, or duration of flows prescribed for any given month in table 3-32, then PG&E proposes submitting the proposal to FERC for approval.
3. Conducting Test Flows—Upon approval from FERC, PG&E proposes conducting the recreation test river flows as prescribed in table 3-32 for a 3-year period.
4. Monitoring—PG&E proposes preparing and submitting to the FS and SWRCB for their review and approval, concurrent with the TRG recommendation, a Belden reach recreation test river flow evaluation plan. Upon FS and SWRCB approval, PG&E proposes submitting the plan to

FERC for approval. The plan would be designed to evaluate the effects of the recreation test river flow releases on ecological and social resources, and the metrics to be used in this determination. Upon approval of the plan by the Commission, PG&E proposes implementing the plan during the 3-year recreation test flow period.

5. Determination of Continued Flows—After the 3-year recreation test river flow period, PG&E proposes convening the TRG to evaluate the existing available ecological and social information. The TRG would make a recommendation regarding whether recreation river flows should be continued to meet the river flow management for recreation objective. The TRG would not recommend any flow schedule that exceeds the frequency, magnitude, or duration of flows prescribed for any given month in table 3-32.

6. Approval of Results of Determination of Continued Flows—Any recommendation regarding continued recreation river flows made by the TRG would be submitted to the FS and SWRCB. The FS and SWRCB would consult with appropriate state and federal agencies including FWS, PG&E, tribal governments, and other interested parties prior to approving, denying, or modifying the TRG's proposal. If the FS and SWRCB approve a proposed schedule for continued recreation river flows that does not exceed the frequency, magnitude, or duration of the flows prescribed for any given month in table 3-32 below, PG&E proposes submitting the proposal to FERC for approval.

FS final Section 4(e) condition no. 28(2) specifies that PG&E would implement the RFIP as described above.

Recreation River Flows

PG&E proposes implementing the recreation river flow schedule and other provisions presented in table 3-32, subject to the RFIP described above.

Recreational Flow Calendar and Additional Flow Days

PG&E proposes posting an annual recreation flow calendar scheduling the initial recreation flow day per month through a third party or other mechanism. PG&E proposes conducting an annual planning meeting each year in March to discuss expected water year type, results of monitoring efforts, PG&E maintenance needs that may conflict with recreation flow releases, and other relevant issues. PG&E further proposes that the TRG recommend the desired date of the month for any additional recreation river flow release days triggered by the number of boats per day as described below based on evaluation of social and ecological considerations.

Table 3-32. Belden reach recreation river flow schedule.[a] (Source: PG&E, 2004a)

Month	Release Amount (cfs)		Release Days Per Month				Boats Per Day Triggers	
	Dry/ Crit. Cry	Norm./ Wet	Crit. Dry Start	Crit. Dry Cap	Dry/ Norm./ Wet Start	Dry/ Norm./ Wet Cap	Wet and Normal/Dry	
							Up	Down
July	650	750	1 day	1 day	1 day	2 days	>100	<100
Aug/Sep/ Oct	650	750	1 day	1 day	1 day	2 days	>100	<100

Notes: Water year types are determined by PG&E based on the predicted, unimpaired inflow to Lake Oroville and the spring snowmelt runoff forecasts provided by PG&E and CDWR each month from January through May. Water year types are defined as follows:

- Wet Water Year Type—greater than or equal to 5,679 thousand acre-feet (TAF) inflow to Oroville is predicted.
- Normal Water Year Type—less than 5,679 TAF, but greater than or equal to 3,228 TAF inflow to Oroville is predicted.
- Dry Water Year Type—less than 3,228 TAF, but greater than or equal to 2,505 TAF inflow to Oroville is predicted.
- Critically Dry Water Year Type—less than 2,505 TAF inflow to Oroville is predicted.

[a] Flow releases would occur between the hours of 10 a.m. and 4 p.m. for the first day and between the hours of 10 a.m. and 2 p.m. for the second release day during wet and normal water years, and between the hours of 10 a.m. and 1 p.m. during dry and critically dry years for both release days.

Recreation River Flow Postponement

PG&E proposes postponing any scheduled recreation river flow release in the event of an emergency. PG&E proposes providing as much notice as reasonably practicable under the circumstances.

If practicable, PG&E proposes rescheduling postponed recreation river flow releases as recommended by the TRG.

Triggers for Adjustments

During scheduled recreation river flows, PG&E proposes counting observed boater use in number of boats per day to determine whether recreation flow release days should be added or subtracted. All boats would be counted as one boat except for rafts 12 feet or greater in length, which would be counted as two boats. All boats observed on the

Belden reach for any part of a given day would be counted. If the number of boats per day on the first recreation river flow day for a month exceeds 100 boats per day, one day of recreation river flow would be added to the recreation river flow schedule in that month the next year. If the number of boats per day is less than 100 boats per day for both the recreation river flow releases in one month, one day of recreation river flow would be subtracted from the recreation river flow schedule for the that month in the next year. Recreation river flow releases would not decrease below one day per month and would not exceed the cap defined in table 3-32. Recreation river flow release days would not be added or subtracted during any period of recreation test river flows.

PG&E also proposes developing and implementing a visitor survey for up to 3 years to determine if visitors would choose to return to recreate on the Belden reach based on their experience related to the number of boats encountered on the river. The visitor survey questionnaire and methodology would be statistically valid and approved by the TRG. The TRG would evaluate the survey results and other data to determine if the trigger for adding/deleting days, based on the number of boats per day, should be amended based on this analysis.

Ramping Rates

PG&E proposes applying the basic ramping rates when implementing recreation river flows. The basic ramping rate at Canyon dam is 0.5 foot per hour up and down, in all months, as measured at NF-2. The proposed basic ramping rate at Belden dam is also 0.5 foot/hour up and down, in all months, as measured at NF-70.

Streamflow Information

PG&E proposes creating a calendar that lists the dates of the March pulse flow in the Seneca reach and any scheduled pulse flow or recreation river flow releases in the Belden reach, and making that calendar available on the Internet through a third party or other mechanism. The calendar would state the timing and magnitude of the scheduled flow release. The March pulse flow release in the Seneca reach would be posted by February 15, and the scheduled summer releases in the Belden reach would be posted by May 15. If PG&E anticipates releasing flows of a similar magnitude and duration as a scheduled pulse flow in the Seneca or Belden reaches, it proposes posting an estimate of the release magnitude and duration of the flow.

In its Section 10(a) condition no. 1, filed December 1, 2003, Interior recommends that PG&E implement a flow schedule similar to the one shown in table 3-31, and concurred with the elements for managing the recreation river flow listed in the SA, including the establishment of a TRG and the consideration of river test flows.

CDFG, in its November 26, 2003, letter to the Commission, indicates that it would support the recreation river flow management program as proposed in a previous version of the SA. CDFG states that it supports this proposal since the agreement language states

that the recreational flow proposal would go forward only if the available information suggests that there would be no unacceptable impacts on sociological and ecological resources.

In their December 1, 2003, letter to the Commission, AW, Chico Paddleheads, and Shasta Paddlers concur with the recreation river flow proposal included in a previous version of the SA with the following exceptions: including whitewater releases during the month of June; modifying the number of boaters necessary to trigger modification of whitewater releases to 80 boaters for the up-trigger and 25 boaters for the down-trigger; scheduling dates for the actual releases in coordination with releases on the Rock Creek-Cresta Project; and an adaptive management team limited to parties to the SA with responsibility for providing recommendations to the regulatory agencies and PG&E and no decision-making authority.

In its response to AW, Chico Paddleheads, and Shasta Paddleheads in a letter filed with the Commission on January 15, 2004, PG&E disagrees with the recommended number of boaters necessary to trigger modification of the whitewater flow releases and explained the calculation and rationale used in the license application to determine the boater use trigger.

In its final Section 4(e) condition no. 28(3), filed November 4, 2004, the FS specifies the same flow schedule, triggers for adjustments, ramping rates, and streamflow information provision as are in PG&E's proposal.

Our Analysis

The proposal to provide recreational whitewater flows in the Belden reach would, if implemented, enhance whitewater boating opportunities in the area. The proposed TRG would ensure that whitewater boating provisions would not cause irreversible damage to terrestrial, aquatic, or other recreational values in the Belden reach of the UNFFR, such as habitat for sensitive wildlife species, riparian vegetation, and developed and dispersed camping in the Belden reach. The up and down triggers for increases and decreases of the number of days would ensure that the benefits of the whitewater releases are commensurate with demand. The trigger numbers that were developed for the Rock Creek-Cresta Project may not necessarily be appropriate for this project. Given the features of the Belden reach and relative inaccessibility, up and down triggers specific to the Belden reach developed by the TRG would provide triggers that are more appropriate. As stated in section 3.3.4, *Threatened and Endangered Species*, there is a potential for recreational whitewater flows to negatively affect the federally threatened bald eagle if they occur during prime foraging hours. The TRG should give special consideration to these potential conflicts caused by the provision of whitewater flows during June and July to ensure that such effects are not realized. Certainly, whitewater boaters would benefit from releases during these months; however these benefits should be balanced with effects on other resources.

During 2000, PG&E conducted a flow assessment for recreational use within the UNFFR bypassed reaches. The study assessed recreational opportunities including whitewater boating and angling within the bypassed reaches and the effects of flows on these activities. Whitewater boaters ran the rivers at approximately 350, 600, and 850 cfs. As a result of the study, PG&E determined that flows from about 700 to 850 cfs are would likely provide quality standard trips for both kayaking and rafting. Lower flows, such as approximately 600 cfs, would provide a starting point for quality kayaking opportunities, but that flow would be below optimal levels for rafting. Flows above 850 cfs would provide more powerful hydraulics and smaller recovery areas associated with challenging whitewater boating opportunities. PG&E's proposed release flows of 650 and 750 cfs fall within the range necessary for providing good boating opportunities.

PG&E proposes providing a calendar that lists the dates of the March pulse flow in the Seneca reach and any scheduled pulse flows or recreation river flow releases in the Belden reach for the public (including anglers and boaters) via an Internet site. This information would help inform the public about flow-related recreational opportunities within the river reaches. The calendar would state the timing, magnitude, and duration of any scheduled flow release. This information could deter unqualified boaters from beginning a run that is too dangerous for their skills and alert anglers of difficult stream fishing conditions.

Belden Interagency Recreation River Flow Management Plan

If a determination is made to proceed with scheduled river recreation flows, PG&E proposes to coordinate with the FS, Plumas County, and CalTrans to develop an MOU to produce the Belden interagency recreation river flow management plan. This plan would address management and integration of recreation opportunities provided by the Belden recreation river flow release with other river recreation opportunities in the watershed. The plan would address establishment of visitor capacity thresholds, maintenance of facilities, signage, traffic management, and monitoring. PG&E proposes that the plan and the MOU would not be financially binding, but would document agency roles, responsibilities, and intentions related to river recreation management. PG&E further proposes terminating the plan and the MOU if recreation river flow releases are not continued after an evaluation period. FS final Section 4(e) condition no. 29 also specifies the same proposal as PG&E.

Our Analysis

The proposal to provide recreational whitewater flows would enhance whitewater boating opportunities in the area. The proposed interagency recreation river flow management plan would provide guidance to ensure that whitewater boating provisions would not cause unintended damage to terrestrial, aquatic, or other recreational values in the Belden reach of the UNFFR. Results of the evaluation of any test flows provided in the reach would provide information on the effects of recreation flows on other river recreation opportunities in the watershed. The plan would be designed so that effects on

a variety of resources are addressed, not just recreation-related interests. This would help minimize adverse effects on any sensitive resources in the Belden reach, such as riparian and wetland habitat, from recreational flows. Additionally, the plan would enhance recreation provisions along the river reaches and would provide guidance in regard to roles and responsibilities along the river reaches.

Reservoir Levels and Annual Meeting with Plumas County

In the SA, PG&E proposes to meet annually with a committee appointed by the Plumas County Board of Supervisors between March 15 and May 15 in order to inform the committee about the water elevation levels of Lake Almanor predicted to occur between May 1 and September 30. Additionally, PG&E proposes to schedule an additional meeting with the committee if PG&E forecasts that its obligation to deliver water to the State of California and the Western Canal Water District pursuant to the January 17, 1986, agreement would require it to deviate from the Lake Almanor water elevation levels previously predicted.

FS final Section 4(e) condition no. 30(12) specifies that PG&E participate in an annual meeting with the Plumas County Board of Supervisors as described above.

Our Analysis

In the SA, PG&E proposes to operate Lake Almanor and the other reservoirs at a higher level than is currently practiced. However, lake levels vary depending on the type of water year forecasted. Informing Plumas County of predicted Lake Almanor water surface elevations in the spring would facilitate its understanding of conditions that are likely to occur during the subsequent high-use recreation season.

Potential Measures to Reduce Water Temperature

As detailed in section 3.3.1.2, as part of the SA for the Rock Creek-Cresta Project, PG&E agreed to evaluate the effectiveness of modifying UNFFR Project's Prattville intake as a temperature control measure for the downstream reaches of the NFFR. PG&E has been conducting feasibility studies, including modeling the water temperature effects of potential Prattville intake modifications, re-operation of the Canyon dam outlet gates, and modification of Caribou No. 2 intake for the past few years. Appendix D of this EIS provides an initial evaluation of the advantages and disadvantages of 42 potential measures that could affect water temperatures and identifies the five measures we analyze further in section 3.3.1.2, *Water Resources*, of this EIS.

Two of the measures evaluated by PG&E and described in section 3.3.1.2 include the installation of a thermal curtain in front of the Prattville intake. The Prattville intake is located in a steep-sided trough in a cove of the relatively shallow western lobe of Lake Almanor. Black & Veatch (2004) conducted a feasibility study of alternatives to lower water temperature based on results of the hydraulic model testing conducted by the IIHR, and provided a conceptual design for installing a U-shaped thermal curtain in this

location. Two sides of the thermal curtain described by Black & Veatch would extend approximately 900 feet from two locations on the shore, with an approximately 770-foot-long thermal curtain parallel to the lakeshore connecting them. The curtain would be supported on the lake surface by a floating boom of steel cables connecting floating galvanized steel tanks. Large floating stabilizing buoys, also of galvanized steel, would be attached to the floating boom with chains to assist with holding the curtain in place.

To minimize public safety hazards, warning signs would be installed offshore to inform the boating public of the existence of the thermal curtain. Public warning buoys (standard lighted Coast Guard warning buoys) also would need to be installed beyond the location of the thermal curtain.

Our Analysis

Lake Almanor is formed by two main lobes or branches; the western lobe or the Chester branch, and the eastern lobe or the Hamilton branch. On average, the eastern lobe is considerably deeper than is the western lobe. The two lobes of Lake Almanor are connected at a narrow region locally called the "Narrows." A peninsula extends into the lake at the Narrows, and acts to partially isolate the eastern and western lobes. The Prattville intake is located just off the southwest shore of the lake's western lobe, in a small cove just northwest of the Narrows.

Access currently is restricted in the area immediately surrounding the Prattville intake for safety reasons. Just beyond the Prattville intake, orange buoys are suspended across the small cove where the intake is located. The thermal curtain would eliminate boating access near the cove where the intake is located, since it would extend approximately 900 feet into Lake Almanor. According to the California Department of Boating and Waterways regulations, boaters must limit their speed to 5 mph or less when within 100 feet of a bather or within 200 feet of a swimming beach, dock, or marina and, according to a Plumas County ordinance, boaters must limit their speed to 5 mph or less when within 300 feet of any buoy or boom. At this time, the low speed zone in Lake Almanor is 300 feet from the buoy line located just beyond the Prattville intake. If the thermal curtain and its associated public warning buoys are added, a low speed zone over 830 feet wide would extend for more than 1,200 feet from the shore. In this narrow section of the lake, the space available for boaters to travel at speeds greater than 5 mph would be greatly reduced by the presence of the thermal curtain, increasing the likelihood of boating accidents. Additionally, boaters, water skiers, and bathers no longer would have access to approximately 16 acres of Lake Almanor occupied by the thermal curtain and the public warning buoys.

We present the estimated cost of all measures that pertain to recreational resources in chapter 4, *Developmental Analysis*, and make our final recommendations regarding these measures in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.5.3 Unavoidable Adverse Effects

None.

3.3.6 Land Use and Aesthetic Resources

3.3.6.1 Affected Environment

The UNFFR Project developments span a 30-mile reach of the UNFFR and 4 miles of the Butt Valley drainage and encompass roughly 31,060 acres of land within the project boundary (see figure 1-1). A total of 1,024 acres of federally owned lands are located within the project boundary. Of this acreage, the FS administers about 986 acres of federally owned land within the project boundary. The Lassen National Forest manages approximately 577 acres, and the Plumas National Forest manages approximately 409 acres. The BLM manages the remaining 38 acres of federal land. Approximately 3 acres of land within the project boundary is privately owned. The entire project is within Plumas County

The general character of the lands in the region surrounding the project includes residential, transportation, parks and recreation, and open space. Much of the region consists of low-density residential and undeveloped lands. The aesthetic character of the area is generally forested. The highways and trails in the area offer scenic views of the lakes, streams, waterfalls, and surrounding mountains.

Land Use

Project Reservoirs

Lake Almanor—Lake Almanor is a 27,000-acre reservoir formed by the 135-foot-high earth-filled Lake Almanor dam. The shoreline of Lake Almanor consists of extensive recreation and residential development. There are more than 1,000 residential lots adjacent to Lake Almanor, as well as 22 commercial resorts and 13 public recreation sites. Highways run along all sides of Lake Almanor, which provides easy access to the area. The principal highways are State Routes (SR) 36, 89, and 147.

Butt Valley Reservoir—Butt Valley reservoir has a surface area of 1,600 acres and is more rural in character than Lake Almanor. The FS manages the lands that completely surround the PG&E-owned Butt Valley reservoir. This reservoir sits within a fairly narrow wooded valley with no commercial or residential uses.

Belden Forebay—The Belden forebay is the smallest of the project reservoirs with a surface area of approximately 42 acres. The Belden forebay is surrounded by the Plumas National Forest, and the shoreline adjacent to the forebay is undeveloped. The northwest boundary of the reservoir is along Caribou Road.

Stream and River Reaches—The project's stream and river reaches are within a canyon that is a deep and narrow valley. Other than the PG&E town of Caribou, there are no commercial or residential developments in this area.

Land Management Plans

The project area falls within several different land management areas and therefore is subject to the following land management plans.

Sierra Nevada Forest Plan Amendment

The Sierra Nevada Forest Plan Amendment establishes the management direction for five problem areas: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; noxious weeds; and lower westside hardwood forest ecosystems. It amends the LRMPs for nine National Forests within California including the Lassen and Plumas LRMPs. It also amends the regional guides for the Intermountain and Pacific Southwest regions. The Sierra Nevada Forest Plan Amendment serves as an overlay to existing forest plan designations and only replaces standards and guidelines of the LRMPs that conflict with it. Within the project area, this plan applies only to NFS lands managed under the Lassen and Plumas LRMPs, namely the area along the southwestern shoreline of Lake Almanor, the land surrounding Butt Valley reservoir and the Belden forebay, and the land along the Belden and Seneca reaches.

The primary objective of the Sierra Nevada Forest Plan Amendment is to conserve important components of the landscape such as stands of mid-seral and late-seral forests with large trees. Riparian conservation area designations are provided along streams and around water bodies to preserve, enhance, and restore habitat for riparian and aquatic-dependent species as well as ensure that water quality is maintained or restored. There are also important and wide-ranging new land allocations for fire and fuels management. The plan attempts to link potential fuel treatment areas to support one another on the landscape so that wildland fire spread and intensity are reduced.

The majority of the NFS lands along the southwestern shoreline of Lake Almanor, a little more than half of the NFS lands along the Seneca reach, and a small portion of the lands along the Caribou Road are designated general forest under the Sierra Nevada Forest Plan Amendment. General forest refers to lands outside other land prescriptions. The management focus of these lands limits fuel treatments to 75 percent of the stand and works toward increasing the amount of forest with late-successional characteristics such as diverse species composition, multi-layered canopy, and a higher density of large diameter trees. Most of the remaining NFS lands along the southwestern shoreline of Lake Almanor, nearly half of the NFS lands along the Seneca reach, and the majority of the lands along the Belden reach are classified as old forest emphasis. Management of old forest emphasis areas focuses on developing larger aggregations of old forest over time through reducing hazardous fuel conditions and re-introducing fire to reduce fuels

and meet ecological goals. Additionally, most of the NFS lands within the project are in the urban wildland intermix zone, which overlaps the other land designations. This zone, where human habitation is mixed with areas of flammable wildland vegetation, extends 1.5 miles out from areas where the population density indicates at least one structure per 40 acres. Management in the urban wildland intermix zone gives high priority to fuel reduction activities to protect human communities from wildland fires as well as minimizing the spread of fires that might originate in urban areas (FS, 2001).

Lassen National Forest Land and Resource Management Plan

The Lassen National Forest LRMP was finalized in 1992 and prescribes land management measures for NFS lands within or administered by the Lassen National Forest. Within the project vicinity, the Lassen LRMP applies to NFS lands on Lake Almanor's southwestern shoreline between Canyon dam and the Lake Almanor West subdivision. The Lassen National Forest administers 577 acres within the project boundary.

All the project lands and lands influenced by project operations that are managed under the Lassen National Forest LRMP fall within the Prattville management area, one of 48 specific management areas designated by the Lassen LRMP. The Prattville management area covers approximately 6,280 acres along the large southwestern shoreline area above Lake Almanor. Most of this management unit lies southwest of SR 89. The majority of intense public recreation is generally found along lands on the northeastern side of SR 89, although there is a group camp and rest area on the southwestern side of the highway. Approximately 480 acres are dedicated to recreation uses and management emphasis around the Almanor campground and neighboring summer housing area. Another 2,210 acres south of Prattville are now designated old forest emphasis areas under the Sierra Nevada Framework Plan Amendment. The Lassen LRMP specifically recognizes that the Prattville area is a highly used recreation area and identifies the need for a comprehensive recreation development plan for the Almanor campground and vicinity. However, snags, wetlands, and nest site protection are also important to protect waterfowl and raptors in the area, and the plan specifically calls for protection and enhancement of bald eagle nesting habitat at Rocky Point and Prattville.

Plumas National Forest Land and Resource Management Plan

The Plumas National Forest LRMP was finalized in 1988 and directs land management measures for NFS lands within or administered by the Plumas National Forest. Within the project vicinity, the Plumas LRMP applies to NFS lands near Canyon dam at the southern end of Lake Almanor, NFS lands around Butt Valley reservoir and Belden forebay, and the NFS lands along the Seneca and Belden reaches. The Plumas National Forest administers 409 acres within the project boundary.

All the project lands and lands influenced by project operations that are managed under the Plumas National Forest LRMP fall within one of four management areas

designated by the Plumas LRMP: Butt Lake, Rich, and a small portion of the North Fork and Indian Valley Management Areas. The Butt Lake management area includes all of the lands surrounding the Butt Valley reservoir and the area to the southwest of Canyon dam. The primary land allocation for NFS lands near Canyon dam is the protection of bald eagle habitat, which includes limiting human activities between November 1 and March 1 to minimize disturbance. The Rich management area includes the lower portion of the Belden bypassed reach just upstream of the confluence with the EBNFFR, and contains three small NFS campgrounds. The management direction for the Rich management area includes maintaining or improving recreation development in the area, eliminating some grazing uses, and reconstructing and surfacing the Caribou Road from Highway 70 to the old railroad bridge at Queen Lily campground. The Belden rest stop, which includes the trailhead for the Pacific Crest Trail (PCT), is located in the North Fork management area. Management direction for the North Fork management area includes maintaining this PCT trailhead and another one near Belden. The northwestern corner of the Indian Valley management area reaches Canyon dam and the Almanor scenic overlook.

Bureau of Land Management Plans

The BLM administers two parcels of land along the western shores of Lake Almanor. One 34-acre parcel is near the end of the runway at the Chester airport and is slated to be transferred to Plumas County. The area below the 4,500-foot-elevation is used for storing water for project purposes. The other parcel is an isolated 4-acre parcel within the Eagle Lake resource area and includes about 4 acres within the project boundary north of Chester. This parcel is used for grazing above the 4,500 foot elevation contour.

Plumas County General Plan

The Plumas County General Plan, as amended, presents goals and policies for private lands within the county and serves as a basis for all decisions regarding land use within the county. The plan elements most relevant to the project include land use, open space, seismic safety, scenic highways, noise safety, and conservation. The Plumas County General Plan addresses hydroelectric power generation under its constraints policies, and the expressed goal of the county is to encourage the use of water for hydroelectric generation to meet the energy needs of the county.

The Plumas County General Plan includes the Plumas County zoning ordinances, which prescribes regulations governing land use through the establishment of land use zones, parcel sizes, and placement of structures within the county. Much of the private land within and adjacent to the project boundary lies within residential zones, especially along Lake Almanor. Also prevalent along the shoreline of Lake Almanor are prime recreation zones, which allow marinas, resorts, and boat ramps, as well as dwellings. However, there are other private lands in commercial, recreation and timberland production zones (TPZs). TPZs are state-designated zones that are reserved for timber

production and compatible uses. In addition to the basic zoning designations, Lake Almanor and its shoreline are considered a scenic area, and scenic protection designations include additional planning measures.

The Plumas County General Plan also includes standards for scenic highways and roads including the Feather River Highway (SR 70) corridor, Highway 147 and SR 89, except where SR 89 crosses Canyon dam. SR 36 is designated scenic from Chester to the Lassen County line near Clear Creek, California. Almanor Drive West is an important roadway serving the Prattville area and many public recreation areas along the southwestern shoreline of Lake Almanor and is also designated as scenic. For each of these scenic roads, a 100-foot scenic corridor is designated from the outer edges of the road easement. Within these zones there are to be no "off-premise" advertising signs, and transmission and utility lines are to be located where they may be concealed by vegetation or topographical features.

Shoreline Land Management

PG&E maintains a public recreational policy that allows access to the project lands without compromising public safety, environmental resources, or interfering with the operation of the project for hydroelectric power generation. Although vehicular access is limited to developed recreation sites, numerous informal trails provide access to the reservoir shorelines. PG&E's policy also includes providing appropriate recreational facilities for public use, without discrimination, and providing general information about availability of recreational use through brochures, notices, and signs.

All project shorelines are open to the public because they are either PG&E lands or public domain lands administered by the FS. Access to project shorelines is variable, with most areas accessible by foot or boat, and specific areas accessible by bicycle, wheelchair or motorized vehicles. Vehicle access is available at all commercial and public recreation sites, as well as several locations where public road rights-of-way parallel project shorelines.

Lake Almanor

Lake Almanor is a highly developed reservoir with more than 1,000 adjacent residential lots, 22 commercial resorts, and 13 public recreation developments (seven PG&E developments and six FS developments). The shoreline of Lake Almanor spans a distance of more than 52 miles. Most of the private residential lots are developed with single-family residential structures. The project boundary around Lake Almanor is generally defined by the 4,500-foot elevation contour (PG&E datum). In five locations the project boundary extends upland above 4,500 feet elevation to encompass Canyon dam and spillway, the Prattville intake, and PSEA camp, as well as several recreation facilities. A large portion of the southwestern Lake Almanor shoreline is federal land managed by the Lake Almanor Ranger District of the Lassen National Forest and the Mt. Hough Ranger District of the Plumas National Forest. The BLM manages another two

parcels of federal land in the northern half of the western shoreline. PG&E owns the remaining 97 percent of the land along the shoreline within the project boundary.

The shoreline within the project boundary serves as a buffer zone surrounding the reservoir. This buffer zone protects the reservoir from encroachments or other competing uses that might degrade the natural resource conditions important to the region and also protects the recreational and aesthetic values of the reservoir. The public can access most of the shoreline by foot or boat. Most of the western shoreline is accessible by pedestrians since it is near the town of Chester; the topography is relatively flat, and the vegetation is grass and shrub land. In non-developed areas on the southeastern shoreline, the land is steeper, making pedestrian access impractical for most individuals. Access is restricted in the areas immediately surrounding Canyon dam and the Prattville intake for safety reasons.

There are several roaded access points at Lake Almanor along SR 147, 36, and 89, including at least two side roads accessing the reservoir off of Almanor Drive West, southeast of Prattville. PG&E seasonally closes some roads along upper Lake Almanor to minimize disturbance to bald eagles, and permanently gates or blocks off lesser used private roads to prevent vehicular damage to archaeological sites.

On June 10, 1935, parts of the Lake Almanor shoreline were acquired by PG&E's predecessor, the Great Western Power Company, from the Red River Lumber Company. These lands include many areas along the Lake Almanor peninsula including much of the Lake Almanor Country Club and parts of the Lake Almanor West subdivision. Some property owners on these lands, including PG&E, possess a special deed reservation that states that the Red River Lumber Company ("second party" in the deed) and its assigns retain:

> "the right and privilege, subject to the restrictions and limitations herein specified, of access by second party, its successors, assigns, and/or licensees, to both of said reservoirs, and each of them for all purposes whatsoever that will not materially injure the quality or do not materially reduce the quantity of water therein. Such right and privilege shall be so exercised as to not limit or impair any of the uses for which first parties, their successors or assigns, may make of said reservoirs, or either of them."

The deed goes on to further state "it is understood and agreed that each of the parties hereto, its successors, lessees and assigns, may boat, hunt, fish and take other recreation upon the waters of both said reservoirs and each of them, subject, however to the prior right of first parties to use said reservoirs for irrigation and power purposes." The intent of the deed reservation appears to be to ensure that local residents and users will always have the use of Lake Almanor waters for their enjoyment. The 1935 deed reservation also specifies that the Red River Lumber Company's privileges "shall be

exercised as to not limit or impair any of the uses." Under the responsibilities of its current FERC license, PG&E is also responsible for ensuring reasonable public access to the reservoir, formulating rules to ensure public safety, and protecting and enhancing the scenic, recreational, and other environmental values of the project. The FERC license provides similar access and use measures as the Red River Lumber Company provided in its deed reservation. These access provisions ensure that the project shorelines are accessible for use and enjoyment by the public without degrading water quality or reducing water quantity.

Under the permitting authority in its current license, PG&E has developed a private residential and commercial development permitting program for Lake Almanor. This permitting program covers routine, non-project uses, including non-commercial boating access facilities (boat docks and buoys), erosion control structures, certain types of recreation development, bulkheading, vegetative removal or trimming, and planting of new vegetation for both private individuals and commercial interests who desire to place structures or undertake other types of development activities on project shorelines. To authorize non-project uses, PG&E must ensure that the proposed uses and occupancies are consistent with the purposes of protecting and enhancing the environmental values of the project. Of the 1,003 residential lots adjacent to Lake Almanor's shoreline, 419 have docks, and 540 have buoys. Also, some lot owners have installed shoreline protection measures such as riprap.

Butt Valley Reservoir

Butt Valley reservoir, which is just under 5 miles long and almost 1 mile wide with a surface area of 1,600 acres, is surrounded entirely by undeveloped NFS land on the Plumas National Forest. The entire shoreline, except for the area near the Butt Valley powerhouse and the Butt Creek inlet, is open to the public. Several locations provide easy road access to the Butt Valley reservoir shoreline along the Prattville-Butt Valley Road, which closely parallels the eastern edge of the undeveloped reservoir shoreline.

Belden Forebay

Belden reservoir, or forebay, is small with a surface area of 42 acres and a daily water surface elevation that can fluctuate between 5 and 10 feet, depending on power operations. Belden forebay is surrounded by the Plumas National Forest and the entire shoreline, with the exception of the area near the Oak Flat powerhouse, is open to the public. There are several locations providing easy road access to the Belden forebay shoreline along Caribou Road, which closely parallels the western edge of the undeveloped reservoir shoreline.

Traffic Use

Four major state highways pass through the project area: SR 36, 89, 147, and 70. SR 36 provides a major transportation corridor between Red Bluff and Susanville with

connecting access into Mount Lassen Volcanic Park and also provides access via U.S. Highway 395 to the Reno area. SR 89 serves as a well-used transportation corridor between communities in the Lake Almanor basin and Quincy, the Plumas County seat. The route is also used as a north-south corridor to access Reno and commercial centers to the south. SR 147 is a 12-mile road running along the eastern shore of Lake Almanor from Canyon dam to an intersection with SR 36 near Westwood, California, and also connects to SR 36 closer to Chester via the 4.2-mile-long County Road A-13. SR 70 is the Feather River Highway, bisecting the Sierra Nevada Mountains along the NFFR canyon and passing through Quincy and onto a connection with U.S. Highway 395.

The existing road system in the project area has been built and maintained around the major transportation corridors, with secondary roads around project developments. These roads continue to provide essential access to project facilities for PG&E personnel and the general public. The project operates on a continuous basis; therefore, project facility roads must be maintained at all times.

Seventeen project area road segments are used (or historically were used) by project personnel for accessing project lands and waters. Table 3-33 lists these 17 road segments. Of these, five roads are wholly within the project boundary and are essential to O&M of the project, including the Butt Valley Dam Road (two roads), the Butt Valley Powerhouse Road, the Oak Flat Powerhouse Road, the French Creek Road, and the Belden Surge Chamber Road. The project boundary is 60-feet wide along most of the project roads and 40-feet wide along the French Creek Water Supply Road.

Additionally, there are 10 recreation facilities and access roads completely within or partially within the project boundary. These include the Almanor scenic overlook, the Canyon dam day-use area, the East Shore picnic area, the Rocky Point campground (three road loops), Camp Connery group camp, Last Chance campground, Last Chance group camp, Ponderosa Flat campground, Alder Creek day-use area, and Cool Springs campground. Table 3-34 lists these 10 project recreation roads. These roads are all designed as 10-mile-per-hour class roads, with a minimum 12-foot paved top.

New development in Plumas County is expected to be concentrated around Lake Almanor and in the southern portions of the county. Overall traffic projections in the project vicinity for at least the next 10 years have minimal increases, along with some overall decreases, on an average daily traffic usage basis. CalTrans suggests that former summer homes are now occupied as full-time residences by retirees, which reduces peak period travel. CalTrans recently decreased its projections for 2020 traffic in the area by more than 20 percent between 1997 and 2000. Also, although California's population is rapidly growing, a slower growth rate is reflected in Plumas and Lassen counties, and most of the new residents in California would likely be urban-oriented.

Table 3-33. Project-related roads. (Source: PG&E, 2002a)

Road Name	Road Number	Surface	Jurisdiction	Maintenance	Length	Notes
Caribou Road	27N26/ 27N26A	Asphalt	FS	Licensee/FS	7.8	Provides access to Caribou powerhouses
Lower Longville-Belden	26N26/ 26N26A	Aggregate	FS/Licensee	Licensee/FS	5.1	Provides access to Tunnel portals #3 and #4, and Belden surge chamber
Belden surge chamber	None	Native	FS	Licensee	0.7	Spur off Longville-Belden spur
Siphon portal #3	None	Aggregate	Licensee	Licensee	0.2	Spur off Longville-Belden Road
Siphon portal #2	None	Aggregate	Licensee	Licensee	1.2	Spur off Caribou Road
Belden adit	26N26E	Aggregate	FS	Licensee	0.3	Spur off Caribou Road
NF 70 gage station	None	Aggregate	Licensee	Licensee	0.7	Spur off Caribou Road
Oak Flat	None	Aggregate	Licensee	Licensee	0.2	Spur off Caribou Road
Butt Valley dam	27N26/ 27N26D	Aggregate	FS	Licensee/FS	7.1	A 2.2-mile portion is one way north, used only in the non-winter season.
French Creek	27N28C	Aggregate	FS	Licensee	0.3	Access to local potable water supply system
Prattville-Butt reservoir	305	Aggregate /asphalt	Plumas County	Plumas County	10.4	Plowed in winter by licensee

Road Name	Road Number	Surface	Jurisdiction	Maintenance	Length	Notes
Butt Valley powerhouse spur(s)	None	Aggregate /asphalt	Licensee	Licensee	0.4	Two spur roads accessing Butt Valley powerhouse
Butt Valley penstock/surge chamber	None	Aggregate	Licensee	Licensee	2.4	Also provides access to Butt Creek gaging station
Humbug-Humbolt Cross	309	Aggregate	Plumas County	Plumas County	1.0	Plowed in winter by licensee, provides access to Butt Valley penstock/surge chamber access road
Seneca	306	Asphalt/ aggregate/ Native	Plumas County	Plumas County	9.8	Not used frequently for project purposes
Ohio Valley	27N98	Aggregate	FS	FS	7.7	Provides good access between Canyon dam and Butt Valley dam/Caribou
Last Chance campground access	None	Gravel	Licensee	Licensee	4.0	Provides access to adjoining properties. Closed in winter

Table 3-34. Project recreation roads. (Source: PG&E, 2002a)

Road Name	Road Number	Surface	Maintenance	Jurisdiction	Notes
Last Chance campground	None	Asphalt	Licensee	Licensee	Seasonal campground
Last Change group camp	None	Asphalt	Licensee	Licensee	Seasonal campground
Eastshore picnic area	None	Asphalt	Licensee	Licensee	Day-use area
Almanor scenic overlook	None	Asphalt	Licensee	Licensee	Day-use area
Canyon dam day-use area	None	Asphalt	Licensee	Licensee	
Lake Almanor campground loops	None	Asphalt	Licensee	Licensee	Seasonal campground
Camp Connery group camp	None	Asphalt	Licensee	Licensee	Seasonal campground
Ponderosa Flat campground loop	None	Asphalt	Licensee	Licensee	Seasonal campground
Alder Creek day-use area loop	None	Asphalt	Licensee	Licensee	Seasonal campground
Cool Springs campground loop	None	Asphalt	Licensee	Licensee	Seasonal campground

PG&E rated all of the project area roads using the FS's classification system. The majority of the roads were rated as traffic service level C, which means they have interrupted traffic flow, limited passing facilities, and low-design speeds; are unstable in certain traffic or weather conditions; and may not be able to accommodate some vehicles. The first 7.2 miles of the Caribou Road between SR 70 and the town of Caribou; the first 4.3 miles of the Prattville-Butt Reservoir Road from Lake Almanor to Butt Valley reservoir; the first 0.2 mile of the primary access road to the Butt Valley powerhouse coming off of County Road 305; and the first 1.3 miles of the Seneca Road heading southbound from the junction with SR 89 were rated with a traffic service level B, which is congested during periods of heavy traffic, slower speeds, and high dust, but accommodates all legal vehicles. The Belden Surge Chamber Road and a 2-mile segment of the Seneca Road from Seneca to the junction with Dutch Hill Road were rated traffic service level D, which has slow or blocked traffic flow and rough and irregular surface, is difficult for two-way traffic, and accommodates high-clearance vehicles. There were no ratings for the project recreation roads listed in table 3-34.

Fire Events

The California Department of Forestry and Fire Protection recorded more than 350 small fires in the Lake Almanor region from 1981 until 2001. Small fires are considered to be less than 30 acres. Many of the small fire incidents were less than an acre, and most of them occurred close to developed areas. The most recent large fire was the Storrie fire in early September 2000, which burned more than 46,000 acres including some project facilities near the Belden powerhouse.

Mining

There are 206 active mining claims on federal lands situated along the NFFR, mostly along the Seneca bypassed reach. A mining claim is a particular parcel of federal land valuable for a specific mineral deposit or deposits. It is a parcel for which an individual has asserted a right of possession, and that right is restricted to the extraction and development of a mineral deposit. The rights granted by a mining claim are valid against a challenge by the United States and other claimants only after the discovery of a valuable mineral deposit. There are two types of mining claims: lode and placer. Lode claims include rock-in-place bearing veins or lodes of valuable minerals having well-defined boundaries. Placer claims are mineral deposits not subject to lode claims and generally consist of unconsolidated materials such as sand and gravel containing free gold or other materials.

Most of the mining claims in the project area are placer claims, and most are located around the small community of Seneca within the Seneca bypassed reach of the NFFR. The maximum size of a placer claim is 20 acres, and most of the claims in the Feather River area are 20-acre claims. There are also a few lode mines as well as mining activities on the scattered private lands in the Seneca area.

Aesthetic Resources

For its aesthetic resource assessment, PG&E identified four characteristic landscape units (zones of generally similar landscape conditions) the Lake Almanor basin, Butt Creek Valley, NFFR/Caribou Road canyon, and the Belden area. PG&E also identified a set of key viewing points (KVPs) within the project area to provide a basis for systematic evaluation of aesthetic resources at the project. The KVPs represent a sampling of views of each landscape unit within the project area and are based on evaluation of the aesthetic characteristics of each landscape unit; each landscape unit's use patterns; the aesthetic sensitivity of each landscape unit; and the plans, regulations, and policies affecting the alteration of each landscape unit's appearance. Table 3-35 provides a summary, and figure 3-16 shows the location of the KVPs.

Table 3-35. Key viewing points in the UNFFR Project area. (Source: PG&E, 2002a)

KVP	Orientation	Landscape Perspective
(1) SR 36 causeway	West	SR 36 Causeway bridge on Lake Almanor
(2) North Shore campground	South	Shallow areas of upper Lake Almanor
(3) SR 36 rest area	Southwest	Wooded view of upper Lake Almanor, Chester and onto Mt. Lassen
(4) Little Cove	South	Inside cove looking down into Lake Almanor neat Peninsula Village
(5) Eastshore picnic area	West	Typical wooded view from picnic area
(6) Scenic Overlook	Northwest	Canyon dam and spillway area
(7)Canyon dam boat ramp	West	Lower Lake Almanor from developed recreation site.
(8) Plumas Pines Resort	Northwest	Resort view of Lake Almanor and Mt. Lassen
(9) Rocky Point campground beach	East	Swimming beach at campground
(10) Butt Valley reservoir cove	Southwest	Upper Butt Valley reservoir shoreline
(11) Alder Creek campground boat ramp	South	Developed recreation site view along Butt Valley reservoir
(12) Lower Butt Valley reservoir	South	Butt Valley dam and spillway
(13) Seneca Bridge	South	Seneca bypassed reach
(14) Butt Valley Dam Road	South	Project transmission line with Belden forebay in distance
(15) Belden forebay	North	Belden forebay and Oak Flat area
(16) Caribou Road bridge	Northeast	Belden bypassed reach
(17) Belden siphon	North	At road crossing on Caribou Road
(18) Belden bypassed reach	Northeast	Along SR 70
(19) Belden powerhouse	Northwest	Pacific Crest Trail crossing and SR 70 corridor at Belden powerhouse

Lake Almanor Basin

The Lake Almanor basin is a large basin rimmed by densely wooded mountains and rolling topography. Lake Almanor, the dominant feature of the basin is an extensive reservoir of high scenic quality. The basin is somewhat flat and the lake is several miles wide and long, broad sweeping views are generally available along most reservoir shorelines. These include highly scenic views of 10,457-foot-high Mt. Lassen and the rugged terrain within Mt. Lassen Volcanic National Park. Views of Mt. Lassen are possible from the northeast shoreline near SR 36's Johnson Grade, the SR 36 Rest Area, Lake Almanor Country Club, County Highway A13, most of the East Shore area, and much of the shoreline in the Prattville community and Lake Almanor West subdivision.

Lake Almanor is generally a fairly shallow reservoir in a wide basin so a drop of a few feet in elevation can expose wide areas of shoreline. When the lake is above 4,482 feet, the exposed shoreline is somewhat beneficial by serving as a beach area for engaging in or staging recreation activities. However, below about elevation 4,482 feet, the exposed shoreline progressively becomes more undesirable to many users and viewers because of the jagged volcanic-type rocks that occur there. In steeper shoreline areas along the southern portion of the east shore, larger reductions in lake elevation are not noticed because the water line remains fairly close to shore. The western shoreline near Chester and the area north of the SR 36 causeway have large areas of brown flat terrain exposed below elevation 4,482 feet.

Other scenic areas of high quality include the broad meadow landscapes found north of the SR 36 causeway and on the extensive lowlands between Chester and Lake Almanor's western shoreline. These areas offer viewers a distinctive change in scenery from the predominant wooded terrain. These meadows offer a lot of variety and gradually blend into mixed lands with interspersed wooded clumps on relatively flat terrain. Waterfowl and other bird life offer additional aesthetic values to these areas.

Butt Creek Valley

The Butt Creek Valley landscape extends from about halfway between Prattville and the Butt Valley powerhouse to the Caribou powerhouses near the mouth of Butt Creek on the NFFR. This landscape offers a wide variety of dramatic topographic relief that is gentle in the upper elevations and steep and rugged in the lower elevations leading down to the Caribou area. Butt Valley reservoir is of high scenic quality with moderately low banks rimmed by a uniform and densely wooded shoreline. The reservoir is confined inside the valley bottom and is long and narrow allowing good view across its waters to the surrounding undeveloped shorelines. There are few long distance views from within this basin since it is somewhat confined in a narrow valley. There are no residences along the reservoir shoreline but the Butt Valley-Caribou Electric Transmission line, supported by steel lattice towers, dominates the foreground landscape as viewed by travelers on the road. Many users think the power line detracts from the natural landscape qualities that dominate the scenery.

Butt Valley reservoir fluctuates daily and weekly to match daily output to peak needs and typically fluctuates about 1 foot on a daily basis and between 3 and 5 feet on a weekly basis depending on power system operating needs. Butt Valley reservoir has a more attractive sand and rock shoreline than Lake Almanor when exposed. Even with the usual amount of fluctuation, visual quality is generally preserved across the range of normal operating levels.

From the Butt Valley reservoir down to the Caribou powerhouses, the terrain is extremely steep and rugged. A single-lane dirt road, which splits into two one-way separated roadways that wind steeply down the hill, provides most visitors their only access to this landscape. There are several locations along the roads in the upper and lower reaches that offer dramatic views down into the rugged and deep NFFR canyon.

North Fork Feather River/Caribou Road

This landscape unit extends the length of the NFFR from Canyon dam passing through Caribou leading downstream to the confluence of the EBNFFR at the scenic SR 70 highway corridor. The uppermost part of this landscape unit is characterized by rolling wooded terrain bisected by the incised NFFR. The river is hidden from widespread public viewing in most locations because there are few trails or roads in the area. Near Seneca, the river canyon is deeply incised, which is especially noticeable around the Caribou powerhouses. Immediately downstream of the Caribou powerhouses, the river fits inside a small box canyon rimmed by jagged rock ledges. The river valley from this location to Belden is narrow and tucked deep down inside a more open canyon with ridges and mountain tops extending over 3,000 feet above the valley floor on both sides. The valley is highly scenic and has an undeveloped feel with rough mountainous character.

Belden Area

The Belden area landscape spans a distance of less than 2 miles along the deep scenic gorge of the NFFR along the SR 70 highway corridor. The upper end of this distinctive landscape is the confluence of the EBNFFR and the NFFR, where Caribou Road begins. The landscape is fairly uniform in topography but has an impressive variety of geologic and vegetative conditions leading to the Belden powerhouse located at the confluence of Yellow Creek and the NFFR. The canyon gorge is generally U-shaped with both wooded and open rocky slopes bisected by steeply defined stream channels extending up several thousand feet above the valley bottom. Most viewers experience the landscape from well-traveled SR 70. The PCT crosses the canyon at Belden powerhouse.

The PCT is a 2,638-mile-long National Scenic Trail extending from Canada to Mexico. The PCT section crossing the NFFR receives light use, although some horseback use is noted in late summer. Views of the project from the PCT can be seen as northbound users descend the canyon from the south where the Belden powerhouse

penstocks and surge chamber are readily visible on the lower slopes of the canyon. At the SR 70 crossing, the Belden powerhouse becomes visible although viewer sensitivity in this stretch is low because of the variety of developed features present.

LRMP Visual Quality Objectives

The Lassen and Plumas National Forest LRMPs provide guidelines for the preferred VQO of land managed under each designation. VQOs are based on the degree of acceptable alteration permitted within the natural characteristic landscapes and are applied to all project proposals and activities on NFS lands. The Lassen National Forest LRMP assigns two VQOs to the project area or lands influenced by project operations, including Retention and Partial Retention. The VQOs for project lands in the Plumas National Forest are Retention, Partial Retention, and Modification. The three VQOs that apply to the project area are further described in table 3-36.

Table 3-36. VQO classifications and guidelines. (Source: FS, 1992, 1995)

VQO Designation	Definition
Retention	Allows management activities that are not visually evident. Activities may only repeat form, line, color, and texture found frequently in the characteristic landscape. Changes in size, amount, intensity, direction, and pattern should not be evident.
Partial Retention	Allows management activities that remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color, and texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, and pattern remain visually subordinate to the characteristic landscape. Activities may also introduce form, line, color, and texture found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.
Modification	Human activities may visually dominate the original characteristic landscape. Vegetation and landform alteration must borrow from naturally established form, line, color, texture, and scale.

On the Lassen National Forest, Retention is prescribed for most of the recreation and lightly developed lands on the southwest shore of Lake Almanor around Prattville. Partial Retention is allocated for the undeveloped lands immediately outside the Lake Almanor West subdivision. On the Plumas National Forest, Retention is prescribed in recreation and scenic areas around Butt Valley reservoir and the lands along the NFFR below the Caribou powerhouses. Partial retention is prescribed to the NFS lands along the Seneca reach. Modification is assigned to the steep canyon lands leading from Butt

Valley dam to Caribou where the project roads, transmission lines and penstocks are visible features of the landscape.

The Lassen and Plumas National Forest LRMPs also provide guidelines for the preferred ROS of land managed under each plan. The ROS provides a framework for classifying the types of outdoor recreational opportunities that the public may desire and identifies the portion of the ROS that any given area may be able to provide. In designating the ROS, factors include qualities provided by the natural setting (i.e., vegetation, topography, scenery), activities associated with recreational use (i.e., type and level of recreational use), and experience opportunities related to management (i.e., development, access, and regulations). Table 3-37 summarizes ROS classifications and guidelines.

Table 3-37. ROS classifications and guidelines. (Source: FS, 1992, 1995)

ROS Classification	Guidelines
Semi-primitive motorized	Provide for minimum evidence of onsite disturbance. Only subtle modifications to an otherwise natural environment. Motorized use of roads and trails is allowed.
Roaded natural	Provide for low-to-moderate interaction between users. Sights and sounds of others are clearly evident.
Rural	Natural environment is substantially modified. Structures are readily evident. Controls and regulations are obvious and law enforcement visible.

The Plumas National Forest LRMP further specifies goals and policies for visual resources. The plan emphasizes the need to allow certain management activities to dominate the visual landscape, especially those activities on lands committed to intensive timber or other commodity production. In areas frequently used by recreationists, the plan emphasizes the need to maintain high visual quality on these lands that are clearly visible from recreational developments, as well as from major travel routes and other high use areas.

In addition to VQOs, there are considerations for visual quality related to the federal designation of the Lassen Scenic Byway and Feather River Scenic Byway. SR 89 has also been designated a California State Scenic Highway by the California State legislature.

3.3.6.2 Environmental Effects

Adding Lands to the Project Boundary

In the license application, PG&E proposes adding approximately 34 acres of the Plumas National Forest into the project at Caribou and Belden dams. The area around the Caribou Nos. 1 and 2 penstocks has required slope stabilization and remediation work over the last 20 years, and PG&E has indicates that it is likely that attention to slope stabilization would continue. Therefore, PG&E proposes to include the area between the two penstocks within the project boundary. Also the project spoil areas located west of the downstream portal of the Caribou No. 2 tunnel and just downstream of the road from the top of Belden forebay dam to Oak Flat powerhouse have each experienced project use and that use is expected to continue. Finally, over the years, the Caribou to Butt Valley Road has experienced minor changes in its alignment, and there are also short access roads in the vicinity of this road that are used by the project. For these reasons, PG&E proposes to include the 34 acres.

In the SA, PG&E proposes to apply to the Commission within 1 year of license issuance to adjust the project boundary to include all recreation improvements covered by the SA at PG&E facilities including the East Shore campground, group camp area, and day-use area, the Stover Ranch day-use area, the Catfish Beach area, the Westwood Beach day-use area, the Stumpy Beach day-use area, the Upper Belden Reach river access site, the Belden Reach trails, and those portions of the southwest shoreline access zone facilities currently outside the project boundary. PG&E also proposes to adjust the UNFFR Project boundary to include the following FS facilities located on the Plumas and Lassen National Forests: Canyon dam boat launch and day-use area, Dyer View day-use area, and Almanor boat launch. PG&E further proposes applying to the Commission to adjust the project boundary as needed to incorporate the Almanor Family Campground and amphitheater, the Almanor Group Campground, and the Almanor beach, 6 months after the FS has completed construction of all of the recreation improvements it has planned for each of these facilities. PG&E also proposes to request a modification of any license article addressing the recreation O&M program included in the draft RRMP to include these facilities.

FS final Section 10(a) condition no. 32(3) specifies the same project boundary adjustments as those listed in PG&E's proposal.

Our Analysis

There are currently 409 acres of lands administered by the Plumas National Forest within the project boundary and 577 acres of lands administered by the Lassen National Forest. PG&E meets with the FS on an annual basis to discuss plans for the upcoming year. The Commission requires licensees for major projects, such as the UNFFR Project, to secure all lands necessary for project purposes either by purchase or acquisition of appropriate easements. Such lands are included within the designated project boundary

and the Commission only has jurisdiction over activities that occur within this project boundary. The Commission has the authority to enforce the terms and conditions of a new license within the project boundary. Adding an additional 34 acres of the Plumas National Forest to the project boundary would not be detrimental to the purposes of the Plumas or Lassen National Forests. The activities that PG&E is responsible for on those lands to be added are addressed in the discussion of vegetation management plans below and in section 3.3.1.2, *Water Resources*.

PG&E has proposed new recreational facilities at the UNFFR Project (see section 3.3.5*, Recreational Resources)* and all of the facilities that PG&E proposes to either construct or provide funding to construct are partially within or adjacent to the existing project boundary, and are used as primary access points to the UNFFR hydroelectric project. As such, a clear connection exists between project operations and recreational use of these facilities. Including all of these facilities in the project boundary would provide assurance that improvements would be consistent with project purposes and that PG&E would continue to provide recreational access to project lands and waters. Additionally, including the FS recreation facilities listed above in the project boundary would have a beneficial effect on recreation since PG&E would be able to apply consistent management to all of the recreation facilities on the Lake Almanor shoreline, reducing visitor confusion over management practices. We conclude that the facilities proposed for improvement or construction should be included in the project boundary.

Traffic Use Surveys and Road Management

In the SA, PG&E proposes to file an FS-approved road traffic survey plan for roads used for project purposes located on NFS lands with the Commission within 1 year of license issuance. PG&E proposes that the plan would include provisions for monitoring traffic every 6 years when PG&E is monitoring recreation use in accordance with FERC Form 80 requirements. PG&E proposes that, at a minimum, the road traffic survey would include the Caribou Road (27N26) and the Caribou-Butt Valley Reservoir roads (27N26 and 27N60) and include the number and types of vehicles per day on these roads and a sampling schedule that includes: the fishing season, including the opening weekend; holiday weekends including Memorial Day, Fourth of July, and Labor Day; non-holiday weekends; the day of and the day after any scheduled Belden reach recreation river flow releases; and weekdays. PG&E further proposes that every 6 years the road traffic reports would be reviewed by the FS and then filed with the Commission.

In its preliminary Section 4(e) condition no. 48, filed December 1, 2003, the FS specified that every 5 years from license issuance, PG&E file a FS-approved road/traffic survey report with the Commission and provide a copy of the survey and the survey results to the FS. The FS wanted to reserve the right to require changes in the project, designated project roads, and operation, after notice and opportunity for comment and administrative review, through revision of the Section 4(e) conditions that require

measures necessary to accomplish protection and utilization of NFS resources and provide for public safety identified as a result of those surveys.

In its response to the FS, filed with the Commission on January 15, 2004, PG&E did not oppose this recommendation, but suggested that it be modified to incorporate the cost sharing responsibilities reflected in the 1998 road maintenance agreement between PG&E and the Plumas National Forest. Additionally, PG&E proposed that the traffic sampling approach not be currently defined but be developed by PG&E in consultation with the FS.

In its preliminary Section 4(e) condition no. 19, filed December 1, 2003, the FS also specified that PG&E furnish, install, and maintain temporary traffic controls when construction is in progress adjacent to or on FS controlled roads open to public travel, to provide the public with adequate warning and protection from hazardous or potentially hazardous conditions associated with PG&E's operations. The FS also specified that any flaggers or devices be as described in the Manual on Uniform Traffic Control Devices for Streets and Highways.

Interior, in its Section 10(j) condition no. 19, filed December 1, 2003, recommends that PG&E develop an erosion control plan for all project facilities including roads, reservoirs, and bypassed reaches.

In its response to Interior filed with the Commission on January 15, 2004, PG&E disagrees with the necessity of the proposed condition for several reasons. One of the reasons PG&E disagrees with the need for a separate erosion control plan is that PG&E and the Plumas National Forest have already entered into a road maintenance agreement for roads on NFS lands. PG&E points out that the agreement addresses such items as slide repair, ditch cleaning, surface repair, shoulder maintenance, dust abatement, drainage structures, and roadside vegetation. PG&E also states that it would be meeting with the FS, Plumas County, and other interested parties at least annually to discuss any project-related issues, including erosion.

FS final Section 10(a) condition no. 39 specifies the same road traffic use survey plan as the one described in PG&E's proposal. In its final Section 4(e) condition no. 42, filed November 4, 2004, the FS specifies that, within 1 year of license issuance, PG&E file a FS-approved road management plan addressing all FS and unclassified roads required by PG&E to access the project area. FS final Section 4(e) condition no. 5 specifies that PG&E would provide the FS with a minimum of 60 days to review and approve the plan before filing it with the Commission. The FS specifies that the road management plan for the UNFFR Project include (1) identification of all FS roads and unclassified roads on NFS lands needed for project access, including road numbers; (2) a map showing all FS roads and unclassified roads on NFS lands used for project access, including digital spatial data accurate to within 40 feet, identifying each road by FS road number; (3) a description of each FS road segment and unclassified road on NFS lands

needed for project access including termini, length, purpose and use, party responsible for maintenance, level of maintenance, structures accessed, location and status of gates and barricades, if any, ownership of road segment and underlying property, instrument of authorization for road use, assessment of road conditions; and (4) provisions requiring PG&E to consult with the FS in advance of performing any road construction, realignment, or closure involving FS roads or lands. The FS specifies that PG&E cooperate with the FS on the preparation of a condition survey and a proposed maintenance plan subject to annual FS approval, beginning the first full year after the road management plan has been approved.

The FS further specifies that PG&E obtain appropriate authorization (e.g., special-use permit, road-use permit, or maintenance agreement) in accordance with the road management plan for all project access roads under FS jurisdiction that are located outside the project boundary, including unclassified roads and FS system roads needed for project access; the term of the authorization would be the same as the term of the license. The FS specifies that PG&E enter into the appropriate authorization mechanism with the FS that supersedes the existing authorization with the FS. The road management plan would identify PG&E's responsibilities for road maintenance and repair costs commensurate with PG&E's use and project-induced use. The FS specifies that the road management plan specify road maintenance and management standards that provide for traffic safety; minimize erosion and damage to natural resources and that are acceptable to the FS.

The FS further specifies that PG&E would be responsible for any new construction, realignment, closure, or other road management actions PG&E proposes in the future, subject to FS standards in effect at the time, including related studies, analyses or reviews required by FS. The FS specifies that snow removal on roads nos. 27N26 and 27N60 and other project roads would be performed to minimize erosion during runoff periods. PG&E would be responsible for maintenance and replacement of aggregate that is damaged or lost due to snow plowing on the aggregate surfaced portion of road nos. 27N26 and 27N60 and other roads from which snow is plowed. The FS specifies that PG&E would be responsible for a share of the cost of needed maintenance and repairs of roads nos. 27N26 and 27N60 commensurate with PG&E's use and project-induced use.

Our Analysis

During its review of PG&E's first stage consultation package, the FS recommended an access management and traffic study for project roads to provide information on the current condition of the project roads as well as current traffic levels, to determine if the roads and trails can provide safe and adequate access to meet existing and future demands. In summer 2001, PG&E conducted a traffic study of the project roads, investigating the traffic safety and road system operations. Also in 2001, PG&E conducted comprehensive traffic monitoring of roads throughout the project area.

The traffic study and road management report concluded that the project road system was suitable for the traffic expected during the life of the license and also provided some specific recommendations for several roads.

PG&E responded to the FS's request for a study of the project roads during initial consultation and in 1998 entered into a road maintenance agreement with the FS that includes a list of roads covered by the agreement (FS System roads jointly used by PG&E and the FS), levels of road maintenance, road maintenance specifications, and methods to fulfill maintenance obligations. The intent of the agreement is to ensure maintenance of the roads in a condition that provides for their intended use, prevent and correct erosion to the roads and adjacent lands, and ensure safe and efficient use of the roads. Additionally, PG&E projects an increase in recreation use at the project over the year 2001 levels. An increase in users as well as the passage of time would likely warrant additional road rehabilitation to help ensure that the capacity of the roads is not exceeded and to maintain the roadways to current traffic service levels and maintenance levels. The traffic use surveys that PG&E and the FS have proposed would help identify when and where roads have reached or exceeded their capacity or fallen below an acceptable level of service. If roads have exceeded their anticipated capacity, PG&E and the FS may need to assess the need to reclassify the road maintenance level or the traffic service level of the road. According to the road maintenance agreement, PG&E and the FS meet annually to develop an annual maintenance plan that addresses all anticipated road maintenance work needed on the roads covered by the road maintenance agreement.

The road management plan specified by the FS differs slightly from the road maintenance agreement PG&E has developed with the FS. Development of a road management plan would require minimal changes to the existing road maintenance agreement as well as development of digital spatial data accurate to within 40 feet, identifying each road by FS road number.

Specific Land Management and Visual Resource Protection Measures

In the SA, PG&E proposes to implement a number of land management and visual resource protection measures at existing facilities within 2 years after initial license issuance.

In its final Section 4(e) condition no. 40, the FS specifies that PG&E implement specific mitigation measures. PG&E's specific visual management proposals and the FS's 4(e) specifications related to visual management are described in the following list.

- Within 2 years of license issuance, PG&E proposes to paint the metal siding and roof of the hoist house on the Prattville intake structure a dark green color similar to the current color. The FS recommends the same measure as an element of its final Section 10(a) condition no. 40(A).

- Within 2 years of license issuance, PG&E proposes to plant sufficient evergreen trees within the UNFFR Project boundary between the existing Prattville maintenance buildings and the shoreline to reduce visual domination of the buildings on the shoreline area. PG&E further proposes to monitor and oversee survival of these trees through the first three summers to ensure their successful establishment. The FS recommends the same proposal as PG&E in its final Section 10(a) condition no. 40(B).

- Within 2 years of license issuance, PG&E proposes to re-grade the Oak Flat road debris spoil piles located on PG&E land outside of the UNFFR Project boundary along Caribou Road to create a more natural rolling topography along the roadside and, where possible, to move spoil materials farther from the road. PG&E also proposes to establish native plantings where possible between the road and the spoil piles to help screen the active use areas from passing motorists. FS final Section 4(e) condition no. 40(C) specifies the same proposal as PG&E.

- Within 2 years of license issuance, PG&E proposes to prepare a plan, in consultation with the FS, to annually apply dust palliatives or other measures, including regular grading, to help minimize dust emissions and improve the lower coupled segment of the Butt Valley-Caribou Road, which is located within the UNFFR Project boundary. FS final Section 4(e) condition no. 40(D) specifies the same proposal as PG&E.

- Within 2 years of license issuance, PG&E proposes to consult with the FS on color selection when maintenance or repair work is scheduled on the Belden powerhouse penstocks, surge chamber, or other powerhouse facilities to reduce visual contrast as seen from SR 70. FS final Section 10(a) condition no. 40(E) specifies the same proposal as PG&E.

- Within 2 years of license issuance, PG&E proposes to maintain the exterior and landscaping of the old clubhouse facility and grounds at Caribou Village to preserve the historic features and character of this facility, which is located within the UNFFR Project boundary. PG&E also proposes to consult with the FS when maintenance or repair activities that affect exterior appearance are to take place to help preserve, as practical, the historic and visual appeal of the village landscaping and structures. FS final Section 4(e) condition no. 40(F) specifies the same proposal as PG&E.

PG&E proposes to file an FS-approved visual management plan with FERC within 60 days prior to any ground-disturbing activities on NFS lands. PG&E proposes that these this plan would, at a minimum, address clearings, spoil piles, and project facilities such as diversion structures, penstocks, pipes, ditches, powerhouses, other buildings, transmission lines, corridors and access roads; facility configurations,

alignments, building materials, colors, landscaping, and screening; a proposed mitigation and implementation schedule necessary to bring project facilities into compliance with the National Forest LRMP direction; locating road spoil piles either in approved areas on NFS lands or in a location off of NFS lands; monitoring and eradicating invasive weeds as specified in any invasive weed management plan for the project; removing all visible non-native materials, including construction debris from the surfaces of piles located on NFS lands; and stabilizing and revegetating all native material that is allowed to be left on NFS lands, including complying with visual quality objectives.

The FS specified, as a part of preliminary Section 4(e) condition no. 49, that within 1 year of issuance of a new license, or 60 days prior to any ground-disturbing activity, that PG&E file a FS-approved visual management plan with the Commission. Additionally, FS preliminary Section 4(e) condition no. 50 specified that PG&E file an FS-approved spoil disposal plan with the Commission within 2 years of license issuance and at least 60 days prior to any ground-disturbing or soil-producing or piling activity. The FS-specified elements are reflective of the elements that PG&E has proposed for inclusion in any visual management plan it prepares.

In its response to the FS, contained in a letter filed with the Commission on January 15, 2004, PG&E expresses its belief that the existing project-related visual quality issues on NFS lands have been adequately addressed through the relicensing studies and consultation and would continue to be adequately addressed through implementation of the proposals included in both the license application and the SA. PG&E has discussed the need for a comprehensive visual management plan with the FS and the FS has concurred with PG&E's recommendation that the visual management plan would only be needed to address future ground-disturbing activities, and should be developed at least 60 days prior to any such activity. FS final Section 4(e) condition no. 40(G) specifies the same proposal as PG&E.

Our Analysis

The Lassen and Plumas National Forest LRMPs define the VQOs for National Forest System lands in the project area. VQOs for the project area are intended to provide various degrees of a natural-appearing landscape. Existing project facilities and operations are clearly visible on the landscape, with buildings, dams, and penstocks contrasting sharply with the surrounding forested setting. Project roads, campgrounds, and appurtenant facilities are also obvious to the casual observer. Although it may not be practical to devise methods to blend the dams in with the natural environment, there may be ways to reduce the contrast of other structures through paint colors or vegetative screening during regular maintenance or upgrading of existing facilities. A coordinated approach to address visual effects of the existing facilities and proposed new facilities would help to protect aesthetic resources within the project area and help ensure that project facilities would be consistent with the applicable LRMP direction.

Periodic painting and maintenance of project facilities is necessary to meet current standards and maintain aesthetic appeal. Consulting with the FS on color selection when any maintenance or repair work is scheduled at the Belden Powerhouse facilities would assure that the LRMP standards are addressed.

The existing PG&E-operated maintenance buildings located at the Prattville intake visually dominate the Lake Almanor shoreline area. Planting evergreen trees between these buildings and the shoreline would reduce the visual domination of the buildings.

The spoil piles located on the Caribou Road at Oak Flat are clearly visible from the road and detract from the scenic quality of the area. Removal of this project-related debris to the extent that such removal is practical along with establishing native plantings where possible, would provide a visual benefit on this road.

The historic structures at the Caribou Village are in need of maintenance to prevent deterioration of the buildings and loss of historic character and value. It would be advantageous for PG&E to consult with the FS on preserving the historic and visual appeal of the village landscaping and structures.

The Butt Valley-Caribou Road (27N60 and 27N26) is quite dusty during the summer, and the dust creates a potential driving hazard. It would be beneficial for PG&E and the FS to work together to address this concern.

A spoil disposal plan was originally recommended by the FS, and the FS final Section 4(e) conditions address spoil pile disposal in the proposed visual management plan. Implementation of this plan would limit the potential for existing and new spoil piles to erode and would improve the aesthetics of the spoil piles. See section 3.3.1.2 for more discussion on the visual management plan.

Shoreline Management Plan

In the SA, PG&E proposes to implement the Lake Almanor SMP included in the final license application within 30 days after license issuance. PG&E further proposes to meet with the FS and Plumas County and other interested parties a minimum of every 10 years to discuss the need to update the SMP. The SMP included in PG&E's final license application describes current conditions and management of the Lake Almanor shoreline and presents the proposed shoreline management program including shoreline authorizations and management policies, including permitting. The proposed shoreline management program designates five shoreline management zones on Lake Almanor including commercial, industrial, residential, recreation, and conservation and also describes the shoreline management policies that apply across all shoreline zones.

In its October 29, 2004, comments on the draft EIS, Plumas County recommends that PG&E meet with local citizens and the 2105 Committee prior to finalizing the SMP and filing it with the Commission.

In its final Section 4(e) condition no. 40(H), filed November 4, 2004, the FS specifies that PG&E consult with the FS and other interested relicensing SA signatories within 30 days of license issuance to finalize the SMP, which the FS specifies that PG&E implement within 1 year of license issuance. The FS states that it would approve those portions of the plan that are within its jurisdiction. The FS further specifies that PG&E meet with the FS, Plumas County, and other interested relicensing SA signatories a minimum of every 10 years to discuss the need to update the SMP; the need to update the SMP sooner may also be raised and discussed during the annual land use meetings with the FS, Plumas County, and other interested relicensing SA signatories.

Our Analysis

The shoreline of Lake Almanor is highly developed and along certain areas of the shoreline, convenient access is limited. PG&E faces a growing need to provide more shoreline access points and shoreline recreation facilities to meet future demand and growth. Also, PG&E currently has more than one program for permitting various features along the reservoir shoreline, addressing both private and commercial uses. The draft SMP that PG&E presented in its license application integrates existing shoreline management policy and permitting documents into one comprehensive plan. The SMP was developed as a guide to future management of the Lake Almanor shoreline in the face of increasing development pressures, as well as frequent requests from adjacent property owners to either make shoreline improvements or place private docks and facilities for public or group use inside the project boundary around Lake Almanor. The plan examines all shoreline areas of the reservoir to identify the appropriate developmental uses, as well as to protect areas deemed necessary for preservation to protect and enhance environmental values. Under the terms and conditions of the project license, PG&E must retain all rights to lands and waters within the project boundary needed for project purposes. PG&E may permit others to use the project's lands and waters but before permitting such a use, PG&E must ensure that the use does not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use and that a permittee takes all reasonable measures to protect the scenic, recreational, and environmental values of the project. Additionally, PG&E is responsible for ensuring that permitted facilities are constructed and operated in a safe manner that do not adversely affect project operations and purposes. See section 3.3.1, *Water Resources,* for more discussion on the SMP.

Annual Meeting

In the SA, PG&E proposes to conduct an annual meeting with the FS, CDFG, and Plumas County to coordinate ongoing project-related land management activities including recreation management and use; fire suppression and related forest health activities; and the planning for commercial, residential and industrial developments. FS final Section 4(e) condition no. 40(I) specifies the same proposal as PG&E.

Our Analysis

An annual meeting of the FS, CDFG, Plumas County, and PG&E would allow these agencies to share current and future plans for land management activities, including any planned development or timber removal. Such a meeting should decrease conflicts with the established land use policies in place for the project area, such as FS LRMP direction and Plumas County zoning ordinances.

Fire Prevention and Response Plan

In its final Section 4(e) condition no. 41, filed November 4, 2004, the FS specifies that, within 1 year of license issuance, PG&E file an FS-approved vegetation management plan, developed for the purpose of identifying hazardous vegetative conditions surrounding project facilities that may accelerate the spread of a wildfire onto NFS lands as a result of project activities or might place project facilities in jeopardy from an approaching fire. The FS specifies that the plan include the following minimum provisions: (1) analysis of live and dead fuel loading and potential fire behavior within 300 feet of project features; (2) treatments to be employed to reduce ignition hazard; (3) an implementation schedule; and (4) provisions for the reassessment of hazardous conditions at 5- to 8-year intervals depending on regrowth of vegetation. The FS further specifies that any treatments extending onto adjacent NFS lands be approved by the FS and accomplishment of any hazard reduction activities be coordinated with the FS when practicable.

The FS also specifies in final Section 4(e) condition no. 9(A) that PG&E file an FS-approved fire prevention and response plan with the Commission, developed in consultation with the appropriate state and local fire agencies. The fire prevention and response plan would set forth in detail the plan for preventing, reporting, controlling, and extinguishing fires in the vicinity of the UNFFR Project, within 1 year of license issuance. The FS specifies that the plan address the following categories at a minimum: (1) fuels treatment and vegetation management; (2) prevention; (3) emergency response preparedness; (4) reporting; and (5) extinguishing and controlling fires. The FS further specifies that the plan include appropriate measures from the vegetation management plan and that any fire prevention measures conform to the water quality protection practices as enumerated in the USDA, FS, Pacific Southwest Region, Water Quality Management for NFS Lands in California-BMPS.

In final Section 4(e) condition no. 9(B), the FS specifies that PG&E agree to fully cooperate with the FS in all fire investigations and produce for the FS upon request all materials and witnesses over which PG&E has control that are related to the fire and its investigation, including all investigation reports, all witness statements, all photographs, all drawings, all analysis of cause and origin, and all other, similar materials and documents regardless of how collected or maintained. The FS further specifies that

PG&E preserve all physical evidence and give the FS custody of all physical evidence requested.

Our Analysis

PG&E has documented only one large fire, but a relatively high number of small fires. The large number of small fires indicates the presence of ignition sources, though favorable conditions such as weather and people to extinguish the fires have helped to keep the number of large fires down. However, the continued hydroelectric operations along with the presence of project facilities such as generators, construction equipment, and transmission lines contribute to fire danger in the project area. We expect that, over the term of a new license, the number of recreational users would increase at most developed project sites, and dispersed recreational areas with user-created fire rings add to the threat of fires in the area. Additional fires within the project area would most likely result in property damage, destruction to the scenic beauty of the project area, increased particulate matter and decreased air quality due to smoke, and possibly loss of life.

Having a fire management and response plan in place with fire prevention and response strategies would help minimize damage to natural resources and increase preparedness of fire personnel to provide for public safety when future fires occur. Currently, CDF, Plumas County, private timber companies, the FS, and PG&E are working together to reduce fire danger in the project area in the future. A fire management and response plan would enable compilation of information from the various consulting agencies to facilitate fire prevention needs and procedures throughout the project area. Formalizing any existing agreements would improve the efficiency and effectiveness of fire management of the project area.

Reservoir Levels

The Lake Almanor water levels proposed by PG&E in the SA provide for water surface elevations from June 1 through August 31 that are 10 feet higher than the current required levels in wet and normal water year types and 5 feet higher in dry and critically dry water year types. In its Section 10(j) recommendation, Interior recommends that PG&E implement project operations to maintain the same water surface elevations as those proposed in the SA. The water levels proposed by PG&E in the SA maintain existing water level management regimes for the Butt Valley reservoir. Typically, Butt Valley reservoir fluctuates about 1 foot on a daily basis and between 3 and 5 feet on a weekly basis depending on power system operating needs.

Our Analysis

Currently, PG&E operates the project with the level of Lake Almanor between a normal maximum elevation of 4,494 feet and a normal minimum pool elevation of 4,469 feet. The reservoir usually reaches it highest elevation in May or June and is slowly

drawn down to its lowest level by December or January. Lake Almanor's average high level occurs in June when the lake averages about 4,487 feet. The average September lake level is about 4,482 feet.

PG&E's proposal to operate the project to maintain the surface water elevation level of Lake Almanor at 4,485 feet until August 31 in wet and normal water years would improve the aesthetic values of the Lake Almanor area.

Potential Measures to Reduce Water Temperature

As detailed in section 3.3.1.2, as part of the SA for the Rock Creek-Cresta Project, PG&E agreed to evaluate the effectiveness of modifying the UNFFR Project's Prattville intake as a temperature control measure for the downstream reaches of the NFFR. PG&E has been conducting feasibility studies, including modeling the water temperature effects of potential Prattville intake modifications, re-operation of the Canyon dam outlet gates, and modification of Caribou No. 2 intake for the past few years. Appendix D of this EIS provides an initial evaluation of the advantages and disadvantages of 42 potential measures that could affect water temperatures and identifies the 5 measures we analyze further in section 3.3.1.2, *Water Resources*, of this EIS.

Two of the measures evaluated by PG&E and described in section 3.3.1.2 include the installation of a thermal curtain in front of the Prattville intake. The Prattville intake is located in a steep-sided trough in a cove of the relatively shallow western lobe of Lake Almanor. Black & Veatch conducted a feasibility study of alternatives to lower water temperature based on results of the hydraulic model testing conducted by the IIHR, and provided a conceptual design for installing a U-shaped thermal curtain in this location. Two sides of the thermal curtain described by Black & Veatch would extend approximately 900 feet from 2 locations on the shore, with an approximately 770-foot long thermal curtain parallel to the lakeshore connecting them. The curtain would be constructed of a geotechnical fabric (Hypalon), supported on the lake surface by a floating boom made of a string of floating tanks, with the bottom edge held at a constant elevation (4,445 ft) by buoyant tanks anchored to the bottom of the lake. Each of the tanks in the floating boom would be 15 feet long with hard rubber bumpers attached to each end to absorb impacts from the tanks bumping each other and to reduce the noise level during those impacts. Large floating stabilizing buoys would be attached to the floating boom with chains to assist with holding the curtain in place. Both the tanks and the stabilizing buoys would be constructed of galvanized steel. The main floats supporting the upper curtain's top edge would be anchored by cables to the stabilizing buoys, which in turn would be anchored by cables to the large main anchors on the bottom of the lake. With this two-cable system, a vertical force would not pull down on the main floats.

The curtain would be attached to the shore by cables attached to "trolley" beams extending from two walls, such as bin-type galvanized steel walls, extending from the

high water line (elevation 4,495 feet) on the shore to a point offshore where the bottom of the lake is at elevation 4,463 feet. The "trolley" beams would be used to accommodate the changing levels of the water level of the lake. The two walls would be backfilled with aggregate to form a top surface which could be used to drive small equipment to the lake end of the walls.

To minimize public safety hazards, warning signs would be installed offshore to inform the boating public of the existence of the thermal curtain. Public warning buoys (standard lighted Coast Guard warning buoys) would also need to be installed beyond the location of the thermal curtain. Additionally, cable break warning buoys would be installed at about the mid-span of the main cables so that in the event of a break in the cable the marker buoy would surface to indicate where there is a problem. These buoys would be spherical buoys approximately 2 feet, 6 inches in diameter, constructed of encapsulated rigid closed-cell foam and brightly painted with an identifier for the cable which has broken below the surface.

As described in section 3.3.1.2, in the 1920s, a channel was constructed to link the Prattville intake with the Big Springs area in the eastern lobe of Lake Almanor. When the channel was constructed, excavated sediments were placed along it, creating underwater levees. Based on the results of the IIHR Report, Black & Veatch also evaluated removal of these levees, in addition to installing a thermal curtain around the Prattville intake. Black & Veatch estimated that a disposal site consisting of a minimum of 2 acres of land would be required to contain the estimated 23,000 cubic yards of dredged spoils that would be generated by the floating curtain and dredging-only alternative. Dredging operations would likely occur during the seasonal low water period when the Prattville intake is shut down, likely mid to late October through the end of November. With approximately a 2-acre "footprint" 23,000 cubic yards of dredged spoils could be placed to a height of 10 to 12 feet on the site, which is a fairly typical depth for spoils placement on a disposal site.

Prior to the placement of spoil material, the disposal site would require some preparatory development work, including developing a low containment berm (at least around the downhill side of the site), installing silt fencing or other erosion and sediment control measures, clearing of brush and trees, creating a temporary landing and berth for moorage of transfer barges during the unloading operation, creating a working platform for the unloading crane, and developing appropriate temporary site access improvements. Upon completion of the project, the site would be finish graded to natural contours and planted with appropriate native plants and grasses.

Black & Veatch evaluated two potential disposal sites for the dredged material. The first site was the quarry site near the spillway for Canyon dam, which was last used a few years ago to provide rock for reinforcement of the dam. This site has been extensively regraded and planted and is now covered by a crop of pine seedlings. The second disposal site considered was immediately adjacent to the Prattville intake area.

This disposal site would occupy an unused portion of a parcel of PG&E property where PG&E's cloud seeding facility, including a garage and machine shop, is located. The site near the Prattville intake is an upland site and is also convenient to the area where dredging would occur.

Our Analysis

Lake Almanor is formed by two main lobes or branches; the western lobe or the Chester branch, and the eastern lobe or the Hamilton branch. On average, the eastern lobe is considerably deeper than is the western lobe. The two lobes of Lake Almanor are connected at a narrow region locally called the "Narrows." A peninsula extends into the lake at the Narrows, and acts to partially isolate the eastern and western lobes.

The Prattville intake is located just off the southwest shore of the lake's western lobe, in a small cove just northwest of the Narrows. Construction activities related to the thermal curtain, though temporary, would detract from the visual experience when visiting Lake Almanor. If constructed as designed, the thermal curtain would extend approximately 900 feet from the shoreline, well beyond the location of the Prattville intake. The floats holding the top of the thermal curtain and the stabilizing buoys would be constructed of galvanized steel, and would be connected with steel cables. The galvanized steel floats and buoys and the steel cables would contrast with the darker tones of Lake Almanor and be highly visible, particularly to boaters in this narrow section of the lake. Several homes and resorts are located on the peninsula that extends into the lake at the Narrows across from the Prattville intake. It is likely that the view of Lake Almanor from the peninsula would also be affected by the reflection of the steel tanks and buoys. We conclude that locating a thermal curtain in this location in Lake Almanor would negatively affect the aesthetic quality of the lake, particularly since the area where the curtain would be located is one of the narrowest sections of the lake.

Access currently is restricted in the area immediately surrounding the Prattville intake for safety reasons. However, a day-use area is proposed just north of the Prattville intake. The visual experience of the visitors to this day-use area would also be affected by the presence of a thermal curtain in the lake just south of this area.

Dredging may also occur in conjunction with the placement of a thermal curtain. The timing of the dredging would be from mid to late October through the end of November, when there are fewer visitors to Lake Almanor. However, prior to dredging, vegetation removal and other site disturbing activities would occur in the 2 acres proposed for the spoil disposal area, negatively affecting aesthetics for visitors to Lake Almanor. It is possible that the spoil pile created with the material dredged from the bottom of Lake Almanor would be 10 to 12 feet high. Even with contouring and planting, the spoil pile would contrast with the surrounding area along the southwest shoreline of Lake Almanor, creating negative visual effects for boaters and visitors to the day use area.

We present the estimated cost of all measures that pertain to land use and aesthetic resources in chapter 4, *Developmental Analysis*, and make our final recommendations regarding these measures in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.6.3 Unavoidable Adverse Effects

None.

3.3.7 Cultural Resources

3.3.7.1 Affected Environment

Identification of the Area of Potential Effects and Consultations

PG&E advocated that the area of potential effects (APE) for the project (PG&E, 2002a, report 4E) should be defined as follows: all of the lands within FERC project boundaries, including the shorelines of Lake Almanor, Butt Valley reservoir, and Belden forebay; roads between Butt Valley reservoir and Caribou powerhouse; the adit access road leading up from Caribou Road to the Belden tunnel; the access road leading up from Highway 70 to the Belden tunnel siphon; and about 15 acres north of the rest stop along Highway 70 near Belden. Project access road corridors extend 25 feet on either side of centerline and include turnouts. Maps of the APE are included in appendix E4-D of PG&E's application.

This definition of the APE was included in PG&E's First Stage Consultation Package for the UNFFR Project, and circulated for discussion among the project's Cultural Resources Working Group. The Cultural Resources Working Group includes representatives of the Greenville Rancheria, Susanville Indian Rancheria, Mountain Maidu, Maidu Cultural and Development Group, United Maidu Nation, Honey Lake Maidu Tribe, Roundhouse Council, Tasmam Koyom Foundation, Mountain Meadows Conservancy, Plumas County 2105 Committee, Lassen National Forest, and Plumas National Forest. FERC cultural resources staff met with the Cultural Resources Working Group twice (July 23 and September 4, 2002), and discussed the definition of the APE.

In a letter dated April 10, 2002, conveying cultural resources reports to the California State Historic Preservation Office (SHPO), PG&E requested that SHPO concur with its definition of the APE. SHPO responded in a letter dated July 29, 2002, accepting the reports submitted by PG&E. We also agree with PG&E's definition of the APE with the understanding that it can be modified in the future based on the discovery of project-related impacts elsewhere.

Staff consulted with federally recognized Indian tribes with an interest in this proceeding; these tribes were sent Commission notices and issuances. The Greenville Rancheria and the Susanville Indian Rancheria were the only federally recognized tribes

to request to be consulting parties in this proceeding. On two occasions prior to the filing of PG&E's final application, staff met directly with the tribal council of the Greenville Rancheria. PG&E documented its consultations with Native American organizations and individuals in appendix E4-C of its application.

Archaeological Research

The earliest professional archaeological field work in the project area was initiated in the late 1940s and 1950s by Francis Riddell of the University of California at Berkeley. Riddell had previously excavated Tommy Tucker cave in the Honey Lake Valley of Lassen County in the late 1930s and 1940s, while a student at Sacramento Junior College (Fenenga and Riddell, 1949; Riddell and Fenenga, 1951). He also was the first to investigate Rainbow Point at Buck's Lake in Plumas County (Riddell and Pritchard, 1971). Riddell recorded sites around Lake Almanor that include CA-PLU-1, 30, 32, and 33.

Chester Rich, a school teacher from Chester, recorded site CA-PLU-87 on Lake Almanor in 1956. His students produced a manuscript (Johnson and Newman, 1956) about the Indians of Big Meadow (where Lake Almanor is now located), which reported projectile points found near the Durbin Motel on the east side of the lake.

In 1974, Makoto Kowta of California State University at Chico led a survey of the Lake Almanor shoreline between the 4,490 and 4,500 foot elevation contours on behalf of PG&E (Kowta, 1974). Kowta relocated four previously recorded sites and recorded four new archaeological sites (CA-PLU-333, 334, 335, 336). In 1975, Kowta salvaged prehistoric burial remains found eroding into the reservoir at site CA-PLU-33 (Kowta, 1980). Those remains were recently reinterred in the Lake Almanor vicinity.

Trudy Vaughn, of Coyote and Fox, led surveys on the eastern and southern end of Butt Valley reservoir for a powerline tree removal project for the FS and PG&E in 1994. Vaughn recorded 15 new archaeological sites (CA-PLU-1185 to 1197 and 1206 and 1207). PAR Environmental Services, Inc. (PAR) conducted additional archaeological surveys at the Butt Valley reservoir in 1996 for PG&E's seismic remediation project at the Butt Valley dam (Macdougall and Maniery, 1996).

In 2000, PG&E had PAR inventory all accessible lands within the relicensing APE. After the level of Lake Almanor was lowered in 2001, PAR conducted additional surveys (Compas, 2001, 2002). Combined, these surveys covered 7,567 acres, which PG&E claims represents 75 percent of the APE, the remaining 25 percent of the APE being inaccessible due to steep terrain. In 2003, PAR surveyed an additional 140 acres for various proposed recreational areas around Lake Almanor, Butt Valley reservoir, and Belden forebay (Compas, 2003). The 2000 PAR survey relocated 21 previously recorded sites within the APE and identified 35 newly recorded sites and 119 isolated finds. The 2001 PAR survey relocated 11 previously recorded sites and identified 36 new

archaeological sites and 60 new isolated finds. The 2003 PAR survey recorded two new archaeological sites. Among the previously recorded sites relocated by PAR around Lake Almanor were Riddell's CA-PLU-1, 30, and 33; Rich's CA-PLU-87; and Kowta's CA-PLU-334 and 336. PAR indicated that Riddell's sites CA-PLU-31 and 32 could not be relocated because they are inundated beneath the waters of Lake Almanor. The same is the case for Kowta's sites CA-PLU-333 and 335. PAR also relocated seven sites previously recorded by Vaughn around Butt Valley reservoir (CA-PLU-1186, 1188, 1190, 1192, 1195, 11196, and 1206).

The cultural chronology of the Sierra Nevada was shaped by the work of the University of California Archaeological Survey beginning in 1948 (Morato, 1984). The oldest occupations in the project area can be placed within the Upper Archaic period, dating back to about 2500 BC, and include projectile points typed as Elko or Martis series (corner-notched, contracting stem and expanding stem) and Mesilla complex (large leaf-shaped and wide-stemmed). Martis or Elko type points were found at site CA-PLU-113 at Rainbow Point and CA-PLU-115 at Boathouse Point on Buck's Lake (Crew, 1981). Along Lake Almanor, sites CA-PLU-30, 33, 284, 1718, 1719, 1720, 1732, 2019, 2061, 2072, 2073, and 2077 produced Martis or Elko type points. Wide stemmed, or leaf-shaped Mesilla style points were recovered at sites CA-PLU-33, 1717, 1709, 1721, 2063, 2067, 2068, and 2090 around Lake Almanor. No evidence of the Bidwell complex was uncovered in the project area.

The Emergent period, after AD 1000, distinguished by the introduction of the bow and arrow, is represented by the Sweetwater and Oroville complexes in the Sierra Nevada. The Sweetwater complex includes Rose Spring and Gunther points. Some archaeologists believe that Gunther points mark the arrival of the Maidu in the northern Sierra. Gunther points were found at Rainbow Point on Buck's Lake, and at sites CA-PLU-284, 2071, and 2072 along Lake Almanor. The Oroville complex is denoted by Cottonwood triangular and Desert side-notched points. At Boathouse Point on Buck's Lake, Gunther, Eastgate, Rose Spring, Cottonwood, and Desert side-notched points were found within the same cultural horizon (Crew, 1981). Likewise, at site CA-PLU-33 at Lake Almanor, Kowta (1980) recovered Gunther, Rose Spring, Desert side-notched points, and Cottonwood points from a cultural horizon estimated to date between AD 1100 and 1750, together with ground stone artifacts, a steatite pipe, tubular bone beads, pine nut beads, Olivella shell beads, abalone shell objects, and carbonized coiled basketry, associated with 14 burials. Rose Spring, Eastgate, and Desert side-notched points were also noted at sites CA-PLU-2063, 2072, and 2090 and P-32-2076 at Lake Almanor, and site CA-PLU-1186 at the Butt Valley reservoir.

Table 3-38 lists all of the prehistoric or aboriginal archaeological sites identified in the APE. Many of these sites also have historic materials associated with them.

Table 3-38. Prehistoric or multicomponent sites identified within the APE. (Source: PG&E, 2002a)

Site No./Name	Description	Effects	Management
CA-PLU-1/CA-PLU-1731 (NF-15)	Prehistoric lithic scatter, originally recorded by Riddell in 1949, and relocated by Kowta in 1974 and by PAR in 2000.	Riddell noted that wave action was destroying site. Partly inundated. Local residents cited artifact collection. Private home construction.	Signage, education, and limit permit. Monitor and additional recording and testing, as necessary.
CA-PLU-30 may be related to ethnohistoric Maidu village of Manimbaldiki	Prehistoric lithic scatter, with Elko/Martis type point. Originally recorded by Riddell in 1958. Relocated by Kowta in 1974 and PAR in 2001.	Usually inundated, wave action, changing lake levels, recreation, casual visitation and potential vandalism.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-33 may be related to ethnohistoric Maidu village of Nakango Koyo	Originally recorded by Riddell in 1958 as prehistoric village and historic stage station, with 8 burials reported. Kowta (1980) salvaged 14 burials eroding from site in 1975. PAR relocated site in 2000, and found bedrock mortars (BRM), ground stone artifacts, Martis expanding stem, Martis corner- notched, Mesilla large leaf shaped, and Gunther points.	Periodically inundated, wave action, recreation and potential vandalism, ORV use.	Proceed to Stage 3. Consult with FERC, SHPO, Greenville Rancheria, SIR, and other interested parties regarding treatment measures to be developed.
CA-PLU-87 may be related to ethnohistoric Maidu village of Yotim	Originally recorded by Rich in 1956 as prehistoric camp with BRMs, points, beads, and ground stone below high water mark. Relocated by PAR in 2000, noted lithics, BRM, and ground stone.	Periodically inundated, wave action, recreation (near old boat ramp and resort), vandalism.	Signage. Monitor and additional recording and testing, as necessary.

Site No./Name	Description	Effects	Management
CA-PLU-284 and CA-PLU-674 may be related to ethnohistoric Maidu village of Oidoing-Koyo	Originally recorded in 1977 for timber sale as prehistoric base camp with Martis corner-notched point and ground stone. Historic component of tin cans originally recorded in 1985 by Chico State. Relocated in 2000 by PAR with Gunther point noted.	Recreation (near camp ground), casual visitation, logging.	Within Lassen National Forest, so treatment should be determined by the FS.
CA-PLU-334	Originally recorded during Kowta's 1974 survey, as BRM. Relocated in 2001 by PAR, with BRMs and lithic scatter, together with historic artifacts and remains of logging railroad grade.	Partial inundation, changing lake levels, wave action, ORV use, casual visitation.	Block ORV access, signage. Monitor and additional recording and testing, as necessary.
CA-PLU-336	Prehistoric lithic scatter, originally recorded during Kowta's 1974 survey, and relocated by PAR in 2000.	Casual visitation, grazing.	Prohibit grazing.
CA-PLU-1185	Prehistoric lithic scatter, including ground stone artifacts, originally recorded during 1994 Coyote and Fox survey.	Recreation (near a camp ground), casual visitation, logging.	Restrict road grading, signage, monitor.
CA-PLU-1186	Prehistoric lithic scatter, with Desert side-notched point. Originally recorded during 1994 Coyote and Fox survey. In 2001, PAR relocated site and found historic artifacts.	Recreation (near camp ground), casual visitation, logging.	Signage, monitor.
CA-PLU-1709 (NF-3)	Recorded by PAR in 2000 as prehistoric lithic scatter in a meadow, with large leaf-shaped Mesilla type point.	Casual visitation.	Signage, monitor.
CA-PLU-1710 (NF-4)	Recorded by PAR in 2000 as prehistoric lithic scatter in a forested meadow, with large leaf-shaped Mesilla type point, and ground stone (metate).	Casual visitation.	Signage, monitor.

Site No./Name	Description	Effects	Management
CA-PLU-1712 (NF-5)	Recorded by PAR in 2000 as prehistoric lithic scatter in a forested meadow. Also has a historic component with depression and artifacts.	Casual visitation (near a dirt road).	Signage, monitor.
CA-PLU-1717 (NF-24)	Recorded by PAR in 2000 as a prehistoric lithic scatter, including large leaf-shaped point (Mesilla complex?).	Often inundated, changing lake levels, wave action.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1718 (NF-26)	Recorded by PAR in 2000 as a prehistoric lithic scatter, including 2 Martis-type points and ground stone artifacts.	Often inundated, changing lake levels, wave action.	PG&E did not propose any treatment measures.
CA-PLU-1719 (NF-27)	Recorded by PAR in 2000 as a prehistoric lithic scatter in marshy alluvial flat, including Martis contracting stem point and ground stone.	Often inundated, changing lake levels, wave action.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1720 (NF-28)	Recorded by PAR in 2000 as a prehistoric lithic scatter in alluvial flat, including Martis point, ground stone, and hearth feature.	Often inundated, changing lake levels, wave action, recreation (near camp ground), and casual visitation.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1721 (NF-29)	Recorded by PAR in 2000 as a prehistoric lithic scatter in marshy alluvial flat, including broad stemmed point similar to Mesilla type.	Often inundated, changing lake levels, wave action, recreation (near picnic area), and casual visitation.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1725 (NF-13) may be associated with ethnohistoric Maidu village of Manimbaldiki	Recorded by PAR in 2000 and 2001 as a prehistoric lithic scatter, with ground stone, and midden soils. Historic component related to RRLC Camp 28.	Often inundated, changing lake levels, wave action.	Monitor and additional recording and testing, as necessary.
CA-PLU-1728 (NF-28)	Sparse prehistoric lithic scatter recorded by PAR in 2000.	Partly inundated, changing lake levels, wave action.	Signage. Monitor and additional recording and testing, as necessary.

Site No./Name	Description	Effects	Management
CA-PLU-1729 (NF-30)	Prehistoric lithic scatter, with ground stone, and midden soils, recorded by PAR in 2000.	Partly inundated, changing lake levels, wave action.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1730 (NF-14)	Prehistoric lithic scatter, with midden soils, recorded by PAR in 2000 on a forested flat.	Partly inundated, changing lake levels, wave action, casual visitation.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1732 (NF-23)	Prehistoric lithic scatter, with leaf-shaped point, recorded by PAR in 2000 and 2001.	Partly inundated, changing lake levels, wave action.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1733 (NF-22)	Prehistoric lithic scatter, with ground stone, recorded by PAR in 2000 and 2001 on muddy alluvial flat meadow.	Partly inundated, changing lake levels, wave action, borrow area for golf course.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1735 (NF-1)	Prehistoric lithic scatter, with BRMs, recorded by PAR in 2000.	Partly inundated, changing lake levels, wave action.	PG&E did not propose any treatment.
CA-PLU-1737 (NF-7)	Prehistoric lithic scatter, with ground stone artifacts, recorded by PAR in 2000.	Partly inundated, changing lake levels, wave action. Recreation, casual visitation, and vandalism.	Signage. Monitor and additional recording and testing, as necessary.
CA-PLU-1738 (NF-8)	Sparse prehistoric lithic scatter, recorded by PAR in 2000. Historic component of tin cans mostly outside project boundary.	Logging, casual visitation.	PG&E did not propose any treatment.
CA-PLU-2019 (LA-5)	Prehistoric lithic scatter, including 4 Elko/Martis points, and ground stone artifacts, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.

Site No./Name	Description	Effects	Management
CA-PLU-2061 (LA-6)	Prehistoric lithic scatter, including Elko point, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2063 (LA-8)	Prehistoric lithic scatter, including 2 leaf-shaped Mesilla type points and a Desert side-notched point, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2065 (LA-10) may be associated with ethnohistoric villages of Oidoing-Koyo or Nakang-Koyo	Prehistoric lithic scatter, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2066 (LA-11)	Prehistoric lithic scatter, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2068 (LA-18)	Prehistoric lithic scatter, including wide-stemmed Mesilla type point, recorded by PAR in 2001. Historic component related to logging activities.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2069 (LA-20)	Prehistoric lithic scatter, with 4 point fragments, and hearth feature, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2071 (LA-22)	Prehistoric lithic scatter, including Gunther point and ground stone, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2072 (LA-24)	Prehistoric lithic scatter, including Martis, Gunther, and Rose Spring points and ground stone, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.

Site No./Name	Description	Effects	Management
CA-PLU-2073 (LA-29)	Prehistoric lithic scatter, including corner-notched Martis and Sierra Contracting Stem points, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2074 (LA-30)	Prehistoric lithic scatter, with 2 point fragments, recorded by PAR in 2001. Site contains an historic component also.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2077 (LA-34)	Prehistoric lithic scatter, including Northern side-notched and Martis type points, and ground stone, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2089 (LA-26) may be associated with ethnohistoric villages of Manimbalkiki	Prehistoric BRM, recorded by PAR in 2001, near sites CA-PLU-30 and 333.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2090 (LA-27)	Prehistoric lithic scatter, including leaf-shaped, Eastgate, and Desert side-notched points, and ground stone, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
CA-PLU-2094 (LA-28)	Prehistoric BRM, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
P-32-1714 (NF-16) may be associated with ethnohistoric village of Chambukunyim	Prehistoric lithic scatter, mounds, and midden soil, in grassy meadow, recorded by PAR in 2000.	Casual visitation, grazing.	Signage. Monitor and additional recording and testing, as necessary.
P-32-2064 (LA-9)	Prehistoric lithic scatter, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.

Site No./Name	Description	Effects	Management
P-32-2075 (LA-32)	Prehistoric lithic scatter, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
P-32-2076 (LA-33)	Prehistoric lithic scatter, with 2 points, including a side-notched, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
P-32-2079 (LA-36)	Prehistoric lithic scatter, with a steatite pipe bowl, recorded by PAR in 2001. Site includes an historic artifact also.	Usually inundated.	PG&E did not propose any treatment.
P-32-2080 (LA-39)	Prehistoric lithic scatter, recorded by PAR in 2001. May be related to site LA-40.	Usually inundated.	PG&E did not propose any treatment.
P-32-2081 (LA-40)	Prehistoric lithic scatter, including ground stone artifacts, recorded by PAR in 2001. May be related to site LA-43.	Usually inundated.	PG&E did not propose any treatment.
P-32-2082 (LA-42)	Prehistoric lithic scatter, recorded by PAR in 2001. May be related to site CA-PLU-1717.	Usually inundated.	PG&E did not propose any treatment.
P-32-2083 (LA-43)	Prehistoric lithic scatter, recorded by PAR in 2001. May be related to site LA-40.	Usually inundated.	PG&E did not propose any treatment.
P-32-2084 (LA-44)	Prehistoric lithic scatter, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
P-32-2085 (LA-45)	Prehistoric lithic scatter, including 3points, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
P-32-2086 (LA-46)	Prehistoric lithic scatter, recorded by PAR in 2001. May be related to site LA-47.	Usually inundated.	PG&E did not propose any treatment.

Site No./Name	Description	Effects	Management
P-32-2087 (LA-47)	Prehistoric lithic scatter, with ground stone, and hearth feature. May be related to site LA-46.	Usually inundated.	PG&E did not propose any treatment.
P-32-2092 (LA-2)	Prehistoric lithic scatter and ground stone artifacts, recorded by PAR in 2001. Site also contains an historic component.	Usually inundated.	PG&E did not propose any treatment.
P-32-2093 (LA-37)	Prehistoric lithic scatter, including corner-notched point, and BRM, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.
P-32-2122 (LA-38)	Prehistoric lithic scatter, recorded by PAR in 2001.	Usually inundated.	PG&E did not propose any treatment.

Ethnographic Research

The project area is the native homeland of the Maidu Indian tribe. The Mountain Maidu, also known as the Northern or Northeastern Maidu, occupied valleys in the Sierra Nevada along the Feather River and its tributaries, including Big Meadow and Butt Valley. Their territory extended from Mount Lassen south to Sierra Butte, and from Honey Lake west to Rich Bar. The Northwestern Maidu, or Konkow, occupied the area from Rich Bar west to the Sacramento River, while the Southern Maidu, or Nisenan, occupied the Yuba and American River drainages east from Sacramento. The Maidu, Konkow, and Nisenan are all subgroups of the California Penutain linguistic family.

Ethnographic studies of the Maidu date back to Stephan Powers' articles in the early 1870s. As part of the Huntington Expedition, between 1899 and 1903, Roland Dixon (1905) was the first trained anthropologist to conduct field work with the Maidu. Physician and biologist C. Hart Merriam did anthropological field work with the Maidu in Big Meadow and the American Valley between 1903 and 1930, supported by an endowment from E.H. Harriman. In 1924, Edward Curtis published photographs of Maidu people, together with some ethnographic notes, in volume 14 of his North American Indian series. A.L. Kroeber, of the University of California, devoted several chapters to the Maidu in his Handbook of the Indians of California, published in 1925. University of California linguist William Shipley started working on the Maidu language in 1954. Francis Riddell (1978), the former State Archaeologist for California, had a long career of research among the Maidu, dating from the 1940s through the 1970s. Dorothy Hill studied the Maidu both as a student at the California State University at

Chico and as a teacher at Butte College. In 1977, Marie Potts, a Maidu from Big Meadow, published her book about the tribe. Leigh Ann Hunt's 1992 California State University at Sacramento master's thesis on the Bear Dance also contained ethnographic information about the Mountain Maidu.

As part of its relicensing efforts, in 2001, PG&E commissioned an ethnographic study of the project area to identify traditional cultural properties (TCPs). The research was conducted by Albion Environmental, Inc. (Albion), according to an MOU signed by Albion, PG&E, and the Greenville Rancheria. Albion reviewed the ethnographic literature, and interviewed nine Maidu informants. The study mentions 14 potential TCPs in the APE (Brickley and Blount, 2002; see table 3-39).

Table 3-39. Potential TCPs identified by PG&E's ethnographic study in the APE. (Source: PG&E, 2002a)

Field No. and Name	Description	Archaeological Correlate	Evaluation	Effects/Management
1 – Big Meadow	Site of numerous ethnohistoric Maidu villages, and historic Maidu allotments; plays role in Maidu Creation Story and other myths, place for fishing, hunting, and gathering activities.	Maidu called valley Naga Koiyo or Nakankoyo or Nah-Kahn-ko. Valley contains numerous aboriginal sites.	Does not retain qualities of a TCP.	Inundated by Lake Almanor. PG&E to develop a public education program.
2 – Eastern Shore Burials	Maidu burials associated with former village location.	Maidu village called Manimbaltdiki. Sites CA-PLU-30, 1725, and 2090.	Retains qualities of a TCP.	Inundated by Lake Almanor. If reservoir is drawn down PG&E would try to relocate and assess burial site.
3 – Frog Rock	Place connected to Maidu mythology and stories about Earthmaker.	CA-PLU-1729.	Retains qualities of a TCP.	Partly inundated by Lake Almanor. PG&E would protect site from future impacts by prohibiting construction in area.

Field No. and Name	Description	Archaeological Correlate	Evaluation	Effects/Management
4 – Prattville	Botanical gathering area; possible burial location; and location of Maidu Big Times ceremony.	CA-PLU-1734, and P-32-2093.	Does not retain qualities of a TCP.	Partly inundated by Lake Almanor, and partly developed as PG&E construction camp, and recreational area. PG&E would develop an agreement with Maidu regarding future gathering and protection of specific plant species.
5 – Big Spring	Maidu village location; named in Maidu myths and associated with Earthmaker; site of Big Times and Bear Dance ceremonies; and important location for Maidu shamans.	Maidu village called Wisotpinim. Site CA-PLU-32.	Retains qualities of a TCP.	Inundated by Lake Almanor. PG&E to develop a public education program.
6 – Canyon dam spillway	Place associated with Earthmaker in Maidu Creation Story and myths.	CA-PLU-1264, 1265, 1726, and 1727.	Retains qualities of a TCP.	Site developed as dam and spillway, and impacted by associated construction camp, and historic logging activities. No treatment proposed.
7 – Willow gathering area	Maidu botanical gathering area. "Gray" willow used for basketmaking.	None.	Retains qualities of a TCP.	Partly inundated by Lake Almanor. PG&E would develop an agreement with Maidu regarding future gathering and protection of specific plant species.
8 – Fishing hole along Butt Creek	Maidu family fishing location	None	Does not qualify as a TCP	Project may have affected fishery. No treatment proposed.

Field No. and Name	Description	Archaeological Correlate	Evaluation	Effects/Management
9 – Roundhouse in Butt Valley	Location of a Maidu roundhouse, probably associated with a village.	CA-PLU-1245.	Does not retain qualities of a TCP.	Inundated by Butt Valley reservoir. If reservoir is drawn down PG&E would try to relocate and assess site.
10 – Maidu Trail	Trail historically used by Maidu to travel between Butt Valley and Humbug Valley.	None.	Does not retain qualities of a TCP.	Partly inundated by Butt Valley reservoir. No treatment proposed.
11 – Gould's Swamp	Historic Maidu hunting grounds and botanical gathering area.	CA-PLU-1709, 1710, 1712, 1719.	Does not retain qualities of a TCP.	Partly inundated by Lake Almanor. No treatment proposed.
12 – Maidu Church	Location of a former church attended by members of the Maidu community; also a plant gathering area.	CA-PLU-1714, and 1717.	Does not retain qualities of a TCP.	Church building no longer standing. No effect from the project. No treatment proposed.
13 – Gravel pit gathering area	Location of a Maidu family botanical gathering area.	CA-PLU-1713 and 1715.	Does not retain qualities of a TCP.	No effect from the project. PG&E would develop an agreement with Maidu regarding future gathering and protection of specific plant species.
14 – Butt Valley	Location of ethnohistoric Maidu villages; botanical gathering, and hunting area.	Maidu called valley Kobati or Yakuning Koiyo or Kawati. Five prehistoric sites recorded in the vicinity.	Does not retain qualities of a TCP.	Inundated by Butt Valley reservoir. PG&E to develop a public education program.

Based on research conducted by Riddell and Kowta, PAR (Compas, 2001) identified nine ethnohistoric Maidu villages in the Lake Almanor area. Brickley and

Blount's (2002) TCP study also mentions Maidu village place names in the project area (see table 3-40).

Table 3-40. Ethnohistoric Maidu villages in the UNFFR Project vicinity. (Source: PG&E, 2002a)

Village Name	Place/Source	Archaeological Correlates	Effects/Management
Chaldino	Village in the Lake Almanor area (Brickley and Blount 2002)	Not located	Assumed inundated under Lake Almanor. No treatment proposed.
Chambukunyim	Village near Chester and Stover Ranch (Riddell 1978; Compass, 2001)	P-32-1714	Affected by historic use, grazing, casual visits; and partly inundated by Lake Almanor. Treatment would include signage, elimination of grazing, monitoring, and possibly testing.
Humodum	Winter village site in Big Meadow (Brickley and Blount, 2002)	Not located	Assumed inundated under Lake Almanor. No treatment proposed.
Kobati or Yakuning koiyo or Kawati	Maidu name for Butt Valley, means "fan the dirt." (Brickley and Blount, 2002)	Too general, not located	Inundated under Butt Valley reservoir. Proposed treatment would include developing a public education and interpretation program.
Kolyem	Village near a spring west of Big Spring (Riddell, 1978; Compass 2001; Brickley and Blount, 2002)	CA-PLU-31, not relocated	Assumed inundated under Lake Almanor. No treatment proposed.
Kom-hum	Village with a roundhouse in Big Meadow (Brickley and Blount, 2002)	Not located	Assumed inundated under Lake Almanor. No treatment proposed.
Manimbaltdiki	Village at edge of Big Meadow, near Canyon dam, including dance house and associated cemetery (Riddell, 1978, Compas, 2001; Brickley and Blount, 2002)	CA-PLU-30, 333, 1725, and 2089	Affected by recreation, casual visitation; and partly inundated under Lake Almanor. Treatment would include signage, monitoring, and possibly testing.

Village Name	Place/Source	Archaeological Correlates	Effects/Management
Naga koiyo, Nakankoyo, or Kahn-ko	Maidu name for Big Meadow (Brickley and Blount, 2002)	Too general, not located	Inundated under Lake Almanor. Proposed treatment would include developing a public education and interpretation program.
Nakan Koyo	Village near Big Spring. Also Maidu name for people of the entire Big Meadow valley (Dixon, 1905; Compass, 2001; Brickley and Blount, 2002))	Compass (2001) associates this village with CA-PLU-33, but the locations do not match	Assumed inundated under Lake Almanor. Treatment proposed for CA-PLU-33 could include data recovery.
Oi-dim koi-yum, or Oidim koiyo, or Oiding Koiyo	Maidu name for "upper valley" or "upper end of the meadows," and village north of Chester (Brickley and Blount, 2002). Compas (2001) thought this village was near Big Spring.	CA-PLU-284 and 2065	Affected by recreation, casual visitation, logging, and inundation. Treatment of site 284 should be determined by the FS.
Potadi	Village west of Canyon dam (Riddell, 1978; Compas, 2001; Brickley and Blount, 2002)	Not located	Assumed inundated under Lake Almanor. No treatment proposed.
Taldinom	Village near new Prattville (Riddell, 1978; Compass, 2001; Brickley and Blount, 2002)	Not located	Assumed inundated under Lake Almanor. No treatment proposed.
Wisotpinim	Village near Big Spring (Riddell, 1978; Compas, 2001; Brickley and Blount, 2002)	CA-PLU-32, not relocated	Assumed inundated under Lake Almanor. No treatment proposed.
Yoatim,	Village near Hamilton Branch (Riddell, 1978; Compass, 2001; Brickley and Blount, 2002)	CA-PLU-87	Affected by vandalism; partly inundated by Lake Almanor. Treatment would include signage, monitoring, and possibly testing.

Although representatives of the U.S. government negotiated a treaty with various Maidu bands in 1851, it was never ratified. While some Maidu people were forced to relocate to reservations, many Mountain Maidu remained in their ancestral homeland, co-existing with miners, ranchers, loggers, and tourists. Marie Potts (1977) recalled that it was common for the Maidu to work as laborers on the ranches in Big Meadow and adjacent valleys. A census in 1864 counted 262 Maidu in Seneca Township, including Big Meadow and Butt Valley, out of a total population of 800 (Brickley and Blount, 2002). The federal census of 1880 enumerated 137 Indians out of a total population of 535 people in Seneca Township (Maniery, 1999). In the 1890s, the government established boarding schools for Maidu children in Greenville, Taylorville, and Indian Valley. After the passage of the Dawes Act in 1887, some Maidu people were able to acquire allotments near their traditional villages in the mountain valleys. Kelsey's census of non-reservation California Indians in 1905-1906 enumerated 29 Maidu families owning land in Big Meadow, and an additional 23 Maidu families living in Big Meadow but not owning land (Compass, 2001). The Great Western Power Company had to acquire some allotments from Maidu landowners when it bought up property for its UNFFR hydroelectric project, shortly after the turn-of-the-century.

Historical Research

The Maidu first came into contact with Euro-Americans during the period of Spanish colonization of California. In 1820, Luis Arguello led a Spanish expedition through the San Joaquin Valley and named the Feather River. American and Canadian fur traders explored the Sierra Nevada between 1828 and 1836, making contact with native tribes, but only passing through the region temporarily during their travels. The first Euro-Americans to reside in Maidu territory included John Sutter at modern day Sacramento in 1839, and John Bidwell at Chico in 1847, at a time when California was still part of Mexico.

It was the gold rush which led to the permanent Euro-American settlement of the project area. In 1848, Peter Lassen blazed the trail, named after him, through the project area. Miners followed this trail to the upper Feather River drainage. Big Meadow, Prattville, Butt Valley, and Caribou are on Gudde's (1975) list of California gold camps. In the 1850s, the town of Caribou sprung up to support activities at the Caribou Mining District. The community of Buttville (site CA-PLU-1245), centered on William and Lena Miller's hotel and store, and Drake's saloon, including a Chinatown, served the North Fork and Seneca Mining Districts.

Some miners turned to agriculture. Although the Lee, Bunnell, and Miller families, who eventually intermarried with each other, were drawn to the upper Feather River drainage in search of gold in the 1850s, they ended up running dairy ranches in Butt Valley (Maniery, 1999). In 1859, the Stover brothers were the first to establish a ranch in Big Meadow (site P-32-1716). Dr. Willard Pratt founded his ranch and hotel in Big Meadow in 1867, and the town of Prattville grew around it. In 1869, Wells Bunnell

married Julia Lee, Lena Miller's sister, and they moved from Butt Valley to near Prattville to operate a ranch and hotel. By the 1870s, a road (site P-32-1742) led from Miller's ranch up Butt Valley to Prattville, and then on to Johnson's ranch near modern Chester.

The timber industry also was associated with mining activities. In the 1890s the Sierra Lumber Company was a major landowner in Big Meadow. Around the turn-of-the-century, the Red River Lumber Company, from Minnesota, began operations in the project area, and established the town of Westwood at its mill in 1913 (Maniery and Compas, 2002). Timber-related historic archaeological sites in the APE include the remains of logging railroad grades (like site CA-PLU-1211) and camps (like site CA-PLU-1736).

The UNFFR Project was the brainchild of engineer Julius Howells, who first visited the region during a geological expedition in 1882 and recognized its potential for hydropower development. In 1902, he helped organize what later became the Great Western Power Company, with the backing of Edwin and Guy Earl. This company had representatives gather together the water rights and easements necessary for the project, and began construction of Canyon dam in 1912, as a multiple arch design by John Eastwood. However, company politics changed this into a hydraulic-fill dam, designed by Howells, which was completed in 1914, creating Lake Almanor. In 1925, the size of Lake Almanor was increased when a new, larger hydraulic-filled dam was put up by the Foundation Company. In Butt Valley, a rock-filled dam was erected by Stone and Webster in 1921. It was replaced by larger hydraulic-filled dam begun in 1923 by the Schultz Construction Company (Jackson Research Projects, 1986). Water from Lake Almanor and Butt Valley was conveyed by tunnels and penstock to the Caribou No. 1 powerhouse, which became operational in 1921. PG&E acquired Great Western Power in 1930, and expanded the UNFFR Project. The Belden dam and forebay were built in 1956; in 1958 the Butt Valley powerhouse came on line and a second powerhouse was put in at Caribou; the Belden powerhouse was built in 1969; and the Oak Flat powerhouse was built in 1984 (Baker and Bakic, 2001).

The earliest history of Plumas County was published in 1882, and mentioned the Miller ranch in Butt Valley and the Stover ranch in Big Meadow (both ranches are within the APE). The first published summary of the creation of the UNFFR hydroelectric system was Coleman's (1952) corporate history of PG&E. In 1986, PG&E commissioned Jackson Research Projects to write a more detailed history of the Great Western Power Company and the UNFFR hydroelectric system. Also for PG&E, Shoup and Cornford (1987) produced a National Register of Historic Places (National Register) evaluation of the Caribou No. 1 powerhouse. Michael Landon, a student at California State University at Sacramento, wrote his 1988 masters thesis about the creation of Lake Almanor. This was also the subject of an article by Teisch (1999). In 1996, PG&E conducted seismic remediation work at both the Butt Valley dam and Canyon dam. This

resulted in a National Register evaluation of Canyon dam (Maniery and Baker, 1996). When water behind the Butt Valley dam was drawn down, the historic dam construction camp (Camp 5, recorded as archaeological site CA-PLU-1245) was revealed, so PG&E mitigated impact through data recovery excavations (Maniery, 1999, 2002). Also because of the seismic remediation, PAR documented the Butt Valley dam, Gate Tender's House and outbuildings for the Historic American Engineering Record. As part of its current relicensing effort, PG&E had PAR produce a National Register evaluation of the entire UNFFR hydroelectric system (Baker and Bakic, 2001), and evaluations of historical archaeological sites within the APE (Maniery and Compass, 2002).

Table 3-41 lists the historic archaeological sites and standing structures identified within the APE. During PG&E's seismic remediation program in 1996, FERC, in consultation with SHPO, determined that Canyondam; Camp 5 (CA-PLU-1245); the Butt Valley Railroad (CA-PLU-1743); and the Gate Tender's House, barn, and shed at the Butt Valley dam were eligible for the National Register. For the current relicensing, SHPO commented on PAR's recommendations for historic sites and structures, in a letter dated July 29, 2003. While SHPO states the UNFFR hydroelectric system as a whole does not qualify for the National Register as a historic district, it does find individual elements of the system to be eligible (Lake Almanor and the Canyondam Outlet Tower). SHPO also indicates that one structure at Camp Almanor (Gate Tender's House), two structures at Canyondam Camp (Patrolman's House and Cottage), and all structures within PG&E's Camp Caribou are eligible for inclusion on the National Register.

Table 3-41. Historic archaeological sites and structures identified in the APE. (Source: PG&E, 2002a)

Site No./Name	Description	SHPO Opinion	Effects	Management
CA-PLU-334	Red River Lumber Company (RRLC) railroad grade (includes prehistoric component, bedrock mortar).	Eligible for nomination to the National Register.	Partly inundated, wave action, recreation, ORV use.	Signage, block access, monitor, and possibly test.
CA-PLU-713 Caribou No. 1 Powerhouse	Powerhouse building and penstocks, originally built with 2 generating units by Stone and Webster between 1919 and 1921, with a third unit added in 1923-1924.	Eligible for the National Register.	Operation and maintenance.	No treatment proposed.

Site No./Name	Description	SHPO Opinion	Effects	Management
CA-PLU-1028 Belden Cemetery	Cemetery contains at least 14 graves, some of whom are Maidu.	Not eligible for nomination to the National Register.	Not considered.	No further work.
CA-PLU-1188	Can scatter, probably related to recreational activities after ca. 1935.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1190	Historic artifact scatter, including cans, ceramics, and glass bottles, probably related to post-1930 recreation.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1192	Historic artifact scatter, probably associated with the Butt Valley dam caretaker's residence, dating to ca. 1930s.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1195	Historic artifact scatter, dating between about 1910 and 1920, related to the occupation of the construction camp for the first Butt Valley dam (Camp 5).	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1196	Historic artifact scatter related to the occupation of Camp 5, ca. 1915 to 1930.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1211 RRLC Railroad	RRLC logging railroad system, 1922 to 1924, consists of 17 recorded segments.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1236	Can dump probably related to logging activities, ca. 1920s.	Not eligible for the National Register.	Not considered.	No further work.

Site No./Name	Description	SHPO Opinion	Effects	Management
CA-PLU-1245 Buttville/Camp 5	William Miller ranch, founded in 1859, later a hotel, store, and townsite, acquired by Great Western Power in 1902 and used as a workers camp during the construction of the first Butt Valley powerhouse in 1911, and the Butt Valley dams built in 1919 and 1923.	Eligible for the National Register.	Inundated under reservoir.	Signage. In the event of a draw down, record, test, and conduct data recovery as necessary.
CA-PLU-1265	Historic artifact scatter (cans and ceramics) probably related to logging activities, ca. 1920s.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1496	Can dump probably related to logging activities, ca. 1920s.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1711 (NF-6)	Historic artifact scatter, perhaps related to recreational activities, 1930s to 1960s.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1713 (NF-12)	Historic artifact scatter, probably representing post-1926 recreation.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1715 (NF-17)	Historic artifact scatter, dated from the 1930s to the 1960s, probably related to the community of Chester. Includes sparse prehistoric component.	Not eligible for the National Register.	Not considered.	No further work.

Site No./Name	Description	SHPO Opinion	Effects	Management
CA-PLU-1726 (NF-19)	Historic artifact scatter related to the second Canyondam construction camp, occupied in the mid-1920s by the Foundation Company workers.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1727 (NF-20) Foundation Company camp at Nevis, also called Canyondam Camp	Foundation remains of the administrative building for the second Canyondam construction camp, occupied between about 1925 and 1930.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1734 (NF-21)	Historic artifact scatter related to Camp 1 (also known as Camp Almanor at New Prattville) the construction camp opened in 1919 for the Prattville intake towers and tunnel, later reused by PG&E as a recreational camp.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1736 (NF-2) RRLC Camp 34	Historic artifact scatter related to the RRLC Camp 34 logging camp, occupied in the early 1920s.	Not eligible for the National Register.	Not considered.	No further work.
CA-PLU-1739 (NF-9)	Historic mining remains and later artifact scatter related to the construction of the Butt Valley dam, ca. 1920.	Not eligible for the National Register.	Not considered.	No further work.

Site No./Name	Description	SHPO Opinion	Effects	Management
CA-PLU-1743 Butt Valley Railroad	In 1919 Stone and Webster built a railroad for the construction of the Caribou power plant and Butt Valley dam. The railroad was reused by Schultz during construction of second Butt Valley dam in 1923.	Eligible for the National Register.	Inundated under Butt Valley reservoir.	Signage. In the event of a draw down, record, test, and conduct data recovery as necessary.
P-32-1206	Concrete cap over air vent for the Prattville Tunnel 1. Use of this tunnel began in 1919 and it was abandoned in place in 1957.	Not eligible for the National Register.	Not considered.	No further work.
P-32-1638 Canyon dam	Originally begun in 1912 as multiple arch designed by John Eastwood, but finished in 1914 as hydraulic-fill designed by Julius Howells. Replaced in 1925-1927 by larger hydraulic fill dam built by the Foundation Company. Second dam height raised in 1962, and seismically retrofitted in 1996.	Eligible for the National Register.	Operation and maintenance (O&M) activities	No treatment measures proposed by PG&E.
P-32-1639 Canyon dam Outlet Tower	Lower section of the tower built in 1912, and height raised in 1926. Slight modifications made between 1936 and 1965.	Eligible for the National Register.	O&M activities. (PG&E repairing outlet tower gates in Fall 2005.)	No treatment measures proposed by PG&E.
P-32-1640 Prattville Intake Towers	First intake tower begun in 1919 to supply water for Prattville Tunnel 1. It was abandoned and replaced by second Prattville Intake Tower in 1957, which connects to Butt Valley Tunnel 1A.	Not eligible for the National Register.	Not considered.	No further work.

Site No./Name	Description	SHPO Opinion	Effects	Management
P-32-1641 Patrolman's House at Canyondam Camp	One of the few remaining buildings left from the construction camp used by the crew which built the second Canyon dam. This house was constructed in 1922 and moved to this location in 1926.	Eligible for the National Register.	Operation and maintenance.	No treatment proposed.
P-32-1642 Cottage at Canyondam Camp	This cabin was constructed in 1922 and moved to this location in 1926. The Canyondam Camp was occupied by the crew which built the second Canyon dam.	Eligible for the National Register.	Operation and maintenance.	No treatment proposed.
P-32-1643 to -1652 Camp Caribou district (also known as Camp 9)	Originally a construction camp for the crew which built the Caribou powerhouse, ca. 1919-1921. Later became a PG&E recreational camp. Consists of 22 structures, including 10 houses, clubhouse, dormitory, schoolhouse, and 2 garages.	Eligible for the National Register.	Operation and maintenance. PG&E considering removing pool and tennis court.	SA requires PG&E to maintain exterior and landscaping of old clubhouse and grounds to preserve historic features and character, and consult with the FS before conducting maintenance and repair activities.
P-32-1716 (NF-18) Stover Ranch	Stover family ranch founded in 1859, operated until 1960s. Ten standing structures remain.	Eligible for National Register.	Recreation, casual visits, vandalism.	Signage, monitoring, possibly testing.
P-32-1722 (NF-31)	Portion of a wagon road grade, dating to the 1870s, connecting Big Meadow ranches with the road to Red Bluff.	Not eligible for the National Register.	Not considered.	No further work.

Site No./Name	Description	SHPO Opinion	Effects	Management
P-32-1723 (NF-32)	Fence.	Not eligible for the National Register.	Not considered.	No further work.
P-32-1724 (NF-33)	Portion of a local wagon road grade, connecting ranches in Big Meadow, utilized from the 1890s to the 1920s.	Not eligible for the National Register.	Not considered.	No further work.
P-32-1740 (NF-10)	Mine adit. Claim not recorded. May date to the 1930s.	Not eligible for the National Register.	Not considered.	No further work.
P-32-1741 (NF-11)	Mine adit. Claim not recorded. May date to the 1930s.	Not eligible for the National Register.	Not considered.	No further work.
P-32-1742 (NF-35)	Portion of the wagon road grade between Prattville and Johnson's Ranch, dated to the 1860s	Not eligible for the National Register.	Not considered.	No further work.
P-32-1744 (NF-36)	Wood fence.	Not eligible for the National Register.	Not considered.	No further work.
P-32-1766 Camp 4	Construction camp, including sawmill, utilized by Stone and Webster from 1919 to 1921 for the first Butt Valley dam. It was reoccupied by Schultz between 1923 and 1924 during construction of second dam.	Eligible for National Register.	Partly inundated, wave action, casual visitation.	Signage. In the event of a draw down of reservoir level, site should be more fully recorded, possibly tested, and data recovery done if necessary.
P-32-2062 (LA-7)	Fence line.	Not eligible for the National Register.	Not considered.	No further work.

Site No./Name	Description	SHPO Opinion	Effects	Management
P-32-2067 (LA-17) RRLC Camp 38	Multi-component: prehistoric isolated find and historic artifact scatter related to RRLC railroad and logging camp occupied in the 1920s.	Not eligible for the National Register.	Not considered.	No further work.
P-32-2070 (LA-21)	Fence line.	Not eligible for the National Register.	Not considered.	No further work.
P-32-2078 (LA-35)	Gravel quarry, perhaps used by RRLC railroad in the 1920s.	Not eligible for the National Register.	Not considered.	No further work.
P-32-2088 (LA-48)	Remains of a segment of old State Highway 36, abandoned in 1928 when the new causeway was built.	Not eligible for the National Register.	Not considered.	No further work.
P-32-2091 (LA-1)	Multi-component: prehistoric isolated find and historic artifact scatter dated to about the turn-of-the-century.	Not eligible for the National Register.	Not considered.	No further work.
UNFFR-1H	Remains of hydraulic mining, including cut features, equipment pads, rock walls, test pits, and rock piles. Not a claimed mine, may date to 1920s–1930s.	Unevaluated.	Use of recreational campground and logging.	No treatment proposed.
UNFFR-2H	Historic artifact scatter, mostly tin cans. Related to sites CA-PLU-1726 and 1727, part of the Canyondam construction camp, occupied in the late 1920s.	Unevaluated.	Use of recreational campground.	No treatment proposed.

Site No./Name	Description	SHPO Opinion	Effects	Management
Camp Almanor (also called New Prattville or Camp 1)	Construction camp established in 1919 for crews working on the Prattville Intake Tower and Prattville Tunnel 1. Moved when level of Lake Almanor was raised in 1925. Most extant structures erected ca. 1926. Non-eligible elements include the old mess hall, office, 2 bunkhouses, warehouse, meathouse, 2 garages, 2 sheds, and boathouse moved here in 1957. Since the 1930s, it has been used as PG&E recreational camp.	Not eligible for the National Register.	Not considered.	No further work.
Gate Tender's House at Camp Almanor	Built in 1926 as part of Camp Almanor, the interior retains many original elements.	Eligible under criterion 36 CFR 60.4c.	Operation and maintenance.	No treatment proposed.
UNFFR Hydroelectric System	Non-eligible elements include Prattville Tunnels 1 (1919) and 1A (1957), Butt Valley powerhouse (1958), Butt Valley dam and reservoir (1924), Butt Valley Tunnel 1 (1920) and 2 (1956), Caribou Penstock 2 (1958), Caribou powerhouse 2 (1958), Belden dam and forebay (1956), Oak Flat powerhouse, (1984), Belden Penstock (1969), Belden powerhouse (1969).	Not eligible for the National Register.	Not considered.	No further work.

Site No./Name	Description	SHPO Opinion	Effects	Management
Lake Almanor	When created behind the first Canyon dam in 1914 it was the largest man-made reservoir in the world. Reservoir size increased in 1927 and 1963.	Eligible for the National Register.	Operation and maintenance.	No treatment proposed.

3.3.7.2 Environmental Effects

Effects on cultural resources within the APE can include, but are not limited to, inundation under the waters of project reservoirs, wave action along the edges of the reservoirs, recreational use of the reservoirs and other project lands, other uses of project lands such as livestock grazing, natural wind and water erosion, use and maintenance of roads, vandalism, and modifications or repairs to project facilities. The type and level of effects on cultural resources can vary widely, depending upon site location and setting, features and attributes, visibility of the resource, and public knowledge and access to a resource. Effects can be direct, resulting from operation of the project, or indirect, such as public use of project roads to access lands not used for project purposes.

Section 106 of the NHPA, and its implementing regulations at 36 CFR Part 800, guide our consideration of project-related effects on cultural resources. The law and regulations only require FERC to consider potential effects of undertakings we license on historic properties, which are cultural resources that are listed or eligible for listing on the National Register. PG&E has agreed to treat all cultural resources that have not been officially evaluated for eligibility to the National Register as potentially eligible.

We agree with SHPO that 35 historic archaeological sites and standing structures in the APE are not eligible for the National Register. The project would have no effect on non-eligible sites, and those resources require no further work. FERC, in consultation with SHPO, has determined that 13 historic archaeological sites and standing structures in the APE qualify for nomination to the National Register. PG&E proposes measures for the future management or treatment of most of the eligible historic archaeological sites and standing structures (see table 3-40). In addition, there are 57 prehistoric archaeological or multi-component sites that have been identified in the APE (see table 3-38), but have not been officially evaluated for the National Register by the Commission or SHPO. We agree with PG&E that these sites should be managed as if they are eligible. PG&E and its cultural resources consultants also identified TCPs and ethnohistoric Maidu village locations in the APE (see tables 3-39 and 3-40). None of the TCPs and ethnohistoric Maidu village sites has been officially evaluated for the National Register by the Commission or SHPO. To the extent that the ethnographic resources can

be tied to specific on-the-ground locations, we agree with PG&E's philosophy to treat them as if they are eligible for the National Register.

Applicant-Proposed Treatment Measures

PG&E's application included, as Report E4, an HPMP. This plan, which we consider a draft, outlines the measures PG&E proposes to use to avoid, reduce, or mitigate effects on cultural resources within the APE listed, eligible, or potentially eligible for listing on the National Register. Site-specific management or treatment measures are detailed in tables 3-37 through 3-39.

The draft HPMP presents a general three-stage strategy for managing eligible and potentially eligible properties. Stage 1 would use signs and dissemination of information to the public and PG&E employees to deter or redirect activities away from sensitive areas. PG&E would assess the effectiveness of Stage 1 measures by monitoring sites. If Stage 1 measures are not effective, PG&E would implement Stage 2 measures, including more restrictions on access and recreational activities, and additional monitoring. If Stage 2 measures fail to protect sites adequately, PG&E would move to Stage 3, and consult with FERC, the FS, Greenville and Susanville Indian rancherias, and other Maidu organizations as appropriate to develop better management or treatment alternatives. The draft HPMP also presents site-specific treatment measures for threatened eligible properties, as discussed above (see tables 3-37 through 3-39).

With one exception, PG&E has not identified plans for major changes, repairs, or modifications at National Register-eligible historic project structures. At Camp Caribou (site P-32-1643 to 1652), PG&E would like to remove the tennis court and swimming pool for safety reasons. However, PG&E has not proposed any site-specific measures to mitigate the impacts of that proposal. PG&E would need to prepare a treatment plan for review by FERC and SHPO prior to receiving approval for actions that may have adverse effects on National Register-eligible properties. The SA and FS Section 4(e) condition no. 40 requires PG&E to maintain the exterior and landscaping of the clubhouse, houses, and grounds at Camp Caribou to preserve the historic features and character of the facility, and to notify the FS when maintenance or repair activities are to take place. The draft HPMP states that any major repairs or modification to National Register-eligible historic project structures done during the course of the new license would be performed in accordance with the Secretary of the Interior's Standards for Rehabilitation, and in consultation with SHPO. In addition, table E4-16 identified routine maintenance activities that PG&E believes would have no adverse effects on National Register-eligible historic project structures, and should be exempt from SHPO review.

Recommended Measures from Other Parties

NPS and the FS have raised concerns about PG&E's proposed public education and interpretive program. NPS would like PG&E to develop a plan that addresses the area's unique cultural history and the history of the hydroelectric system. The FS would

like the HPMP to include more details about the public education and interpretive program, including informational kiosks and brochures. In the opinion of the Maidu Cultural and Development Group (MCDG), PG&E's proposed use of signage and public education would not be adequate to protect or mitigate effects on cultural resources, and its three-stage approach would not be practical. The Plumas County Board of Supervisors (Plumas County), the FS, Greenville Rancheria, MCDG, and Tasmam Koyom Indian Sanctuary Foundation requested that PG&E provide land and funds for a curation and interpretive center for the Maidu community.

The FS, Honey Lake Maidu, Greenville Rancheria, and MCDG are concerned about impacts on cultural resources from wave action, changing lake levels, erosion, and inundation under the water of project reservoirs. The Susanville Indian Rancheria, Tasmam Koyom Indian Sanctuary Foundation, Maidu Summit Group, Greenville Rancheria, and Plumas County raised concerns about potential effects on cultural resources if PG&E were to conduct dredging activities at either Lake Almanor or the Butt Valley reservoir related to the possible proposed installation of thermal curtains. In comments on the draft EIS, the Greenville Rancheria and MCDG questioned PG&E's proposed measures to mitigate effects on cultural resources. The Greenville Rancheria wants PG&E to monitor the project more often, and execute an MOU with the Plumas County Sheriff for patrols and prosecution of vandals. Both the Greenville Rancheria and the Susanville Indian Rancheria offered the services of their members for monitoring and other cultural resources investigations. The Greenville Rancheria indicated that the HPMP needs more specific details about control of grazing and ORV traffic.

The FS listed some site locations that it would like recorded and evaluated by PG&E. In its comments on the draft EIS, dated October 29, 2004, Plumas County indicated concerns for the historic buildings at Camp Caribou (also known as Camp 9 or site P-32-1643 to 1652). The FS would like the APE extended for 1 mile outside the current FERC boundary on FS lands to account for effects on cultural resources due to dispersed recreational activities. The Greenville Rancheria would like the APE expanded for 2 miles outside the current FERC boundaries.

The FS and Honey Lake Maidu have suggested that unevaluated cultural resources should be archaeologically tested, and FERC should make formal determinations of National Register eligibility for all sites identified in the APE, in consultation with SHPO. The Greenville and Susanville Indian rancherias object to disturbing prehistoric archaeological sites through archaeological excavations, and would like those sites to be treated as if they were eligible for the National Register, with preservation, education, monitoring being preferable management practices. The Honey Lake Maidu, Greenville Rancheria, Susanville Indian Rancheria, and Mountain Maidu raised concerns about the treatment of Native American human remains.

NPS, the FS, Plumas County, Honey Lake Maidu, Greenville Rancheria, Susanville Indian Rancheria, and MCDG have all requested to be parties to be consulted

during the process of complying with Section 106 of the NHPA. The FS, Greenville Rancheria, and Susanville Indian Rancheria requested to be signatories to the PA for this project. The FS, NPS, and Plumas County want to be included in the UNFFR Cultural Resources Working Group, and the FS questioned the status of future working group meetings. The U.S. Bureau of Indian Affairs (BIA) encouraged FERC to consult on a government-to-government basis with federally recognized Indian tribes with an interest in the cultural resources of the project area, including the Enterprise, Mooretown, and Berry Creek rancherias. EPA, in comments on the draft EIS, requested that FERC provide additional information on the process and outcome of government-to-government consultations with Indian tribes. Both the Susanville Indian Rancheria and the Greenville Rancheria questioned FERC's consultation process with Indian tribes. Plumas County and the FS have requested copies of cultural resources reports, including PG&E's ethnographic study. MCDG requested that the ethnographic study MOU be revised to include them. In addition, MCDG questioned the recommendations in the ethnographic report.

The Greenville Rancheria, Susanville Indian Rancheria, and MCDG requested that PG&E allow Maidu people access to project lands for gathering activities and set aside project lands for traditional cultural practices. The Tasmam Koyom Indian Sanctuary Foundation believes that donations of land and funds could bridge the gap between Native Americans in the project area and agencies associated with the relicensing proposal. MCDG indicated that it considers the donation of land to be mitigation of effects on Maidu lifeways and cultural resources resulting from the construction and continued operation of the UNFFR Project. In addition, the Greenville Rancheria and MCDG would like PG&E to provide them with information about historic Indian allotments that were acquired when Great Western Power initiated the Project.

Our Analysis

The original FERC license for the project was issued in 1955, prior to the passage of the NHPA. Therefore, no article in the original license dealt with the management of cultural resources. However, over time the license has been amended, and articles 37 and 44 were inserted to address cultural resources. These articles require that construction be halted, SHPO and the FS consulted, and a mitigation plan developed if previously unidentified cultural resources are discovered during construction activities. An Order in 1997 amended the license to attach the Memorandum of Agreement executed for the seismic remediation program at the Butt Valley dam, outlining the measures implemented to mitigate impacts on Camp 5, the Butt Valley Railroad, and the Butt Valley dam Gate Tender's House and outbuildings.

The license application filed by PG&E on October 23, 2002, included a draft PA and provided the first opportunity for FERC to address project-wide compliance with Section 106 of the NHPA, through the execution of it. FERC produced its own PA, and on November 23, 2004, provided copies of our draft to the ACHP, SHPO, the FS,

Greenville Rancheria, Susanville Indian Rancheria, MCDG, and Honey Lake Maidu Tribe. In a letter dated December 22, 2004, PG&E concurred with the draft PA. The Greenville Rancheria, Susanville Indian Rancheria, and the FS indicated they want to be signatories to the PA, rather than concurring parties as listed in the draft.

It has been FERC's practice in hydropower relicensing cases to restrict signatories to a PA to the Commission, SHPO, and ACHP to ensure that the Commission remains in control of its ability to issue a license in a timely manner. The FS, as a federal land-managing agency, would retain its ability to manage historic properties on NFS lands through its Section 4(e) conditions and various other federal laws and regulations, including, but not limited to, the Native American Graves Protection and Repatriation Act (NGPRA) and the Archaeological Resources Protection Act. The responsibilities of the FS arise out of these statues, and not as a result of the PA. With respect to the tribes, no tribal lands (as defined in 36 CFR Part 800.16(x)) are within the project boundaries. We believe that the FS and tribes should remain as concurring parties as outlined in the PA. As concurring parties, the FS and the tribes would have the ability to review and comment on the draft HPMP and would be consulted about the treatment of historic properties under the terms of the PA. By letter dated May 10, 2005, the ACHP declined to participate further in this consultation. As a result, the PA, would be executed as a "two party" PA between FERC and SHPO. The final PA was provided to the consulting parties for signature on August 11, 2005.

FERC's PA would require that cultural resources be managed over the term of the new license in accordance with a final HPMP. The final HPMP would be based on PG&E's draft HPMP, after it has been revised to address comments from interested parties. FS final Section 4(e) condition no. 43 specifies that PG&E file an FS-approved HPMP within 1 year after license issuance. Implementation of the measures outlined in the PA and the final HPMP would ensure that cultural resources are afforded adequate protection.

PG&E has expressed a willingness to formulate an I&E program relating to the region's cultural history as proposed mitigation for effects on potential TCPs such as Big Meadow and Butt Valley. The SA includes an I&E program that PG&E would develop within 2 years after issuance of a new license, which addresses themes including Native American culture, pioneers, and the development of hydropower. This program is also specified in FS final Section 4(e) condition no. 34. Such a program would likely include an explanation of how information would be conveyed through interpretive signs and kiosks and at recreational sites within the project. The details of PG&E's I&E program relating to employee education, and public interpretation, protection, and treatment of cultural resources would likely be outlined in the final HPMP. While the MCDG questions whether signage and public education would be adequate mitigation of effects on cultural resources, it could assist PG&E in formulating more practical mitigation measures during consultations prior to the production of the final HPMP.

Because the FS, Plumas County, and the Maidu community have requested a curation facility or interpretive center, PG&E needs to consult with those parties and more fully investigate the possibility of providing land or seed funds for such a facility. PG&E (in its comments on the draft EIS) pointed out that it currently holds no cultural materials from the project area requiring curation. If, during the term of the new license, archaeological excavations are conducted in the future, in accordance with the procedures outlined in the HPMP, PG&E indicated it would consult with the Maidu community regarding the appropriate curation of recovered cultural materials. Before it would consider any funding for a new Maidu curation or interpretive center, PG&E would request additional information from the Maidu community about details for such a facility, and the source of other funds to be used for the creation and/or operation of the curation/interpretive center. PG&E also pointed out that there are several museums in the vicinity of the project that house Maidu cultural materials and that there is an existing Maidu Interpretive Center in Roseville, California. PG&E agreed to consult with the Maidu community, the FS, SHPO, and the Commission regarding additional interpretive opportunities and a public education program. The results of those consultations need to be documented in the final HPMP.

The draft HPMP identified effects on cultural resources resulting from wave action, changing lake levels, erosion, and inundation from project reservoirs. It did not address potential effects from measures that may be recommended to provide cool water to the North Fork Feather River downstream of the project. In a December 17, 2004, additional information request, we asked PG&E to provide the results of studies of various alternatives to lower water temperatures in the Feather River for the Rock Creek-Cresta Project. On January 13, 2005, PG&E filed studies of 23 alternatives, including the installation of thermal curtains at either or both Lake Almanor and Butt Valley reservoir. Some of these alternatives, including dredging of the Prattville intake area, would have the potential to affect cultural resources. However, PG&E did not recommend any alternative; although it indicated it was unlikely to recommend the use of thermal curtains because of local opposition and their high cost with limited benefits. In section 3.3.1, *Water Resources*, of this EIS, we address the alternatives for cooling water in the Feather River. The final HPMP needs to provide more detailed site-specific treatment measures, based on further consultations with interested parties.

Additional consultations with interested parties are needed so that the final HPMP could address site-specific mitigation measures for the historic archaeological sites and standing structures that FERC, in consultation with SHPO, has determined are eligible for the National Register and may be affected by future project-related activities. This would include the future management and treatment of sites P-32-1638 (Canyon dam), 1639 (Canyon dam outlet tower), 1641 (patrolman's house at Canyondam Camp), 1642 (cottage at Canyondam Camp), 1643 through 1652 (Camp Caribou), Gate Tender's House at Camp Almanor, and Caribou No. 1 powerhouse. The SA proposes and FS Section 4(e) condition no. 40.F specifies that PG&E maintain the exterior and

landscaping of the clubhouse, houses, and grounds at Camp Caribou, and to consult with the FS when planning maintenance and repair activities.

PG&E indicated that it no longer allows grazing on project lands. In addition, the draft HPMP provides for barriers to limit ORV access. We agree with PG&E that monitoring during the months when recreational activities are at the highest levels (April to October) would be most effective. If Stage 1 monitoring shows continued impacts on sites from tourists or recreational users of project lands, PG&E would increase monitoring in Stage 2. Stage 2 also would include working with local law enforcement agencies to undertake periodic patrols. Appendix B of the SA includes measures agreed to among the parties that are not intended for inclusion in the project license and includes a provision that, if Plumas County passes an ordinance limiting vehicle traffic below the 4,500-foot elevation contour, PG&E would partially fund a seasonal Plumas County Sheriff's Department position to enforce rules restricting visitor access below the 4,500-foot elevation contour. As discussed in section 3.3.6, *Land Use and Aesthetics*, law enforcement at the UNFFR Project is the responsibility of the FS and Plumas County so we agree that this provision should not be included in the project license. Both the Greenville Rancheria and the Susanville Indian Rancheria offered the services of their members for monitoring and other cultural resources investigations. Continued consultation among PG&E, Plumas County, the Greenville Rancheria, Susanville Indian Rancheria, and other interested Maidu groups during preparation of the final HPMP should allow these issues to be properly addressed.

PG&E indicated that the sites that the FS wants it to record (construction railroad grade and historic trail) are outside of the currently defined APE, but that PG&E would consult with the FS about this request. The FS indicated that it is willing to discuss the modification of the APE with PG&E. SHPO and FERC have previously agreed with PG&E's definition of the APE. If the APE needs to be modified or expanded to meet future project needs or modifications during the course of the new license, the HPMP would need to include provisions for amending the APE if new information indicates a need to do so. We support the recordation, evaluation, and treatment of all cultural resources within the APE as it currently exists, and as it may be modified in the future.

While the FS and Honey Lake Maidu have suggested that unevaluated prehistoric sites should be tested, the Greenville Rancheria and Susanville Indian Rancheria object to archaeological excavations. The FS can require archaeological testing of sites on National Forest lands, but this only applies to one unevaluated prehistoric site (CA-PLU-284) within the APE. PG&E's management strategy of treating all unevaluated prehistoric sites as if they are potentially eligible for the National Register, once incorporated into the HPMP, would offer all potentially eligible sites the same protection as historic properties, those resources listed or officially determined eligible for listing on the National Register.

PG&E stated it would comply with all applicable state laws and regulations (including Section 7050.5 of the California Health and Safety Code and Section 5097.98 of the California Public Resources Code) regarding the treatment of new discoveries of human remains on non-federal project lands should they occur. The FS would be responsible for following the NAGPRA if human remains and funerary objects are discovered on federal lands within the project boundaries. The final HPMP needs to outline procedures and establish protocols for consultation in the event of future discoveries of human remains within the APE. All human remains and funerary objects previously salvaged from the Lake Almanor shoreline were repatriated to members of the Maidu community and reburied in October 2002. That action was done under the current license and is not part of the undertaking considered in PG&E's new license application.

Before filing its license application, PG&E created a Cultural Resources Working Group to facilitate communication about the project. PG&E invited the federally recognized Greenville Rancheria, Susanville Indian Rancheria, Berry Creek Rancheria, Enterprise Rancheria, and Mooretown Rancheria to participate in the working group and included those tribes on its project mailing list. PG&E also had its ethnographic consultant contact the Greenville, Susanville, Berry Creek, Enterprise, and Mooretown rancherias when it conducted its traditional cultural property study. PG&E needs to continue to consult with Indian tribes about this project, and the results of these communications need to be outlined in the final HPMP.

We also acknowledge that other Maidu groups, which have not been granted federal recognition, have a demonstrated interest in the project because their ancestors historically used or resided in the project area. We consider the Honey Lake Maidu and the MCDG to be consulting parties in the process of complying with Section 106 of the NHPA, according to 36 CFR 800.2(c)(5). PG&E invited the Honey Lake Maidu and MCDG to attend its Cultural Resources Working Group meetings, and included them on its cultural resources mailing list. Albion contacted both the Honey Lake Maidu and the MCDG during its ethnographic study. We have included the Honey Lake Maidu and MCDG as concurring parties to the PA for this project.

Additionally, Plumas County, the FS, and NPS could qualify as consulting parties in the Section 106 compliance process according the 36 CFR 800.2(c)(3) and (5). PG&E indicated it would like the Maidu community to concur with the involvement of Plumas County and the NPS. We encourage the participation of all consulting parties in future Cultural Resources Working Group meetings. PG&E stated that on January 22, 2003, it provided copies of its traditional cultural properties study for this project, conducted by Albion, to the staff archaeologists for the Plumas and Lassen National Forests. However, the MOU between PG&E and the Greenville Rancheria restricts the distribution of this report and requests for additional information must be made through the Greenville Rancheria. While we encourage PG&E to provide copies of cultural resources investigation reports to all consulting parties, the parties must agree not to make these reports available to the public because they contain confidential information protected

under Section 304 of the NHPA. The final HPMP needs to outline procedures for inclusion of consulting parties in the Section 106 process, the organization of future working group meetings, and the distribution of cultural resources investigation reports.

PG&E's ethnographic study listed plants historically important to the Maidu. To mitigate impacts on some gathering locations identified in the TCP study, PG&E recommended protecting certain species, and conferring with the Maidu community to reach an agreement on how and where future gathering could be done. The SA includes a condition that would require PG&E to produce and implement a habitat enhancement plan that would protect rare plants, wetlands, riparian communities, and cultural resources. The final HPMP should address species protection and results of discussions with Maidu groups concerning access to project lands for traditional cultural use.

A condition of the settlement of its bankruptcy case requires PG&E to protect watershed lands in its service territory through conservation easements or the donation of property to public entities or non-profit organizations. PG&E describes how the Pacific Forest and Watershed Land Stewardship Council was created out of the bankruptcy settlement and is charged with developing a Land Conservation Plan. PG&E will submit any land transactions recommended by the Stewardship Council to the appropriate regulatory agencies. We expect that conservation easements or donations of project lands by PG&E should be discussed in the final HPMP, if applicable.

It is a historical fact that some Indian allotments were acquired by Great Western Power when it obtained rights and easements for the original UNFFR hydroelectric project. PG&E owns 30,032 acres out of the 31,060 acres within the FERC project boundary. There are 1,024 acres of federal land within the FERC project boundary; 986 acres managed by the FS and 38 acres managed by the BLM. Land title is a legal issue to be resolved in the courts and not an environmental issue to be reviewed under NEPA or Section 106 of the NHPA.

3.3.7.3 Unavoidable Adverse Effects

None.

3.3.8 Socioeconomic Resources

3.3.8.1 Affected Environment

The UNFFR Project is located in northeastern California in Plumas County, which has an area of 2,554 square miles. The population of the county in 2000 was 20,824 (Bureau of Census, 2003b). This rural county, with a population density of just 8.2 persons per square mile, has more than 100 lakes, 1,000 miles of rivers, and more than 1 million acres of national forest (Plumas County, undated). This abundance of natural resources supports not only employment in wood products and forest management, but also in recreation-related industries such as hotels and motels, food services, real estate, and retail trade.

Between 1990 and 2000, the population of Plumas County grew by 1,085 people, or approximately 5.5 percent. During the same period, the population of California grew by approximately 13.6 percent (Bureau of Census, 2003b). The town closest to the UNFFR Project is Chester, which is located on the shores of Lake Almanor and has a population of 2,316. Other nearby towns include Taylorsville, with a population of 154, and Westwood, in Lassen County, with a population of 1,998 (ePodunk, undated, www.epodunk.com, accessed January 22, 2004).

According to the 2000 Census (Bureau of Census, 2003a), Plumas County ranked 48th out of 58 counties in the State of California in terms of total personal income. Total personal income in the county equaled $543,953, which was less than 1 percent of total personal income in the state. The average annual growth rate in total personal income in Plumas County was 4.8 percent between 1990 and 2000, which was lower than both the statewide rate (5.3 percent) and the national rate (5.6 percent) over the same period. On a per capita basis, personal income in Plumas County was $26,173 in 2000. This per capita income ranked 23rd in the state and equaled 81 percent of the state average ($32,363) and 88 percent of the national average ($29,760). The average annual growth rate in per capita income in Plumas County was 4.3 percent between 1990 and 2000, which was above the state average (4.0 percent) and equal to the national average (4.3 percent).

Employment in all industries in 2000 equaled 7,200 people, an increase of 740 (11.5 percent) compared to the 1990 employment of 6,460. By 2002, employment equaled 7,370 people. During the same period, the unemployment rate was reduced from 9.8 to 8.4 percent of the labor force. The single largest employment sector in the county is the local government sector, accounting for 28 percent of employment in 2000. Other important sectors include leisure and hospitality services (14 percent), retail trade (11 percent), and manufacturing (9 percent) (InfoUSA, 2002). Within the leisure and hospitality sector, employment in accommodation and food/drink services predominates. Among the 10 major employers in the county are the county government, the FS, several hospitals, Feather River College, the Plumas Pines Golf Resort, and two sawmills and planing mills.

Similar to statewide and national economic trends, the county has seen a continuing shift away from goods-producing (that is, manufacturing, construction, and natural resource-based employment) to service-providing. Between 1990 and 2000, employment in goods-producing sectors was reduced from 21 percent to 17 percent of employment, while service-providing employment grew from 78 percent to 81 percent of the economy (InfoUSA, 2002). This shift is exemplified in Plumas County by the loss of 130 jobs in the natural resources and mining sector between 1990 and 2000, with a simultaneous gain of 110 jobs in the arts, entertainment, and recreation sector (part of the leisure and hospitality sector noted above).

Recreation and tourism, which are becoming increasingly important to the local economy, are one focus of local development efforts. The Plumas Corporation, which is

the county's non-profit economic development entity, is engaged in general economic and business development, visitor attraction (through the Plumas County Visitor's Bureau), and natural resource development. The organization has cited the area's scenic beauty, the quality of life, and the recreational opportunities as some of the strengths that can be drawn on in developing the local economy (Plumas Corporation, 2002).

According to one source, more than $117 million was spent on tourism in the county in 1992, including a payroll of $18.1 million, employment of 1,800 people, and tax receipts of $1.47 million (Plumas Corporation, 1996, cited in Pacific Health Consulting Group LLC, 2000). A later study indicates that the total spent on tourism increased in 1993 to more than $123 million, including a payroll of $19.2 million and employment of 1,927 people (Sheffield and Warren, undated, cited in Pacific Health Consulting Group LLC, 2000). According to Sheffield and Warren, vacation home residents had the greatest influence on the economy, accounting for one-third of the jobs resulting from tourism. Vacation home residents were found to spend more locally than those who stay in hotels, motels, and other accommodations.

Table 3-42 presents the racial mix of the Plumas County population. The county population is predominantly white, with whites (91.8 percent) and American Indians/Alaska Natives (2.6 percent) representing a greater percentage of the population than they do in the state of California as a whole. Hispanics or Latinos may be of any race; they represent a much lower percentage of the county population (5.7 percent) than of the state population (32.4 percent).

Table 3-42. Race and poverty in UNFFR Project area.

	Plumas County	**California**
Race as Percentage of Total Population[a]		
Total population (2000)	100	100
Population of one race	97.4	95.3
White alone	91.8	59.5
Black or African American alone	0.6	6.7
American Indian and Alaska Native alone	2.5	1.0
Asian alone	0.5	10.9
Native Hawaiian and Other Pacific Islander alone	0.1	0.3
Some other race alone	1.8	16.8
Population of two or more races	2.6	4.7
Hispanic or Latino as Percentage of Total Population[a]		
Hispanic or Latino (of any race)	5.7	32.4
Persons Below Poverty Level as Percentage of Total Population[b]		
Persons below poverty level (1999)	13.1	14.2

[a] Bureau of Census, 2000a.
[b] Bureau of Census, 2000b.

As table 3-42 shows, a slightly lower percentage of the county population lives below the poverty level than in the state as a whole.

3.3.8.2 Environmental Effects

Relicensing of the UNFFR Project could affect the socioeconomic resources of the communities near the project. Possible effects include direct changes in employment, tax revenue, and local expenditures, as well as indirect influences on the local economy.

Under the no-action alternative, there would be no project-related changes in the socioeconomic conditions of the local communities. Any changes in population growth, employment, property tax payments, and recreation expenditures would be unrelated to relicensing the project, and there would be no change in government revenue related to the project. The recreation services industry associated with rafting, boating, camping, fishing, and other recreational activities would likely continue to make up a substantial portion of the local economy.

PG&E's proposal, including finalizing and implementing the RRMP; making improvements in ADA accessibility; providing campground facilities, day use facilities, boat launches, and trails; providing a new bathymetric map of Lake Almanor; implementing river recreation flows; maintaining the surface of Lake Almanor at a higher level through the summer recreation season; and improving the aesthetics of some project features, would have a beneficial economic effect on the area. These measures would help meet future recreation demand and could encourage additional tourism to the area, thereby increasing expenditures in the region.

Growth-inducing Impacts

Growth-inducing impacts are another form of impact that may be attributed to some projects. A project may be growth inducing if it fosters economic, population, or housing growth or removes obstacles to growth, which could indirectly lead to additional economic and environmental impacts. Evaluation of potential growth-inducing impacts of the UNNFR Project was based on a qualitative analysis of the indirect effects that could result from the use of power within PG&E's service area and from the additional tourism that could occur as a result of improvements in recreation resources.

At its proposed generating capacity, the project represents approximately seven-tenths of a percent of the current (2003) generating capacity in the CA/MX (see table 1-1) and six-tenths of a percent of the generating capacity forecast for 2012. Neither PG&E's proposed action nor the proposed action with staff-recommended measures would change the generating capacity, while the cost of generation at the project would increase by about 13 and 15 percent, respectively (see table 4-2). Therefore, with respect to the use of power within PG&E's service area, any changes in the project would not be expected to foster growth, remove obstacles to growth, or have any growth-inducing impacts.

As noted above, PG&E's proposed recreational resource improvements could encourage additional tourism and increase tourism-related expenditures in the area. Those changes would likely be experienced as small incremental changes in existing activities rather than as large changes. Any growth-inducing impacts would be very small, if they occur.

Demographics

PG&E's proposed project is not expected to have adverse socioeconomic effects on the local population. Insofar as the proposed project would protect or enhance fish and terrestrial resources, improve public use of recreational facilities and resources, and maintain and protect historic and archaeological resources within the area affected by project operations, it can be reasonably expected to have a beneficial effect on any population that relies on those resources.

Potential Measures to Reduce Water Temperature

As detailed in section 3.3.1.2, as part of the SA for the Rock Creek-Cresta Project, PG&E agreed to evaluate the effectiveness of modifying the UNFFR Project's Prattville intake as a temperature control measure for the downstream reaches of the NFFR. PG&E has been conducting feasibility studies, including modeling the water temperature effects of potential Prattville intake modifications, re-operation of the Canyon dam outlet gates, and modification of Caribou No. 2 intake for the past few years. Appendix D of this EIS provides an initial evaluation of the advantages and disadvantages of 42 potential measures that could affect water temperatures and identifies the 5 measures we analyze further in section 3.3.1.2, *Water Resources*, of this EIS.

Two of the measures evaluated by PG&E and described in section 3.3.1.2 include the installation of a thermal curtain in front of the Prattville intake, in a steep-sided trough in a cove of the relatively shallow western lobe of Lake Almanor. PG&E did not provide any information on the estimated effects of the thermal curtain on the economy of the Lake Almanor area. However, the Commission received many comments from individuals concerned that the effects of the thermal curtain on the water quality, fisheries, recreation, and aesthetics in the Lake Almanor area would ultimately have a negative effect on the local economy. In its letter filed with the Commission on October 29, 2004, the Plumas County Board of Supervisors pointed out that Plumas County has moved from a goods-producing to a service-providing economy, and that recreation and tourism are increasingly important to the local economy. At the October 19, 2004, public meeting in Chester, John DeJong stated that the recreation industry has replaced the timber industry in the Lake Almanor area. Mr. DeJong emphasized that seasonal recreational activities in the Lake Almanor area occur for about 12 weeks in the summer, but that fishing in Lake Almanor usually begins 2 months before the summer recreation season and continues for 2 months after the end of the summer recreation season. In its letter filed with the Commission on November 3, 2004, the Butt Lake Anglers Association points out that Lake Almanor and Butt Valley reservoir are invaluable

recreation resources because of both their fisheries and water contact sports, and any adverse effects on these resources will adversely affect Plumas County, due to loss of recreational dollars.

Mr. DeJong and Plumas County both stated that Lake Almanor attracts land buyers to northern Plumas County. Both Plumas County and the Plumas Association of Realtors (letter filed with the Commission on December 6, 2004) express concern with the effect of the thermal curtain on property values.

At the October 19, 2004, public meeting in Chester, Russ Lesko discussed a 1999 cost benefit analysis commissioned by PG&E that stated that the temperature modification proposal did not come close to justifying its cost, as calculated by FERC methods. At that time, PG&E's estimated capital costs for the Prattville intake modification were $5 million. Mr. Lesko pointed out that PG&E now estimates the cost to be $53 million (this cost includes dredging and installation of two curtains in Butt Valley reservoir). In his letter filed with the Commission on September 27, 2004, Dale Knutsen points out that in addition to the initial cost of approximately $53 million, PG&E estimates annual maintenance costs of more than $100,000 per year. Mr. Knutsen believes that this cost is unreasonable with so little benefit to the temperature of the water in the system. Both Mr. Knutsen and Plumas County Several individuals expressed their concern that the cost of installing and maintaining the thermal curtain would be borne by PG&E's customers in the form of higher utility bills.

3.3.8.3 Unavoidable Adverse Effects

None.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, PG&E would continue to operate the project under the terms and conditions of the current license. The environmental measures proposed by PG&E and/or recommended by staff would not be implemented.

3.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Continued operation of the existing project would continue to commit the lands and waters previously developed for energy production. This commitment of resources would not necessarily be irreversible or irretrievable because removal of the project dams and restoration of disturbed areas could return the project area to near pre-project conditions. However, given the substantial costs and loss of energy, recreational, and socioeconomic benefits, removal of the dams is unlikely.

Under PG&E's proposed project, or with the staff, agency, and NGO recommended measures, maintaining the new minimum flow regime would commit water for aquatic and riparian habitat enhancements instead of energy production. While

over the short term such commitment of water may be considered irretrievable, any changes in flow requirements would not be irreversible over the longer term, since stream flows are a renewable resource and flow requirements could be changed in a license amendment proceeding or in any future license that may be issued for the project.

In addition, implementation of the staff-recommended alternative, or certain measures recommended by others, would require the commitment of lands that would be developed for recreational enhancements (e.g., trails, reservoir and river public access sites, and development of current informal campgrounds and trails). However, our measures would not change the existing, informal usage of such land and, therefore, there would be no incremental irreversible or irretrievable commitment of resources.

3.6 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Our recommended operating alternative for the project is expected to provide an average of at least about 1,074,298,000 kilowatt-hours (kWh) of energy each year to the region. This long-term energy productivity would extend for at least as long as the duration of the new license. Our recommendations are designed to minimize or avoid in certain cases, long-term decreases in biological productivity of the system, as well as enhance aquatic habitat and local and regional recreational opportunities.

If the project was to operate solely to maximize hydroelectric generation, there could be a loss of long-term productivity of the river fisheries and perhaps sensitive invertebrates and amphibians (i.e., foothill yellow-legged frog), due to decreases in habitat availability. Moreover, many efforts to enhance recreational opportunities at the project would be foregone.

With the proposed operating mode, as well as with proposed and recommended enhancement or protection measures, the project would continue to provide a low-cost, environmentally sound source of power. Moreover, the project, with our recommended measures, would further the many goals and objectives identified by the agencies and other interested parties for managing the resources of the UNFFR, Butt Valley reservoir, and Lake Almanor.

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

SECTION 4

DEVELOPMENTAL ANALYSIS

PAGES 4-1 to 4-38

FEIS

4.0 DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the water resources of the NFFR to generate power, estimate the economic benefits of the UNFFR Project, and estimate the cost of various environmental protection and enhancement measures and the effects of these measures on project operations.

Under its approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

For our economic analysis of alternatives, we used the assumptions, values, and sources shown in table 4-1.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROPOSED PROJECT

As proposed by PG&E, the UNFFR Project would generate an average of 1,085,692,000 kWh of electricity annually and have an annual power value of $69,307,500 (63.84 mills/kWh) and total annual costs of $25,386,500 (23.38 mills/kWh), resulting in a net annual benefit of $43,921,000 (40.46 mills/kWh).

4.2 POWER AND ECONOMIC BENEFITS OF THE STAFF-RECOMMENDED ALTERNATIVE

Resource agencies and NGOs recommended implementing a variety of measures at the project. An SA entered into by several entities included measures addressing several resource areas. Some of the parties to the SA, as well as other entities, also recommended measures addressing other issues not covered in the SA. Many of these measures not included in the SA were similar but somewhat different from each other. Staff reviewed each recommendation and determined the measures that were most appropriate for implementation.

As recommended by staff, the UNFFR Project would generate an average of 1,085,548,000 kWh of electricity annually and have an annual power value of $69,313,700 (63.84 mills/kWh) and total annual costs of $25,501,000 (23.49 mills/kWh), resulting in a net annual benefit of $43,812,700 (40.35 mills/kWh).

Table 4-1. Staff assumptions for economic analysis of the UNFFR Project. (Source: PG&E as modified by staff, and staff)

Assumption	Value	Source
Energy value (2004$)[a]	63.84 mills/kWh	PG&E
Capacity value (2004$)	Included in energy value	
Cost of debt	6.61 percent	PG&E
Return on project equity	11.21 percent	PG&E/staff
Bond/Debt ratio	0.48	PG&E
Overall cost of money	9 percent	PG&E
Discount rate	9 percent	PG&E
State and federal income tax rate	34 percent	Staff
Local tax rate	3 percent	Staff
Insurance rate	0.25 percent of initial net investment	Staff
Term of financing	20 years	Staff
Period of analysis	30 years	Staff
Escalation rate after 2004	0 percent	Staff
Net investment (2004$)	$118,688,200	PG&E/staff
O&M costs (2004$)	$5,061,300	PG&E/staff
No-action average annual generation (kWh)	1,171,900,000	Staff
No-action installed capacity (kW)	342,600	Staff

[a] Sum of energy, capacity, and ancillary benefits values from PG&E, escalated to 2004 dollars.

Table 4-2 compares power value, annual costs, and net benefits for the no-action alternative, PG&E's proposal, and PG&E's proposal with additional staff-adopted measures for the UNFFR Project. Table 4-3 shows the effect on costs and power values of individual measures proposed by PG&E and recommended by staff and others, including the additional measures that staff has adopted. In section 5.1, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the staff alternative and why the environmental benefits are worth these costs.

Table 4-2. Summary of the annual net benefits for PG&E's proposed action, PG&E's proposed action with additional staff-adopted measures, PG&E's proposed action with additional staff-adopted measures and mandatory measures, the no-action alternative, and project retirement for the UNFFR Project. (Source: Staff)

	PG&E's Proposed Action	Proposed Action with Additional Staff-adopted Measures	Proposed Action with Additional Staff-adopted Measures and Mandatory Measures	No Action	Project Retirement
Installed capacity (MW)	342.6	342.6	342.6	342.6	0
Annual generation (kWh)	1,085,692,000	1,085,548,000	1,085,521,000	1,171,900,000	0[a]
Annual power value ($)	69,307,500	69,313,700	69,296,600	74,810,800	74,810,800
(mills/kWh)	63.84	63.84	63.84	63.84	63.84
Annual cost ($)	25,386,500	25,501,800	27,959,200	22,326,100	74,847,000
(mills/kWh)	23.38	23.49	25.76	19.05	63.87
Annual net benefit ($)	43,921,000	43,812,700	41,337,400	52,484,700	-36,200
(mills/kWh)	40.46	40.35	38.08	44.79	-0.03

[a] No generation from project; energy purchased and resold at cost.

Table 4-3. Summary of capital and one-time costs, annual costs, annual energy costs, and total annualized costs of environmental measures proposed by PG&E and recommended by staff and others for the UNFFR Project. (Source: PG&E as modified by staff)

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
Water Resources Measures							
1. Maintain stream gages NF-2 (Seneca reach), NF-70 (Belden reach), NF-1 (Lake Almanor), NF-8 (Butt Valley reservoir), NF-67 (Belden forebay) (SA section 1, item 5; FS final Section 4(e) condition no. 25, paragraphs 5 and 8)	SA, FS	$0	$0	$0	$0	Yes	
2. Gaging 4 times per year in lower Butt Creek (SA section 1, item 8)	SA	$0	$200	$0	$200	Yes	a
3. Water quality monitoring program and reporting (SA section 5)	SA	$0	$5,000	$0	$5,000	Yes	
4. Canyon dam mitigation measures evaluation (SA section 5, item 2D)	SA	$0	$87,300	$0	$87,300	No	b
5. Canyon dam mitigation measures evaluation	Staff	$0	$49,300	$0	$49,300	Yes	c

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
6. Cadmium and specific conductance monitoring program (SA section 5, item 2A)	SA	$0	$8,600	$0	$8,600	No	d
7. Cadmium and specific conductance monitoring program	Staff	$0	$12,300	$0	$12,300	Yes	e
8. Lake Almanor water quality monitoring program (SA section 5, item 2E)	SA	$0	$29,800	$0	$29,800	No	f
9. Lake Almanor water quality monitoring program	Staff	$0	$37,000	$0	$37,000	Yes	g
10. Fish tissue bioaccumulation screening (SA section 5, item 2C)	SA	$0	$11,800	$0	$11,800	No	h
11. Fish tissue bioaccumulation screening	Staff	$0	$6,600	$0	$6,600	Yes	i
12. Bacteriological sampling program (SA section 5, item 2B)	SA	$0	$13,400	$0	$13,400	No	j
13. Bacteriological sampling program	Staff	$0	$4,900	$0	$4,900	Yes	k
14. Augment water quality program, if needed	Plumas County	$0	$0	$0	$0	No	
15. Switch Canyon dam releases	PG&E	$0	$0	$0	$0	Yes	l

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
16. Monitor DO in Lake Almanor and Butt Valley reservoir	Staff	$0	$0	$0	$0	Yes	m
17. Water temperature management plan, which includes funding for construction of temperature control measures beyond that provided by the Rock Creek-Cresta Project's Coldwater Habitat and Fishery Enhancement Fund) (Interior 10(j) recommendation 5)	Interior	$50,000,000	$20,000	$0	$7,293,200	No	n
18. Water temperature monitoring plan	Staff	$0	$0	$0	$0	Yes	m
19. Revise draft SMP (FS final Section 4(e) condition no. 40(H))	Plumas County, FS	$0	$900	$0	$900	Yes	o
20. Implement SMP (SA section 8, item H; FS final Section 4(e) condition no. 40(H))	SA, FS	$0	$10,000	$0	$10,000	Yes after revision	
21. Control shoreline erosion adversely affecting other resources	Plumas County	$0	$0	$0	$0	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
22. Erosion control as included in recreation facility development program and in land management measures (SA section 7, items 1A1b, 1A1d, 1A1j, 1A1k, 1A1n, 1A4c, and section 8, items C, G, and H)	SA	$0	$0	$0	$0	Yes	
23. Continued implementation of road maintenance agreement with Plumas National Forest (FS final Section 4(e) condition no. 42)	PG&E, FS	$0	$0	$0	$0	Yes	
24. Erosion control plan for any new construction (FS final Section 4(e) condition no. 15)	FS	$0	$0	$0	$0	Yes; partially adopted	
25. Erosion control plan for all project facilities, roads, reservoirs, and bypassed reaches (Interior Section 10(j) recommendation no. 19)	Interior	$25,000	$0	$0	$3,600	No	
26. Visual management plan (FS final Section 4(e) condition no. 40(G))	FS	$20,000	$0	$0	$2,900	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
Aquatic Resources Measures							
27. Seneca reach, Belden reach minimum flow regime per SA (SA section 1, item 1; FS final Section 4(e) condition no. 25(1))	SA, FS	$0	$0	$3,684,200	$3,684,200	Yes	p
28. Seneca reach, Belden reach minimum flow regime as recommended by Interior (Interior Section 10(j) recommendation no.1)	Interior	$0	$0	$4,153,200	$4,153,200	No	q
29. Maintain existing inflows in lower Butt Creek (SA section 1, item 2; FS final Section 4(e) condition no. 25(2), Interior Section 10(j) recommendation no. 1)	SA, FS, Interior	$0	$0	$0	$0	Yes	r
30. Pulse flows in Seneca reach as proposed in SA (SA section 1, item 3A; FS final Section 4(e) condition no. 25(3))	SA, FS	$0	$0	$198,900	$198,900	Yes	s
31. Pulse flows in Seneca reach as recommended by Interior (Interior Section 10(j) recommendation no. 2)	Interior	$0	$0	$301,800	$301,800	No	t

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
32. Pulse flow (700 cfs in March) in Seneca reach in water years classified as dry (Interior alternative Section 10(j) recommendation no. 2)	Interior	$0	$0	$7,600 (incremental cost compared to SA proposal)	$7,600	Yes	--
33. Pulse flows in Belden reach as proposed in SA (SA section 1, item 3A; FS final Section 4(e) condition no. 25(3)	SA, FS	$0	$0	$77,300	$77,300	Yes	u
34. Pulse flows in Belden reach as proposed by Interior (Interior 10(j) recommendation 2)	Interior	$0	$0	$114,100	$114,100	No	v
35. Pulse flow (700 cfs in March) in Belden reach in water years classified as dry (Interior alternative Section 10(j) recommendation no. 2)	Interior	$0	$0	$3,300 (incremental cost compared to SA proposal)	$3,300	Yes	--
36. Pulse flows in lower Butt Creek (study-dependent) (SA section 1, item 4; FS final Section 4(e) condition no. 25(4))	SA, FS	$0	$0	$0	$0	Yes	r

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
37. Lower Butt Creek pulse flow plan + 1 year test pulse release within creek (Interior Section 10(j) recommendation no. 3)	Interior	$20,000	$0	$0	$2,900	No	r
38. Gravel monitoring plan (SA section 1, item 3B; FS final Section 4(e) condition no. 25(3)B)	SA, FS	$20,000	$6,600	$0	$9,500	Yes	w
39. Develop and implement a gravel enhancement plan (NOAA Fisheries Service 10(j) recommendation no. 1)	NOAA	$20,000	$0	$0	$2,900	No	
40. Coarse sediment management plan (Interior Section 10(j) recommendation no. 8)	Interior	$20,000	$0	$0	$2,900	No	
41. Geomorphological monitoring plan[q] (Interior Section 10(j) recommendation no. 6)	Interior	$50,000	$6,600	$0	$13,800	No	e
42. Geomorphological monitoring plan (mid-license survey) (Interior alternative Section 10(j) recommendation no. 6)	Interior	$12,500	$0	$0	$1,800	Yes	--

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
43. Develop a ramping rate plan (Interior Section 10(j) recommendation no. 20)	Interior	$20,000	$0	$0	$2,900	No	
44. Ramping rates at Canyon dam (SA section 1, item 6A; FS final Section 4(e) condition no. 25(6)A)	SA, FS	$0	$0	$0	$0	Yes	r
45. Ramping rates at Belden dam (SA section 1, item 6A; FS final Section 4(e) condition no. 25(6)A)	SA, FS	$0	$0	$0	$0	Yes	r
46. Belden block loading (SA section 1, item 7; FS final Section 4(e) condition no. 25(7))	SA, FS	$0	$0	$0	$0	Yes	r
47. Monitor the effects of recreational flow releases on aquatic biota as part of the recreational flow implementation plan and recreational activities monitoring plan (SA section 2, item 2D; Interior Section 10(j) recommendation no. 14)	SA, Interior	$50,000	$20,700	$0	$28,000	Yes	x
48. Fish monitoring plan (Interior Section 10(j) recommendation no. 10)	Interior	$20,000	$21,800	$0	$24,700	No	y

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
49. Macroinvertebrate monitoring plan (Interior Section 10(j) recommendation no. 11)	Interior	$20,000	$8,400	$0	$11,300	No	z
50. Seneca, Butt Valley Creek, and Belden reaches biological monitoring (fish, amphibians, and macroinvertebrates) (SA section 1, item 9; FS final Section 4(e) condition no. 26)	SA, FS	$20,000	$3,700	$0	$6,600	No	ab
51. Seneca and Belden reaches habitat monitoring (fish and macroinvertebrates)	Staff	$20,000	$8,300	$0	$11,200	Yes	ac
52. Development and implementation of aquatic habitat monitoring in lower Butt Creek (SA section 1, item 8; FS final Section 4(e) condition no. 26)	SA, FS	$20,000	$4,300	$0	$7,200	Yes	ad
53. Woody debris management (plan, test program, and monitoring) (Interior Section 10(j) recommendation no. 9)	Interior	$20,000	$5,800	$0	$8,800	Yes	ae
54. Adaptive management plan (Interior Section 10(j) recommendation no. 13)	Interior	$10,000	$1,700	$0	$3,100	Yes	af

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
55. Maintain Lake Almanor at specific water surface elevations per SA (SA section 3, item 2; FS final Section 4(e) condition no. 30(1); Interior Section 10(j) recommendation no. 4)	SA, Interior, FS	$0	$0	$1,527,500	$1,527,500	Yes	ag
56. Maintain maximum Lake Almanor water surface elevation (SA section 3, item 9; FS final Section 4(e) condition no. 30(9))	SA, FS	$0	$0	$0	$0	Yes	r
57. Maintain Butt Valley reservoir per SA terms (SA section 3, item 3; FS final Section 10(a) condition no. 30(3))	SA, FS	$0	$0	$0	$0	Yes	
58. Maintain Belden forebay per SA terms (SA section 3, item 4; FS final Section 4(e) condition no. 30(4))	SA, FS	$0	$0	$0	$0	Yes	r
59. Develop and maintain water year type forecast (SA section 4; FS final Section 4(e) condition no. 27)	SA	$0	$0	$0	$0	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
60. Design receiving facility for adult anadromous fish in the Seneca reach (NOAA Fisheries final fishway prescriptions)	NOAA	$200,000	$0	$0	$29,100	No	ar
61. Construct and operate a receiving facility in the Seneca reach for adult anadromous fish transferred from the Oroville Project (P-2100) (NOAA Fisheries final fishway prescriptions)	NOAA	$259,000	$25,000	$0	$62,700	No	ar,as
62. Design receiving facility for adult anadromous fish in Yellow Creek (NOAA Fisheries final fishway prescriptions)	NOAA	$200,000	$0	$0	$29,100	No	ar
63. Construct and operate a receiving facility in Yellow Creek for adult anadromous fish transferred from the Oroville Project (P-2100) (NOAA Fisheries final fishway prescriptions)	NOAA	$259,000	$25,000	$0	$62,700	No	ar

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
64. Design downstream collection facility in the Seneca reach for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	$650,000	$0	$0	$94,600	No	ar
65. Construct and operate a downstream collection facility in the Seneca reach for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	$6,500,000	$100,000	$0	$1,045,500	No	ar
66. Design downstream collection facility in Yellow Creek for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	$455,000	$0	$0	$66,200	No	ar
67. Construct and operate a downstream collection facility in Yellow Creek for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	$6,500,000	$100,000	$0	$1,045,500	No	ar

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
68. Lower Butt Creek- monitoring of fish passage of weir (removal or modification if a barrier) (SA section 1, item 8; FS final Section 4(e) condition no. 25(8))	SA, FS	$10,000	$900	$0	$2,300	Yes	o
69. Remove Gansner Bar fish barrier	PG&E	$35,000	$0	$0	$5,100	Yes	
Terrestrial Resources Measures							
70. Wildlife monitoring plan (Interior Section 10(j) recommendation no. 21)	Interior	$10,000	$25,000	$0	$26,500	No	
71. Wildlife habitat enhancement plan (SA section 6; FS final Section 4(e) condition no. 31; Interior alternative Section 10(j) recommendation no. 21; Interior alternative Section 10(j) recommendation no. 21)	SA, FS, Interior	$20,000	$5,000	$0	$7,900	Yes	
72. Vegetation management plan as recommended by Interior (Interior Section 10(j) recommendation no. 7)	Interior	$65,000	$10,000	$0	$19,500	No	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
73. Visual and vegetation management plans as recommended by the FS (FS final Section 4(e) condition nos. 40 and 41, respectively)	FS	$10,000	$3,000	$0	$4,500	Yes	
74. Invasive weed management plan (FS final Section 4(e) condition no. 46)	FS	$10,000	$6,000	$0	$7,500	Yes	
75. T&E management plan (FS final Section 4(e) condition no. 45)	FS	$5,000	$2,000	$0	$2,700	Yes	
76. Amphibian monitoring plan (SA section 1, item 9; FS final Section4(e) condition no. 26; Interior Section 10(j) recommendation no.12)	SA, FS, Interior	$4,000	$8,000	$0	$8,600	Yes	
77. Peregrine falcon monitoring (Interior Section 10(j) recommendation no.18)	Interior	$4,000	$4,500	$0	$5,100	Yes	
Threatened and endangered species measures							
78. Continue to comply with measures protecting bald eagles	PG&E	$0	$0	$0	$0	No	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
79. Compliance with the biological opinion, pursuant to the ESA (Interior Section 10(j) recommendation no. 15)	Interior	$3,000	$1,000	$0	$1,400	Yes, partially adopted	
80. Bald eagle management plan (FS final Section 4(e) condition no. 47)	FS	$0	$0	$0	$0	Yes	
81. Interagency bald eagle management plan (Interior Section 10(j) recommendation no. 16)	Interior	$15,000	$104,000	$0	$106,200	Yes	
82. Bald eagle monitoring (Interior Section 10(j) recommendation no. 17)	Interior	$0	$0	$0	$0	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
Recreational Resources Measures							
83. Within 1 year finalize and implement the draft RRMP for the project (SA, Interior), which includes the following elements: a recreation facility development program (SA, FS), a recreation O&M program (SA, FS), an I&E program (SA, FS), a recreation monitoring program (SA, FS, Interior), a resource integration and coordination program (SA, FS, Interior), and a RRMP review and revision program (SA, FS) (SA section 7; FS final Section 4(e) condition nos. 32, 33, 34, 35, 36, 37; Interior Section 10(j) recommendation no. 2)	See first column	$56,700	$31,100	$0	$39,400	Yes	ai,aj
84. Recreation within 1–3 years: upgrades at Last Chance campground (SA section 7, item 1A1a; FS final Section 10(a) condition no. 32(1)A.1.a)	SA, FS	$20,800	$10,400	$0	$13,400	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
85. Recreation within 5–10 years: upgrades at Rocky Point campground and day-use area (SA section 7, item 1A1b; FS final Section 10(a) condition no. 32(1)A.1.b)	SA, FS	$207,500	$31,800	$0	$62,000	Yes	ai,ak
86. Recreation within 1–13 years: provide matching funds to the FS to improve FS-owned recreation facilities (SA section 7, item 1A1c; FS final Section 4(e) condition no. 32(1)A.1.c)	SA, FS	$5,000,000	$0	$0	$727,300	Yes	aj
87. Within 1 year assume O&M responsibility for FS facilities: Dyer View day-use area, Canyon dam boat launch and day-use area, Almanor boat launch (SA section 7, item 4; FS final Section 4(e) condition no. 33)	SA, FS	$0	$15,600	$0	$15,600	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
88. Within 13 years assume O&M responsibility for FS facilities: Almanor Family Campground, Almanor Group Campground, Almanor beach (SA section 7, item 3; FS final Section 4(e) condition no. 33)	SA, FS	$0	$62,300	$0	$62,300	Yes	ai,aj
89. Recreation within 1–3 years: convert East Shore picnic area to group camp area (SA section 7, item 1A1d; FS final Section 10(a) condition no. 32(1)A.1.d)	SA, FS	$455,700	$5,200	$0	$71,500	Yes	ai,aj
90. Recreation within 1–5 years: develop East Shore day-use area (SA section 7, item 1A1i; FS final Section 10(a) condition no. 32(1)A.1.i)	SA, FS	$264,700	$2,600	$0	$41,100	Yes	ai,aj
91. Recreation over the term of the license: develop East Shore family campground (SA section 7, item 2A2; FS final Section 10(a) condition no. 32(1)2.A.2)	SA, FS	$5,299,000	$37,900	$0	$808,700	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
92. Recreation within 3–5 years: provide North Shore public boat launch (SA section 7, item 1A1e; FS final Section 10(a) condition no. 32(1)A.1.e)	SA, FS	$595,300	$7,800	$0	$94,400	Yes	ai,al
93. Recreation within 3–5 years: develop Stover Ranch day-use area (SA section 7, item 1A1f; FS final Section 10(a) condition no. 32(1)A.1.f)	SA, FS	$81,600	$2,000	$0	$13,800	Yes	ai,al
94. Recreation within 1–3 years: expand and improve Marvin Alexander beach (SA section 7, item 1A1g; FS final Section 10(a) condition no. 32(1)A.1.g)	SA, FS	$143,200	$2,100	$0	$22,900	Yes	ai,aj
95. Recreation within 1–3 years: upgrades at Canyon dam day-use area (SA section 7, item 1A1h; FS final Section 4(e) condition no. 32(1)A.1.h)	SA, FS	$171,300	$9,300	$0	$34,300	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
96. Recreation within 1–3 years: upgrades at Westwood beach day-use area (SA section 7, item 1A1j; FS final Section 10(a) condition no. 32(1)A.1.j)	SA, FS	$207,100	$2,600	$0	$32,700	Yes	ai,aj
97. Recreation within 1–3 years: upgrades at Stumpy beach day-use area (SA section 7, item 1A1k; FS final Section 10(a) condition no. 32(1)A.1.k)	SA, FS	$292,200	$2,600	$0	$45,100	Yes	ai,aj
98. Recreation within 3–5 years: upgrades at Catfish beach day-use area (SA section 7, item 1A1l; FS final Section 10(a) condition no. 32(1)A.1.l)	SA, FS	$114,400	$3,900	$0	$20,600	Yes	ai,al
99. Recreation within 1–5 years: improve Almanor scenic overlook (SA section 7, item 1A1m; FS final Section 10(a) condition no. 32(1)A.1.m)	SA, FS	$11,400	$3,100	$0	$4,800	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
100. Recreation within 1-5 years: develop access to SW shoreline of Lake Almanor between Prattville and Canyon dam (SA section 7, item 1A1n; FS final Section 4(e) condition no. 32(1)A.1.n)	SA, FS	$425,600	$10,400	$0	$72,300	Yes	ai,aj
101. Recreation in 1–5 years: upgrades at Camp Connery group camp (SA section 7, item 1A1o; FS final Section 10(a) condition no. 32(1)A.1.o)	SA, FS	$48,300	$5,200	$0	$12,200	Yes	ai,aj
102. Recreation over the term of the license: expand Camp Connery group camp (SA section 7, item 2A2; FS final Section 10(a) condition no. 32(1)2.A.1)	SA, FS	$597,400	$10,400	$0	$97,300	Yes	ai,aj
103. Recreation within 5–10 years: provide Butt Valley reservoir powerhouse trails (SA section 7, item 1A2a; FS final Section 10(a) condition no. 32(1)A.2.a)	SA, FS	$56,700	$1,300	$0	$9,600	Yes	ai,ak

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
104. Recreation within 5–10 years: improvements at Ponderosa Flat campground (SA section 7, item 1A2b; FS final Section 10(a) condition no. 32(1)A.2.b)	SA, FS	$48,600	$10,600	$0	$17,700	Yes	ai,ak
105. Recreation over the term of the license: expand Ponderosa Flat campground (SA section 7, item 2B1; FS final Section 10(a) condition no. 32(2)B.1)	SA, FS	$311,400	$5,200	$0	$50,500	Yes	ai,aj
106. Recreation within 5–10 years: improvements at Cool Springs campground (SA section 7, item 1A2c; FS final Section 10(a) condition no. 32(1)A.2.c)	SA, FS	$44,600	$6,400	$0	$12,800	Yes	ai,ak
107. Recreation within 5–10 years: improvements at Alder Creek boat launch (SA section 7, item 1A2d; FS final Section 10(a) condition no. 32(1)A.2.d)	SA, FS	$239,800	$2,600	$0	$37,500	Yes	ai,ak

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
108. Recreation within 5–10 years: provide Belden forebay car-top boating and trail access (SA section 7, item 1A3a; FS final Section 4(e) condition no.32(1)A.3.a)	SA, FS	$59,700	$300	$0	$8,900	Yes	ai,ak
109. Recreation within 1–3 years: improve North Fork fishing trail (SA section 7, item 1A3b; FS final Section 4(e) condition no. 32(1)A.3.b)	SA, FS	$75,300	$1,000	$0	$12,000	Yes	ai,aj
110. Prior to any recreation release flows provide river access at upstream end of Belden reach (SA section 7, item 1A4a; FS final Section 4(e) condition no. 32(1)A.4.a)	SA, FS	$10,400	$2,600	$0	$4,100	Yes	ai,aj
111. Recreation within 1–3 years: provide and maintain four trails to Belden reach shoreline (SA section 7, item 1A4b; FS final Section 4(e) condition no. 32(1)A.4.b)	SA, FS	$51,900	$3,900	$0	$11,500	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
112. Recreation within 3–5 years: upgrades at the Belden rest stop (SA section 7, item 1A4c; FS final Section 4(e) condition no. 32(1)A.4.c)	SA, FS	$22,800	$2,300	$0	$5,700	Yes	ai,al
113. If decision is made to provide recreation release flows, provide funding to the FS to construct non-project river access to the lower Belden reach (SA section 7, item 1A4d; FS final Section 4(e) condition no.32(1)A.4d)	SA, FS	$125,000	$0	$0	$18,200	Yes	aj
114. Within 2 years develop and implement an I&E program for the project (SA section 7, item 6; FS final Section 4(e) condition no. 34)	SA, FS	$77,800	$10,400	$0	$21,700	Yes	ai,aj
115. Within 1 year develop and provide new Lake Almanor bathymetry map (SA section 7, item 6; FS final Section 4(e) condition no. 34)	SA, FS	$51,900	$0	$0	$7,500	Yes	ai,aj
116. Annual fish stocking (SA section 7, item 5; FS final Section 10(a) condition no. 32(4))	SA, FS	$0	$50,000	$0	$50,000	Yes	aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
117. Within 1 year provide funding for river ranger position (SA section 7, item 10; FS final Section 4(e) condition no. 38)	SA, FS	$0	$25,000	$0	$25,000	No	ar
118. If decision is made to provide recreation release flows, cooperatively develop a Belden interagency river recreation flow management plan (SA section 7, item 11; FS final Section 4(e) condition no. 29)	SA, FS	$20,800	$1,600	$0	$4,600	Yes	ah
119. Within 6 months establish a recreation river flow TRG (SA section 2, item 1; FS final Section 4(e) condition no. 28(1))	SA, FS	$10,400	$1,000	$0	$2,500	Yes	ai,aj
120. Within 6 months, implement the recreation flow implementation plan, including test flows and monitoring (SA section 2, item 2; FS final Section 4(e) condition no. 28(2))	SA, FS, CDFG	$6,200	$1,600	$0	$2,500	No	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
121. In year 6, implement the recreation flow implementation plan, including test flows and monitoring (Interior Section 10(j) recommendation no. 22)	Interior	$6,200	$1,600	$0		Yes	
122. After 3 years, implement recreational flow regime as proposed in SA (SA section 2, item 3; FS final Section 4(e) condition no. 28(3))	SA, FS	$0	$0	$15,400	$15,400	No	ai,an
123. Delay implementation of recreational flow release for a period of 6 years (in year 9) (Interior Section 10(j) recommendation no. 22)	Interior	$0	$0	$13,700	$13,700	Yes	
124. After 3 years, implement recreational flow regime as proposed by Interior (Interior Section 10(a) recommendation no. 1)	Interior, CDFG	$0	$0	$15,400	$15,400	No	ao
125. After 3 years, implement recreational flow regime as proposed by AW	AW	$0	$0	$15,400	$15,400	No	ao

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
126. Participate in annual planning meeting and post an annual recreation flow calendar (SA section 2, item 3A; FS final Section 4(e) condition no. 28(3))	SA, FS	$0	$5,200	$0	$5,200	Yes	ai
127. During scheduled recreation river flows, count number of boats per day (SA section 2, item 3D; FS final Section 4(e) condition no. 28(3))	SA, FS	$0	$21,300	$0	$21,300	Yes	ai
128. Develop and implement a visitor survey for up to 3 years (SA section 2, item 3D; FS final Section 4(e) condition no. 28(3))	SA, FS	$100,000	$24,600	$0	$39,200	Yes	ap
129. Annual meeting with Plumas County to discuss reservoir levels (SA section 3, item 12; FS final Section 4(e) condition no. 30(12))	SA, FS	$0	$1,600	$0	$1,600	Yes	ai
Land Use and Aesthetic Resources Measures							
130. Within 1 year adjust project boundary (SA section 7, item 3; FS final Section 4(e) condition no. 32(3))	SA, FS	$0	$0	$0	$0	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
131. Within 1 year prepare road traffic survey plan and implement every 6 years (SA section 7, item 12; FS final Section 4(e) condition no. 39)	SA, FS	$10,000	$2,700	$0	$4,100	Yes	aj,aq
132. Within 2 years, paint the metal siding and roof of the hoist house on the Prattville intake structure (SA section 8, item A; FS final Section 10(a) condition no. 40(A))	SA, FS	$10,000	$500	$0	$2,000	Yes	
133. Within 2 years, plant evergreen trees at the Prattville maintenance area for visual buffering and establish native plantings between the road and the Oak Flat spoil piles (SA section 8, item B; FS final Section 10(a) condition no. 40(B))	SA, FS	$7,000	$500	$0	$1,500	Yes	
134. Within 2 years, regrade the Oak Flat road debris spoil piles (SA section 8, item C; FS final Section 4(e) condition no. 40(C))	SA, FS	$10,000	$0	$0	$1,500	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
135. Within 2 years, prepare a plan to minimize dust and improve the Butt Valley-Caribou Road (SA section 8, item D; FS final Section 10(a) condition no. 40(D))	SA, FS	$13,000	$1,000	$0	$2,900	Yes	
136. Within 2 years, consult with the FS on Belden powerhouse visual upgrades (SA section 8, item E; FS final Section 10(a) condition no. 40(E))	SA, FS	$0	$1,000	$0	$1,000	Yes	
137. Within 2 years, maintain exterior and landscaping at Caribou village (SA section 8, item F; FS final Section 10(a) condition no. 40(F))	SA, FS	$100,000	$25,000	$0	$39,500	Yes	
138. Within 60 days prior to any ground-disturbing activities, prepare and file visual management plans (SA section 8, item G; FS final Section 10(a) condition no. 40(G))	SA, FS	$5,000	$1,000	$0	$1,700	Yes	
139. Participate in annual meeting with the FS and Plumas County to coordinate land management activities (SA section 8, item I; FS final Section 10(a) condition no. 40(I))	SA, FS	$0	$1,500	$0	$1,500	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004$)	Annual Costs Including O&M (2004$)	Annual Energy Costs (2004$)	Total Annualized Cost (2004$)	Adopted by Staff?	Notes
140. Within 1 year, prepare and implement fire prevention and response plan (FS final Section 4(e) condition no. 29)	FS	$20,000	$0	$0	$2,900	Yes	
141. Develop and implement a road management plan (FS final Section 4(e) condition no. 42)	FS	$10,000	$0	$0	$1,500	Yes	
Cultural Resources Measures							
142. Revised HPMP (FS final Section 4(e) condition no. 40)	PG&E, FS	$425,000	$40,500	$0	$102,300	Yes	
143. Copies of cultural resources reports	Plumas County	$0	$500	$0	$500	Yes	
144. Additional Cultural Resources Working Group meetings	Staff	$0	$1,000	$0	$1,000	Yes	

[a] $1,000/year in years 16 through 30, annualized to current cost.

[b] $200,000/year in years 1 through 6, annualized to current cost.

[c] $200,000/year in years 1, 2, and 3, annualized to current cost.

[d] $50,000/year in years 1 and 2, annualized to current cost.

[e] $50,000/year in years 1, 2, and 3, annualized to current cost.

[f] $150,000/year in years 3, 8, 13, 18, 23, and 28, annualized to current cost.

[g] $150,000/year in years 1, 2, and 3, annualized to current cost.

[h] $50,000/year in years 1, 6, 11, 16, 21, and 26, annualized to current cost.

[i] $50,000/year in years 5, 10, and 15, annualized to current cost.

[j] $20,000/year in years 1 through 5 and odd years following year 5, annualized to current cost.

[k] $20,000/year in years 1, 2, and 3, annualized to current cost.

[l] Staff recommends that PG&E clarify its recommendation by developing a schedule for using the Canyon dam outlet upper-level gates to alleviate heavy metals and odors in late summer to fall associated with Canyon dam releases to the Seneca reach.

[m] Under the existing FERC-approved Rock Creek-Cresta Water Temperature Monitoring Plan, PG&E conducts seasonal monitoring of water temperature throughout the project area, and vertical profiles of water temperature and DO concentrations in Lake Almanor and Butt Valley reservoir.

[n] Study of the changes to the Prattville intake structure to modify water temperature is being done as part of the Rock Creek-Cresta Project license.

[o] $10,000/year in year 1, annualized to current cost.

[p] Represents reduction in annual generation of 57.714 GWh versus no-action alternative.

[q] Represents reduction in annual generation of 65.060 GWh versus no-action alternative.

[r] No impact on generation.

[s] Represents reduction in annual generation of 3.115 GWh versus SA flow regime for Seneca and Belden reaches.

[t] Represents reduction in annual generation of 4.727 GWh versus SA flow regime for Seneca and Belden reaches.

[u] Represents reduction in annual generation of 1.211 GWh versus SA flow regime for Seneca and Belden reaches with Seneca reach pulse flows.

[v] Represents reduction in annual generation of 1.787 GWh versus SA flow regime for Seneca and Belden reaches with Seneca reach pulse flows.

[w] $20,000/year in years 1, 3, 5, 10, 15, 20, 25, and 30, annualized to current cost.

[x] $100,000/year in years 3, 4, and 5, annualized to current cost.

[y] $50,000/year in years 1 through 3, 8 through 10, 15, 20, and 25, annualized to current cost.

[z] $50,000/year in years 5, 10, 15, 20, 25, and 30, annualized to current cost.

[aa] $100,000/year in years 3, 6, 9, 14, 19, 24, and 29, annualized to current cost.

[ab] $35,000/year in years 10, 12, and 14, annualized to current cost.

[ac] $35,000/year in years 4, 5, 10, 15, 20, 25, and 30, annualized to current cost.

[ad] $20,000/year in years 4, 8, 12, 16, 20, 24, and 28, annualized to current cost.

[ae] $40,000/year in year 2 and $10,000/year in years 3, 5, 10, 15, 20, 25, and 30, annualized to current cost.

[af] $10,000/year in years 5, 10, 15, 20, 25, and 30, annualized to current cost.

[ag] Represents reduction in annual generation of 23.928 GWh versus SA minimum and pulse flow regime.

[ah] Part of Rock Creek-Cresta agreement associated with relicensing of that project; costs accounted for as part of that project.

[ai] Costs escalated to 2004 dollars using Implicit Price Deflator.

[aj] Assume costs begin to be incurred in year 1 of license.

[ak] Assume costs begin to be incurred in year 8 of license; capital costs depreciated back to year 1 of license, and the present value of annual costs incurred during license determined.

[al] Assume costs begin to be incurred in year 4 of license; capital costs depreciated back to year 1 of license, and the present value of annual costs incurred during license determined.

[am] $1,500/year in years 6, 12, 18, 24, and 30, annualized to current cost.

[an] Represents reduction in annual generation of 0.241GWh versus SA minimum and pulse flow regime and Lake Almanor and Butt Valley reservoir operation under SA.

[ao] No additional loss of generation versus SA recreational flow regime.

[ap] $50,000/year in years 1 through 3, annualized to current cost.

[aq] $20,000/year annual cost in years 6, 12, 18, 24, and 30, annualized to current cost.

[ar] Although staff does not recommend these measures, they are mandatory conditions.

[as] The estimated costs assumes the following: (a) only two actual release sites (number of sites not specified in the prescription) and they are limited to a boat ramp access for fish transfer truck access; (b) costs do not include any fish tempering tanks or holding facilities; (c) each of the two release sites will be within 0.25 mile of a pre-existing maintained road; and (d) the roads to the release sites will be graded with gravel and allow for the excavation of a base and drainage, as necessary.

4.3 POWER AND ECONOMIC BENEFITS OF THE NO-ACTION ALTERNATIVE

Under the no-action alternative, the UNFFR Project would generate an average of 1,171,900,000 kWh of electricity annually, have an annual power value of $74,810,800 (63.84 mills/kWh), and total annual costs of $22,326,100 (19.05 mills/kWh), resulting in a net annual benefit of $52,484,700 (44.79 mills/kWh).

4.4 POWER AND ECONOMIC BENEFITS OF THE PROJECT RETIREMENT ALTERNATIVE

Under the project retirement alternative, the UNFFR Project would no longer generate electricity. The cost associated with this project would represent the cost of purchasing 1,171,900,000 kWh of replacement energy, or $74,810,800. In addition, securing powerhouses and other structures under project retirement, assuming the structures would remain in place, would require an additional capital cost of about $250,000, which corresponds as an annualized cost of $36,400. Since the cost of replacing this energy would be recuperated through the resale of the replacement purchased energy, the power benefit would represent the cost of purchasing this energy, or $74,810,800, resulting in a net annual benefit under project retirement of -$36,400.

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

SECTION 5

STAFF'S CONCLUSIONS

PAGES 5-1 to 5-68

FEIS

5.0 STAFF'S CONCLUSIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When we review a hydropower project, we consider the water quality, fish and wildlife, recreational, and other non-developmental values of the involved waterway equally with its electric energy and other developmental values. Accordingly, any license issued shall be best adapted to a comprehensive plan for developing a waterway or waterways for all beneficial public uses.

This section contains the basis for, and a summary of, our recommendations to the Commission for relicensing the UNFFR Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

5.1.1 Staff's Modifications to PG&E's Proposal

We developed the staff's alternative after evaluating PG&E's proposal and recommendations and comments from resource agencies and other interested parties and individuals. As a result, there were a number of proposed measures that were either modified or not included in the staff alternative.

In its license application, PG&E proposed to use the upper-level gates in the Canyon dam outlet tower for releases to the Seneca bypassed reach beginning on September 15 and continuing until at least November 1. However, in its rehabilitation plan for the Canyon dam outlet tower (PG&E, 2004c) it proposed using these upper-level gates from September 1 to October 15. We slightly modified this measure by recommending that a plan be developed to address the timing of use of the gates. Our recommended plan would rectify this inconsistency, while considering the potential effects on temperatures, odors and metals in the Seneca reach. Additionally, in its license application, PG&E proposed to continue to comply with measures protecting bald eagles according to existing nesting territory plans. Instead, we have recommended that PG&E develop an interagency bald eagle management plan in consultation with the FS, FWS, and CDFG to address project-related activities, especially those associated with a new license for the project. Our recommended plan would enable responses to conditions that arise during the term of a new license, some of which may not be foreseeable at this time (e.g., establishment of new nests within or adjacent to the project area, changes in recreational use patterns, changes in the bald eagle recovery plan, new management guidelines based on future research results), to be effectively addressed, rather than relying on existing plans.

The FS specified many of the SA measures in its final Section 4(e) conditions. We recommend that most of the terms of the SA be approved and made conditions of the license to be issued for the UNFFR Project. However, a specific Section 4(e) condition (and SA measure) that we do not include in the staff alternative is the funding for a river ranger position. We conclude that this should be the responsibility of the FS and/or Plumas County because the primary responsibility of this position would be for law enforcement, which is the responsibility of these agencies. We also recommend modifications to some of the measures PG&E proposed in the SA for reasons discussed in section 3.0, *Environmental Analysis*. Specific measures that we have modified, including five that are also FS Section 4(e) conditions, are listed below:

- Monitoring fish and benthic macroinvertebrates in the Belden and Seneca reaches: PG&E proposes and the FS specifies initiating monitoring between 10 and 12 years after license issuance, with sampling occurring every 2 years over a 6-year period, for a total of three sampling periods; we recommend initiating this monitoring during years 4 and 5 of the new license and then monitoring every fifth year. We recommend this modification because we are concerned that changes, negative or positive, to the fish, amphibian, and macroinvertebrate communities would not be evident in a timely manner under the monitoring program proposed by PG&E and specified by the FS.

- Pulse flows from Canyon and Belden dams: PG&E proposes and the FS specifies providing one pulse flow release from both Canyon dam and Belden dam in January, February, and March if the forecasted water year type for that month indicates that the water year is anticipated to be either normal or wet (no pulse flows are proposed in any of those months if the forecasted water year type is dry or critically dry); in addition to the pulse flows proposed by PG&E and specified by the FS, we recommend providing a pulse flow of 700 cfs below Canyon dam and Belden dam in March of dry years, unless the water temperature exceeds 10°C for two consecutive days in March and if a flow of this magnitude was not measured in the preceding January or February at NF4 (Seneca) and NF7 (Belden). We recommend this modification to ensure that periodic flows of the magnitude necessary to flush fine substrates from spawning gravels, redistribute small gravels, and activate floodplain habitat would occur with enough frequency to improve conditions for the aquatic biota in the bypassed reaches, especially during periods of drought.

- Gravel monitoring plan: PG&E proposes and the FS specifies developing and implementing a gravel monitoring plan to evaluate the movement of sediment that occurs in the Belden and Seneca reaches during scheduled pulse flow events and other flow events of similar magnitude; we recommend that the gravel monitoring plan include specific contingency actions for the enhancement of substrate distribution and abundance in the bypassed reaches.

We recommend this modification to facilitate corrective measures in case that monitoring shows that the recommended pulse flow schedule should be modified to improve the abundance and distribution of spawning-sized gravels, or that gravel supplementation or vegetation management is needed..

- Recreation flow implementation plan: PG&E proposes and the FS specifies implementing the recreation flow implementation plan, including test flows and monitoring, in the Belden reach, in year 1 of the license; we recommend delaying implementation of the plan until year 6. We recommend this modification because it provides an opportunity for the biotic community to adapt to the revised instream flow schedule without being disrupted by recreational release flows, which would improve the likelihood of enhancing macroinvertebrate and fish populations.

- Scheduled recreation flow releases: PG&E proposes and the FS specifies releasing recreation flows in the Belden reach beginning in year 4 of the license, following implementation of the recreation flow implementation plan; we recommend delaying the recreation flow releases in the Belden reach until year 9, also following the implementation of the recreation flow implementation plan.

- Lake Almanor water quality monitoring: PG&E proposes monitoring once every 5 years beginning in year 3 from license issuance; we recommend monitoring only in years 1 to 3.

- Bioaccumulation (methylmercury and PCBs) monitoring in catchable-sized fish: PG&E proposes monitoring once every 5 years beginning in year 1 from license issuance; we recommend monitoring only in years 5, 10, and 15. PG&E also proposes monitoring for bioaccumulation of silver; we do not recommend monitoring for bioaccumulation of silver because previous sampling indicates that silver body burdens are low, silver does not typically biomagnify, and we are not aware of an established action or screening level that represents the risk to human health.

- Bacteriological monitoring: PG&E proposes monitoring in years 1 to 5 from license issuance, then every other year; we recommend monitoring only in years 1 to 3.

- Cadmium and specific conductance monitoring: PG&E proposes monitoring in years 1 and 2 from license issuance, at a minimum; we recommend monitoring for up to 3 years in years 1 to 3.

- Monitoring the effectiveness of seasonal switching of the Canyon dam outlet tower gates: PG&E proposes monitoring for 6 water years (not necessarily

consecutive) beginning in year 1 from license issuance; we recommend monitoring only in years 1 to 3, only if those 3 water years are normal, dry, or critically dry.

- Shoreline management plan: PG&E proposes implementing the shoreline management plan included in the license application; the FS specifies and we recommend revising the shoreline management plan prior to implementation.

Additional measures not proposed by PG&E that we recommend include (1) a spoil disposal plan; (2) a water level and flow gaging plan; (3) a woody debris management plan; (4) an adaptive management plan for environmental resources; (5) a vegetation and invasive weed management plan; (6) expanding the amphibian plan to address the federally threatened CRLF; (7) a threatened, endangered, proposed for listing, and sensitive species protection plan; (8) a peregrine falcon monitoring plan; (9) a road management plan; and (10) a fire prevention, response, and investigation plan. Staff's alternative would provide the following benefits over PG&E's proposed measures: (1) greater aquatic habitat enhancement; (2) tracking of population trends of special-status species and, if necessary, adaptive adjustments made to project operations; and (3) monitoring of project-related features to identify the need for remedial measures and ensure that protective measures are functioning as planned.

5.1.2 Other Measures Not Included in Staff's Alternative

While not proposed for the UNFFR Project, as part of the SA for the Rock Creek-Cresta Project, PG&E agreed to evaluate the effectiveness of modifying the project's Prattville intake as a temperature control measure for the downstream reaches of the UNFFR. Based on our analysis in the EIS, summarized in section 5.1.4.1 below, we do not include any provisions for modifying the Prattville intake in staff's alternative.

On March 14, 2005, NOAA Fisheries submitted a modified Section 18 fishway prescription for the UNFFR Project to the Commission. Based on our analysis in the EIS, summarized in section 5.1.4.2 below, we do not include this prescription in staff's alternative.

5.1.3 No-action Alternative

The no-action alternative would result in the project continuing to operate as it is currently operated. The environmental protection and enhancement measures proposed by PG&E and recommended by staff would not be implemented.

5.1.4 Recommended Alternative

Based on our independent review and evaluation of the proposed project, the proposed project with our additional recommended environmental measures, and the no-action alternative, we select the staff's alternative (proposed project with our additional

recommended environmental measures) as the preferred alternative. The staff's alternative includes elements of the FS final Section 4(e) conditions, PG&E's proposed measures in its license application and in the SA, and some additional staff-recommended measures.

We recommend this alternative because (1) issuance of a new license would allow PG&E to continue to operate the project as a dependable source of electric energy for its customers; (2) the 342.6-MW project would avoid the need for an equivalent amount of fossil-fuel fired electric generation and capacity, continuing to help conserve these nonrenewable energy resources while reducing atmospheric pollution; and (3) the recommended environmental measures would protect or enhance fish and terrestrial resources, improve public use of recreational facilities and resources, and maintain and protect historic and archaeological resources within the area affected by project operations.

We evaluated numerous recommendations from resource agencies and other parties along with other potential measures considered by PG&E (to provide cooler water downstream at its Rock Creek-Cresta Project) in the resource sections and, after consideration of the environmental benefits and associated costs, we recommend including the following measures that PG&E proposes in staff's alternative for any license issued by the Commission for the UNFFR Project:

1. Use the upper-level gates in the Canyon dam outlet tower for releases to the Seneca reach beginning in September and continuing until at least mid-October.
2. Continue to implement the road maintenance agreement between PG&E and the Plumas National Forest as it pertains to project roads on FS lands within the project boundary.
3. Operate and maintain the existing gages to determine river stage and minimum streamflow below Canyon dam (NF-2) and Belden forebay dam (NF-70) under the supervision of the USGS. Within 3 years of license issuance, complete any modification to the two gage facilities that may be necessary to measure the new minimum streamflow releases.
4. Prepare annual water quality report(s) that contain elements consistent with reporting requirements from five water quality programs, and provide the report(s) to the Commission and appropriate resource agencies by no later than March 15 of the following year. Convene a discussion group meeting once annually between April 15 and April 28 that is noticed at least 30 days in advance.
5. Within 3 months of license issuance, develop a monitoring plan to evaluate the effectiveness of seasonal switching of releases from the Canyon dam outlet tower gates. This plan would be developed after consultation with

SWRCB, CVRWQCB, Plumas County, the FS, CDFG, and FWS. The plan would identify analytical methods to be used, sampling protocols and locations, QA/QC procedures, schedule, and reporting requirements.

6. Within 3 months of license issuance, develop a monitoring plan to determine if the elevated dissolved cadmium and specific conductance levels recorded within the UNFFR basin during 2002 and 2003 were caused by the project and, if so, potential remedial measures. The plan would be developed after consultation with SWRCB, CVRWQCB, Plumas County, the FS, CDFG, and FWS. The plan would identify analytical methods to be used, sampling protocols and locations, QA/QC procedures, schedule, and reporting requirements. Monitoring would be conducted during years 1 and 2 after license issuance, at a minimum.

7. Within 3 months of license issuance, develop a monitoring plan to document water quality conditions in Lake Almanor under altered project operations for the new license. This plan would monitor analytes seasonally (spring, summer, and fall) and would be developed through consultation with the SWRCB and the signatories of the SA; and identify analytical methods to be used, sampling protocols and locations, QA/QC procedures, schedule, and reporting requirements.

8. Within 3 months of license issuance, develop a monitoring plan to assess potential bioaccumulation of methylmercury and PCBs in catchable-sized fish in UNFFR Project waters. This plan would be developed after consultation with SWRCB, CVRWQCB, Plumas County, the FS, CDFG, and FWS; and identify analytical methods to be used, sampling protocols and locations, QA/QC procedures, schedule, and reporting requirements.

9. Within 3 months of license issuance, develop a bacteriological monitoring plan, using a methodology appropriate to determine compliance with state water quality standards. This plan would be developed after consultation with SWRCB, CVRWQCB, Plumas County, the FS, CDFG, and FWS, and identify analytical methods to be used, sampling protocols and locations, QA/QC procedures, schedule, and reporting requirements.

10. Provide minimum streamflows to the Seneca and Belden reaches, as measured at gages NF-2 and NF-70, respectively, as PG&E proposes in the SA (see tables 3-17 and 3-18). The minimum streamflows would commence within 60 days of the issuance of the new license, unless PG&E and/or the Commission determine that facility modifications are required.

11. Maintain existing streamflow in lower Butt Creek. No action would be taken to reduce dam leakage, tunnel leakage, spring or other natural flows that currently provide inflow to lower Butt Creek below the Butt Valley

dam, unless directed to do so by the Commission or other regulatory agencies.

12. Provide one pulse flow release from both Canyon dam (Seneca reach) and Belden dam (Belden reach) in each of January, February, and March if the forecasted water year type for that month indicates that the water year is anticipated to be either normal or wet. No pulse flows would be required in months where the water year type forecast for that month indicates that the water year would be critically dry.

13. Develop a monitoring plan to evaluate movement of sediment that occurs during scheduled pulse flow events and other flows of a similar magnitude. Emphasis would be placed on monitoring the movement of spawning-sized gravel and recruitment of similar-sized materials into the Belden and Seneca reaches. This plan would be developed after consultation with the FS, FWS, SWRCB, and CDFG. If it is determined that the pulse flows appear to have a detrimental effect on the availability and distribution of spawning-sized gravel, or it appears that a pulse flow of a different magnitude or duration would be beneficial, the pulse flow schedule would be altered to achieve the desired results.

14. Implement a ramping rate of 0.5 foot per hour, in all months, at Canyon dam, measured at gage NF-2, and Belden dam, measured at gage NF-70, when ramping rate can be controlled. The ramping rate would not apply to releases from project powerhouses or unregulated spills from project dams. In the event that studies or monitoring that may be required during the term of the license result in changes to the ramping rate, the new ramping rates would not result in an increase in the total volume of water that is released when the new ramping rates are applied.

15. Block load (i.e., maintain a constant generating load for a predetermined period) at the Belden powerhouse at times when the downstream Rock Creek dam is spilling water in excess of the minimum streamflow required under the license for the Rock Creek-Cresta Project, but less than 3,000 cfs. Block loading would assist in minimizing the frequency of fluctuation in the river stage and help meet ramping rates at downstream PG&E dams.

16. Rehabilitate and maintain an existing streamflow gaging station on lower Butt Creek designated as NF-9. An approximate rating curve would be maintained with periodic spot checks and re-rating, as necessary. The gage and the data collected on the gage would not be required to meet USGS standards. The gage would be read each year on or about April 1, June 1, August 1, and October 1.

17. Develop a monitoring plan in lower Butt Creek to (1) determine if the weir for gage NF-9 is acting to block upstream fish passage, and (2) evaluate

habitat quality at intervals of 3 to 5 years. This plan would be developed following consultation with the FS, FWS, SWRCB, and CDFG. If it is found that the weir is blocking upstream fish passage, remove or modify the weir within 1 year of the determination. If monitoring indicates that habitat quality in lower Butt Creek has been degraded, or if that habitat quality could be improved over existing conditions, a pulse flow regime would be developed in conjunction with the FS, FWS, CDFG, and SWRCB.

18. As part of the recreational flow implementation plan, develop a monitoring plan in the Belden reach for aquatic biota during the 3-year recreational flow release test period. Monitoring would include an analysis of the response of fish, benthic macroinvertebrates, and amphibians to recreational flow releases at a minimum three sites. Monitoring would include an analysis of stranding, displacement, disruption of spawning behavior and habitat, and all other noticeable effects associated with release flows. In addition, develop a recreational activities monitoring plan to assess the effects of boating, camping, access, angling, and recreational flow releases on fish and wildlife resources. These plans would be developed in consultation with the FS, FWS, NPS, SWRCB, and CDFG.

19. Maintain Lake Almanor water levels (PG&E datum) as follows:

    - Wet and Normal Water Years—By May 31, the water surface elevation would be at or above 4,485.0 feet (908,000 acre-feet) and from June 1 through August 31, at or above 4,485.0 feet (908,000 acre-feet);
    - Dry Water Years—By May 31, the water surface elevation would be at or above 4,483.0 feet (859,000 acre-feet) and from June 1 through August 31, at or above 4,480.0 feet (787,000 acre-feet);
    - Critically Dry Water Years—By May 31, the water surface elevation would be at or above 4,482.0 feet (835,000 acre-feet) and from June 1 through August 31, the water surface elevation is at or above 4,480.0 feet (787,000 acre-feet); and
    - Multiple Dry Water Years—In the event of multiple (two or more), sequential dry or critically dry water years, decreases in Lake Almanor surface water elevations below those specified above would be allowed.[28] By March 10 of the second or subsequent dry or critically dry water year and the year following the end of a sequence of dry or critically dry water years, notify CDFG, FWS,

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[28] Similar deviations from the current minimum elevations specified for the Butt Valley and Belden reservoirs also would be permitted.

SWRCB, FS, and Plumas County of drought concerns. By May 1 of these same years, consult with representatives from CDFG, FWS, SWRCB, FS, and Plumas County to discuss operational plans to manage the drought conditions.

20. Take such reasonable actions as may be prudent to prevent the water surface elevation in Lake Almanor from exceeding elevation 4,494.0 feet unless a higher level is approved by the Commission and CDWR, Division of Safety of Dams.

21. Continue to operate Butt Valley reservoir so that the minimum water surface elevation from June 1 through September 30 is at or above 4,120.0 feet (32,000 acre-feet) and from October 1 through May 31 at or above 4,115.0 feet (24,500 acre-feet).

22. Continue to operate Belden reservoir so that the minimum water surface elevation is 2905.0 feet (300 acre-feet), year round.

23. Forecast the water year type on or about January 10; notify the FS, CDFG, FWS, SWRCB, and Plumas County within 15 days; and operate for the remainder of that month and until the next forecast, based on that January forecast. New forecasts would be made on or about the tenth of February, March, April, and May, after snow surveys are completed, and operations would be changed as appropriate. The May forecast would be used to establish the water year type for the remaining months of the year and until next January 10, when forecasting should begin again.

24. Remove the Gansner Bar fish barrier on the Belden reach.

25. Design a wildlife habitat enhancement plan, within 1 year of license issuance, to be developed after consultation with the FS, FWS, CDFG, SWRCB, and Plumas County, that would benefit sensitive biological resources at the UNFFR Project. The plan would also include measures to evaluate the response of riparian vegetation along the two bypassed reaches to the proposed flow regime.

26. Develop an amphibian monitoring plan for FS-sensitive species for the Seneca, Butt Creek, and Belden bypassed reaches and submit to the Commission within 1 year of license issuance. The plan would be developed after consultation with the FS, FWS, SWRCB, and CDFG, and would provide for monitoring conducted at 3-year intervals beginning no later than 3 years following license issuance.

27. Finalize a RRMP for the project that includes the following elements:

    – A recreation facilities development program that defines proposed responsibilities related to construction, including details of proposed recreation development projects, estimated costs, and schedules;

- A recreation O&M program that defines proposed existing and future recreation O&M responsibilities, including annual maintenance costs and maintenance standards to be used;
- An I&E program that describes how hydroelectric energy production, environmental, cultural, and informational I&E would be coordinated and conducted at project facilities;
- A recreation monitoring program that identifies the frequency at which the various recreational resource monitoring activities would be conducted, including monitoring standards and indicators and how the monitoring information would be used in decision-making;
- A resource integration and coordination program that defines how recreation resource needs would be integrated with other resource management needs over time, such as cultural, wildlife, and aquatic resources and discusses how actions would be coordinated through annual meetings; and
- A RRMP review and revision program that defines how the RRMP would be updated or revised over the term of any new license and limits updates to the RRMP to no more than once every 12 years.

  The RRMP would be finalized in consultation with Plumas County, the FS, CDFG, Interior, and the U.S. Army Corps of Engineers within 1 year of license issuance.

28. Implement the following recreational facility enhancement measures (part of the recreation facilities development program) after initial license issuance and during the license term based on target completion dates and monitoring triggers (standards) included in the RRMP.

    Lake Almanor Recreational Facilities and Access

    - **Last Chance Family and Group Campground—**In accordance with ADA, modify two campsites and existing toilet buildings and provide a 150-foot access route leading to the nearby creek within 1 to 3 years after license issuance.
    - **Rocky Point Campground and Day-Use Area—**Within 5 to 10 years after license issuance, convert the Loop 3 overflow camping area into a day-use swim area containing an approximately 1-acre sand beach above the high water level (4,494 feet elevation, PG&E datum), provide a swimming delineator, a paved parking area to accommodate 35 to 40 vehicles, and a double vaulted restroom; relocate the 20 Loop 3 overflow campsites to the Loop 1 camp overflow area and provide a new double vaulted toilet building at

this location; provide a new entrance kiosk at the campground, three fee-based shower facility buildings (one for each loop) with hot water, and bear-proof food lockers at each campsite (151); replace older Klamath stoves with campfire rings; and revegetate or harden areas significantly disturbed by pedestrian or vehicle traffic. Implement the following accessibility improvements in accordance with the ADA: modify 10 campsites (four at Loop 1, three at Loop 2, and three at Loop 3); create an accessible access route to the high water level (4,494-foot elevation, PG&E datum) at the sandy beach; make improvements to existing recreation facilities as needed, such as the campground library box, telephones, and the envelope box at the pay station and provide appropriate ADA-accessible access routes; modify existing water faucets near accessible elements, such as toilets and campsites, to be ADA-accessible; create accessible routes to the toilet buildings near the campground entrance and near campsite # 100); and relocate the interior pay station directly across the road on a level, firm, and stable surface (Loop 2).

- **Forest Service Almanor Shoreline Facilities**—Within 1 to 13 years after license issuance, partner with the FS and provide approximately 40 percent of matching funding up to a maximum of $5,000,000 (2004 dollars) for the FS to complete recreation improvements, including reconstruction of existing facilities and construction of new facilities, at the following FS-owned recreation facilities: the Almanor Family Campground, the Almanor Group Campground, the Almanor amphitheater, the Almanor picnic area, and the Almanor beach. If PG&E has not paid the FS the maximum $5,000,000 (2004 dollars) at the end of the thirteenth year after the license is issued because the FS has been unable to obtain its corresponding share of the matching funds, then use the remaining funds (the difference between the amount PG&E has already paid the FS in matching funds and the $5,000,000 cap [2004 dollars]) for recreation improvements at the Almanor beach and the East Shore family campground, which would include the addition of up to 28 campsites in a third loop as funding permits.

- **East Shore Group Camp Area—**Within 1 to 3 years after license issuance, convert the existing East Shore picnic area to a group reservation camp area that will accommodate one group of 16 RVs or two groups of eight RVs; widen the entrance road; improve internal road circulation to accommodate RVs; provide one ADA-accessible parking space near the existing double-vaulted toilet building and an ADA-accessible access route to the nearby trash receptacles; provide bear-proof food lockers at 16 sites; provide a

paved, non-accessible trail down to the shoreline with switchbacks and stairs; and institute erosion control measures.

- **East Shore Day-Use Area—**Within 1 to 5 years after license issuance, designate a day-use swim area in the existing cove adjacent to the proposed new East Shore campground which would include up to five picnic tables, non-paved shoreline access trails, a single vaulted toilet building, and parking for 10 to 20 vehicles.
- **East Shore Family Campground—**Over the term of the project license period, contingent on reaching the recreation monitoring standards contained in the RRMP during the new license term, provide a new two-loop family campground on PG&E-owned land along the east shore of Lake Almanor. Construct the campground in two phases with a total of approximately 63 new tent and RV campsites, bear-proof food lockers at each campsite, two user-fee buildings with indoor hot showers and flush toilets, approximately 20 boat moorage slips/buoys, and a camp host site.
- **North Shore Public Boat Launch—**Within 3 to 5 years after license issuance, provide a new and expanded public boat launching facility at the North Shore campground, including paved parking for 40 single vehicles with trailers and 12 single vehicles, a double vaulted toilet building, and a boarding float. Dredge and maintain the existing submerged river channel to provide an approximately 1,000-foot-long, 50-foot-wide, and 6-foot-deep boat channel that provides boat access to approximately the 4,480-foot elevation (PG&E datum). The boat launch would be open for public use from April 1 to December 1 when the lake's elevation is at or above the 4,480 foot elevation (PG&E datum) and as snow on the ground permits. Provide public access to the boat launch facility along an abandoned portion of Highway 36 located along the north side of the campground, in order to reduce traffic impacts at the campground. Relocate 22 campsites within the project boundary that would be affected by the expanded boat launch facility.
- **Stover Ranch Day-Use Area—**Within 3 to 5 years after license issuance, develop the Stover Ranch day-use area to provide improved Lake Almanor shoreline access for Chester residents, including gravel parking for 10 to 20 vehicles, a double-vaulted toilet building, four picnic tables, a non-paved trail to the shoreline, an interpretive sign, and an RV site to accommodate a new Lake Almanor caretaker. Coordinate these developments with the Chester Public Utility District and the Chester Recreation and Parks District.

- **Marvin Alexander Beach**—Within 1 to 3 years after license issuance, assume management responsibility of the PSEA swim beach and expand and improve the existing sandy beach to a 0.4 acre area above the high water level (4,494 foot elevation, PG&E datum), provide an improved gravel parking area for 30 to 45 single vehicles, replace the site's two single-vault toilet buildings and 10 picnic tables, and provide a swim delineator. Change the name of the site to the "Marvin Alexander Beach."

- **Canyon Dam Day-Use Area**—Within 1 to 3 years after license issuance, provide an approximately 0.3 acre sandy beach above the high water level (4,494 foot elevation, PG&E datum), a swim area delineator, an informational kiosk, improved vehicle circulation, and eight new ADA-accessible picnic tables; and in accordance with ADA, modify eight existing picnic tables to make them accessible, provide an accessible parking space, and provide an accessible route to the high water level (4,494 foot elevation, PG&E datum) at the swim beach area in accordance with ADA. Reserve approximately 2.4 acres of land adjacent to the Canyon dam day-use area for potential future recreation development during the term of the new license.

- **Westwood Beach Day-Use Area**—Within 1 to 3 years after license issuance, provide a gravel parking area for 10 vehicles, six picnic tables, an ADA-accessible single vaulted toilet building, an approximately 0.1 acre sandy beach, a swim delineator, directional signage, and erosion control measures to protect the shoreline from wind-caused wave action at the Westwood beach.

- **Stumpy Beach Day-Use Area**—Within 1 to 3 years after license issuance, provide five picnic tables, directional signage, an approximately 0.7 acre sandy beach above the high water level (4,494 foot elevation, PG&E datum), a swim delineator, 8 to 10 paved parking spaces parallel to Highway 147 with trails connecting to the northern and southern portions of Stumpy beach (the southern trail would be ADA-accessible where feasible and the northern trail would be non-paved), four benches at the roadside parking area for viewing Lake Almanor and the surrounding mountains, and erosion control measures to protect the shoreline from wind-caused wave action. Provide a single vaulted toilet building if allowed by Plumas County and the California Department of Transportation set-back regulations; otherwise, provide a seasonal portable toilet building.

- **Catfish Beach**—Within 3 to 5 years after license issuance, make a good faith effort to negotiate a reasonable easement across private

lands to provide public road access to the Catfish beach area. Provide a single vaulted toilet building at this site and monitor and maintain the toilet building and the site's cleanliness through appropriate means.

- **Almanor Scenic Overlook—**Within 1 to 5 years after license issuance, provide an ADA-accessible route connecting the existing ADA-accessible double vaulted toilet building at the overlook with a new ADA-accessible parking space, and vegetative brushing and clearing to restore the views of Lake Almanor, Mt. Lassen, and the Canyon dam.

- **Southwest Shoreline Access Zone—**Within 1 to 5 years after license issuance, provide four shoreline access points at existing informally used areas along Lake Almanor's southwest shoreline between Prattville and Canyon dam after consultation with the FS. These shoreline access areas would provide vehicle access at or above the 4,494 foot elevation (PG&E datum) and serve as pedestrian access areas to the adjacent shoreline. Provide four gravel parking areas that provide parking for up to four to eight vehicles at two of the areas and 10 to 20 vehicles at the other two areas; vehicle barriers; regulatory, interpretive, and informational signs; gravel access roads; and, if appropriate, single vaulted toilet buildings at these access areas. Close and rehabilitate other user-created vehicular access routes along the southwest shoreline after consultation with the FS.

- **Camp Connery Reservation Group Camp Area—**Within 1 to 5 years after license issuance, provide an ADA-accessible parking space and a new bunk house cabin with accessible toilet and fee based hot shower and retrofit the existing telephone position and water faucet features to meet the ADA. Over the term of the project license period, contingent on reaching the recreation monitoring standards contained in the RRMP during the new license term, provide a new group reservation camping area adjacent to the existing Camp Connery group camp, which would either provide space for two groups of approximately eight self-contained RVs or one group of approximately 16 self-contained RVs, a centrally-located bear-proof food facility, and two user fee, indoor shower buildings with hot water and flush toilets.

Butt Valley Reservoir Recreational Facilities and Access

- **Powerhouse Trails—**Within 5 to 10 years after license issuance, provide improved angler access trails to two locations near the Butt

Valley powerhouse. One of the trails would be an approximately 200-foot, non-paved trail beginning at the existing gravel parking area next to the powerhouse down the steep slope east of the powerhouse to the levee below, with stairs, if needed. The second trail would be ADA-accessible (compact base rock) originating from an existing pullout along the Prattville-Butt Valley Road near the powerhouse, extending approximately 700 feet to the eastern shoreline of the inlet near the levee. Develop a new compacted base rock trailhead parking area with barriers for this trail.

- **Ponderosa Flat Campground—**Within 5 to 10 years after license issuance, provide a single person, non-heated outdoor shower at Ponderosa Flat campground, and, in accordance with ADA; modify four campsites and retrofit the existing designated accessible campsites to provide accessibility of the picnic table, fire ring, cooking grill, tent or RV area, and water faucet at each of these campsites; replace the vault toilets in the overflow area with one new accessible single vaulted toilet building and modify all of the other existing designated accessible toilet buildings to meet current ADA standards; provide an ADA-accessible access route to the toilet building near Site 45 and one ADA-accessible paved parking space near the toilet buildings; provide an ADA-accessible swimming area at the campground with an approximately 0.4 acre sandy beach above the high water elevation (4,132 foot elevation, PG&E datum) and a swim delineator; and provide a new ADA-accessible fishing access trail and pier or platform north of the overflow area. Over the term of the project license period, contingent on reaching the recreation monitoring standards contained in the RRMP during the new license term, provide approximately 20 new primitive tent campsites, likely to the north of the current overflow area, and a new 100 person capacity group camp area in the existing overflow area.
- **Cool Springs Campground—**Within 5 to 10 years after license issuance, provide a two-person, non-heated outdoor shower at Cool Springs Campground and one new ADA-accessible campsite with elements including a picnic table, a fire ring, a cooking grill, a tent or RV space, and water faucet.
- **Alder Creek Boat Launch—**Within 5 to 10 years after license issuance, expand the existing Alder Creek boat launch parking area to accommodate 10 to 20 additional vehicles with trailers and to improve vehicle circulation. New parking areas on the east side of the Butt Valley Reservoir Road would be gravel while the parking areas on the west side of this road would be paved. Modify the boat

launch to be accessible, and provide one ADA-accessible parking space near the existing double vaulted toilet building.

Belden Forebay Recreational Facilities and Access

- **Belden Forebay Access—**Within 5 to 10 years after license issuance, provide a car-top boat launch, a seasonal portable toilet building, and a gravel parking area for 10 single vehicles at the Belden forebay's existing undeveloped parking area, which also serves as the trailhead for the North Fork fishing trail; provide suitable access for launching small car-top watercraft at the Belden forebay; post signage referring to a Plumas County ordinance (once the ordinance is approved) limiting boat engines to 10 hp, boat speeds to 5 mph on small reservoirs such as the Belden forebay, prohibiting swimming or boating within 0.25 mile of Belden dam and prohibiting swimming or boating at night.
- **North Fork Fishing Trail—**Within 1 to 3 years after license issuance, improve the North Fork fishing trail from the Belden forebay parking area to the upstream side of Caribou No. 1 powerhouse, including retrofitting the existing metal trail decking and railing at the powerhouse above the turbine outlets providing enhanced access and safety, providing trail directional signs and a wider, more even non-paved trail base along the chain-link fencing at the powerhouse yard and along Caribou Road from the parking area.

Recreational Facilities and Access in the Bypassed Reaches

- **Upper Belden Reach River Access—**Prior to the initiation of any recreation release flows, provide a river access point at the upstream end of the Belden reach located at the spoil pile area which would include a seasonal portable toilet, a seasonal dumpster located over a concrete pad, and a non-paved parking area to accommodate 15 to 25 single vehicles.
- **Belden Reach Trails—**Within 1 to 3 years after license issuance, provide and maintain four trails to the Belden reach shoreline from existing informal parking areas where public access can be provided in a safe manner.
- **Belden Rest Stop (SR 70)—**Within 3 to 5 years after license issuance, relocate the existing picnic tables down to the rest stop's lower level and disperse them within the area from the Eby Stamp Mill to the gazebo near the creek; replace two of the tables with ADA-accessible tables; develop ADA-accessible routes to the gazebo, the overlook area next to the creek, and to the Eby Stamp

Mill historical features; and provide improved I&E elements at the rest stop and erosion control measures on the slope between the parking lot and the upper picnic area. Remove the existing cooking grills from the upper level and close that area. Over the term of the project license period, replace the existing vault restrooms when major renovation is needed. This improvement is contingent on the monitoring triggers (standards) contained in the RRMP being reached over the license term.

– **Lower Belden Reach River Access**—If a determination is made to proceed with scheduled river recreation flows, provide up to a maximum of $125,000 (2005 dollars) to the FS for construction of non-project river access to the lower Belden reach.

29. Assume responsibility for operational maintenance and heavy maintenance of the following FS facilities prior to the start of the first recreation season following license issuance: the Dyer View day-use area, the Canyon dam boat launch and day-use area, and the Almanor boat launch. Additionally, as each recreation facility is individually constructed, assume operational maintenance and heavy maintenance responsibility for the southwest shoreline access zone facilities. Finally, within 6 months after the FS has completed construction of each of the recreation improvements it has planned for the FS Almanor Family Campground and amphitheater, the FS Almanor Group Campground, and the FS Almanor beach, apply to the Commission to incorporate these additional FS facilities within the project boundary and include these facilities in the O&M program.

30. Develop an I&E program (part of the RRMP) for the project after consultation with the FS and Plumas County within 2 years after license issuance that provides information to enhance recreation experiences and encourage appropriate resource protection, cooperative, and safe behaviors from project visitors. The I&E program would include themes, media, media design, prioritized sites, and prioritized services. As part of the I&E program, prepare a Lake Almanor bathymetric (underwater topographic) map within 1 year of license issuance, which would be available in pamphlet form to area boaters and posted on signs at Lake Almanor public boat ramps.

31. Complete a recreation monitoring program (part of the RRMP) after consultation with the FS and Plumas County, adopting the limits-of-acceptable change (LAC)-based monitoring approach as described in the October 2002 draft of the RRMP. Specifically monitor (at a minimum) the water surface of project reservoirs, and PG&E and FS recreation facilities and shoreline areas within the project boundary. Prepare periodic monitoring reports every 6 years in conjunction with FERC Form 80

recreation facility, and use monitoring requirements and conduct annual recreation planning and coordination meetings with other recreation providers in the project area to discuss recreation resource management decisions for the project area, implementation of project recreation enhancements, recreation monitoring results, potential grant applications, and other pertinent project-related recreation issues that may arise over the term of the new project license. If test river recreation flows are conducted, develop a study plan to monitor recreation use during the test flow period and produce a report on monitoring results after consultation with the FS.

32. Stock approximately 5,000 pounds of catchable trout per calendar year in the waters of the NFFR between its confluence with the EBNFFR and the Belden diversion dam and augment CDFG's existing Lake Almanor fisheries program by expanding the pen rearing program and/or constructing rearing habitat for warmwater fish.

33. Coordinate with the FS, Plumas County, and CalTrans to develop an MOU to produce a Belden interagency recreation river flow management plan that would address management and integration of recreation opportunities provided by the Belden recreation river flow release with other recreation opportunities in the watershed.

34. Establish a recreation river flow TRG for the purpose of consulting with PG&E in the design of recreation and resource river flow management and monitoring plans, reviewing and evaluating recreation and resource data, and in developing possible recreation river flows in the Belden reach. Include representatives of the FS, CDFG, SWRCB, FWS, NPS, and Plumas County in the TRG. Maintain, and make public, records of TRG meetings, and forward those records with any recommendations to the FS, SWRCB, and the Commission. Establish communication protocols after consultation with the TRG to facilitate interaction among TRG members, which would allow for open participation, consultation with independent technical experts, and communication among all TRG participants.

35. Implement the recreation flow implementation plan as described in the SA including:

    – Convene the Technical Review Group (TRG) to evaluate the existing available ecological information regarding recreation river flows to determine whether (1) sufficient information exists to conclude that recreation river flows would result in unacceptable impacts on sociological or ecological resources; or (2) recreation river test flows as prescribed should be conducted to further evaluate the ecological and social effects of the recreation river flows in the Belden reach. If the TRG determines that recreation test flows

should be conducted, it would not recommend any flow schedule that exceeds the frequency, magnitude, or duration of flows prescribed in the SA. Within 6 months of convening the TRG, forward the TRG recommendations regarding recreation test river flows to the FS and SWRCB.

- If the TRG recommends that recreation test river flows in the Belden reach should be conducted, the FS and SWRCB would consult with appropriate state and federal agencies, PG&E, and tribal governments about the TRG's proposal. If the proposed schedule for recreation test river flows does not exceed the frequency, magnitude, or duration of flows prescribed for any given month in the SA, then PG&E would submit the proposal to the Commission for approval.
- Conduct the river recreation test flows upon approval from the Commission as prescribed in the SA for a 3-year period.
- Prepare a Belden reach recreation river test flow evaluation plan and submit it to the FS and SWRCB for their review, consistent with the TRG recommendation. The plan would be designed to evaluate the effects of the recreation test river flow releases on ecological and social resources, and the metrics to be used in this determination. Upon approval of the plan by the Commission, implement the plan during the 3-year recreation test flow period.
- Convene the TRG after the 3-year recreation test river flow period to evaluate the existing available ecological and social information. The TRG would make a recommendation whether recreation river flows should be continued to meet the river flow management for recreation objectives. The TRG would not recommend any flow schedule that exceeds the frequency, magnitude, or duration of flows prescribed in the SA.
- Submit any recommendation regarding continued recreation river flows made by the TRG to the FS and SWRCB for review. The FS and SWRCB would consult with FWS, PG&E, and tribal governments during their review. If the proposed schedule for continued recreation river flows that does not exceed the frequency, magnitude, or duration of the flows prescribed for any given month in the SA, PG&E would submit the proposal to the Commission for approval.

36. Post, through a third party or other mechanism, an annual recreation flow calendar scheduling the initial recreation flow day per month.

37. Conduct an annual planning meeting each year in March to discuss expected water year type, results of monitoring efforts, PG&E maintenance needs that may conflict with recreation flow releases, and other relevant issues. Suggest that the TRG recommend the desired date of the month for any additional recreation river flow release days triggered by the number of boats per day as described below, based on evaluation of social and ecological considerations.

38. Postpone any scheduled recreation river flow release in the event of an emergency, providing as much notice as reasonably practicable under the circumstances. If practicable, reschedule postponed recreation river flow releases as recommended by the TRG.

39. During scheduled recreation river flows, count observed boater use in number of boats per day to determine whether recreation flow release days should be added or subtracted. All boats would be counted as one boat except for rafts 12 feet or greater in length which would be counted as two boats. All boats observed on the Belden reach for any part of a given day would be counted. If the number of boats per day on the first recreation river flow day for a month exceeds 100 boats per day, one day of recreation river flow would be added to the recreation river flow schedule in that month the next year. If the number of boats per day is less than 100 boats per day for both the recreation river flow releases in one month, one day of recreation river flow would be subtracted from the recreation river flow schedule for the that month in the next year. Recreation river flow releases would not decrease below one day per month and would not exceed the cap defined in the SA. Recreation river flow release days would not be added or subtracted during any period of recreation test river flows.

40. Develop and implement a visitor survey for up to 3 years to determine if visitors would choose to return to recreate on the Belden reach based on their experience related to the number of boats encountered on the river. The visitor survey questionnaire and methodology would be statistically valid. The TRG would evaluate the survey results and other data to determine if the trigger for adding/deleting days, based on the number of boats per day, should be amended based on this analysis.

41. Apply the basic ramping rates when implementing recreation river flows.

42. Create a calendar that lists the dates of the March pulse flow in the Seneca reach and any scheduled pulse flow or recreation river flow releases in the Belden reach, and make that calendar available on the Internet through a third party or other mechanism. The calendar would state the timing and magnitude of the scheduled flow release. The March pulse flow release in the Seneca reach would be posted by February 15, and the scheduled summer releases in the Belden reach would be posted by May 15. Post an

estimate of the release magnitude and duration of the flow if releasing flows of a similar magnitude and duration as a scheduled pulse flow in the Seneca or Belden reaches.

43. Meet annually with a committee appointed by the Plumas County Board of Supervisors between March 15 and May 15 to inform the committee about the water elevation levels of Lake Almanor predicted to occur between May 1 and September 30. Schedule an additional meeting with the committee if forecasts show that PG&E's obligation to deliver water to the state of California and the Western Canal Water District pursuant to the January 17, 1986, agreement would require it to deviate from the Lake Almanor water elevation levels previously predicted.

44. Modify the project boundary to include approximately 34 additional acres of the Plumas National Forest at Caribou powerhouse and Belden dam for the purposes of penstock maintenance and spoil management.

45. Apply to the Commission within 1 year of license issuance to adjust the project boundary to include all recreation improvements covered by the SA and associated roads at PG&E facilities including the East Shore campground, group camp area, and day-use area, the Stover Ranch day-use area, the Catfish Beach area, the Westwood Beach day-use area, the Stumpy Beach day-use area, the Upper Belden Reach river access site, the Belden reach trails, and those portions of the southwest shoreline access zone facilities currently outside the project boundary as well as the following FS facilities located on the Plumas and Lassen National Forests: Canyon dam boat launch and day-use area, Dyer View day-use area, and Almanor boat launch.

46. Apply to the Commission to adjust the project boundary as needed to incorporate the Almanor Family Campground and Amphitheater, the Almanor Group Campground, and the Almanor beach, 6 months after the FS has completed construction of all of the recreation improvements it has planned for each of these facilities.

47. File a road traffic survey plan for roads used for project purposes located on NFS lands with the Commission within 1 year of license issuance which includes provisions for monitoring traffic every 6 years when monitoring recreation use in accordance with FERC Form 80 requirements. At a minimum, the road traffic survey would include the Caribou Road (27N26) and the Caribou-Butt Valley Reservoir roads (27N26 and (27N60) and include the number and types of vehicles per day on these roads and a sampling schedule that includes the fishing season, including the opening weekend; holiday weekends including Memorial Day, Fourth of July, and Labor Day; non-holiday weekends; the day of and the day after any scheduled Belden reach recreation river flow releases; and weekdays.

Every 6 years, the road traffic reports would be reviewed by the FS and then filed with the Commission.

48. Implement the following measures within 2 years of license issuance:

- Paint the metal siding and roof of the hoist house on the Prattville intake structure a dark green color similar to the current color;
- Plant sufficient evergreen trees between the existing Prattville maintenance buildings and the shoreline to reduce visual domination of the buildings on the shoreline area. Monitor and oversee the survival of these trees through the first three summers to ensure successful establishment;
- Re-grade the Oak Flat road debris spoil piles along Caribou Road to create a more natural rolling topography along the roadside and where possible move spoil materials farther from the road; and
- Establish native plantings where possible between the road and the Oak Flat spoil piles to help screen the active use areas from passing motorists.

49. Within 2 years of license issuance, prepare a plan, after consultation with the FS, to annually apply dust palliatives or other measures, including regular grading, to help minimize dust emissions and improve the lower coupled segment of the Butt Valley-Caribou Road.

50. Consult with the FS on color selection when maintenance or repair work is scheduled on the Belden powerhouse penstocks, surge chamber, or other powerhouse facilities, to reduce visual contrast as seen from SR 70.

51. Maintain the exterior and landscaping of the clubhouse, houses, and grounds at Camp Caribou to preserve the historic features and character of the facility. Consult with the FS when planning maintenance or repair activities at this National Register eligible property.

52. File a visual management plan with the Commission within 60 days prior to any ground-disturbing activities on NFS lands. This plan will, at a minimum, address clearings, spoil piles, and project facilities such as diversion structures, penstocks, pipes, ditches, powerhouses, other buildings, transmission lines, corridors and access roads; facility configurations, alignments, building materials, colors, landscaping, and screening; a proposed mitigation and implementation schedule necessary to bring project facilities into compliance with the National Forest LRMP direction; locating spoil piles either in approved areas on NFS lands or in a location off of NFS lands; monitoring and eradication of noxious weeds as specified in any noxious weed management plan for the project; removal of all visible non-native materials, including construction debris from the

surfaces of piles located on NFS lands; and stabilization and revegetation of all native material that is allowed to be left on NFS lands, including compliance with visual quality objectives.

53. Meet with the FS and Plumas County a minimum of every 10 years to discuss the need to update the SMP. The need to update the SMP sooner may also be raised and discussed during the annual land use meetings with the FS and Plumas County.

54. Conduct an annual meeting with the FS, CDFG, and Plumas County to coordinate ongoing project related land management activities including recreation management and use, fire suppression and related forest health activities, and the planning for commercial, residential and industrial developments.

55. Finalize and implement the HPMP.

In addition to, or in lieu of, PG&E's proposed measures, we recommend the following additional resource measures based on our independent analysis (see section 3.0 of this EIS).

1. Develop a plan, including the schedule, for using the Canyon dam outlet upper-level gates to alleviate heavy metal concentrations and odors associated with late-summer and fall releases from Canyon dam. This plan would be developed after consultation with the SWRCB, CVRWQCB, Plumas County, the FS, CDFG, and FWS. The plan would be filed with the Commission within 3 months of license issuance.

2. File with the Commission a spoil disposal plan within 6 months of issuance of a new license and at least 60 days prior to any ground-disturbing or soil producing or piling activity.

3. Develop a water level and flow gaging plan. The plan would be developed and filed with the Commission within 3 months of license issuance, and implemented immediately upon approval. This plan would specify monitoring locations, instrumentation, monitoring protocols, schedule, and reporting requirements, including who the reports would be routed to. Minimum requirements of the plan would include continued operation of existing gages; monitoring of lower Butt Creek flows at or near station NF9 on or about April 1, June 1, August 1, and October 1; reporting of non-compliance conditions; and providing daily midnight Lake Almanor storage and water surface elevations, delayed between approximately 1 and 2 days, on the Internet through a third party or other mechanism.

4. As part of the proposed plan to document the effectiveness of seasonal switching of releases from Canyon dam outlet tower gates, seasonally monitor water quality in Lake Almanor near the outlet tower and the Seneca

reach for the first 3 years after license issuance, only if those three water years are normal, dry, or critically dry.

5. As part of the proposed plan to document water quality in Lake Almanor under altered project operations for the new license, seasonally monitor *in situ* parameters, general analytes, minerals, metals, nutrients, petroleum products, and Secchi depths in Lake Almanor annually for the first 3 years after license issuance.

6. As part of the plan to assess potential bioaccumulation of methylmercury and PCBs in catchable-sized fish, collect and analyze samples in years 5, 10, and 15 following license issuance.

7. As part of the bacteriological monitoring program, monitor fecal coliform densities, using a sampling regime that will allow determination of compliance with state standards, annually for the first 3 years after license issuance.

8. If the Commission reduces or terminates the current water temperature monitoring requirements of the Rock Creek-Cresta Project Water Temperature Management Plan for Project 2105 affected sites, develop a plan to monitor DO concentrations in Lake Almanor and Butt Valley reservoir. This plan would be developed after consultation with SWRCB, the FS, CDFG, and FWS; and filed with the Commission within 3 months of Commission approval of reduction or termination of the Rock Creek-Cresta Project Water Temperature Management Plan. This plan would describe monitoring methods and locations, QA/QC procedures, the monitoring schedule, and reporting requirements. The schedule would ensure monitoring for at least 3 years following license issuance.

9. If the Commission reduces or terminates the current water temperature monitoring requirements of the Rock Creek-Cresta Project Water Temperature Management Plan for Project 2105 affected sites, develop a water temperature monitoring plan to document water temperatures resulting from operating the project under a new license. The plan would ensure monitoring for at least 3 years following license issuance.

10. Provide a pulse flow release of 700 cfs in the Seneca reach and in the Belden reach in March of water years classified as dry, unless the water temperature exceeds 10°C for two consecutive days in March and if a flow of this magnitude was not measured in the preceding January or February at NF4 (Seneca) and NF7 (Belden).

11. As part of the proposed gravel monitoring plan, develop specific contingency actions for the enhancement of substrate distribution and abundance in the bypassed reaches.

12. Implement one mid-term geomorphological evaluation in project reaches to assess the response of channel processes to the recommended flow schedule.

13. File the aquatic monitoring plan for the Seneca and Belden reaches with the Commission within 1 year of license issuance. As part of the aquatic monitoring plan, periodically monitor fish populations (in a manner consistent with data presented in pre-filing study reports) and benthic macroinvertebrates in the Seneca and Belden reaches, as proposed in the SA, to determine the effects of measures included in the license, such as minimum flow regimes, pulse flows, and ramping rates. Initiate monitoring during years four and five of the new license to determine the biological response to any measures and to establish a new baseline for detecting biological responses to any modifications of measures. After this 2-year monitoring period, the frequency of surveys would be reduced to every fifth year to evaluate long-term responses to measures implemented in the new license and any subsequent modifications that are made. A draft aquatic monitoring plan would be distributed to the consulted agencies, who would be allowed a minimum of 30 days to comment on the plan. Distribute the results of each year's monitoring to CDFG, SWRCB, the FS, FWS, and the Commission.

14. Develop a woody debris management plan after consultation with CDFG, SWRCB, the FS, and FWS. The plan would be developed and filed with the Commission within 1 year of license issuance. A draft plan would be distributed to the consulted agencies which would be allowed a minimum of 30 days to comment on the plan and would include measures to warn and educate boater in the Belden reach about LWD obstacles in the riverine corridors.

15. Develop an adaptive management plan after consultation with CDFG, SWRCB, the FS, and FWS to be filed with the Commission within 1 year of license issuance. The plan would be designed to evaluate the effects of environmental measures on all resource areas and to evaluate the need for adjusting or implementing new measures to enhance environmental resources affected by the project. The plan would also define the process that would be used to determine whether or not there is a need to adjust measures that may be specified in a new license or implement new measures. The plan would also define consultation procedures that would be taken prior to undertaking any actions that would affect FS sensitive species or their habitat to determine whether preparation of a Biological Evaluation would be necessary. A review would be conducted and reports would be filed with the Commission every 5 years for the term of the license.

16. Delay implementation of recreational flow releases for a period of 6 years to allow the riverine aquatic biota to respond to new minimum and pulse flow schedules. In year 6 of the license, establish the recreation river flow TRG and implement the recreation flow implementation plan, as described in the SA. If a decision is made to continue recreation river flows following a 3 year test period, implement the recreation river flow schedule and other provisions as presented in the SA.

17. Within 1 year of license issuance develop a vegetation and noxious weed management plan for all project lands that provides for the following: protection of special-status plants that includes maintenance of the project GIS data base that would allow mapping and tracking occurrences of special-status plants to assist in evaluating plans for vegetation management, siting for new recreational facilities and considering other activities that would cause ground disturbance or habitat alteration; improvement of wildlife habitat, consulting with the FS to evaluate the consistency with FS standards and guidelines for management of the NFS lands, protection of listed and sensitive species; and control of noxious weeds. Part of this plan would include a plan for the protection and management of VELB habitat, including protection in the area around the known location of the elderberry shrub and pre-activity surveys in areas that would have vegetation clearing or cutting. PG&E would consult with the FS and FWS on protection and management of VELB habitat and ensure that measures identified in the plan (e.g., flagging and protecting elderberry shrubs with stems over 1 inch in diameter) are consistent with the current FWS guidelines (FWS, 1999, or subsequent update).

18. As part of the wildlife habitat enhancement plan, include additional monitoring of habitat for wading birds and waterbirds in the causeway area, and incorporate management considerations outlined in the "Conservation Assessment and Management Plan for Breeding Western and Clark's Grebes in California."

19. Develop a threatened, endangered, proposed for listing, and sensitive species protection plan, within 1 year of license issuance, as part of the biological and adaptive management plans for listed species. Consult with the FS and FWS prior to undertaking any actions that would affect FS sensitive species or their habitat, to determine whether preparation of a biological evaluation is necessary; identify BMPs that are consistent with FS standards and guidelines; and develop any specific protection measures that should be implemented.

20. As part of the amphibian monitoring plan, specify the process by which additional potential CRLF habitat would be determined and potential project-related effects identified. In addition, specify the consultation

process that would be implemented with FWS and other appropriate agencies, should the presence of a CRLF be confirmed within project-affected waters during monitoring, or based on credible information from other sources. After year 15, meet with the FS, FWS, SWRCB, and CDFG and determine the need, frequency, and locations of future monitoring efforts.

21. Develop a peregrine falcon monitoring plan within 1 year of license issuance after consultation with the FS, FWS, and CDFG. This plan would include provisions for monitoring of peregrine falcon nest territories in accordance with measures found in FWS' "Monitoring Plan for the American Peregrine Falcon" completed in December 2003. Where possible, this plan may be incorporated into the interagency bald eagle management plan to avoid duplication of effort.

22. Develop an interagency bald eagle management plan within 1 year of license issuance after consultation with the FS, FWS, CDFG, private timber companies (e.g., Collins Pine), and recreational groups (e.g., AW, Chico Paddleheads, and Shasta Paddlers). This plan would include, for all project lands and waters, at a minimum, provisions for (1) annual monitoring of bald eagle reproductive success, distribution, and abundance; (2) monitoring of human use patterns to determine human/eagle interactions; (3) coordination of any plans for timber harvest, mining, and recreational enhancements on PG&E lands influenced by the UNFFR Project with the FS, FWS, and other consulting agencies; (4) protection and enhancement measures within the management zones; and (5) steps to minimize eagle disturbance resulting from proposed changes in project operations, facilities, and recreational enhancements. Where possible, peregrine falcon nest territory monitoring may be incorporated into the interagency bald eagle management plan. At the discretion of the consulting agencies, PG&E may incorporate portions of this plan with the FS' "Bald Eagle Management Plan, Lake Almanor and the Upper Feather River, Recovery Zone 26, Lake Almanor Basin Area" completed in September 2003.

23. Prior to implementation of the Lake Almanor SMP, revise the draft SMP included in the final license application after consultation with SWRCB, CDFG, the FS, Plumas County, and the Maidu community to determine appropriate actions to take to evaluate the potential adverse effects of the altered lake level conditions on other resources. Revisions to the draft SMP would include addressing inconsistencies with county land-use designations, as identified by Plumas County; reevaluation of shoreline erosion at a few locations identified by Plumas County as having moderate to severe erosion; and addressing evaluation of potential adverse effects of shoreline erosion resulting from the altered lake level conditions on water quality, aquatic resources, cultural resources, recreation, and aesthetics.

PG&E would file the revised SMP along with comments on it with the Commission within 3 months of issuance of a new license.

24. Within 1 year of license issuance, develop a road management plan for all FS and unclassified roads on NFS lands needed for project access. The road management plan will identify all FS and unclassified roads on NFS lands needed for project access, including the road numbers; a map of all FS roads and unclassified roads on NFS lands needed for project access, including digital spatial data accurate to within 40 feet identifying each road by FS road number, detailed descriptions of each FS road segment and unclassified road on NFS land needed for project access; provisions for PG&E to consult with the FS prior to any road construction, realignment or closure involving FS roads or lands needed for project access; provisions for PG&E to cooperate with the FS on the preparation of a condition survey and a proposed maintenance plan annually, beginning the first full year after the road management plan has been approved. The road management plan will also specify that PG&E must obtain appropriate authorization from the FS for all project access roads under FS jurisdiction outside of the project boundary, including unclassified roads and FS system roads needed for project access. The road management plan would identify PG&E's responsibility for road maintenance and repair costs commensurate with PG&E's use and project-induced use. Any roads identified as necessary for operation of the project should be included within the project boundary.

25. Develop a fire prevention, response, and investigation plan developed in consultation with the FS and appropriate state and local fire agencies within 1 year of issuance of a new license that sets forth in detail the plan for prevention, reporting, control, and extinguishing of fires in the vicinity of the UNFFR Project.

26. Implement the measures outlined in the PA.

27. Provide Plumas County with copies of all requested cultural resources reports, including the non-confidential volume of the ethnographic study, if Plumas County agrees not to make the reports available to the public, in compliance with Section 304 of the NHPA.

28. Finalize the HPMP and include (1) the details of PG&E's employee and public education and interpretive program; (2) site-specific treatment measures for historic archaeological sites and standing structures that FERC, in consultation with the SHPO, has determined are eligible for the National Register; (3) protocols for PG&E to consult and work with the Greenville Rancheria, Susanville Indian Rancheria, and other interested Maidu groups; (4) results of any consultations on a curation facility or interpretive center; and (5) a discussion on the Cultural Resources Working Group, including member entities and a schedule for future meetings.

Implementation of these measures, in addition to the measures proposed by PG&E, would protect and enhance water quality, fisheries, terrestrial, recreational, aesthetic, and cultural resources in the project area. We present our rationale for some of our recommended measures in the following sections.

5.1.4.1 Water Resource Measures

Measures to Reduce Water Temperature

Water temperature data for the UNFFR Project area and the lower NFFR indicate that summer daily mean water temperatures frequently exceed 20.0ºC and thereby adversely affect the coldwater fishes in surface waters of Lake Almanor and Butt Valley reservoir; Caribou powerhouse discharges; and the Belden, Rock Creek, Cresta, and Poe reaches (see table 3-7). PG&E evaluated numerous potential measures to reduce water temperatures in the Belden reach and the lower NFFR reaches. Although the primary goal of many of these measures is to reduce temperatures in reaches downstream of the UNFFR Project, because implementing some of them would necessitate modifying UNFFR Project facilities and/or operations, we evaluate these measures in this EIS (see *Water Temperature and Dissolved Oxygen Management* in section 3.3.1.2, *Water Quality*, and appendix D).

Although the use of thermal curtains in Lake Almanor and/or Butt Valley reservoir would reduce NFFR temperatures downstream of the Caribou powerhouses, we are concerned about the extreme adverse effects that these measures would have on the lakes' coldwater fishery and other environmental, cultural, and recreational resources, and the high cost. This also is the case for other Prattville intake modifications (see appendix D) evaluated by PG&E. Operating the project with Prattville intake modifications would have extreme ecological, social, and economical effects including:

- Adverse effects on the coldwater fishery of Lake Almanor (see section 3.3.2.2 of this EIS);
- Adverse effects on the existing trophy rainbow and brown trout fishery of Butt Valley reservoir (see section 3.3.2.2 of this EIS);
- Adverse effects on boating safety on Lake Almanor (see section 3.3.5.2 of this EIS);
- Elimination of public access and recreational use of approximately 16 acres of Lake Almanor (see section 3.3.5.2 of this EIS);
- Adverse effects on viewsheds of Lake Almanor (see section 3.3.6.2 of this EIS);
- Potential disturbance of Native American burial grounds associated with dredging of the submerged levees, if the levees are removed (see section 3.3.7.2 of this EIS);

- Cost of between roughly $6,000,000 and $18,000,000 to modify the Prattville intake depending on whether the levees are removed (Black & Veatch, 2004);
- Additional costs associated with operating and maintaining the floating curtain throughout the term of any new license; and
- Adverse effects on the local economy of Chester and the region near Lake Almanor (see section 3.3.8.2 of this EIS);

Studies also show that increasing Canyon dam releases and reducing withdrawals through the Prattville intake and consequently discharges from the Butt Valley and Caribou powerhouses would reduce temperatures in reaches of the NFFR. PG&E's proposed MIFs and use of the Canyon dam low-level gates would reduce temperatures in the Belden reach and lower NFFR reaches, although daily mean temperatures of greater than 20.0ºC would still occur throughout most of these reaches during July and August. We estimate that implementing the proposed MIFs would decrease the net annual benefit of the project by about $3,684,200.

Providing releases from Canyon dam higher than the proposed MIFs, while reducing withdrawals through the Prattville intake, would further reduce temperatures in the NFFR, although the incremental benefit would be smaller as flow releases are increased. In addition, reducing discharges from the Butt Valley powerhouse would increase Butt Valley reservoir temperatures and thus degrade its coldwater fishery. We estimate that these releases (200-cfs to 400-cfs releases from the Canyon dam outlet low-level gates through Canyon dam instead of the Butt Valley powerhouse) would have an average annual cost in lost generation to the project of approximately $1,800,000 more than implementation of PG&E's proposed MIFs. For these reasons, along with the incremental decrease in the net annual benefit of the project, which would result from reduced generation at the Butt Valley and Caribou powerhouses, we do not recommend MIFs higher than those proposed by PG&E in the SA.

Water Quality Monitoring

Our review of PG&E's water quality data, detailed in section 3.3.1.1, *Water Quality*, indicates that project waters typically comply with the applicable federal and state standards for most water quality parameters. However, available information indicates that the applicable criteria for water temperature and DO are frequently not satisfied in some areas, and it is questionable whether other water quality standards including some trace metals are typically satisfied throughout project waters. Evidence also indicates that trace metals and PCBs accumulate in fish and crayfish in the Belden forebay and the NFFR downstream of the forebay.

Concentrations of dissolved cadmium in grab samples collected during 2002 and 2003 suggest that EPA's National 4-day average hardness-based criteria may be exceeded for the NFFR near Chester (NF1), Lake Almanor near Canyon dam surface

(LA1-S), and Butt Valley powerhouse tailrace (BV1) and specific conductance values exceeded the Basin Plan criterion of 150 μmhos/cm at several stations on the NFFR and a station in lower Butt Creek.

Under existing project operation, PG&E typically uses the Canyon dam outlet tower low-level gates to supply the Seneca reach with cool water; however, these operations have resulted in elevated odors and trace metal concentrations in the NFFR downstream of Canyon dam, particularly in the fall prior to turnover of Lake Almanor.

Lake Almanor's limnology could be influenced by operating the project to provide for water surface elevations from June 1 through August 31 that are 10 feet higher than current levels in wet and normal water year types and 5 feet higher in dry and critically dry water year types. We conclude that it would be appropriate to monitor water quality conditions in Lake Almanor for the first 3 years of any new license period to assess the effects of changing project operation under any new license for this project. In this manner, the effects of the new operations could be readily evaluated and corrective actions, if necessary, could be made within a few years of implementing the new license terms.

In the SA, PG&E proposes developing a water quality study and monitoring plan that would incorporate five plans. These five plans, which we recommend with our specific details, are (1) a plan to evaluate the adequacy and efficacy of mitigating elevated odor and dissolved metal levels in the Seneca reach through seasonal gate switching at the Canyon dam outlet; (2) a plan to identify the cause of high dissolved cadmium and specific conductance levels in waters of the UNFFR that were measured in 2002-2003; (3) a water quality monitoring plan to monitor water quality conditions in Lake Almanor; (4) a plan to monitor the potential bioaccumulation of total mercury and PCBs in tissue samples collected from resident catchable-sized (minimum total length of 8 inches) fish in waters of the project in years 5, 10, and 15 following license issuance; and (5) a bacteriological monitoring plan consistent with the Basin Plan objectives for protection of the water contact recreation beneficial uses.

We estimate the annualized cost of developing and implementing these five recommended water quality plans, together with the cost of producing the water quality reports for the project, would be about $150,900. Because we recommend a more abbreviated monitoring schedule than the one presented in the SA (we do not recommend monitoring for the entire license term), the cost of our recommendations is $40,800 less than the recommendations as presented in the SA.

5.1.4.2 Aquatic Resource Measures

Minimum Flows

The minimum flow regime proposed by PG&E in the SA calls for the release of minimum flows, based on water year type, for the preservation and improvement of

aquatic resources in the Seneca and Belden reaches of the NFFR. The proposed flow schedules allow for variable releases that range from 60 to 150 cfs into the Seneca reach from Canyon dam, and variable releases that range from 75 to 235 cfs into the Belden reach from the Belden dam. The releases are dependent on the month and water year type (critically dry, dry, normal, and wet) and are designed to mimic the variability in flow that would occur with a natural hydrograph. The highest flows would typically occur during late winter and early spring, and the lowest flows would occur during late summer and early fall. The minimum flow regime specified in the SA would enhance aquatic habitat, including water temperature, for a number of key species and life stages, while retaining the ability of anglers to effectively fish in both project bypassed reaches, as discussed in section 3.3.2.

We estimate that implementing the minimum flow regime proposed in the SA would decrease the net benefit of the project by about $3,684,200, due to the loss of generation. An advantage of the SA's flow shaping approach that is not evident in the lost revenue and generation values is that, during the period of peak energy demand, which is typically in July and August, the minimum flow requirements are near their lowest levels. Consequently, more energy would be available at those times than would be if a single higher year-round minimum flow regime was to be implemented in both of the bypassed reaches. We consider the environmental benefits of implementing this flow regime to be worth its cost.

In its Section 10(j) recommendation, Interior recommends that PG&E implement a proposed flow schedule that allows for variable releases dependent on the month and water year type. However, Interior recommends variable releases that range from 60 to 170 cfs into the Seneca reach from Canyon dam, and variable releases that range from 100 to 250 cfs into the Belden reach from the Belden dam. Interior's recommended flow regime, though providing somewhat higher flows during certain seasons for different water year types, does not provide for a substantial increase in habitat suitability for the evaluated species' lifestages over the flow regime recommended in the SA, as discussed in section 3.3.2. We estimate that implementing Interior's flow regime would decrease the net annual benefit of the project by $469,000 more than our recommended flow regime, with little additional environmental benefit.

In the SA, PG&E commits to make a good faith effort to provide the specified minimum streamflows to the bypassed reaches where facility modifications are needed to release flows specified in the SA. No indication is provided as to which facilities may need to be modified to accommodate the flows and thus would be subject to interim good faith flow release provisions. It is important to establish whether facility modifications would be needed, and if so, at which dam, the cost of such facilities, and the advantages that the new facilities would provide over using the capabilities of the existing facilities. Additional capital costs may be necessary if PG&E and/or the Commission determine that facility modifications are required to release the minimum flows.

Lake Almanor Water Levels

The Lake Almanor water levels proposed by PG&E in the SA provide for water surface elevations from June 1 through August 31 that are 10 feet higher than current levels in wet and normal water year types and 5 feet higher in dry and critically dry water year types. In its Section 10(j) recommendation, Interior recommends that PG&E implement project operations to maintain the same water surface elevations as those proposed in the SA. Lake Almanor supports both warm- and coldwater fisheries. Maintaining lake levels during the late spring/summer period at higher elevations over existing conditions would increase the lake's surface area by approximately 12 percent during wet year types and 6 percent during normal year types. This increased surface area may provide further shallow water habitat in areas of the lake that are currently not watered, providing spawning habitat for centrarchids, such as smallmouth bass, largemouth bass, and Sacramento perch, as discussed in section 3.3.2.

Maintaining the level of Lake Almanor higher than the current levels also would improve conditions for recreation use and aesthetics, as discussed in section 3.3.2. Below approximately elevation 4,482 feet, the shoreline progressively becomes more undesirable to many beach users and viewers, due to exposed jagged volcanic-type rocks.

We estimate that implementing the Lake Almanor water levels as described in the SA would decrease the net benefit of the project by about $1,527,500. Although this represents a substantial cost, we conclude that the environmental benefits (enhanced aquatic habitat and aesthetic conditions) as well as the socioeconomic benefits (increase in the capital value of residential property) associated with these higher water levels would be worth the cost.

Butt Valley Reservoir Water Levels

In the SA, PG&E proposes operating Butt Valley reservoir so that the minimum water surface elevation is 4,120 feet from June 1 through September 30, and 4,115 feet from October 1 through May 30 (sic); however, we assume that the reservoir will be operated to maintain a minimum surface elevation of 4,115 feet through May 31. Currently there are no elevation restrictions on the reservoir; however, from January 1975 until December 1999 (the period where data were available for all project gages), PG&E operated the reservoir at or above these recommended levels at almost all times, except during the time that it was drawn down to allow seismic remediation of the dam and for a few additional minor periods where elevations fell below the proposed limits. Typically, Butt Valley reservoir fluctuates about 1 foot on a daily basis and between 3 and 5 feet on a weekly basis depending on power system operating needs. The reservoir supports a trophy rainbow and brown trout fishery; however, available habitat for centrarchids in the reservoir is limited, with little or no littoral zone present, as discussed in section 3.3.2. Butt Valley reservoir has a more attractive shoreline than Lake Almanor, when exposed, and visual quality is generally preserved across the range of normal operating levels. Formalizing current Butt Valley reservoir water level management, as we recommend,

would not decrease the net annual benefit of the project because it is reflective of existing conditions. Our analysis has not demonstrated any negative effects on resources in the reservoir under the current operating regime, and in fact, Butt Valley reservoir supports a trophy rainbow and brown trout fishery.

Monitoring of Aquatic Resources in the Bypassed Reaches

In the SA, PG&E proposes to develop an aquatic monitoring plan for the Seneca and Belden reaches, in consultation with CDFG, SWRCB, the FS, and FWS. PG&E proposes initiating aquatic (fish and benthic macroinvertebrates) monitoring between 10 and 12 years after license issuance, with sampling occurring every 2 years over a 6-year period, for a total of three sampling periods. The FS, in its final Section 4(e) condition no. 26 specifies the same sampling plan as the one in the SA, but includes NOAA Fisheries as a consulting party. The plan proposed by PG&E and specified by the FS includes monitoring of fish populations (including condition and trend) and benthic macroinvertebrates (including population robustness, feeding group, and tolerance/intolerance trend monitoring) in at least three sites in each reach. Sampling could be deferred to the following year in the event of a critically dry year.

We agree that it would be appropriate to collect biological data to document the response of the aquatic community to changes in project operation, which would allow for a determination to be made as to whether the expected benefits of the new flow regime are occurring and, if not, whether any adjustments to the flow regime are necessary. However, monitoring is not proposed or specified until years 10 to 12, and we are concerned that changes, negative or positive, to the fish and macroinvertebrate communities would not be evident in a timely manner under this proposed monitoring program. We agree with monitoring fish populations and benthic macroinvertebrates in the Seneca and Belden reaches, as proposed in the SA, to determine the effects of measures included in the license, such as minimum flow regimes, pulse flows, and ramping rates. However, we have recommended that PG&E initiate this monitoring during years 4 and 5 of the new license to determine the biological response to any measures and to establish a new baseline for detecting biological responses to any modifications of measures. After this 2-year monitoring period, the frequency of surveys would be reduced to every fifth year to evaluate long-term responses to measures implemented in the new license and any subsequent modifications that are made.

Section 18 Fishway Prescription

Implementation of the NOAA Fisheries Section 18 prescription likely would provide access to approximately 15 miles of spawning and juvenile rearing habitat for Central Valley spring-run Chinook salmon and Central valley steelhead (assuming the prescription is included in the license for the UNFFR Project and implementation of a complementary prescription for the Oroville project) by trapping adults below the Oroville Project and transporting them to the Seneca reach and Yellow Creek. The

minimum instream flows that we recommend and that are proposed by PG&E and the resource agencies for the Seneca reach combined with the existing physical conditions in the UNFFR would likely provide suitable habitat for anadromous salmonids. However, as discussed in section 3.3.2.2, the potential success of this program is questionable and there would likely be many adverse effects associated with the implementation of the fish passage prescription such as adverse effects on the existing fish community and adverse effects on riparian habitat and instream habitat due to construction. Although the fish passage measures prescribed by NOAA Fisheries would likely be a more effective means of passing upstream and downstream migratory fish as compared to other more traditional measures (e.g., intake screens or fish ladders), there remains a wide discrepancy between the concepts presented by NOAA Fisheries in its March 14, 2005, prescription and the scientific evidentiary support necessary to guarantee the success of such efforts. Given that uncertainty, the potential adverse effects, and the cost of this measure (an estimated decrease of the net annual benefit of the project of $2,435,400) we do not recommend the implementation of the NOAA Fisheries Section 18 fishway prescription.

5.1.4.3 Recreation Resource Measures

Recreation Resource Management Plan

In the SA, PG&E proposes finalizing the draft UNFFR RRMP, which would include six programs: (1) a recreation facilities development program that defines PG&E's proposed responsibilities related to construction, including details of proposed recreation development projects, estimated costs, and schedules; (2) a recreation O&M program that defines PG&E's proposed existing and future recreation O&M responsibilities, including annual maintenance costs and maintenance standards to be used; (3) an I&E program that describes how hydroelectric energy production, environmental, cultural, and informational interpretation and education would be coordinated and conducted by PG&E at project facilities; (4) a recreation monitoring program that defines how PG&E proposes conducting recreation resource monitoring, including monitoring standards and indicators, and how the monitoring information would be used in decision-making; (5) a resource integration and coordination program that defines how PG&E would integrate recreation resource needs with other resource management needs over time, such as cultural, wildlife, and aquatic resources and discusses how actions would be coordinated through annual meetings; and (6) a RRMP review and revision program that defines how the RRMP would be updated or revised over the term of the new license. We estimate that finalization of the RRMP would decrease the net annual benefit of the project by about $39,400, but the benefits, directing management of recreation resources over the term of the license, would justify the costs.

Recreation Facility Improvements at Lake Almanor

In the SA, PG&E proposes improvements at four developed campgrounds located on Lake Almanor: Last Chance family and group campground, Rocky Point campground, the East Shore group camp, and the East Shore family campground. In the SA, PG&E also proposes improvements at nine day-use areas: Rocky Point, Stover Ranch, Marvin Alexander beach, Canyon dam, East Shore, Westwood beach, Stumpy beach, Catfish beach, and the Almanor scenic overlook. The SA also provides for improvements in the southwest shoreline access zone, at the North Shore public boat launch, and at the Camp Connery group camp. Many of these enhancements would increase opportunities for the public to access the Lake Almanor shoreline. Proposed improvements at existing facilities include modifications and upgrades in accordance with ADA, improving vehicle access and parking opportunities, providing bear-proof food lockers, and replacement of stoves with campfire rings. We estimate that completion of these improvements would decrease the net annual benefit of the project by about $1,447,100. Even though this is a fairly significant cost to the project, these measures would help meet future recreation demand and could encourage additional tourism to the area, thereby increasing expenditures in the region and improving the economic viability of the local community of Chester.

In the SA, PG&E also proposes providing the FS with approximately 40 percent matching funds up to a total maximum of $5,000,000 in the first 13 years following license issuance for the FS to construct recreation improvements at FS facilities along Lake Almanor including the Almanor Family Campground, the Almanor Group Campground, the Almanor amphitheater, the Almanor picnic area, and the Almanor beach. These improvements would include reconstruction of existing facilities and construction of new facilities. We estimate that providing matching funds to the FS for facility improvements would decrease the net annual benefit of the project by $727,300. We believe this cost is reasonable because improvement of the FS facilities would bring them up to the current standards of the PG&E facilities and provide additional ADA-accessible elements.

Once improvements at these FS facilities are completed, PG&E proposes assuming O&M responsibility for these facilities and the Dyer View day-use area, the Canyon dam day-use area and boat launch, and the Almanor boat launch. PG&E's O&M of these facilities would allow for consistent management of all available facilities on the Lake Almanor shoreline. PG&E proposes to incorporate those facilities that are not currently in the project boundary into the project boundary. We estimate that PG&E's assumption of the O&M of these facilities would decrease the net annual benefit of the project by $77,900, but providing consistent management is worth the increased cost.

Recreation Facility Improvements at Butt Valley Reservoir

In the SA, PG&E proposes improvements at the following PG&E facilities along the Butt Valley reservoir: Ponderosa Flat campground, Cool Springs campground, and the Alder Creek boat launch. Proposed improvements at these facilities include modifications and upgrades in accordance with ADA guidelines, improving vehicle access and parking opportunities, and providing showers. In the SA, PG&E also proposes providing angler access trails to two locations near the Butt Valley powerhouse. One of these trails would be accessible in accordance with ADA guidelines. We estimate that completion of these improvements would decrease the net annual benefit of the project by about $128,100, but would increase visitor satisfaction at the Butt Valley reservoir which is worth the increased cost.

Recreation Facility Improvements at Belden Forebay

In the SA, PG&E proposes improving access at the Belden forebay by providing a car-top boat launch and other amenities at the trailhead for the North Fork fishing trail and also improving the North Fork fishing trail. Both of these improvements would improve angler access at the Belden forebay, which is worth the decrease in the net annual benefit of the project of $20,900.

Recreation Facility Improvements in the Bypassed Reaches

In the SA, PG&E proposes improving facilities at the Belden rest stop and providing and maintaining 4 trails to the shoreline of the Belden reach. PG&E would increase accessibility in accordance with ADA guidelines and also improve visitor safety at the Belden rest stop. We estimate that providing these improvements would decrease the net annual benefit of the project by $17,200. Also, if recreation release flows would be provided in the Belden reach, the SA provides for provision of a river access point at the upstream end of the Belden reach by PG&E. This would decrease the net annual benefit of the project by an additional $4,100. If requested by the FS, PG&E would also provide funding to the FS for construction of non-project river access to the lower Belden reach, which would decrease the net annual benefit of the project by an additional $18,200, but the benefits, including increased visitor satisfaction and improved environmental conditions, would justify the costs.

Recreation River Flow Management

We agree with PG&E's proposal as described in the SA to implement the recreation flow implementation plan, including test flows and monitoring, in the Belden reach. Additionally, in its final Section 4(e) condition no. 28(2), the FS specifies that PG&E implement the recreation flow implementation plan. We estimate that implementation of this plan would decrease the net annual benefit of the project by $2,500. Implementation of scheduled releases following the 3 years of test flows

proposed in the recreation flow implementation plan would decrease the net annual benefit of the project by $15,400 if implemented in year 4 of the license. Monitoring boater use once the scheduled releases are implemented would decrease the net annual benefit of the project by $21,300 and developing and implementing a visitor survey for up to 3 years would decrease the net annual benefit of the project by $39,200. The cost of environmental monitoring once the scheduled releases are implemented would decrease the net annual benefit of the project by another $28,000. Collectively, preparing for and implementing scheduled whitewater releases as proposed in the SA would decrease the net annual benefit of the project by about $106,400, but the benefit of enhanced whitewater boating opportunities in the area would justify the costs.

In its final 10(j) recommendation no. 26, Interior recommends delaying implementation of the recreational flow implementation plan for 6 years following license issuance to allow the biological communities in the bypassed reaches to respond to the new flow regime. In section 3.3.2.2, we analyze the effects of recreational flows on the aquatic community in the Belden reach and describe how a substantial flow increase could disrupt fish and amphibians, displace macroinvertebrates, and affect channel processes. We believe that monitoring the effects of recreational flows on aquatic resources within the Belden reach, using information from the evaluation of recreation flows in the Rock Creek and Cresta reaches of the NFFR, and incorporating the results of other pertinent studies would provide a better understanding of how recreation flows affect substrate conditions, macroinvertebrates, amphibians, and fish populations in the reach. The biotic community would have the opportunity to adapt to the revised instream flow schedule without being potentially disrupted by recreational release flows, which would improve the likelihood of enhancing macroinvertebrate and fish populations. The delay also would allow PG&E to implement monitoring to assess changes to the biotic community that may have resulted from implementation of the new flow schedule without the confounding effects of recreational flow releases. By delaying implementation of the recreational flow implementation plan from year 1 until year 6, the decrease in the net annual benefit is reduced from $2,500 to $1,200. By delaying implementation of the scheduled releases from year 6 until year 9 of the license, the decrease in the net annual benefit is reduced from $15,400 to $12,000. The cost of preparing for and implementing scheduled whitewater releases, with a delay of 6 years, would only reduce the net annual benefit from $106,400 to $101,700. The difference in the cost of implementing the recreational flow release program in year 1 or year 6 is slight, but the potential benefits of delaying implementation of the flows to the aquatic community, as well as a better understanding of how recreation flows affect the aquatic community, justifies the delay.

River Ranger Funding

We agree that the addition of a river ranger along the project river reaches could enhance the recreation experiences of some of the visitors to the project river reaches by

increasing visitor awareness of federal, state, county, and local regulations and laws. This increase in awareness could lead to an increase in compliance with those laws and regulations, and a greater degree of resource protection resulting from increased compliance. However, law enforcement at the UNFFR Project is the responsibility of the FS and Plumas County. PG&E pays property taxes to Plumas County that relate to the operation of its UNFFR Project and a portion of the tax payment would be expected to fund law enforcement activities associated with continued project operation. The FS is responsible for enforcing the natural resource protection provisions of the Plumas National Forest LRMP. Neither Plumas County nor the FS has provided any data to indicate the need for PG&E to fund a river ranger position to patrol the UNFFR Project area. Security at the project development is the responsibility of PG&E. We find no indication that law enforcement within the project area is inadequate, or that additional assistance is needed to complement the current levels of law enforcement. Additionally, we have no assurance that the river ranger would be used exclusively in the project area, in addition to the current levels of patrols in the project area. Therefore, we do not recommend funding of the river ranger position.

5.1.5 Conclusion

Based on our independent analysis, continued operation of the UNFFR Project with our recommended measures would improve environmental conditions in the project area and ensure an economically beneficial use of project resources.

5.2 CUMULATIVE EFFECTS SUMMARY

We identified the following resources that have the potential to be cumulatively affected by relicensing the UNFFR Project with our recommended measures in combination with other activities in the NFFR basin: (1) water quality and quantity, (2) rainbow trout, and (3) bald eagles.

In section 3.3.1.3, *Cumulative Effects on Water Resources*, we note that project facilities and operations have affected water temperatures throughout much of the NFFR, lower Butt Creek, and project impoundments ever since the construction of the UNFFR Project. Increasing summer flows in the Seneca and Belden reaches would cool water within these reaches, and modifying the Prattville intake to supply cold water from Lake Almanor to downstream reaches, if feasible and implemented, would result in cooler water in the Butt Valley reservoir and in the NFFR between the Caribou development and Lake Oroville. Implementation of some other coldwater supply options is also expected to cool water in the NFFR downstream of the Caribou development. However, implementation of options that include reducing discharges from Butt Valley powerhouse, or installing curtains in Butt Valley reservoir, would warm water in the Butt Valley reservoir. Routing a portion of the flow around the Rock Creek, Cresta, and Poe bypassed reaches warms water in these reaches. We conclude that the cumulative effects of the project and non-project facilities and operations would be largely dependent on

which, if any, coldwater supply option is implemented. If the Prattville intake is modified with a curtain, the cumulative effects would be cooling of water in the NFFR between the Caribou development and Lake Oroville; deepening of the thermocline in Lake Almanor; and cooling or warming of Butt Valley reservoir, depending on whether curtains also are constructed in Butt Valley reservoir and discharges through the Butt Valley and Caribou powerhouses are substantially reduced.

Several project and non-project actions affect trace metals concentrations within NFFR basin waters. PG&E's cloud seeding program has increased silver concentrations in the atmosphere of the Lake Almanor watershed, and consequently has increased the likelihood of elevated silver concentrations in precipitation and runoff. The accumulation of sediments with naturally high levels of metals in the reservoir combined with anoxic conditions in the reservoir's hypolimnion and at the water/substrate interface, have historically resulted in mineralization of trace metals in the reservoir and elevated trace metal concentrations in Lake Almanor's hypolimnion and the Seneca reach. Additionally, the continuation of non-project-related mining, which increases sedimentation and trace metal concentrations, is expected to continue in the Seneca and Belden reaches and other streams within the basin. Modifying the Prattville intake to draft deeper water from Lake Almanor, if implemented, is expected to increase oxygen levels in much of Lake Almanor and consequently reduce mineralization of metals contained in the sediments deposited in the reservoir. PG&E's use of the upper gates instead of the low-level gates at the Canyon dam outlet tower during periods with elevated hypolimnetic metal concentrations would reduce the conveyance of water with high metal concentrations to the Seneca reach. A cumulative effect of anticipated project and non-project actions also would be continued elevation of metals in sediments and the hypolimnion of Lake Almanor, but reduced metal concentrations in the Seneca reach. If the Prattville intake is modified to supply more cold water, metal concentrations in some of Lake Almanor likely would be reduced in comparison to existing conditions.

The expected increase in water-oriented recreation throughout the NFFR basin would increase the potential for fecal coliform bacteria and human pathogens to be introduced to surface waters in the basin. With continued project operation, the Lake Almanor shoreline bank may recede into or near septic leach fields that were constructed prior to raising the normal Lake Almanor water level to 4,494 feet (PG&E datum) in 1974 and subsequently result in introduction of fecal coliform bacteria and human pathogens from the leach fields into Lake Almanor waters. The cumulative effects of these actions would be additive and likely result in localized increases in concentrations of fecal coliform bacteria and human pathogens in surface waters of the NFFR basin.

In section 3.3.2.3, *Cumulative Effects on Aquatic Resources*, we indicate that construction of the UNFFR Project reservoirs and downstream reservoirs (Rock Creek, Cresta, Poe, and Oroville) has reduced the amount of riverine habitat in the NFFR between West Branch and Hamilton Branch from about 90 miles to about 41 miles,

divided among the Seneca, Belden, Rock Creek, Cresta, and Poe bypassed reaches. We recognize that, although some of these reservoirs provide suitable rearing habitat for rainbow trout, the fish communities in impounded areas have generally shifted toward warmwater species. Diversion of water for hydroelectric generation has substantially reduced flow volumes and altered temperature regimes in the bypassed reaches, but trout fisheries remain in good condition, especially in the Seneca, Belden, and lower Butt Creek reaches. Our recommendations to (1) provide pulse flow releases in both bypassed reaches for gravel entrainment and relocation to improve spawning habitat for trout; (2) increase minimum flows in the bypassed reaches, which would increase the amount of available physical habitat and improve summer water temperatures in the Belden bypassed reach; and (3) develop a plan for ramping spill flows to avoid rapid onset and termination of spill flows that may flush aquatic biota downstream, are expected to provide benefits to rainbow trout. The condition of rainbow trout would be expected to improve and could result in anglers catching larger trout from the Seneca and Belden bypassed reaches downstream from the Belden and Rock Creek dams, respectively.

Monitoring fish and macroinvertebrate populations would enable determination of trout responses to new project operations and an evaluation of the need to implement adaptive management measures. Providing scheduled whitewater flows in the Belden reach, if implemented, could adversely affect trout populations by scouring algae and invertebrates from the stream channel, but ecological monitoring during any such events would enable identification of substantial effects and provide a basis for taking corrective actions.

In section 3.3.4.3, *Cumulative Effects on Bald Eagles*, we conclude that, under existing conditions, a stable and abundant prey base for the bald eagle, which feed primarily on fish, exists, and regulated flows in the NFFR maintain foraging opportunities in smooth, shallow water. Modest increases in flows, such as those proposed in the SA, would be likely to maintain or increase the prey base, as well as foraging opportunities, and would represent a cumulative benefit to the bald eagle population.

5.3 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 by 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 a fish and wildlife agency recommendation is inconsistent with the purposes of the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

Interior submitted 21 Section 10(j) recommendations for the UNFFR Project on December 1, 2003. In our draft EIS, we determined that 20 of them were within the scope of Section 10(j), but that 11 of them were potentially inconsistent with the FPA. In Interior's letter responding to our preliminary determinations of inconsistency, Interior stated that four of the measures staff recommended in the draft EIS provided acceptable alternative recommendations to its original recommendations. On February 3, 2005, Commission staff participated in a Section 10(j) teleconference with representatives from Interior, CDFG, the FS, SWRCB, Plumas County, and PG&E in an attempt to resolve the preliminary determinations of inconsistency with the FPA of the remaining seven of Interior's Section 10(j) recommendations. During the teleconference we resolved three of the potential inconsistencies, partially resolved two others, and two potential inconsistencies remained unresolved. Our summary of the teleconference was issued on March 22, 2005. Subsequent to the teleconference, we resolved two of the remaining inconsistencies, including one that was partially resolved during the teleconference. Two potential inconsistencies remain unresolved, including one that we initially considered partially resolved following the teleconference.

NOAA Fisheries submitted three Section 10(j) recommendations on November 26, 2003, that were contingent on the provision of passage for anadromous fish at one or more unspecified dams below the project area. These recommendations included (1) evaluating and monitoring any fishways prescribed at the UNFFR Project to meet the criteria specified by NOAA Fisheries in "Fish Screening for Anadromous Salmonids" and other specifications as necessary to provide for the safe, timely, and effective passage of anadromous fishes; (2) moderation of the ramping rate after anadromous fish have been reintroduced to the project area, so as not to produce a significant effect on anadromous fishes, their habitat, or their forage; and (3) provision for a fish water release device at the Butt Valley dam, in order to provide sufficient flow to enable the safe, timely, and effective passage of adult anadromous fishes upstream, and kelt and juvenile anadromous fishes downstream. Because the nature, location, and timing of potential future passage facilities for anadromous fish was not specified for any of the dams below the project area, it was not possible to evaluate NOAA Fisheries' original Section 10(j) recommendations in our draft EIS.

On March 11, 2005, NOAA Fisheries filed two "modified" Section 10(j) recommendations as replacement for its original three recommendations. These include a gravel enhancement plan and compensation for past mining activities. We analyze these recommendations in section 3.3.2.2, *Aquatic Resources*, of this final EIS, and, as discussed below, have adopted the gravel enhancement plan and found the mining compensation to be outside of the scope of Section 10(j). The timing and validity of these "modified" 10(j) recommendations will be discussed in the license order.

Table 5-1 summarizes recommendations from Interior and NOAA Fisheries, our conclusions on whether or not the recommendations are appropriate Section 10(j)

measures, and whether or not we adopt the recommendations. For its 10(j) recommendations, CDFG submitted a copy of the draft SA. Because CDFG is a party to the SA, we include its 10(j) recommendations in our recommended alternative and do not show them separately in table 5-1. We consider recommendations outside the scope of Section 10(j) under Section 10(a) and address them in other sections of this EIS.

Table 5-1. Fish and wildlife agency recommendations for the Upper North Fork Feather River Project. (Source: Staff)

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Conclusion
1. Instream flow schedules for the Belden and Seneca bypassed reaches and lower Butt Creek (Interior 10(j) recommendation no. 1)	Interior	Yes	$4,153,200	Not adopted; our recommended flow schedules provide similar results that (1) increase adult rainbow trout, spawning rainbow trout, and adult Sacramento sucker habitat suitability; (2) maintain juvenile rainbow trout habitat suitability near existing levels; and (3) maintain suitable water temperatures within both bypassed reaches for rainbow trout and Sacramento sucker.
2. Make pulse flow releases below Canyon dam and Belden forebay dam (Interior 10(j) recommendation no. 2)	Interior	Yes	$415,900	Not adopted; adopted Interior's alternative recommendation (see item 2A in this table).
2A. Provide a pulse flow of 700 cfs below Canyon dam and Belden forebay dam in March of dry years, unless water temperature exceeds 10°C for two consecutive days in March (Interior alternative 10(j) recommendation no. 2)	Interior	Yes	$10,900	Adopted

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Conclusion
3. Within 6 months of license issuance, develop a lower Butt Creek pulse flow plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 3)	Interior	Yes	$2,900	Resolved; we did not adopt the original recommendation but Interior agrees that implementing staff's aquatic monitoring plan for the Seneca and Belden reaches resolves the issue.
4. Maintain minimum water surface elevations in Lake Almanor (Interior 10(j) recommendation no.4)	Interior	Yes	$1,527,500	Adopted
5. Within 6 months of license issuance, develop a water temperature management plan, fund and construct a modified Prattville intake, and fund other structure(s) to satisfy appropriate water temperature criteria beyond that provided by the Coldwater Habitat and Fishery Mitigation and Enhancement Fund under the relicensing SA for the Rock Creek-Cresta Project (Interior 10(j) recommendation no. 5)	Interior	Yes	$7,293,200	Not adopted; Interior provided a modified recommendation (see item 5A in this table).

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Conclusion
5A. Within 6 months of license issuance, develop a water temperature management plan for the project's bypassed reaches and reservoirs in consultation with the FWS, FS, CDFG, and SWRCB, and provide funding beyond the Rock Creek-Cresta Project's Coldwater Habitat and Fishery Enhancement Fund for coldwater temperature control measures (Interior modified 10(j) recommendation no. 5)	Interior	Yes	$7,293,200	Not adopted; but we do recommend a temperature monitoring plan. Also, components of Interior's recommended plan are addressed by the FERC-approved water temperature monitoring plan for the Rock Creek-Cresta Project, and recommended by staff in the event that monitoring of UNFFR Project sites is reduced or terminated under the Rock Creek-Cresta Project license.
6. Within 6 months of license issuance, develop a geomorphological monitoring plan for the project's bypassed reaches in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 6)	Interior	Yes	$13,800	Not adopted; adopted Interior's alternative recommendation (see item 6A in this table).
6A. Conduct geomorphological monitoring once during the license term (approximately mid-term) (Interior alternative 10(j) recommendation no. 6)	Interior	Yes	$1,800	Adopted; we have also recommended gravel monitoring.
7. Within 6 months of license issuance, develop a vegetation management plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 7)	Interior	Yes	$19,500	Adopted; also includes development of an invasive weed management plan.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Conclusion
8. Within 6 months of license issuance, develop a coarse sediment management plan in consultation with the FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 8)	Interior	Yes	$2,900	Resolved; we did not adopt the original recommendation but Interior agrees that clarifying and implementing staff's gravel monitoring plan resolves the issue.
9. Within 6 months of license issuance, develop a woody debris management plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 9)	Interior	Yes	$8,800	Adopted
10. Within 6 months of license issuance, develop a fish monitoring plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 10)	Interior	Yes	$24,700	Resolved; we did not adopt the original recommendation but Interior agrees that implementing staff's aquatic monitoring plan for the Seneca and Belden reaches resolves the issue.
11. Within 6 months of license issuance, develop a macroinvertebrate monitoring plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 11)	Interior	Yes	$11,300	Resolved; we did not adopt the original recommendation but Interior agrees that implementing staff's aquatic monitoring plan for the Seneca and Belden reaches resolves the issue.
12. Within 6 months of license issuance, develop an amphibian monitoring plan for the Belden and Seneca reaches in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 12)	Interior	Yes	$8,600	Adopted; however, we recommend the plan be developed within 1 year of license issuance.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Conclusion
13. Periodically review studies to ensure adaptive management to identify need to adjust flows or storage to achieve identified resource goals and objectives (Interior 10(j) recommendation no. 13)	Interior	Yes	$3,100	Adopted; however we recommend the reviews to occur every 5 years during the term of the license.
14. Within 6 months of license issuance, develop a recreational activities monitoring plan in consultation with FWS, NPS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 14)	Interior	Yes	$28,000	Adopted
15. Ensure endangered species compliance by complying with the terms and conditions required in any biological opinion issued for the project pursuant to Section 7 of the ESA (Interior 10(j) recommendation no. 15)	Interior	No. Not a specific measure to protect fish and wildlife.	$1,400	Partially adopted; condition 1.b of Interior's biological opinion requires any new owners of lands in the project area previously owned by PG&E to agree in writing to abide by the terms and conditions of the biological opinion. The Commission could not impose or enforce any conditions on land that may be removed from the project boundary, so we cannot include this condition in the license.
16. Within 6 months of license issuance, develop an interagency bald eagle management plan in consultation with FWS, the FS, and CDFG (Interior 10(j) recommendation no. 16)	Interior	Yes	$106,200	Adopted; combined with 10(j) recommendation no. 17.

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Conclusion
17. Develop a bald eagle monitoring plan in consultation with FWS, the FS, and CDFG (Interior 10(j) recommendation no. 17)	Interior	Yes	$0 (Cost is included in Interior's 10(j) recommendation no. 16)	Adopted, recommended as part of the interagency bald eagle management plan.
18. Develop a peregrine falcon monitoring plan in consultation with FWS, the FS, and CDFG (Interior 10(j) recommendation no. 18)	Interior	Yes	$5,100	Adopted; could be incorporated as part of the interagency bald eagle management plan.
19. Develop an erosion control plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 19)	Interior	Yes	$3,600	Resolved; we did not adopt the original recommendation but Interior agrees that finalizing and/or implementing the spoil disposal plan, recreational resource management plan, and road maintenance agreement between PG&E and Plumas National Forest, and the annual meeting on land management issues resolve the issue.
20. Develop a ramping rate plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 20)	Interior	Yes	$2,900	Resolved; we did not adopt the original recommendation but Interior agrees that implementing staff's recommended ramping rates resolves the issue.
21. Develop a wildlife monitoring plan in consultation with FWS, the FS, CDFG, and SWRCB (Interior 10(j) recommendation no. 21)	Interior	Yes	$26,500	Not adopted; adopted Interior's alternative recommendation (see item 21A in this table).

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Conclusion
21A. Develop a wildlife management plan including additional monitoring of wading bird habitat in the causeway area (Interior alternative 10(j) recommendation no. 21)	Interior	Yes	$7,900	Adopted
22. Delay implementation of recreational flow releases for a period of 6 years to allow the riverine aquatic biota to respond to new minimum and pulse flow schedules (Interior Section 10(j) recommendation no. 22)	Interior	Yes	$12,000	Adopted
23. Develop and implement a gravel enhancement plan that determines the amount of gravel necessary to fully seed the Seneca reach with anadromous fish (NOAA Fisheries 10(j) recommendation no. 1)	NOAA	Yes	$2,900	Adopted; gravel monitoring and gravel supplementation contingency actions are already provided for in the SA and in our recommendations for PM&E measures in the Seneca reach.
24. Provide suitable compensation to partially offset impacts on anadromous fish caused by past mining activities in the project area (NOAA Fisheries 10(j) recommendation no. 2)	NOAA	No	--	Not adopted; not a specific measure for the protection, mitigation, and enhancement of fish and wildlife resources, no nexus between project operation and mining, also outside the scope of the FPA.

In the draft EIS, we did not adopt Interior's recommended instream flow schedules (Interior 10(j) recommendation no. 1) for the Belden and Seneca bypassed reaches. Interior recommended variable releases that range from 60 to 170 cfs into the Seneca reach from Canyon dam, and variable releases that range from 100 to 250 cfs into the Belden reach from the Belden dam. However, we recommended the minimum flow regime proposed in the SA and endorsed by CDFG, which calls for variable releases that range from 60 to 150 cfs into the Seneca reach from Canyon dam, and variable releases that range from 75 to 235 cfs into the Belden reach from the Belden dam. Providing the

minimum flow regimes in the Seneca and Belden reaches, under the existing Prattville intake configuration, as PG&E proposes in the SA would (1) maintain rainbow trout juvenile habitat suitability near or at existing high levels; (2) improve adult and spawning rainbow trout and adult Sacramento sucker habitat suitability; (3) maintain significant macroinvertebrate habitat suitability; (4) maintain suitable water temperatures within both reaches for rainbow trout and Sacramento sucker; and (5) maintain water temperatures in the Belden reach that are within the preferred range of hardhead. Interior's recommended flow regime provides somewhat higher flows during certain seasons for different water year types but does not provide for a substantial increase in habitat suitability for the evaluated species' life stages over the flow regime recommended in the SA. We considered the environmental benefit not to be worth the associated incremental annualized cost of $469,000 associated with implementing Interior's measure over our recommended measure. We therefore made a preliminary determination that this measure may be inconsistent with the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

We participated in a teleconference with Interior, CDFG, the FS, SWRCB, Plumas County, and PG&E on February 3, 2005, in an effort to resolve our preliminary findings of inconsistency pursuant to the provisions of Section 10(j)(2) of the FPA. We discussed Interior's recommended minimum instream flow, and Interior described the likely ecologic, geomorphic, and sedimentologic benefits it believed would occur due to increased flow to the bypassed reaches. It was Interior's opinion that certain benefits, including increased habitat for adult rainbow trout, increased movement of substrates, and activation of floodplain surfaces, would be substantially enhanced by the implementation of its flow recommendations. We mentioned that benefits to the aquatic system would occur as a result of either proposed flow regime, and that it was questionable as to whether the increase in water as recommended by Interior would result in a substantial increase in overall aquatic benefit. Flows recommended in the SA would more than double the current amount of habitat available for adult trout during the spring and high-flow events of wet/normal years, thus providing a substantial benefit to the trout fishery.

Following the teleconference, we conducted additional analyses and concluded that the flows proposed in our recommendation would provide similar benefits to the aquatic environment as compared to baseline conditions, and that the incremental increase of habitat for adult rainbow trout that would result from Interior's recommendation would be at the expense of juvenile trout macroinvertebrate community diversity. The flow regime recommended by Interior, though providing higher flows during certain seasons for different water year types, would likely not provide a substantial increase in overall ecosystem benefit as compared to the minimum flow schedule proposed in the SA. This potential inconsistency remains unresolved.

In the draft EIS, we did not adopt Interior's recommendation for pulse flow releases below Canyon dam and Belden forebay dam (Interior 10(j) recommendation no. 2). Interior recommended one release per month in January, February, and March of 1,500 cfs in wet years, one release per month in January, February, and March of 1,200 cfs in normal years, one release in March of 700 cfs in dry years, only if no other pulse was released in January or February, and no pulse flows in critically dry years. Our review of existing flow information for the 31 water years extending from 1970 through 2001 indicates that, in the Seneca and Belden reaches, peak flows exceeded 1,000 cfs in 9 years and 1 year, respectively. We recommended the pulse flows proposed in the SA: in wet years, one release per month in January (675 cfs), February (1,200 cfs), and March (1,200 cfs); in normal years, one release per month in January (675 cfs), February (1,000 cfs), and March (1,000 cfs); and no pulse flows in dry or critically dry years.

Our analysis of the sediment incipient motion study and geomorphic study concluded that the Interior-recommended pulse flows, though of greater magnitude, would not provide a significant increase in entrainment or relocation of substrates over that which would occur under the pulse flow schedule proposed by PG&E in the SA. The greater magnitude flows recommended by Interior would have the potential to move gravel out of the reaches at a rate greater than recruitment. Although transport of some gravel up to 15 mm in diameter would be achieved in the Seneca and Belden reaches during dry water years under Interior's pulse flow regime, such a flow release would be ineffective in mobilizing most spawning gravels within the reaches. The annualized cost of implementing Interior's recommended pulse flow releases in the Seneca reach would be $102,900 more than our recommended measure, and the annualized cost of implementing Interior's recommended pulse flow releases in the Belden reach would be $36,800 more than our recommended measure. We therefore made a preliminary determination that this measure may be inconsistent with the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

During the Section 10(j) teleconference, Interior expressed its concern with the potential for consecutive years without any pulse flows in project reaches and cautioned us that if insufficient frequency of spring pulse flow is allowed for benefits to the ecosystem, there may be potential for a negative impact on organisms and ecosystem processes that rely on such pulse flows. Interior also expressed its desire to see a pulse flow of some magnitude in dry years, especially since the draft EIS and SA allow for recreation flows in dry and critically dry years. Interior provided an alternative to its original 10(j) recommendation, which provides for a pulse flow of 700 cfs in March of dry years, but qualifies that no pulse flow would occur if water temperature exceeded 10°C for two consecutive days in March. The annualized cost of implementing Interior's alternative recommended pulse flow releases in the Seneca reach would be $7,600 more than our recommended measure, and the annualized cost of implementing Interior's recommended pulse flow releases in the Belden reach would be $3,300 more than our

recommended measure. We further considered Interior's recommendation and, based on additional analysis, determined that a pulse flow of 700 cfs as recommended by Interior would be beneficial to aquatic resources. We consider this inconsistency resolved with Interior's alternative recommendation because the cost is more commensurate with the benefit to the resources.

In the draft EIS, we did not adopt Interior's recommendation for a pulse flow plan for lower Butt Creek (Interior 10(j) recommendation no. 3). Existing flows within lower Butt Creek exceed 10 cfs 90 percent of the time for all months. Therefore, current flows are sufficient to flush fines from larger substrates and transport gravels within the creek. Recent fishery, mollusc, habitat mapping, and IFIM studies conducted in lower Butt Creek document high quality coldwater habitat that does not show any sign of impairment or a need for pulse flows. Pulse flow releases, even on a trial basis, have the potential to result in adverse effects, and given the existing high quality habitat for aquatic biota, there is no need to evaluate pulse flow releases in lower Butt Creek. We estimate that implementation of Interior's plan could cost $2,900 a year. We consider it more appropriate to conduct periodic monitoring of habitat to determine if such flows are needed to maintain or improve the quality of the habitat within the creek. We recommend an aquatic monitoring plan to monitor and assess aquatic habitat quality in lower Butt Creek between Butt Valley dam and its confluence with the NFFR. Monitoring of habitat quality would occur at intervals of 3 to 5 years, depending on water year type and other appropriate factors. If the monitoring results conclude that habitat quality has degraded, PG&E, in consultation with CDFG, SWRCB, the FS, and FWS, would initiate a pulse flow program if it is concluded such a flow would provide a significant benefit. We estimated the cost of implementing our recommended aquatic monitoring plan would be $7,200. We therefore made a preliminary determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

During the Section 10(j) teleconference on February 3, 2005, Interior agreed that the actions called for in our recommendation would be acceptable as long as adaptive management remains a viable and attainable component of the proposal. PG&E described the problems associated with providing pulse flows since Butt Valley dam has no low-level outlet and, at present, the only way to release pulse flows would be through the spillway. We evaluated the estimated cost and feasibility for a siphon system, weighed those costs against the expected benefits of a pulse flow in lower Butt Creek, and determined that the installation of a siphon system to provide future pulse flows is not warranted at this time. In addition to the excessive costs of initiating a siphon system, the timing of releases is problematic because water levels are likely not sufficient in March to release a pulse flow. Therefore, we decided that our original aquatic monitoring plan is sufficient, and we consider this inconsistency resolved.

In the draft EIS, we did not adopt Interior's recommendation to develop a water temperature management plan, fund and construct a modified Prattville intake, and fund other structure(s) to satisfy appropriate water temperature criteria beyond that provided by the Coldwater Habitat and Fishery Mitigation and Enhancement Fund under the relicensing SA for the Rock Creek-Cresta Project (Interior preliminary 10(j) recommendation no. 5). In addition, Interior specified that PG&E should develop appropriate additional temperature criteria by season, reach, and outlet location to avoid unintended adverse effects of sublethal temperature stress on aquatic biota as a result of structures or operations that involve planned surface water release discharge, and that these criteria be included in the water temperature management plan. In accordance with the Rock Creek-Cresta Project SA, PG&E is required to evaluate and potentially modify the Prattville intake and implement other options for using the coldwater supply in Lake Almanor and Butt Valley reservoir to attain cooler temperatures in the NFFR downstream of the Caribou developments.

Modification and implementation of the Prattville intake and/or implementation of measures for the Rock Creek-Cresta Project along with altering operations of the UNFFR Project under any new license could substantially alter the thermal regimes of Lake Almanor, Butt Valley reservoir, and the NFFR downstream of the Caribou developments. Prior to issuance of the draft EIS, however, PG&E and the ERC had not completed studies to determine the feasibility of modifying the Prattville intake to provide cooler water to downstream reaches, and the cost, benefits, and effects (both beneficial and adverse) of modifying the Prattville intake were unknown. By continuing to implement its water temperature monitoring plan for the Rock Creek-Cresta Project, PG&E would continuously monitor summer water temperatures at 25 stations within the UNFFR Project area and monitor summer vertical profiles in Lake Almanor and Butt Valley reservoir. We concluded that continued implementation of the water temperature monitoring plan would provide a thorough assessment of the thermal conditions in the reservoirs and project-affected reaches. We therefore made a preliminary determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

During our 10(j) teleconference on February 3, 2005, we noted that on December 17, 2004, we issued an AIR to PG&E to obtain reports on the studies it has conducted to investigate the feasibility of providing cooler water to the reaches downstream of the project. PG&E stated that it has evaluated 23 alternatives to accomplish this goal, and filed several reports in its January 13, 2005, response to the AIR. On July 29, 2005, PG&E filed a report, which it amended on September 21, 2005, with the Commission for the Rock Creek-Cresta Project that summarizes the results of its investigation of 24 potential alternatives that it evaluated to provide cold water to NFFR reaches (PG&E, 2005b). PG&E also issued a news release in November 2004 stating that it does not currently anticipate recommending a floating curtain for the Prattville intake. PG&E and

the ERC are continuing to evaluate alternatives to provide cooler water to the reaches downstream of the project with the 2105 Collaborative group. Interior modified its 10(j) recommendation for the water temperature plan by recommending that PG&E establish a process to develop appropriate water temperature criteria for the Seneca and Belden reaches instead of developing the criteria, and changing its specific recommendation for modifying the Prattville intake to a more general recommendation to fund construction/modification of structure(s) to satisfy appropriate water temperature criteria beyond that required by the Coldwater Habitat and Fishery Mitigation Fund under the Rock Creek-Cresta Project SA.

In this EIS, we evaluate potential measures to control water temperature in the NFFR with the objective of providing daily mean water temperatures of less than 20°C, along with potential measures to address water quality and odors in the Seneca reach. Due to the extreme ecological, social, and economical costs associated with modifying the Prattville intake to provide cooler water to downstream reaches, we do not recommend that measure. We recommend monitoring water temperature for the first 3 years of any new license period. This potential inconsistency remains unresolved.

In the draft EIS, we did not adopt Interior's recommendations to develop a geomorphological monitoring plan (Interior 10(j) recommendation no. 6) and a coarse sediment management plan (Interior 10(j) recommendation no. 8) for the project's bypassed reaches. In its geomorphological monitoring plan, Interior recommended that PG&E monitor streambed cross-sections, longitudinal profiles, and overall channel dynamics, including mesohabitat dimensions, distribution, and net channel changes in years 1, 5, 10, and 20 of the license. Interior's coarse sediment management plan includes (a) a program for monitoring spawning gravel quantity and quality, (b) contingency actions for improving the quality and availability of such gravels, (c) triggers for the implementation of contingency actions, and (d) a special study of pulse flows. In place of Interior's two recommendations focusing on physical aquatic habitat, we recommended the gravel monitoring plan proposed by PG&E in the SA, which would allow PG&E to monitor the movement of coarse sediment that occurs in the Belden and Seneca reaches during scheduled pulse flow events and other flows of similar magnitude. The emphasis of this plan is on spawning-sized gravel, although it is expected that information on smaller and larger sized materials also would be gathered. Interior's recommended coarse sediment management plan includes a special study to evaluate the effects of pulse flows on sediment transport and gravel recruitment; the gravel monitoring plan that we recommend does not. The gravel monitoring plan would be filed with the Commission for approval before implementation. If, after review of the data collected through gravel monitoring efforts, the FS, CDFG, FWS, and SWRCB determine that the pulse flow schedule could be improved to enhance the availability and distribution of spawning-sized gravel or enhance riparian function, the agencies may propose revisions to the magnitude, duration, or frequency of pulse flows.

The approximated minimum discharge needed to mobilize the median bed material from representative sites in both the Seneca and Belden reaches would be 1,600 to 3,600 cfs. Our review of existing flow information for the 31 water years extending from 1970 through 2001 indicates that, in the Seneca and Belden reaches, peak flows exceeded 1,000 cfs in 9 years and 1 year, respectively. Based on the presence of established mature vegetation on mid-channel bars at several of the study transects that were able to survive the 1997 floods of 2,160 cfs in the Seneca reach and 3,500 cfs in the Belden reach, it is likely that it would take flows of even greater magnitudes to modify mid-channel bars and to alter the mature vegetation present on these mid-channel bars.

Given the magnitude of our recommended pulse flows and the particle size they would mobilize, large-scale changes in geomorphology of the reaches would likely not occur and therefore Interior's geomorphological monitoring plan would not be warranted. We recommend that, following implementation of a pulse flow regime, gravel should be monitored to assess whether the redistribution of gravel is resulting in the expected benefits to trout spawning habitat to ensure that the effectiveness of the pulse flows can be assessed. If the amount of gravel transported out of either the Seneca or Belden reaches is greater than the amount of gravel that enters the reaches from the material known to be available for transport adjacent to each reach, pulse releases could result in a decrease in trout spawning habitat. Monitoring of gravel at representative locations in both reaches would provide data to assess whether unintended consequences from pulse flows are occurring and quantify the actual benefits of pulse flow releases, and, enable contingency actions to be developed and implemented, if needed. The gravel monitoring plan would include provisions for adjusting pulse flows to lesser magnitude or less frequent releases if the expected benefits are not being realized, or unexpected adverse effects are documented. We estimated the cost of implementing our recommended gravel monitoring plan would be $9,500 annually, $7,200 less than the annual estimated cost of Interior's plans for monitoring geomorphology and coarse sediment. We therefore made a preliminary determination that these measures may be inconsistent with the substantial evidence standard of Section 313(b) and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

During the teleconference and in letters filed with the Commission on October 27, 2004, and November 1, 2004, Interior indicated that, while it prefers its original recommendation, as an alternative, it would be satisfied with geomorphological monitoring once during the license term (approximately mid-term) instead of four times (in years 1, 5, 10, and 20) as it originally recommended. However, Interior would like to see standard monitoring conducted, including longitudinal profiling and mesohabitat measurements, as well as monitoring changes resulting from the modified minimum flow schedule or pulse flows, changes resulting from vegetation encroachment (or lack of), and cumulative effects due to the project or other large-scale events. We agree that Interior's current alternative to its original recommendation provides a reasonable compromise with an annualized cost of $1,800. We modified the recommended

alternative in section 5.1.1 of this final EIS accordingly and consider this inconsistency resolved.

During the teleconference, Interior indicated that it would be agreeable to the gravel monitoring plan as recommended in the draft EIS in place of its coarse sediment management plan if contingency actions (e.g., gravel supplementation) are more clearly defined in the final EIS. We agreed to do this, revised our recommended alternative in section 5.2.1 of this final EIS accordingly, and consider this inconsistency resolved.

In the draft EIS, we did not adopt Interior's recommendations to develop a fish monitoring plan (Interior 10(j) recommendation no. 10) and a macroinvertebrate monitoring plan (Interior 10(j) recommendation no. 11) for the project. Although we agree that such monitoring is needed to acquire data to document the response of the aquatic community (fish and macroinvertebrate populations) to a new flow regime specified in a new license, we did not agree with Interior's original 10(j) recommendation to monitor fish populations in years 1-3, 8-10, 15, 20, and 25. Instead, we recommend that PG&E begin monitoring of fish populations during years 4 and 5. After this 2-year monitoring period, we recommend a reduction in survey frequency to every fifth year, which is consistent with Interior's recommendations, and would allow for the evaluation of long-term responses to measures implemented in the new license and to any subsequent modifications that are made. Our recommended monitoring for macroinvertebrates is only marginally different than that recommended by Interior, which specified that macroinvertebrate populations be monitored at the onset of the license issuance and at 5-year intervals thereafter. Monitoring activities for both fish and macroinvertebrates should occur during the same years to allow for uniform sampling procedures and data comparison. Macroinvertebrate sampling and electrofishing surveys for fish would be coordinated in a manner that would reduce the likelihood of compromising either study. For example, macroinvertebrate sampling would be conducted prior to the implementation of electrofishing surveys or in areas that are geographically isolated from electrofishing surveys.

Adequate baseline data about fish populations in the Seneca and Belden reaches does exist and provides a reference for comparison with future monitoring results. The implementation of a new flow regime in the bypassed reaches would likely cause a state of flux within the aquatic community during the initial 2 to 3 years of the new license, as populations would have not yet adapted to the new flow regimes. Consequently, sampling during that time would likely not provide an accurate assessment of the effects of any newly instituted measures. We therefore made a preliminary determination that the monitoring schedule for fish populations made by Interior may be inconsistent with the substantial evidence standard of Section 313(b) of the FPA. In its response to the Commission's Section 10(j) preliminary determinations of inconsistency filed November 1, 2004, and during the Section 10(j) teleconference held on February 3, 2005, Interior agreed that the aquatic monitoring plan in the bypassed reaches as we recommend is

satisfactory and meets the goals of its Section 10(j) recommendation nos. 10 and 11. Therefore, we consider both of these inconsistencies resolved.

In the draft EIS, we did not adopt Interior's recommendation to develop an erosion control plan for the project (Interior 10(j) recommendation no. 19), although we recognize the need to address erosion at the UNFFR Project. PG&E's ground-disturbing activities, and its use and management of a roadway system that is necessary to maintain and operate the project, may result in erosion and subsequent degradation of water quality. However, we believe that PG&E is adequately addressing erosion control through other plans already in place, or that are proposed.

In 1998, PG&E and the Plumas National Forest entered into a road maintenance agreement that includes provisions for preventing and correcting erosion to the roads and adjacent lands. We recommend that PG&E continue to implement this road maintenance agreement only for roads within the project boundary. We also recommend the finalization of the RRMP, which includes a recreation facilities program. In the RRMP, erosion control will be addressed in site-specific design for any recommended new recreational facilities. We also recommend the development of a spoil disposal plan which would limit the potential for existing and new spoil piles to erode. We therefore made a preliminary determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA. In its response to the Commission's Section 10(j) preliminary determinations of inconsistency filed November 1, 2004, Interior indicated that the road maintenance agreement, finalization of the RRMP, the SA measure to meet annually on land management issues, additional spoil disposal measures, and the need to consult with Interior on various proposed plans constituted an acceptable alternative to its recommendation. Therefore, we consider this inconsistency resolved.

In the draft EIS, we did not adopt Interior's recommendation to develop a ramping rate plan for the project (Interior 10(j) recommendation no. 20). We agree with Interior's premise that gradual ramping (either up or down) of flows to the Seneca and Belden bypassed reaches would be much more preferable than a non-ramping situation because the impacts associated with not ramping on non-mobile and low-mobility organisms (fish larvae, molluscs, macroinvertebrates) would be minimized. Therefore, in lieu of plan development, we recommend the basic ramping rates proposed in the SA, and endorsed by the CDFG, of 0.5 foot per hour in all months as measured immediately downstream of the dams (gaging stations NF-2 and NF-70, respectively). The recommended ramping rates for releases from Canyon and Belden dams would allow organisms in the Seneca and Belden reaches to more effectively relocate to suitable habitat as flows are adjusted. We also recommend block loading of the Belden powerhouse, which would assist PG&E with compliance with its required ramping rates at the downstream Rock Creek and Cresta dams that were developed to allow the aquatic organisms in the Rock Creek and

Cresta bypassed reaches to experience flow changes that would be similar to those occurring in the unregulated EBNFFR. We therefore made a preliminary determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA. In its response to the Commission's Section 10(j) preliminary determinations of inconsistency filed November 1, 2004, Interior indicated that the provisions included in the SA, which the Commission adopted, were an acceptable alternative to its recommended ramping rate. Therefore, we consider this inconsistency resolved.

In the draft EIS, we did not adopt Interior's recommendation to develop a wildlife monitoring plan for the project (Interior 10(j) recommendation no. 21). Interior recommended a plan that would provide for evaluation of changes in wildlife use in response to changes in flows, lake levels, implementation of the vegetation management plan and other activities associated with project operations and required license conditions. Instead, we recommended a variety of other plans that would address Interior's concerns: a vegetation and noxious weed management plan, a wildlife enhancement plan, an amphibian monitoring plan, a threatened, endangered, proposed for listing and sensitive species plan, a peregrine falcon monitoring plan, and an interagency bald eagle management plan. We therefore made a preliminary determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

In its letter filed with the Commission on November 1, 2004, Interior revised its initial recommendation to wildlife monitoring focusing on changes in habitat types and avian surveys for PG&E-owned lands as specified by the FS in its preliminary Section 4(e) condition no. 37. During the teleconference, Interior further refined its recommendation to a more focused request for wildlife studies specific to the causeway area (between Last Chance Creek Campground and the Chester Airport). Interior explained that this area is sensitive to water levels and under the new license water levels will be slightly higher and less variable. The causeway area is important for wading birds and waterbirds, and Interior believes a focused study here would be appropriate. Interior points out that this area is approximately the same area specified by the FS in its final 4(e) recommendation no. 31: "lands owned by the licensee on the shoreline of Lake Almanor from Last Chance Campground westward to approximately the northern edge of the flood control channel south of the Chester Airport." PG&E explained that the project has been operating at the same water levels (which are consistent with the SA) for the past 5 years and does not think the water level regime will markedly change post-licensing. When asked about the value of this monitoring, Interior responded that it would establish relationships of water level to wildlife habitat and use, and may assist adaptive management of water level outside of the operating target dates (after Labor Day). Although the response of individual resources would be monitored in a number of

resource-specific plans, as provided in the SA, we believe it would be beneficial to have a broader plan to guide the interpretation of monitoring results and consideration of potential effects on all resources, if any measures are adjusted via adaptive management. We agreed that the wildlife management plan should include the additional monitoring recommended by Interior and that the need for future actions based on the results of studies would best be addressed through the adaptive management plan. We consider this inconsistency resolved.

In its letter to the Commission filed November 1, 2004, and during the Section 10(j) teleconference held on February 3, 2005, Interior recommended implementing a 6-year waiting period following license issuance before the release of flows for recreational purposes (Interior 10(j) recommendation no. 22). Interior's primary concern is to allow the biological communities in the bypassed reaches to respond to the new flow regime. Interior also expressed concern that biological, geomorphic, and sedimentological monitoring of responses to the new flow regime would likely be confounded by the release of recreational pulse flows in the initial 5 years after license issuance. PG&E stated that the boating groups are opposed to a delay in implementing recreational flows. Interior stressed that it is not opposed to completing the recreational flow study and notes that the NPS has supported whitewater recreation flows at other projects. Interior believes temporarily delaying implementation of the recreational flow study, as proposed, would only result in a small reduction in recreational benefits while allowing the biotic community to adjust to the revised instream flow regime. It believes this delay would allow effects of the revised instream flows to be distinguished from the effects of summer recreational flows. PG&E stated it did not believe that it would be possible to discern the response of the biotic community to the instream flow regime from natural variation. Interior believes the new flow regime would result in significant responses and potential changes to the biotic community, and emphasized the need to exercise caution in light of studies showing recreational flow disruption of macroinvertebrates, including those for the Rock Creek-Cresta Project license. We agreed with Interior's recommendation that postponing recreational flows would allow a better assessment of the effects of the new license conditions. Following the teleconference, we conducted additional analysis and concluded that a delay in implementation of the recreational boating flows would benefit the aquatic community, with no substantial effect on the recreational boaters.

We adopted NOAA Fisheries' 10(j) recommendation no. 1 to develop and implement a gravel enhancement plan for the Seneca reach. The gravel monitoring plan that we recommend, as developed in the SA, would allow for evaluation of the sediment budget in the Seneca reach. Our recommendation calls for the development of specific gravel supplementation contingency actions to be identified by PG&E if deemed necessary by FWS, the FS, CDFG, and SWRCB, after review of study results. If Central Valley spring-run Chinook salmon and Central Valley steelhead are introduced into UNNFR project waters, we recommend that PG&E modify the gravel and coarse-sediment management plans to incorporate the substrate requirements of these species.

We encourage NOAA Fisheries to review the results of the gravel monitoring plan and study results, and cooperatively work with PG&E to evaluate the condition of gravels and other substrates in the Seneca reach.

We do not adopt NOAA Fisheries' 10(j) recommendation no. 2 to "partially offset impacts to anadromous fish caused by inundation of habitats and minimize adverse effects to the safe, timely, and effective passage of anadromous fishes, by providing suitable compensation from active mining interests in the Seneca Reach or Yellow Creek through conservation easements and the purchase and rehabilitation of sites used for mining operations." Providing "suitable compensation" is outside the scope of Section 10(j) because it is not a specific measure to protect fish and wildlife resources. Further, although NOAA Fisheries contends that the project, by reducing flows, enables mining operations to occur that would otherwise be impeded by unimpaired flows, mining in the watershed predated construction of the project by over 50 years. Consequently, we do not find the argument convincing that there is a nexus between project operation and mining impacts. Accordingly, we consider this measure under Section 10(a) of the FPA and do not recommend it.

5.4 CONSISTENCY WITH COMPREHENSIVE AND OTHER RESOURCE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, and conserving waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed plans that address various resources in California. Seventeen plans address resources relevant to the UNFFR Project:

1. California Advisory Committee on Salmon and Steelhead Trout. 1988. Restoring the balance: 1988 Annual Report. Sausalito, CA.
2. California Department of Fish and Game, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Bureau of Reclamation. 1988. Cooperative agreement to implement actions to benefit winter-run chinook salmon in the Sacramento River basin. Sacramento, CA. May 20. 10 pp. and exhibit.
3. California Department of Fish and Game. 1990. Central Valley salmon and steelhead restoration and enhancement plan. Sacramento, CA. April. 115 pp.
4. California Department of Fish and Game. 1993. Restoring Central Valley streams: a plan for action. Sacramento, CA. November. 129 pp.
5. California Department of Fish and Game. 1996. Steelhead restoration and management plan for California. February. 234 pp.

6. California–The Resources Agency. 1989. Upper Sacramento River fisheries and riparian habitat management plan. Sacramento, CA. January. 158 pp.

7. California Department of Parks and Recreation. 1998. Public opinions and attitudes on outdoor recreation in California. Sacramento, CA. March.

8. California Department of Parks and Recreation. 1994. California outdoor recreation plan–1993. Sacramento, CA. April. 154 pp. and appendices.

9. California Department of Water Resources. 1983. The California water plan: projected use and available water supplies to 2010. Bulletin 160-83. Sacramento, CA. December. 268 pp. and attachments.

10. California Department of Water Resources. 1994. California water plan update. Bulletin 160-93. Sacramento, CA. October. Two volumes and executive summary.

11. State Water Resources Control Board. 1999. Water quality control plans and policies. Adopted as part of the State Comprehensive Plan. Three enclosures.

12. Forest Service. 1988. Plumas National Forest Land and Resource Management Plan. Department of Agriculture, Quincy, CA. August 26. 342 pp. and appendices.

13. Forest Service. 1992. Lassen National Forest Land and Resource Management Plan, including Record of Decision. Department of Agriculture, Susanville, CA. Appendices and maps.

14. Forest Service. 2004. Sierra Nevada forest plan amendment, including final environmental impact statement and Record of Decision. Department of Agriculture, Vallejo, CA. January.

15. Fish and Wildlife Service. California Department of Fish and Game. California Waterfowl Association. Ducks Unlimited. 1990. Central Valley habitat joint venture implementation plan: a component of the North American waterfowl management plan. U.S. Department of the Interior, Portland, OR. February. 102 pp.

16. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. U.S. Department of the Interior. Environment Canada. May. 19 pp.

17. Fish and Wildlife Service. Undated. Fisheries U.S.A: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, DC. 11 pp.

18. National Park Service. 1982. The nationwide rivers inventory. U.S. Department of the Interior. Washington, DC. January. 432 pp.

No conflicts were found with these plans.

5.5 RELATIONSHIP OF LICENSE PROCESS TO LAWS AND POLICIES

5.5.1 Water Quality Certification

Section 401 of the Clean Water Act (33 U.S.C. §1341) requires a license applicant to obtain from the state a certification that project discharges will comply with applicable effluent limitations, or waiver of certification. Without a 401 certificate, the project cannot be licensed. On October 9, 2002, PG&E applied to SWRCB for water quality certification (WQC) for the UNFFR Project as required by Section 401 of the Clean Water Act. SWRCB received this request on October 10, 2002. On September 15, 2003, PG&E withdrew and re-filed its request for WQC, and SWRCB received this re-filed request on September 22, 2003. On September 7, 2004, PG&E withdrew and re-filed its request for WQC, and SWRCB received this re-filed request the same day. On August 29, 2005, PG&E withdrew and re-filed its request for WQC, and SWRCB received this re-filed request the same day. SWRCB has not yet taken action on PG&E's request for WQC.

5.5.2 Section 18 of the Federal Power Act—Authority to Require Fishways

Section 18 of the FPA (16 USC §811) states that the Commission shall require the construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Commerce and the Interior may prescribe. By letter dated December 1, 2003, Interior stated that it reserved its authority to prescribe the construction, operation, and maintenance of such fishways as appropriate, including measures to determine, ensure, or improve the effectiveness of such fishways. According to Interior's letter, this reservation includes, but is not limited to, authority to prescribe fishways for rainbow trout, steelhead, spring run Chinook salmon, and any other fish to be managed, enhanced, protected, or restored to the Feather River basin during the term of any license.

By letter dated November 26, 2003, NOAA Fisheries provided a fishway prescription, conditioned on the passage of anadromous fishes at one or more unspecified dams below the project area. Additionally, NOAA Fisheries stated that it reserved its authority to prescribe fishways under Section 18 of the FPA. On March 14, 2005, NOAA Fisheries issued its modified prescription for the UNFFR Project, which prescribes design, construction, and operation of collection facilities for juvenile Central Valley spring-run Chinook and juvenile and adult outmigrant Central Valley steelhead from the Belden forebay and Yellow Creek and design, construction, and operation of facilities for the release of adult Central Valley spring-run Chinook salmon and Central Valley steelhead into the Seneca reach and Yellow Creek. NOAA Fisheries states that its prescription for the UNFFR Project would be integrated with fish passage prescriptions for the downstream Oroville Project (P-2100).

5.5.3 Section 4(e) of the Federal Power Act

Because the project occupies lands of the Lassen and Plumas National Forests, the FS has authority to impose conditions under Section 4(e) of the FPA. The FS provided 50 preliminary Section 4(e) conditions, 26 of which are standard license conditions and 24 of which are project specific conditions (letter from J. Gipsman, Attorney, U.S. Department of Agriculture, Office of the General Counsel, Pacific Region, San Francisco, CA, to the Secretary of the Commission, dated December 1, 2003). The FS provided 47 final Section 4(e) conditions by letter dated November 4, 2004 (letter from J. Rider, Attorney, USDA Office of the General Counsel, Pacific Region, San Francisco, CA, to the Secretary of the Commission, dated November 4, 2004). Many of these conditions are identical to the terms that are specified in the SA.

5.5.4 Endangered Species Act

Section 7 of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or cause the destruction or adverse modification of the critical habitat of such species.

Interior indicates that four endangered, threatened, or candidate species may be found in the UNFFR Project area, or may be expected to occur in the project area over any new license term: bald eagle (*Haliaeetus leucocephalus*), VELB (*Desmocerus californicus dimorphus*), CRLF (*Rana aurora daytoni*), and slender orcutt grass (*Orcuttia tenuis*) (letter from Willie R. Taylor, Director of the Office of Environmental Policy and Compliance, U.S. Department of the Interior, Office of the Secretary, Washington, DC, to the Secretary of the Commission, dated December 1, 2003). The federally threatened bald eagle presently has 14 nesting territories in the UNFFR Project area and vicinity. One elderberry bush, host plant for the federally listed threatened VELB, was found in the project area. The NFFR and selected tributary drainages have been included in the proposed critical habitat Unit 1 for the CRLF and include areas as far upstream as the Butt Creek confluence with the NFFR in the Seneca reach and the upper Mosquito Creek drainage east of Butt Valley reservoir. Suitable habitat for the CRLF exists at some locations in the UNFFR Project area, but no CRLFs were found there. No populations of or suitable habitat for slender orcutt grass exist within the UNFFR Project area.

In its December 1, 2003, letter, Interior also included the American peregrine falcon, which was federally listed until 1999. Interior points out that species that are delisted must be monitored for at least 5 years to determine if the status of the species is continuing to improve.

Our analyses of project effects on these species are presented in section 3.3.4, *Threatened and Endangered Species*, and our final recommendations are presented in section 5.2, *Comprehensive Development and Recommended Alternative*.

We conclude that relicensing the project with our recommended interagency bald eagle management plan would minimize the risk of adverse effects on bald eagles. However, construction of new recreation areas and project-related recreational activities could disturb bald eagles. Proposed changes in reservoir operation or the flow regime (including implementation of higher minimum flows, pulse flows, more restrictive ramping rates, and recreation releases) that affect fish populations or foraging conditions would also have the potential to affect bald eagles. We conclude that it may not be possible to avoid such minor effects and therefore, issuance of a new license is likely to adversely affect the bald eagle. Consequently, we initiated formal consultation with FWS regarding the bald eagle pursuant to Section 7 of the ESA.

Interior issued its biological opinion regarding the bald eagle by letter dated January 25, 2005, stating that the proposed licensing of the project and the cumulative effects are not likely to jeopardize the continued existence of the bald eagle. No critical habitat had been designated or proposed for the bald eagle; therefore, none would be adversely modified or destroyed. The biological opinion included two terms and conditions that state that the project should be implemented as described in the draft EIS and the final FS Section 4(e) conditions and that assurance that any new owners of land in the project area previously owned by PG&E, including holders of conservation easements, would agree in writing to abide by the terms and conditions of the biological opinion. Our recommendations in this final EIS are consistent with one of these terms and conditions. We do not agree that it is necessary for any new owners of project lands to agree in writing to abide by the terms of the biological opinion because there are existing standard conditions in place that ensure that all measures specified in a project license would be complied with regardless of the ownership of the land. For lands that would be outside the project boundary, the Commission has no authority to impose or enforce any conditions.

Given the very low abundance of elderberry shrubs in the project area that are suitable VELB habitat, together with the lack of exit holes in the one known shrub that represents potential habitat, we conclude that issuing a subsequent license for this project with our recommended conditions, is not likely to adversely affect the VELB. We have recommended that PG&E develop a vegetation monitoring plan that includes a plan for the protection and management of VELB habitat, including protection in the area around the known location of the elderberry shrub and pre-activity surveys in areas that would have vegetation clearing or cutting. PG&E would consult with the FS and FWS on protection and management of VELB habitat and ensure that measures identified in the plan (e.g., flagging and protecting elderberry shrubs with stems over 1 inch in diameter) are consistent with the current FWS guidelines.

Our recommended amphibian monitoring plan would include surveys designed to detect the presence of CRLF and determine how potential CRLF habitat is affected by any proposed changes in project operations, including changes in the project flow regime.

The plan would also provide a basis for determination of if and when further protective actions should be taken, after consultation with FWS and other agencies. We conclude that issuing a new license for this project, with our recommended measures, is not likely to adversely affect the CRLF.

Because no slender orcutt grass or suitable habitat for it exists within the UNFFR Project area, we conclude that issuing a new license for this project would have no effect on this plant. We sought concurrence from FWS regarding our conclusion for VELB, CRLF, and slender orcutt grass.

In its biological opinion, Interior stated that it concurs with our determination that the project is not likely to adversely affect the VELB and the CRLF and would have no effect on slender orcutt grass.

On March 14, 2005, NOAA Fisheries filed its modified fish passage prescription for the UNFFR Project. The prescription requires the design and construction of facilities to introduce federally threatened Central Valley spring-run Chinook salmon and Central Valley steelhead adults into the Seneca reach and Yellow Creek, a tributary that enters the NFFR in the vicinity of the Belden powerhouse and to collect juvenile Chinook and outmigration juvenile and adult steelhead for transportation downstream. NOAA Fisheries states that it will file a preliminary prescription for the downstream Oroville Project by October 2005, which would require the P-2100 licensee to implement a program to develop measures to trap and transfer adult anadromous fish collected below Oroville dam to the UNFFR facilities for release. NOAA Fisheries requested that we initiate formal Section 7 consultation for these two species. Our analysis of the potential project effects on Central Valley spring-run Chinook and Central Valley steelhead is presented in section 3.3.2.2, *Aquatic Resources,* of this final EIS.

Because anadromous fish do not currently exist within the UNFFR Project area, we conclude that issuing a new license for this project would have no effect on these species. Therefore, we conclude that consultation with NOAA Fisheries on these species is not warranted at this time.

5.5.5 National Historic Preservation Act

Relicensing is considered an undertaking within Section 106 of the NHPA of 1966, as amended (P.L.89-665; 16 U.S.C.470). 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. As the lead federal agency for issuing a license, the Commission is responsible for ensuring that the licensee will take all necessary steps to "evaluate alternatives or modifications" that "would avoid, minimize, or mitigate any adverse effects on historic properties" for the term of the new license

involving the project. The lead agency must also consult with SHPO(s), as well as with other land management agencies where the undertaking may have an effect, and with Indian tribes who may have cultural affiliations with affected properties involving the undertaking. The overall review process involving Section 106 is administered by the Advisory Council, an independent federal agency.

To meet the requirements of Section 106, the Commission will execute a PA for the protection of historic properties from the effects of the continued operation of the UNFFR Project. The terms of the PA would ensure that PG&E would address and treat all historic properties identified within the project area through an HPMP. The HPMP entails ongoing consultation involving historic properties for the license term.

5.5.6 California Environmental Quality Act

The California Environmental Quality Act (CEQA) is the California counterpart to NEPA. CEQA went into effect in 1970 for the purpose of monitoring land development in California through a permitting process. This statute, enacted to protect the health of the environment from current and future development, requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. CEQA applies to all discretionary activities proposed to be undertaken or approved by California state and local government agencies. Because the California State Water Resources Control Board (SWRCB) must act on PG&E's request for a WQC for the UNFFR Project relicensing (see section 5.6.1, *Section 401 of the Clean Water Act—Water Quality Certification*), the SWRCB has responsibilities as the lead agency under CEQA.

Under CEQA, an environmental impact report (EIR) is prepared when the public agency finds substantial evidence that the project may have a significant effect on the environment. An EIR is the public document used to analyze the significant environmental effects of a proposed project, to identify alternatives, and to disclose possible ways to reduce or avoid the possible environmental damage. CEQA guidelines state that when federal review of a project is also required, state agencies are encouraged to integrate the two processes to the fullest extent possible, which may include a joint EIR/EIS. While this document is not a joint EIR/EIS, the SWRCB has the opportunity to use this document, as appropriate, to satisfy its responsibilities under CEQA.

The content requirements for an EIR under CEQA are similar to the requirements for an EIS, although an EIR must contain two elements not required by NEPA. The first element needed in an EIR not required by NEPA is a discussion of how the proposed project, if implemented, could induce growth. A project can be considered to have a growth-inducing effect if it directly or indirectly fosters economic or population growth or removes obstacles to population growth, strains existing community service facilities to the extent that the construction of new facilities would be needed, or encourages or facilitates other activities that cause significant environmental impacts. We discuss

growth-inducing impacts of the UNFFR Project in section 3.3.8, *Socioeconomic Resources*.

The second element needed in an EIR, but not required by NEPA, is a discussion of a program for monitoring or reporting on mitigation measures that were adopted or made conditions of project approval. The monitoring or reporting program must ensure compliance with mitigation measures during project implementation. The program may also provide information on the effectiveness of mitigation measures. Although discussion of the mitigation reporting or monitoring program can be deferred until the final EIR or, in some cases, after project approval, it is often included in the draft EIR to obtain public review and comment.

In section 5.2, *Comprehensive Development and Recommended Alternative*, we list the mitigation measures and monitoring and reporting requirements we recommend for inclusion in any license issued for the UNFFR Project. See chapter 3, *Environmental Analysis*, for a review of the analysis of each affected environmental resource and the rationale for each recommended measure. Many of the measures are consistent with the comprehensive SA for the UNFFR Project that was filed with the Commission by PG&E on April 30, 2004 (see section 1.5, *Settlement Agreement*, for more discussion). Even though SWRCB is not a party to (did not sign) the SA, it participated in the collaborative discussions leading to the settlement to provide the parties to the settlement with guidance concerning SWRCB's regulatory responsibilities and requirements. Any conditions of a WQC that may be issued for this project will become an enforceable part of the any license issued for this project.

On August 30, 2005, SWRCB issued a Notice of Preparation of a draft EIR and Notice of CEQA Scoping Workshop for the UNFFR WQC. SWRCB conducted a CEQA Scoping Workshop on September 27, 2005, in Chester, California, to obtain comments that will assist it with determining the range of actions, alternatives, mitigation measures, and significant effects that should be analyzed in depth in the EIR.

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

SECTION 6

LITERATURE CITED

PAGES 6-1 to 6-16

FEIS

6.0 LITERATURE CITED

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

APPENDIX A

FINAL SETTLEMENT AGREEMENT

PAGES A-1 to A-67

FEIS

APPENDIX A

FINAL SETTLEMENT AGREEMENT

UPPER NORTH FORK FEATHER RIVER PROJECT
FERC Project No. 2105

Project 2105 Relicensing Settlement Agreement

April 22, 2004

Upper North Fork Feather River Project
FERC Project No. 2105

Relicensing Settlement Agreement

Table of Contents Page

Upper North Fork Feather River Project
FERC Project No. 2105

Relicensing Settlement Agreement

1. Introduction

1.1 Parties. This SETTLEMENT AGREEMENT ("Settlement") is made and entered into pursuant to Federal Energy Regulatory Commission ("FERC") Rule 602, 18 CFR § 385.602, by and among Pacific Gas and Electric Company ("Licensee"), the United States Department of Agriculture Forest Service ("FS"), the California Department of Fish and Game ("CDFG"), American Whitewater ("AW"), Plumas County ("Plumas"), Chico Paddleheads ("CP"), Shasta Paddlers ("SP"), Mountain Meadows Conservancy (MMC), and California Sportfishing Protection Alliance ("CSPA") each referred to individually as a "Party" and collectively as "Parties."

The Parties to this Settlement agree as follows:

1.2 Recitals

1.2.1 On October 23, 2002, Licensee filed with the Federal Energy Regulatory Commission ("FERC") an application for a New Project License for the Upper North Fork Feather River Project, FERC Project No. 2105 ("Project") located on the North Fork Feather River ("NFFR") in Plumas County, California.

1.2.2 Prior to filing its application for a New Project License the Licensee consulted with the Parties and other individuals and organizations in development of the studies, data, and other material presented in the application.

1.2.3 In 2002, Licensee and the Parties met and agreed to engage in discussions to resolve issues and agree on PM&E measures appropriate for the relicensing of the Project. This group, sometimes referred to as the 2105 Licensing Group, engaged in collaborative discussions and is referred to in this Settlement as the "Collaborative." This Settlement is an end product of the Collaborative's work.

1.2.4 State Water Resources Control Board ("SWRCB") staff has participated in the Collaborative in order to provide the Parties with guidance concerning the SWRCB's regulatory requirements and in furtherance of the SWRCB's policy to promote voluntary settlement agreements. However, the SWRCB cannot prejudge the Licensee's request for water quality certification pursuant to Section 401 of the Clean Water Act (33 USC §1341[a][1]) ("401 Certification") in connection with this relicensing proceeding and therefore can not execute this Settlement.

1.3 Effective Date of Settlement. This Settlement becomes effective as of April 22, 2004.

1.4 Term of Settlement. The term of this Settlement shall commence on the Effective Date and shall continue (unless terminated as otherwise provided herein) for the term of the New Project License (subject to FERC's reserved authority under the New Project License to require modifications), plus the term(s) of any annual license(s) which may be issued after the foregoing New Project License has expired, or until the effective date of any FERC order approving surrender of all or part of the Project under the Federal Power Act (FPA).

1.5 Definitions.

401 Certification: See Paragraph 1.2.4.
Accessible: A recreation or other facility or site element that meets ADAAG.
ADAAG: Americans With Disabilities Act Accessibility Guidelines.
ADR: Alternative Dispute Resolution - see Paragraph 4.8.1.
AF: acre-foot of water.
Basic Ramping Rate: See Appendix A, Section 1, Paragraph 6.
Basin Plan: The Water Quality Control Plan for the Central Valley Region, the Sacramento and San Joaquin River Basins.
Belden Reach: The portion of the NFFR between Belden Forebay Dam and Belden Powerhouse.
Beneficial Use: Those uses designated as Beneficial Uses for the North Fork Feather River in the Basin Plan, as may be amended.
Block Loading: Operational mode of a powerhouse in which the generation capacity (and resulting cfs release) is held at or near a constant level for an extended period of time.
CD: Critically Dry Water Year Type as defined in Appendix A, Section 4.
cfs: cubic feet per second.
Collaborative: See Paragraph 1.2.3.
Controlled Spill: Release of water from a Project reservoir at times when the release could have otherwise been controlled (not spilled) by increasing the flow through the generating units or controlling inflows by controlling releases from upstream reservoirs.
CWA: (Clean Water Act) The federal Water Pollution Prevention and Control Act, 33 U.S.C. § 1251 *et. seq.*, as may be amended.
Disputing Party; Disputing Parties: See Paragraph 4.8.1.
Dry: Dry Water Year Type as defined in Appendix A, Section 4.
Effective Date: See Paragraph 1.3.
Emergency: An event that is reasonably out of the control of the Licensee and requires Licensee 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.

ESA: Federal Endangered Species Act, 16 U.S.C.§1531 *et seq.*, as may be amended.

FPA: Federal Power Act 16 U.S.C. §791a et seq. as may be amended.

FWS: United States Department of the Interior Fish and Wildlife Service.

Good Faith: Honesty of purpose, free from intention to defraud, faithful to one's duty or obligation.

Heavy Maintenance: Maintenance or reconditioning that arrests deterioration and appreciably prolongs the life of the property. From an accounting standpoint, the expenditures may be capitalized. Examples include installing a new roof, new floor, or new siding, replacing electrical wiring or heating systems, repairing or replacing pipes, pumps or motors, repairing or maintaining government property threatened or damaged by heavy snow or ice, repairing or maintaining the paths, lands, walks, roads, or walls adjacent to other government-owned structures, and performing exterior painting or refinishing.

I&E: Interpretation and Education.

Inconsistent License: A New Project License which (a) materially modifies the PM&E measures stated in Appendix A or Appendix B, (b) fails to include all PM&E measures in Appendix A that fall within the jurisdictional authority of the issuing agency, or (c) includes additional PM&E measures related to Resolved Subjects beyond those in Appendix A or Appendix B.

Licensee: The owner of the Project. Currently the Licensee is Pacific Gas and Electric Company.

Minimum Streamflows: Required minimum stream flows in the Belden and Seneca Reaches as provided in Appendix A, Tables A-1 and A-2.

NA: not applicable.

NPS: United States Department of the Interior National Park Service.

NEPA: National Environmental Policy Act, 42 U.S.C.§4321 *et seq.*, as may be amended.

New Project License: The new license issued by FERC for the Project at the conclusion of the current relicensing proceeding, including any mandatory conditions such as FPA Section 4(e) Conditions, 401 Certification conditions, and FPA Section 18 fishway prescriptions.

NFFR: North Fork Feather River.

Normal: Normal Water Year Type as defined in Appendix A, Section 4.

Notice: See Paragraph 5.9.

Operational Maintenance: Maintenance or reconditioning that neither materially adds to the value of the property nor appreciably prolongs its life. The work serves only to keep the facility in an ordinary, efficient operating condition. From an accounting or tax perspective, it is work that may be expensed. Examples include interior painting,

repair of broken windows, light bulb replacement, cleaning, unplugging drains, preventative maintenance, normal wear and tear, water, sanitation, road maintenance, greasing, servicing, inspecting, oiling, adjusting, tightening, aligning, sweeping, and incidental snow removal.

Party; Parties: See Paragraph 1.1.

PM&E: Protection, mitigation or enhancement measure, as provided in Section 10(j) of the FPA.

Prattville Intake Modifications: Physical improvements in the vicinity of the Prattville Intake to attract cold water to the intake.

Project: See Paragraph 1.2.1.

Pulse Flows: Short term elevated levels of release from Project dams in amounts and durations specified in Appendix A, Section 1, Paragraph 3(A).

Ramping Rate: The rate of change in a flow release or Controlled Spill from a dam expressed as an increase or decrease in discharge (in cfs) over a period of time. See Appendix A, Section 1, Paragraph 6.

Reconstruction: Replacing or rebuilding a majority of a structure or recreation site, which has reached the end of its useful life or has been destroyed or damaged as a result of a natural event such as a landslide, storm or wildfire. Reconstruction also includes improvements aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than those originally planned.

Recreation Monitoring Indicators: A specific, measurable recreation or resource variable used to define key features of the desired recreation experience.

Recreation Monitoring Standard: Defines the minimum acceptable condition for a Recreation Monitoring Indicator. Also referred to as a trigger, as once a standard is reached over a sustained period of time, this 'triggers' a potential management action.

Resolved Subjects: See Paragraph 2.2.

RV: Self-contained recreational vehicle up to 40 feet in length.

Section 4(e) Conditions: Any license conditions proposed by FS under FPA Section 4(e).

Seneca Reach: That portion of the NFFR between Canyon Dam (Lake Almanor) and Caribou Powerhouse.

Settlement: This Settlement Agreement between the Parties as described in Paragraph 1.1.

TRG: The Technical Review Group established pursuant to Appendix A, Section 2, Paragraph 1.

Uncontrolled Spill: Release of water from a Project reservoir at times when flow into the reservoir, excluding releases from upstream reservoirs that can be controlled, exceeds the sum of the streamflow release requirement plus the current flow capacity of the generating units.

UNFFR: Upper North Fork Feather River.

Water Quality Parties: The SWRCB, Regional Water Quality Control Board Central Valley Region, Plumas, FS, CDFG, FWS, and other Parties that request involvement in the water quality monitoring program described in this Settlement. Water Quality Parties shall also include California Department of Water Resources (DWR) if it chooses to participate.

Water Year Type: See Appendix A, Section 4.

Wet: Wet Water Year Type as defined in Appendix A, Section 4.

2. Purpose of Settlement

2.1 Purpose. The purpose of this Settlement is to resolve among the Parties all lake level and streamflow issues for ecological purposes, river-based recreational uses, and other Resolved Subjects in support of FS issuing its recommended mitigation and FERC issuing a New Project License. For this purpose, the Parties agree that this Settlement constitutes an entire agreement that provides an appropriate balancing of the Resolved Subjects and the Parties will request that the FERC use the provisions of this Settlement as an alternative to be considered in the FERC's NEPA analysis process.

2.2 Resolved Subjects. Except as provided in Paragraph 2.3, the Parties agree that this Settlement fairly, reasonably, and appropriately resolves streamflows and other subjects listed in Table 1 ("Resolved Subjects") in support of FS issuing recommended mitigation and FERC issuing a New Project License.

Table 1

Subjects Resolved by this Settlement

a) Streamflows for PM&E of fish, wildlife, and other aquatic biota in Project-affected stream reaches
b) Streamflows for stream channel maintenance in Project-affected stream reaches
c) Streamflows for whitewater boating and other river-based recreation on the Belden and Seneca Reaches
d) Water quality associated with Project operations and facilities excluding erosion and water temperature (see Table 2)
e) Streamflow fluctuations from Project operations, including Ramping Rates
f) Streamflow gaging for compliance monitoring
g) Stream ecology monitoring
h) Streamflow information for use by the public
i) Facility modifications to implement the PM&E measures stated in Appendix A
j) Administration of Settlement
k) River sediment management
l) Project reservoir operation and lands management principles
m) Recreation facilities development during the term of the New Project License

2.3 Unresolved Subjects. This Settlement leaves unresolved specific subjects related to the Resolved Subjects. These unresolved subjects are listed in Table 2. This Settlement also does not resolve subjects not specifically listed in Table 1 and Table 2.

Table 2

Subjects Not Resolved by this Settlement

a) Shoreline Erosion: Plumas considers Lake Almanor shoreline erosion an unresolved issue.

b) Water Temperature: Feasibility studies are currently underway to determine Project 2105 controllable factors associated with attainment and protection of cold freshwater habitat, a designated Beneficial Use of the North Fork Feather River. All Parties await additional information in early 2004 from on-going modeling efforts related to the potential Prattville Intake Modifications, re-operation, or other structural changes (Canyon Dam Intake structure modification, modification to Caribou 2, etc.) to inform PM&E development and agreement on appropriate water temperature conditions. CSPA has unresolved issues with temperature impacts on aquatic resources resulting from the continued operation of the Hamilton Branch and Project 2105 features including the Prattville outlet, Butt Valley Powerhouse, Butt Valley Reservoir, the Caribou 2 Powerhouse and Belden Reservoir in the Project vicinity and in downstream reaches of the North Fork Feather River to Oroville Reservoir.

c) Whitewater flow effects on water temperature in the Belden Reach: CSPA considers this an unresolved issue.

d) Term of New Project License: Licensee, Plumas, and FS support a 40-year license; AW and NPS support a 40-year license if the Rock Creek Cresta (FERC No.1962) license is extended to coincide with the term of the New Project License. CDFG supports a 30-year license. If, however, the Rock Creek Cresta (FERC No. 1962) license were extended at the request of CDFG, then CDFG would support a license term for this Project that would coincide with the Rock Creek Cresta license term. SWRCB and CSPA do not support extension of the FERC No.1962 license. CSPA considers a 30-year license term appropriate for this Project and consistent with the FERC No. 1962 Rock Creek Cresta signed agreement.

e) Angler Access Trail Improvement in Seneca Reach: CSPA considers this an unresolved issue.

f) Wetland and Riparian Habitat Offsite Mitigation: CSPA considers mitigation for effects of initial Project construction and continuing Project operations on wetland and riparian habitat through off-site mitigation in Humbug Valley and Mountain Meadows to be an unresolved issue.

2.4 No Precedent for Other Proceedings. This Settlement is made upon the express understanding that it constitutes a negotiated resolution of Resolved Subjects. No Party shall be deemed to have approved, admitted, accepted, or otherwise consented to any operation, management, valuation, or other principle underlying or supposed to underlie any of the Resolved Subjects, except as expressly provided herein. Nothing in

this Settlement is intended nor shall be construed as a precedent with regard to any other proceeding or hydroelectric project.

2.5 Compliance with Legal Responsibilities. Nothing in this Settlement is intended to nor shall be construed to affect or limit the authority of any Party to fulfill its statutory, regulatory, or existing contractual responsibilities under applicable law. However, by entering into this Settlement the Parties with such responsibilities represent that they believe their responsibilities relative to Resolved Subjects have been, are, or can be met for the purpose stated in Paragraph 2.1, consistent with and by the terms of this Settlement.

2.5.1 ESA and FPA Section 18 Responsibilities Not Affected. Nothing in this Settlement is intended to nor shall be construed to restrict or affect the continuing responsibilities of FERC or any Party, including FWS under the ESA, including the implementing regulation at 50 C.F.R. § 402.16. Further, notwithstanding any other provision in this Settlement, this Settlement is not intended and shall not be construed to address, affect, or apply to the Secretary of the United States Department of the Interior through the FWS independent authority under FPA Section 18 to prescribe fishways, or other Parties' rights to dispute such authority.

2.6 Reservation of Claims, Rights, and Responsibilities. Each Party reserves all claims, rights, and responsibilities, which it may otherwise have with respect to any subjects not listed as Resolved Subjects. Nothing in this Settlement is intended nor shall be construed to affect or restrict any Party's participation in or comments about compliance with the New Project License, future relicensing of the Project subsequent to the current relicensing, or any other hydroelectric project licensed to Licensee.

3. Use of Settlement in New Project License and Section 4(e) Conditions

3.1 Protection, Mitigation, and Enhancement Measures Recommended to be Included in New Project License. Subject to Paragraphs 3.2 and 3.3, the Parties respectfully request that FERC accept and incorporate, without material modification, as license articles all of the PM&E measures stated in Appendix A of this Settlement. Subject to the same limitation, the Parties further request that FERC not include in the New Project License articles that are inconsistent with this Settlement, except as may be necessary to enable FERC to ascertain and monitor Licensee's compliance with the conditions of the New Project License and its rules and regulations under the FPA.

3.2 Protection, Mitigation, and Enhancement Measures Recommended to be Included in Section 4(e) Conditions. The Parties respectfully request that FS accept and incorporate, without material modification, as Section 4(e) Conditions all relevant PM&E measures stated in Appendix A of this Settlement that are within the FS's jurisdiction under FPA Section 4(e). The Parties further request that FS not include in its Section 4(e) Conditions, any requirements that are inconsistent with this Settlement. FS agrees to propose as Section 4(e) Conditions on Resolved Subjects the PM&E measures stated in

Appendix A of this Settlement which it determines are within its jurisdiction to prescribe as Section 4(e) Conditions, except to the extent that any changes result from analysis under NEPA, National Forest Management Act, and any other applicable law or regulation. This paragraph shall not be read to predetermine or limit the outcome or lawful discretion of FS in issuing Section 4(e) Conditions or in adopting Section 4(e) Conditions inconsistent with those recommended herein.

3.3 Relationship of Settlement to Section 7 Consultation. The Parties acknowledge that if FERC submits the PM&E measures stated in Appendix A as part of the proposed action for consultation under Section 7 of the ESA, FWS may in its lawful discretion identify PM&E measures different from or additional to those set forth in Appendix A and Appendix B to minimize the effects of take of listed species.

3.4 Protection, Mitigation, and Enhancement Measures Recommended to be Included in the 401 Certification. The Parties respectfully request that the SWRCB accept and incorporate, without material modifications, as conditions to the 401 Certification all the PM&E measures stated in Appendix A of the Settlement that are within the SWRCB's jurisdiction under Section 401 of the CWA. The Parties further request that the SWRCB not include conditions to the 401 Certification that are inconsistent with this Settlement.

3.5 Measures Agreed to that will not be Included in the New Project License or Section 4(e) Conditions. Measures agreed to among the Parties that are not to be incorporated in the New Project License or FS Section 4(e) Conditions are stated in Appendix B.

4. Implementation of Settlement

4.1 Support for Settlement and Issuance of New Project License. To the extent permitted by applicable law, the Parties shall support or advocate through appropriate written communications to FERC and FS, this Settlement and the PM&E measures stated in Appendix A hereto. For Resolved Subjects and subject to Paragraph 3.2, the Parties agree not to propose, support, or communicate to FERC or FS any comments, recommended PM&E measures, or license conditions other than ones consistent with this Settlement. Prior to the issuance of the New Project License, and at the request of Licensee, the Parties shall timely support this Settlement in written communications to any other administrative agency with advisory or mandatory conditioning authority over issuance of the New Project License, provided this sentence shall not apply to the agency exercising the authority.

4.2 Inconsistent License. If FERC issues an Inconsistent License this Settlement shall be deemed modified to conform to the Inconsistent License, unless a Party provides Notice within 30 days after FERC issues an order approving the Inconsistent License that (a) the Party does not accept the Inconsistent License, and (b)

the Party is initiating the ADR procedures stated in Paragraphs 4.8.1 - 4.8.2. Before initiating the ADR, a Party shall make a Good Faith effort to meet and confer with other Parties to this Settlement. The Disputing Party (ies) may, in addition, initiate the appeal procedures described in Paragraph 4.3. If the New Project License does not contain all of the PM&E measures stated in Appendix A because FERC or one of the agencies with mandatory conditioning authority expressly determines that it does not have jurisdiction to adopt or enforce the omitted PM&E measures, the Parties agree that they shall be bound by the entire Settlement, including those recommended PM&E measures omitted by FERC or the agency with mandatory conditioning authority, provided the New Project License contains those PM&E measures stated in Appendix A over which FERC and the agencies with mandatory conditioning authority determine they do have jurisdiction and the New Project License is otherwise consistent with this Settlement.

4.3 Appeal of Inconsistent License. Any Party may petition for administrative rehearing and/or seek judicial review of any Inconsistent License. The ADR requirements stated in Paragraphs 4.8.1 - 4.8.2 do not preclude any Party from timely filing for and pursuing administrative rehearing or judicial review of an Inconsistent License or any other New Project License article that relates to any subject not listed as a Resolved Subject. However, the Parties shall follow the ADR procedures stated in Paragraphs 4.8.1 - 4.8.2 to the extent reasonably practicable while such appeal is being pursued. If any Party or non-Party files for administrative rehearing or judicial review of an Inconsistent License, Licensee's duties under this Settlement are suspended to the extent necessary to enable Licensee to comply with the Inconsistent License. If a Party has filed for administrative rehearing or judicial review of an Inconsistent License and the Parties subsequently agree to modify this Settlement to conform to the Inconsistent License, the filing Party (ies) shall withdraw the request for rehearing or appeal, or recommend such withdrawal, as appropriate. This Settlement shall be deemed modified to conform to any final non-appealable administrative or judicial decision upholding a challenged Inconsistent License unless a Party provides Notice within 45 days after the date of the final decision that (a) the Party does not accept the Inconsistent License, and (b) the Party is initiating the ADR procedures stated in Paragraphs 4.8.1 - 4.8.2. Except as necessary to fulfill a statutory or regulatory responsibility or policy, the Parties have a continuing duty to support this Settlement, or as appropriate, recommend such support, during an administrative rehearing or judicial review. If there is disagreement about the need for such support between the requesting Party and any Party, those Parties shall meet and confer within 5 days of the request being made and shall make Good Faith efforts to resolve the disagreement.

4.4 Cooperation Among Parties. The Parties shall cooperate in the performance of this Settlement and compliance with related articles in the New Project License. The Parties shall cooperate in implementing the PM&E measures, conducting studies, performing monitoring, and conducting all other activities within their statutory or regulatory authorities related to the measures stated in Appendices A and B of this Settlement, as may be modified in the New Project License. Further, subject to Paragraph 2.5, inclusive of 2.5.1, and upon Licensee's request, the Parties shall provide written communications of support in any administrative approval that may be required

for implementation of this Settlement or related articles of the New Project License, provided this obligation shall not apply to the agency exercising the authority.

4.4.1 Responsibility for Costs. Licensee shall pay for the cost of actions required of Licensee by this Settlement or the New Project License. Licensee shall have no obligation to reimburse or otherwise pay any other Party for its assistance, participation, or cooperation in any activities pursuant to this Settlement or the New Project License unless expressly agreed to by Licensee or as required by law.

4.4.2 Licensee Solely Responsible for Operations of Project. Except as expressly provided in this Settlement, by entering into this Settlement none of the Parties, except for Licensee, have accepted any legal liability or responsibility for the operation of the Project.

4.4.3 Availability of Funds. Implementation of this Settlement for a Party that is a federal agency is subject to the requirements of the Anti-Deficiency Act, 31 United States Code, Section 1341, and the availability of appropriated funds. Nothing in this Settlement is intended nor shall be construed to require the obligation, appropriation, or expenditure of any money from the U.S. Treasury. The Parties acknowledge that the Parties that are federal agencies shall not be required under this Settlement to expend any federal agency's appropriated funds unless and until an authorized official of each such agency affirmatively acts to commit such expenditures as evidenced in writing. Implementation of this Settlement by Parties that are state or local agencies is subject to the availability of appropriated funds. Nothing in this Settlement is intended nor shall be construed to require the obligation, appropriation, or expenditure of any money from the Treasury of the State of California or Plumas. The Parties acknowledge that the Parties that are state or local agencies shall not be required under this Settlement to expend any appropriated funds unless and until an authorized official of each such agency affirmatively acts to commit such expenditures as evidenced in writing.

4.4.4 FS Participation in Settlement. FS is not included in the definition of the words "Party" or "Parties" as used in Paragraphs 3.1, 3.2, 4.1, 4.2, 4.3 and 4.6.1. Additionally, FS' obligations under and participation in this Settlement are fulfilled upon issuance of a New Project License containing final Section 4(e) Conditions that are consistent with Appendix A. FS will remain a Party to Appendix B, Section 2, Paragraphs 1 and 2 until such time as the obligations contained within those paragraphs are fulfilled. Notwithstanding any provision to the contrary, nothing in this Settlement is intended or shall be construed to create FS authority over a subject that is not within its existing authority.

4.4.5 Escalation of Costs. Unless otherwise indicated, costs specified as a year 2004 cost basis shall be escalated (starting in January 2005) based on the U. S. Gross Domestic Product - Implicit Price Deflator (GDP-IPD). Costs not specified as a year 2004 cost basis are constant dollars not subject to escalation.

4.5 Implementation Schedule. Implementation of the PM&E measures stated in Appendix A shall begin after issuance of the New Project License and consistent with the schedule specified in Appendix A (as may be modified by the New Project License). Implementation of the measures stated in Appendix B shall begin consistent with the schedule specified in Appendix B. Within six months after issuance of the New Project License, Licensee shall prepare and provide to all Parties the Licensee's planned schedule for implementing the PM&E measures recommended in this Settlement and incorporated in the New Project License. The schedule shall specify dates for initiation, progress reporting, monitoring and completion, as appropriate, for each such PM&E measure and shall include milestones for major activities.

4.6 Reopener or Amendment of New Project License.

4.6.1 Reopener. Except as required to fulfill statutory or regulatory responsibilities or as provided in Paragraph 4.6.2, a Party to this Settlement may seek to modify, or otherwise reopen during the term of this Settlement the PM&E measures from this Settlement included in the New Project License, only if and when significant new information not known or understood as of the date of issuance of the New Project License reasonably demonstrates that such proposed modification or other cause of reopener is in furtherance of the public interest under the FPA or other applicable law. In such an event, that Party shall provide Licensee at least 90-days Notice to consider the new information and that Party's position. A Party shall not be required to comply with this 90-day Notice provision if it believes an emergency situation exists, or if required to meet its responsibilities under applicable law. Notwithstanding the provisions of this paragraph, any Party may seek to reopen the New Project License to implement future changes in applicable law, or to protect Beneficial Uses through coordinated operations of this Project, Rock Creek – Cresta Project (FERC No. 1962), and Poe Project (FERC No. 2107), in connection with the relicensing proceedings for the latter project.

4.6.2 Amendment. Nothing in this Settlement is intended nor shall be construed to affect or limit the right of Licensee to seek to amend or surrender the New Project License, provided that Licensee may seek a Project license amendment or surrender which would be inconsistent with this Settlement only if Licensee, relying on significant new information not known or understood as of the date of issuance of the New Project License, can reasonably demonstrate that the amendment is in furtherance of the public interest under the FPA or other applicable law. Prior to filing a proposed license amendment or surrender application which relates to a Resolved Subject or would otherwise be inconsistent with this Settlement, Licensee shall provide the Parties at least 90-days Notice of its intention to do so, and shall promptly consult with Parties responding within 30 days of such Notice regarding the need for and the purpose of the amendment or surrender. Licensee shall not be required to comply with this 90-days Notice provision if it believes an Emergency exists or if required to meet its responsibilities under applicable law or an order of an agency with jurisdiction over Licensee. In any application for a Project license amendment or surrender that relates to a Resolved Subject or is otherwise inconsistent with this Settlement, Licensee shall provide with its application documentation of its consultation with the responsive Parties,

summarize the positions and recommendation of the responsive Parties and provide its response to those positions and recommendations. Licensee shall not oppose an intervention request by any Party that satisfies FERC's procedural requirements in a proceeding for a Project license amendment or surrender that any Party has concluded would be inconsistent with this Settlement. A Project license amendment or surrender that, as approved by FERC, would be inconsistent with this Settlement is subject to Paragraph 4.2. Further, a Project license amendment or surrender that, as approved by FERC, would be inconsistent with this Settlement may be considered by a Party as significant new information, allowing that Party to invoke the reopener provision in Paragraph 4.6.1.

4.7 Amendment of Settlement. This Settlement may be amended at any time after Notice, with the unanimous agreement of all Parties still in existence and responsive within 30 days of such Notice. Any amendment of this Settlement shall be in writing and executed by the responding Parties.

4.8 Dispute Resolution.

4.8.1 General. Except to the extent that FERC, FS, or other agency with jurisdiction over a Resolved Subject has a procedure that precludes implementation of Paragraphs 4.8.1 - 4.8.3, all disputes among the Parties regarding any Party's performance or compliance with this Settlement, including resolution of any disputes related to an Inconsistent License, shall be the subject of a non-binding alternative dispute resolution ("ADR") procedure among the Disputing Parties, as stated in Paragraphs 4.8.1 and 4.8.2. Each Party participating in a dispute ("Disputing Party," or collectively, "Disputing Parties") shall cooperate in Good Faith to promptly schedule, attend and participate in the ADR. The Disputing Parties agree to devote such time, resources and attention to the ADR as is needed to attempt to resolve the dispute at the earliest time possible. Each Disputing Party shall implement promptly all final agreements reached, consistent with its applicable statutory and regulatory responsibilities. Nothing in Paragraphs 4.8.1 - 4.8.3 is intended nor shall be construed to affect or limit the authority of FERC, FS, or other agency with jurisdiction over a Resolved Subject, to resolve a dispute brought before it in accordance with its own procedure and applicable law.

4.8.2 ADR Procedures. A Party claiming a dispute shall give Notice of the dispute within 30 days of the Party's actual knowledge of the act, event, or omission that gives rise to the dispute, unless this Settlement provides otherwise. If the dispute includes a claim regarding an Inconsistent License and the claim arises prior to rehearing or appeal, the Notice shall be made within the time periods specified in Paragraphs 4.2. If the dispute includes a claim regarding an Inconsistent License, and the claim arises during or after rehearing or appeal, the Notice shall be made within the time period specified in Paragraphs 4.3. At a minimum and in any dispute subject to these ADR procedures, the Disputing Parties shall hold two informal meetings within 30 days after Notice, to attempt to resolve the disputed issue(s). Any Disputing Party may request that a FERC employee facilitate these informal meetings to assist in resolving the dispute. If

the informal meetings fail to resolve the dispute, the Disputing Parties shall attempt to resolve the dispute using a neutral mediator jointly selected within 15 days after Notice by a Disputing Party that the informal meetings did not resolve the dispute. The Disputing Parties shall select a mediator from the sources described in 18 CFR §385.604(c)(3). Absent an agreement for equitable allocation of costs of the mediator, the Parties shall select a FERC employee as mediator. The mediator shall mediate the dispute during the next 60 days after his or her selection. Any of these time periods may be reasonably extended or shortened by agreement of the Disputing Parties, or as necessary to conform to the procedure of an agency or court with jurisdiction over the dispute. Unless otherwise agreed among the Disputing Parties, each Disputing Party shall bear its costs for its own participation in the ADR procedures.

4.8.3 Enforcement of Settlement After Dispute Resolution. Any Party may seek in a court of competent jurisdiction specific performance of this Settlement by any other Party, after compliance with the ADR procedures stated in Paragraphs 4.8.1 and 4.8.2. No Party shall be liable in damages for any breach of this Settlement, any performance or failure to perform a mandatory or discretionary obligation imposed by this Settlement, or any other cause of action arising from this Settlement. The time used to comply with the ADR procedures shall be excluded from computing any applicable statute of limitations, except where applicable law precludes such exclusion when computing time. Nothing in Paragraphs 4.8.1 - 4.8.3 is intended nor shall be construed to affect or limit the jurisdiction of any agency or court as established under applicable law.

4.9 Withdrawal From Settlement.

4.9.1 Withdrawal of a Party from Settlement. A Party may withdraw from this Settlement only in the following circumstances: (a) a Disputing Party claiming a material breach or violation of this Settlement may withdraw once the Party has complied with the ADR procedures stated in Paragraphs 4.8.1 and 4.8.2 to attempt to resolve the dispute; or (b) a Party objecting to a final and non-appealable order issuing an Inconsistent License may withdraw once the Party has complied with the ADR procedures stated in Paragraphs 4.8.1 and 4.8.2 to attempt to resolve the objection. In addition, Licensee may withdraw as provided in Paragraph 4.9.2. In addition, when required to fulfill a statutory or regulatory responsibility, a Party that is an agency may suspend participation or, if necessary, withdraw from this Settlement, without first using the ADR procedures stated in Paragraphs 4.8.1 and 4.8.2. Finally, a Party may withdraw as provided in Paragraph 5.3.

4.9.2 Withdrawal of Licensee from Settlement. In addition to the provisions of Paragraph 4.9.1, Licensee may withdraw from this Settlement without first complying with the ADR procedures stated in Paragraphs 4.8.1 and 4.8.2 if a Party does not execute or withdraws from this Settlement, and Licensee reasonably determines at its sole discretion that the failure to execute or the withdrawal (a) may adversely affect the likelihood of FS issuing final Section 4(e) Conditions consistent with this Settlement; (b) may adversely affect FERC's issuance of a New Project License consistent with this Settlement; (c) may adversely affect the likelihood of SWRCB issuing a 401 Certification

consistent with this Settlement; or (d) substantially diminishes the value of this Settlement to Licensee. Before withdrawing pursuant to this paragraph Licensee shall consult with the remaining Parties and make a Good Faith effort to resolve the issues that gave rise to Licensee's decision to withdraw. Licensee shall exercise the right to withdraw from this Settlement as provided in this paragraph within 30 days of Licensee's knowledge of the event creating the right to withdraw. This time period may be extended by mutual agreement of the remaining Parties.

4.9.3 Method of Withdrawal. A Party may exercise its right to withdraw from this Settlement by giving Notice. Withdrawal is effective 10 calendar days after Notice. A Party that is an agency may suspend participation in this Settlement as provided in Paragraph 4.9.1 by giving Notice.

4.9.4 Continuity After Withdrawal. The withdrawal of a Party, other than Licensee, does not terminate this Settlement for the remaining Parties. If a Party withdraws from this Settlement, the withdrawing Party shall not be bound by any term contained in this Settlement.

4.10 Termination of Settlement. This Settlement shall terminate as to all Parties and have no further force or effect upon expiration of the New Project License and any annual licenses issued after expiration thereof or upon withdrawal from this Settlement of Licensee. If this Settlement is terminated, this Settlement and all documents related to its development, execution, and submittal to FERC shall be deemed confidential and shall not be discoverable or admissible in any forum or proceeding for any purpose to the fullest extent allowed by applicable law, including 18 C.F.R. § 385.606. This provision does not apply to the results of resource studies or other technical information developed for use by the Collaborative.

4.11 Addition of Signatory to Settlement. Upon the request by an individual, entity or agency to become a signatory to this Settlement, the Parties shall proceed in accordance with the provisions in Paragraph 4.7, Amendment of Settlement.

5. General Provisions

5.1 Non-Severable Terms of Settlement. The terms of this Settlement are not severable one from the other. This Settlement is made on the understanding that each term is in consideration and support of every other term, and each term is a necessary part of the entire Settlement.

5.2 No Third Party Beneficiaries. Without limiting the applicability of rights granted to the public pursuant to applicable law, this Settlement shall not create any right or interest in the public, or any member thereof, as a third party beneficiary hereof, and shall not authorize any non-Party to maintain a suit at law or equity pursuant to this Settlement. The duties, obligations and responsibilities of the Parties with respect to third parties shall remain as imposed under applicable law.

5.3 Successors and Assigns. This Settlement shall apply to, and be binding on, the Parties and their successors and assigns. Upon completion of a succession or assignment, the initial Party shall no longer be a Party to this Settlement. No change in ownership of the Project or transfer of the existing or New Project License by Licensee shall in any way modify or otherwise affect any other Party's interests, rights, responsibilities or obligations under this Settlement. Unless prohibited by applicable law, Licensee shall provide in any transaction for a change in ownership of the Project or transfer of the existing or New Project License, that such new owner shall be bound by, and shall assume the rights and obligations of this Settlement upon completion of the change of ownership and approval by FERC of the license transfer. In the event applicable law prohibits the new owner from assuming the rights and obligations of this Settlement, any Party may withdraw from this Settlement. A transferring or assigning Party shall provide Notice to the other Parties at least 30 days prior to completing such transfer or assignment.

5.4 Failure to Perform Due to Force Majeure. No Party shall be liable to any other Party for breach of this Settlement as a result of a failure to perform or for delay in performance of any provision of this Settlement due to any cause reasonably beyond its control. This may include, but is not limited to, natural events, labor or civil disruption, or breakdown or failure of Project works. The Party whose performance is affected by a force majeure shall notify the other Parties in writing within seven (7) days after becoming aware of any event that such affected Party contends constitutes a force majeure and results in a material deviation from the terms of this Settlement. Such notice shall: (a) identify the event causing the delay or anticipated delay; (b) estimate the anticipated length of delay; (c) state the measures taken or to be taken to minimize the delay; and (d) estimate the timetable for implementation of the measures. The affected Party shall make all reasonable efforts to promptly resume performance of this Settlement, and, when able to resume performance of its obligations and give the other Parties written Notice to that effect.

5.5 Governing Law. The New Project License and any other terms of this Settlement over which a federal agency has jurisdiction shall be governed, construed, and enforced in accordance with the statutory and regulatory authorities of such agency. This Settlement shall otherwise be governed and construed under the laws of the State of California. By executing this Settlement, no federal agency is consenting to the jurisdiction of a state court unless such jurisdiction otherwise exists. All activities undertaken pursuant to this Settlement shall be in compliance with all applicable law.

5.6 Elected Officials Not to Benefit. No member of or delegate to Congress shall be entitled to any share or part of this Settlement or to any benefit that may arise from it.

5.7 No Partnership. Except as otherwise expressly set forth herein, this Settlement does not and shall not be deemed to make any Party the agent for or partner of any other Party.

5.8 Reference to Regulations. Any reference in this Settlement to any federal or state regulation shall be deemed to be a reference to such regulation, or successor regulation, in existence as of the date of the action.

5.9 Notice. Except as otherwise provided in this paragraph, any Notice required by this Settlement shall be written. It shall be sent to all Parties still in existence by first-class mail or comparable method of distribution, and shall be filed with FERC. For the purpose of this Settlement, a Notice shall be effective 7 days after the date on which it is mailed or otherwise distributed. When this Settlement requires Notice in less than 7 days, Notice shall be provided by telephone, facsimile or electronic mail and shall be effective when provided. For the purpose of Notice, the list of authorized representatives of the Parties as of the Effective Date is attached as Appendix C. The Parties shall provide Notice of any change in the authorized representatives designated in Appendix C and Licensee shall maintain the current distribution list of such representatives.

5.10 Paragraph Titles for Convenience Only. The titles for the paragraphs of this Settlement are used only for convenience of reference and organization, and shall not be used to modify, explain, or interpret any of the provisions of this Settlement or the intentions of the Parties.

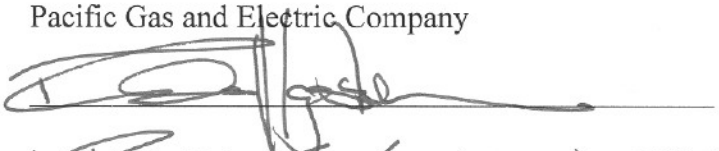
6. Execution of Settlement

6.1 Signatory Authority. Each signatory to this Settlement certifies that he or she is authorized to execute this Settlement and to legally bind the Party he or she represents, and that such Party shall be fully bound by the terms hereof upon such signature without any further act, approval, or authorization by such Party.

6.2 Signing in Counterparts. This Settlement may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument as if all the signatory Parties to all of the counterparts had signed the same instrument. Any signature page of this Settlement may be detached from any counterpart of this Settlement without impairing the legal effect of any signatures thereon, and may be attached to another counterpart of this Settlement identical in form hereto but having attached to it one or more signature pages.

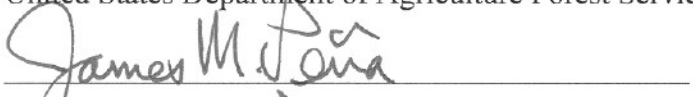
WHEREFORE, for valuable consideration, which is hereby acknowledged, and by authorized representatives, the Parties execute this Settlement effective as of April 22, 2004.

Pacific Gas and Electric Company



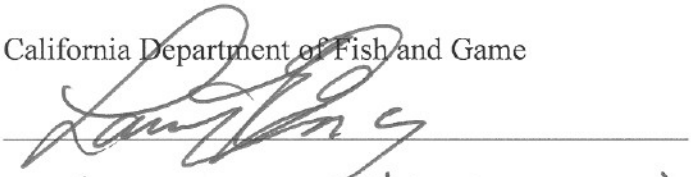
by RANDAL S. LIVINGSTON SR DIRECTOR
(Print) (Title)

United States Department of Agriculture Forest Service



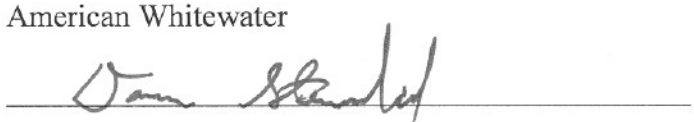
by JAMES M. PEÑA FOREST SUPERVISOR
(Print) (Title)

California Department of Fish and Game



by LARRY L. ENG DEPUTY REGIONAL MANAGER
(Print) (Title)

American Whitewater



by Dave Steindorf
(Print) (Title)

Plumas County

William N Dennison

by William N. Dennison
(Print) (Title)

Chico Paddleheads

Dave Stardock

by Dave Stardock
(Print) (Title)

Shasta Paddlers

Dave Stardock

by Dave Stardock
(Print) (Title)

California Sportfishing Protection Alliance

Jerry Mensch

by JERRY MENSCH consultant
(Print) (Title)

Mountain Meadows Conservancy

by Steve Robinson ED.
(Print) (Title)

APPENDIX A. Protection, Mitigation, and Enhancement Measures Recommended to be Included in New Project License, Section 4(e) Conditions, and Other Mandatory License Conditions

Section 1. Streamflow Management

1. Minimum Streamflows. For the preservation and improvement of aquatic resources in the Project area, Licensee shall maintain specified Minimum Streamflows and release Pulse Flows below Project dams as measured at gages NF-2 and NF-70 in accordance with the Tables A-1 and A-2 below. The Minimum Streamflows identified are minimum release requirements as per Paragraph 5. The Parties recognize that the SWRCB's 401 Certification may adjust Table A-2 Streamflows in June through September to achieve water temperatures protective of cold, freshwater habitat, as determined to be under reasonable control of Project operation. Minimum Streamflows shall commence within 60 days of the issuance of the New Project License, unless facility modifications are required.

Table A-1. Releases from Canyon Dam

Water Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CD	75	75	90	90	90	80	75	60	60	60	60	70
Dry	90	100	110	110	110	110	80	70	60	60	60	75
Normal	90	100	125	125	125	125	90	80	60	60	60	75
Wet	90	100	125	150	150	150	95	80	60	60	60	75

Table A-2. Releases from Belden Dam

Water Year type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CD	105	130	170	180	185	90	80	75	75	75	85	90
Dry	135	140	175	195	195	160	130	110	100	100	110	115
Normal	140	140	175	225	225	225	175	140	140	120	120	120
Wet	140	140	180	235	235	225	175	140	140	120	120	120

Where facility modification is required to implement the efficient release of Minimum Streamflows, the Licensee shall submit applications for permits within one year after issuance of the New Project License and complete such modifications as soon as

reasonably practicable but no later than two years after receipt of all required permits and approvals. Prior to completion of such required facility modifications, the Licensee shall make a Good Faith effort to provide the specified Minimum Streamflows within the capabilities of the existing facilities. The requirements of this Section 1 are subject to temporary modification if required by equipment malfunction, as directed by law enforcement authorities, or in Emergencies. The requirements of this article are subject to temporary modification if required by an Emergency, as defined herein. If the Licensee temporarily modifies the requirements of these articles, then the Licensee shall make all reasonable efforts to promptly resume performance of such requirements and shall notify SWRCB, FS and all Parties pursuant to Section 5.4.

2. Streamflows in Lower Butt Creek. Licensee shall take no action to reduce dam leakage, tunnel leakage, spring or other natural flows that currently provide inflow to Lower Butt Creek below the Butt Valley Dam unless directed to do so by FERC or other regulatory agency.

3. Pulse Flows in North Fork Feather River. Licensee shall implement Pulse Flows and gravel monitoring in the Seneca and Belden Reaches to further assist in the preservation and improvement of aquatic conditions in the Project area.

A. Pulse Flows: Licensee shall provide one Pulse Flow release from both Canyon Dam (Seneca Reach) and Belden Forebay Dam (Belden Reach) in each of January, February and March if the forecasted Water Year Type for that month, as defined in Section 4, indicates that the water year is anticipated to be either Normal or Wet. No Pulse Flows are required in months where the Water Year Type forecast for that month indicates that the water year will be either Dry or CD. No Pulse Flows will be required in March in the respective reach if two successive days of mean daily water temperature greater than 10 degrees C are measured at gages NF-2 (Seneca Reach) or NF-70 (Belden Reach), or if rainbow trout spawning in the Seneca or Belden Reaches is observed and reported to Licensee by CDFG or FS. In both the Seneca and Belden Reaches, the total volume of water released for each Pulse Flow event (including the water released during the ramp up and ramp down periods) shall not exceed 1,800 AF. Initially, the typical schedule will be to increase the streamflow at the Basic Ramping Rate to reach the peak streamflow, and hold the peak streamflow for 12 hours. The peak streamflow is variable by month and Water Year Type as follows: 675 cfs in January of Wet and Normal water years; 1,000 cfs in February and March of Normal water years, and 1,200 cfs in February and March of Wet water years. In the Seneca Reach during March of Normal and Wet years, streamflow will be reduced at the Basic Ramping Rate until 400 cfs is reached, held at that streamflow for 6 hours, and then reduced at the Basic Ramping Rate until the Minimum Streamflow specified in Table A-1 above is reached. The 6-hour period of constant streamflow during the ramp down shall occur between 9 AM and 3 PM of a weekend to allow recreational boating opportunities. In the Belden Reach, the peak streamflow will be reduced using the Basic Ramping Rate until the Minimum Streamflow specified in Table A-2 above is reached, but no period of constant flow during the ramp down will be required in any month.

B. Pulse Flow Monitoring (Gravel Monitoring Plan): The Licensee shall, within 12 months of license issuance, develop and begin implementing a Gravel Monitoring Plan, in consultation with the FS, CDFG, FWS, SWRCB, and other Parties. The Gravel Monitoring Plan must be approved by the FS and filed with FERC before implementation. The plan shall evaluate movement of sediment that occurs in the Belden and Seneca Reaches during scheduled Pulse Flow events and other flow events of similar magnitudes. Emphasis shall be placed on monitoring the movement of spawning-sized gravel and recruitment of similar-sized material into the Belden and Seneca Reaches. If, after review of the data collected through the Gravel Monitoring Plan, the FS, CDFG, FWS, and SWRCB determine that the Pulse Flow regime outlined in Paragraph 3(A) above could be improved to enhance the availability and distribution of spawning-sized gravel or enhance riparian function, the agencies specified above may propose revisions to the magnitude, duration, and/or frequency of the scheduled Pulse Flows, subject to the following limitations: (a) any proposed revised Pulse Flow events shall continue to occur in the months of January – March of Normal and Wet years; (b) the total volume of water released for revised Pulse Flows in January – March of each year (including the water released during the ramp up and ramp down periods) shall not exceed 5,400 AF; (c) the total volume of water released for revised Pulse Flows in January shall not exceed 1800 AF but the agencies may defer the January and/or February flows to February or March; (d) any proposed revised Pulse Flows shall not exceed the safe operating capabilities of the existing outlet works; and (e) any proposed schedule for revised Pulse Flow releases shall take into consideration the forecasted Water Year Type as that forecast is developing each year, and no revised Pulse Flows shall be required in a month where the Water Year Type is forecasted to be Dry or CD. If the agencies propose a revised Pulse Flow regime concept that meets these criteria, Licensee shall file the revised Pulse Flow regime with FERC.

4. Pulse Flows in Lower Butt Creek. If determined to be necessary pursuant to Paragraph 8 below, Licensee shall provide Pulse Flows in Lower Butt Creek via use of the Butt Valley Reservoir spillway or an acceptable alternative. The magnitude, ramping, and duration of the Pulse Flow[s] will be determined by the Licensee in consultation with FS, FWS, SWRCB, CDF&G and other Parties and will consider the need to adequately move desired particle size material to the confluence with the Seneca Reach and address woody debris and live vegetation concerns. The timing of any Pulse Flows shall be coordinated with Pulse Flows in the Seneca Reach.

5. Streamflow Measurement. For the purpose of determining the river stage and Minimum Streamflow below Canyon Dam and Belden Forebay Dam, Licensee shall operate and maintain the existing gages at NF-2 and NF-70 (United States Geological Survey ("USGS") gages 11399500 and 11401112, respectively) consistent with all requirements of FERC and under the supervision of the USGS. Any modification of the gage facilities at NF-2 and NF-70 that may be necessary to measure the new Minimum Streamflow releases shall be completed within three years after issuance of the New Project License. Licensee shall record instantaneous 15-minute streamflow as required

by USGS standards at NF-2 and NF-70. The instantaneous 15-minute streamflow at these gages shall be at least 90 percent of the Minimum Streamflows set forth in Tables A-1 and A-2 above provided that the individual mean flows over a 24-hour period shall be equal to or greater than the Minimum Streamflow set forth in Table A-1 and A-2.

6. Ramping Rates. For the preservation and improvement of aquatic resources in the Project area, Licensee shall control river flows by ramping streamflow releases from Project dams as provided in this Paragraph 6. Ramping Rates shall not apply to releases from Project Powerhouses (excluding Oak Flat Powerhouse) or Uncontrolled Spills from Project dams.

A. Basic Ramping Rates: During periods when ramping can be controlled, Ramping Rates shall apply to releases made from Canyon Dam and Belden Dam. Ramping Rates shall be followed during releases made to provide Pulse Flows and recreation river flows, and all other releases from Canyon Dam and Belden Dam that the Licensee makes for operational purposes. Monthly changes in Minimum Streamflow releases shall be made in a single step because the change is always less than the Ramping Rate criterion. Licensee shall follow the Basic Ramping Rate as close as reasonably practicable given gate and other operating limitations:

Canyon Dam: 0.5 ft/hr up and down, in all months, as measured at NF-2; and
Belden Dam: 0.5 ft/hr up and down, in all months, as measured at NF-70.

Changes in Canyon Dam streamflow releases, because of gate size and other factors, may exceed the Ramping Rate in any particular hour, but Licensee shall make a Good Faith effort to return to the overall Basic Ramping Rate in the next and subsequent hours.

B. Revision to Ramping Rates: In the event that studies or monitoring during the term of the License identify the need for modifications to ramping rates, the Licensee shall consult with the FS, FWS, CDFG, SWRCB and other Parties to establish more appropriate rates. New Ramping Rates for Pulse Flows shall not result in an increase in the total volume of water that is required to be released when the new Ramping Rates are applied to geomorphic Pulse Flows The total volume of water released for a recreation river flow release shall not exceed 110% of the flow volume resulting from the releases specified in Section 2, Table B when the new Ramping Rates are applied. For example, the volume of water released in addition to the Minimum Streamflow during a recreation river flow release in July of a Normal water year is 471 AF when the Basic Ramping Rate is applied to the required 750 cfs release amount set forth in Section 2, Table B. If the Basic Ramping Rate is revised, the volume of water released in addition to the Minimum Streamflow for that same month when the revised Ramping Rate is applied shall not exceed 518 AF. Depending upon how the Basic Ramping Rate is revised, the volume limitations described above may require a corresponding change in the magnitude or duration of the scheduled Pulse Flows or recreation river flow release.

C. Unit Trips: Licensee shall make a Good Faith effort to control streamflow releases to stay within the Basic Ramping Rates but shall not be in violation of the Basic Ramping Rates in the event that the specified rates are exceeded due to a unit tripping off-line, and subsequent restoration, or other conditions beyond the reasonable control of Licensee.

7. Belden Block Loading. To (a) minimize the frequency of fluctuation in the river stage and (b) help meet Basic Ramping Rates at downstream Licensee dams, Licensee shall Block Load Belden Powerhouse at times when the Rock Creek Dam is spilling water in excess of the minimum streamflow required under the FERC license for Project No. 1962 but less than 3,000 cfs. Under Block Loading, a unit's generation level is not cycled but rather set at a constant level for a predetermined period of time. Licensee shall not be required to implement or continue this operation if the gate controls at downstream Licensee dams are shown to be able to meet the Ramping Rates specified in the Project No. 1962 license without such Block Loading. If the draft through Belden Powerhouse needs to be increased or decreased from Block Loading levels between 0 and 40 MW, Licensee shall, to the extent reasonably feasible, make adjustments to Belden Powerhouse drafts so as not to exceed ramping rates specified in the Project No. 1962 license. Because of operational constraints that limit Licensee's ability to operate Belden Powerhouse between 40 and 70 MW, Licensee shall not be required to comply with the Basic Ramping Rates if a transition through these MW levels is needed. Licensee shall attempt to accomplish this transition with as little impact on the Basic Ramping Rates as reasonably feasible.

8. Lower Butt Creek Streamflow and Habitat Monitoring. In addition to maintaining gages at NF-2 and NF-70 as provided in Paragraph 5 above, Licensee shall rehabilitate, as necessary, and maintain an existing streamflow gaging station located on Lower Butt Creek designated by Licensee as NF-9. An approximate rating curve shall be maintained with periodic spot checks and re-rating as necessary. The gage and the data collected at the gage shall not be required to meet USGS standards. This gage shall be read each year on or about April 1, June 1, August 1 and October 1.

Within 12 months of license issuance, Licensee in consultation with FS, FWS, SWRCB, CDFG, and Parties, shall develop and submit to FERC for its approval a plan to monitor and assess aquatic habitat quality in Lower Butt Creek between Butt Valley Dam and the confluence with the NFFR. This monitoring plan shall include evaluation of habitat quality at intervals of 3 to 5 years, depending on Water Year Type and other appropriate factors. If the Licensee, in consultation with FS, FWS, SWRCB and CDFG, concludes that habitat quality in Lower Butt Creek has degraded and that Pulse Flows would provide a significant benefit, then Licensee shall implement Pulse Flows as described in Paragraph 4 above.

If the monitoring plan data demonstrates that the Lower Butt Creek weir is blocking fish passage, then within one year after the evaluation of monitoring plan data that confirms fish passage blockage Licensee shall remove or modify the existing weir to allow fish passage.

9. Seneca, Butt and Belden Reach Biological Monitoring. Within one year of license issuance, and after consultation with the FS, FWS, SWRCB, CDFG and Parties, the Licensee shall file with FERC a fish population, benthic macroinvertebrate, and amphibian monitoring plan outlining sampling that shall be conducted in the Upper North Fork Feather River Project Seneca, Butt Creek and Belden bypass reaches. The plan shall include, at a minimum, the following components: (a) Between years 10 and 12 after license issuance, Licensee shall initiate a cooperative aquatic monitoring program with FS, FWS, SWRCB, and CDFG. Sampling shall occur every two years over a six-year period, for a total of three sampling efforts. The program shall include monitoring of fish populations including condition and trend and benthic macroinvertebrates in at least three sites in the Belden and Seneca Reaches. Benthic macroinvertebrate monitoring shall include population robustness, feeding group and tolerance/intolerance trend monitoring. Sampling may be deferred to the following year in the event of a CD year; (b) The amphibian monitoring plan for the Seneca, Butt Creek and Belden bypass reaches shall include targeted monitoring of FS Sensitive amphibians conducted at three-year intervals beginning no later than three years following license issuance. Should target amphibians be located in Project reaches, focused annual monitoring of population health, life stages, reproductive success, and distribution will be required.

The Licensee shall provide results of monitoring and any flow change recommendations to FERC, FS, FWS, SWRCB, CDFG and Parties in a draft technical report prepared by June of the year following completion of each sampling effort. The Licensee shall finalize the technical report by the following December. In addition to describing the results, the report shall compare the results with those of previous surveys. The fish-based sampling shall discuss implications regarding trends in fish abundances. The benthic macroinvertebrate sampling report shall enumerate any changes over time regarding the composition of functional feeding groups, overall population heterogeneity and robustness, and pollution tolerance/intolerance trends.

At the conclusion of the aquatic monitoring program described in subsection (a) above, the Licensee, FS, CDFG, FWS, SWRCB, Plumas and other interested Parties shall meet to review the results of the monitoring. If, after review of the data collected during the monitoring, the parties specified above in this paragraph determine that aquatic species or other ecological attributes may benefit from modifications to the Minimum Streamflows set forth in Tables A-1 and A-2, the parties specified above in this paragraph shall evaluate and determine whether such modifications: (1) can be implemented within Licensee's operational capabilities; (2) will maintain the total annual volume of water that has been allocated for Minimum Streamflows in any given Water Year Type as set forth in Tables A-1 and A-2; and (3) will not adversely impact other Beneficial Uses, including hydroelectric power generation, Lake Almanor surface water elevation, and recreation. If all Parties concur and propose revised Minimum Streamflows that meet these criteria, Licensee shall file the proposal with FERC for its approval.

Section 2. Recreation River Flow Management

1. Recreation River Flow Technical Review Group. Licensee shall, within 6 months after license issuance, establish a Recreation River Flow Technical Review Group ("TRG") for the purpose of consulting with Licensee in the design of recreation and resource river flow management and monitoring plans, review and evaluation of recreation and resource data, and in the development of possible recreation river flows in the Belden Reach. The TRG shall be composed of FS, CDFG, SWRCB, FWS, NPS, Plumas, and other Parties. TRG meetings shall be open to and accept comments from the public. The Licensee shall maintain, and make public, records of TRG meetings, and shall forward those records with any recommendations to the FS, SWRCB and FERC. The Licensee shall establish communication protocols in consultation with the TRG to facilitate interaction between TRG members, which allow for open participation, consultation with independent technical experts, and communication between all TRG participants.

2. Recreation Flow Implementation Plan. Licensee shall implement the following plan.

A. Determination to Proceed with Test Flows: Within six months after license issuance, Licensee shall convene the TRG to evaluate the existing available ecological information regarding recreation river flows and make a determination whether (i) sufficient information exists to conclude that recreation river flows will result in unacceptable impacts on sociological or ecological resources; or (ii) recreation test river flows as prescribed in Paragraph 3, Table B should be conducted in order to further evaluate the ecological and social effects of recreation river flows in the Belden Reach. If the TRG determines that recreation test river flows should be conducted, it shall not recommend any flow schedule that exceeds the frequency, magnitude or duration of flows prescribed for any given month in Paragraph 3, Table B below. Within six months of convening the TRG, Licensee shall forward the TRG recommendations regarding recreation test river flows to FS and SWRCB.

B. Approvals to Proceed with Test Flows: If the TRG recommends that recreation test river flows in the Belden Reach should be conducted, the FS and SWRCB will consult with appropriate state and federal agencies including the FWS, Licensee, tribal governments, and other interested Parties prior to approving, denying or modifying the TRG's proposal. If the FS and SWRCB approve a proposed schedule for recreation river test flows that does not exceed the frequency, magnitude or duration of the flows prescribed for any given month in Paragraph 3, Table B below, Licensee shall submit the proposal to FERC for its approval.

C. Conducting Test Flows: Upon approval from FERC, Licensee shall conduct recreation test river flows as prescribed in Paragraph 3, Table B for a 3-year period.

D. Monitoring: Licensee shall prepare and submit to the FS and SWRCB for their review and approval, concurrent with the TRG recommendation, a Belden Reach

Recreation Test River Flow Evaluation Plan. Upon FS and SWRCB approval, Licensee shall file the plan with FERC for its approval. The plan shall be designed to evaluate the effects of the recreation test river flow releases on ecological and social resources**,** and the metrics to be used in this determination. Upon approval of the plan by FERC, Licensee shall implement the plan during the 3-year recreation test flow period.

E. Determination of Continued Flows: After the 3-year recreation test river flow period, Licensee shall convene the TRG to evaluate the existing available ecological and social information. The TRG shall make a recommendation regarding whether recreation river flows should be continued in order to meet the river flow management for recreation objective. The TRG shall not recommend any flow schedule that exceeds the frequency, magnitude or duration of flows prescribed for any given month in Paragraph 3, Table B below.

F. Approval of Results of Determination of Continued Flows: Licensee shall forward to the FS and SWRCB any recommendation by the TRG to continue recreation river flows. The FS and SWRCB will consult with appropriate state and federal agencies including FWS, Licensee, tribal governments, and other interested Parties prior to approving, denying or modifying the TRG's proposal. If the FS and SWRCB approve a proposed schedule for continued recreation river flows that does not exceed the frequency, magnitude or duration of the flows prescribed for any given month in Paragraph 3, Table B below, Licensee shall submit the proposal to FERC for its approval.

3. Recreation River Flows. Subject to the conditions of Paragraph 2 above, Licensee shall implement the following recreation river flow schedule and other provisions presented in Table B, Belden Reach Recreation River Flow Schedule.

Table B – Belden Reach Recreation River Flow Schedule *

	Release amount in Cubic Feet per Second (cfs)		Release Days per Month				Boats Per Day Triggers	
	Dry/ Crit. Dry	Normal/ Wet	Crit. Dry Start	Crit. Dry Cap	Dry/ Normal/ Wet Start	Dry/ Normal/ Wet Cap	Wet & Normal /Dry	
							Up	Down
July	650	750	1 day	1 day	1 day	2 days	>100	<100
Aug	650	750	1 day	1 day	1 day	2 days	>100	<100
Sep	650	750	1 day	1 day	1 day	2 days	>100	<100
Oct	650	750	1 day	1 day	1 day	2 days	>100	<100

- During Normal and Wet water years, recreation river flow releases at Belden Dam and measured at NF-70 shall occur between the hours of 10 AM and 4 PM for the first release day of each month, and between the hours of 10 AM and 2 PM for the second release day of each month. During Dry and CD water years, recreation river flow releases shall occur between the hours of 10 AM and 1 PM for both release days.

A. Recreation Flow Calendar: Licensee shall post, through a third party or other mechanism, an annual recreation flow calendar that schedules the initial recreation flow day per month. Licensee shall conduct an annual planning meeting with SWRCB, FS, and other interested Parties each year in March to discuss expected Water Year Type, results of monitoring efforts, Licensee maintenance needs that may conflict with recreation flow releases, and other relevant issues.

B. Additional Flow Days: The desired date of the month for any additional recreation river flow release days triggered by number of boats per day as described in Paragraph 3 (D) below will be recommended by the TRG based on evaluation of social and ecological considerations.

C. Recreation River Flow Postponement:

1. Emergencies: In the event of an Emergency, Licensee may postpone any scheduled recreation river flow release. Licensee shall provide as much notice as reasonably practicable under the circumstances.

2. Postponed Recreation River Flows: To the extent reasonably practicable, Licensee shall reschedule postponed recreation river flow releases as recommended by the TRG.

D. Triggers for Adjustments: During scheduled recreation river flow releases, Licensee shall count observed boater use in number of boats per day to determine whether recreation river flow release days should be added or subtracted. All boats will be counted as 1 boat except for rafts 12' or greater in length will be counted as 2 boats. All boats observed on the Belden Reach for any part of a given day will be counted. If the number of boats per day on the first recreation river flow release day for a month exceeds 100 boats per day, one day of recreation river flow release shall be added to the recreation river flow release schedule in that month the next year. If the number of boats per day is less than 100 boats per day for both the recreation river flow releases in one month, one day of recreation river flow release shall be subtracted from the recreation river flow release schedule for that month in the next year. Recreation river flow releases shall not decrease below 1 day per month and shall not exceed the cap defined in Table B. Recreation river flow release days shall not be added or subtracted during any period of recreation test river release flows conducted pursuant to Paragraph 2(C) above.

The Licensee shall develop and implement a visitor survey for up to three years to determine if visitors would choose to return to recreate on the Belden Reach based on their experience related to number of boats encountered on the river. The visitor survey questionnaire and methodology shall be statistically valid and approved by the TRG. The TRG will evaluate the survey results and other data to determine if the trigger for adding/deleting days, based on number of boats per day, should be amended based on this analysis.

E. Ramping Rates: In implementing recreation river flow releases, Licensee shall apply the Basic Ramping Rates as defined in Section 1, Paragraph 6.

F. Streamflow Information: Through a third party or other mechanism, Licensee shall make available on the Internet, a calendar that lists the dates of the March Pulse Flow in the Seneca Reach and any scheduled Pulse Flow or recreation river flow releases in the Belden Reach. The calendar shall state the timing and magnitude of the scheduled flow release. The March Pulse Flow release in the Seneca Reach will be posted by February 15 and the scheduled summer releases in the Belden Reach will be posted by May 15. If the Licensee anticipates releasing flows in the Seneca or Belden Reaches of a similar magnitude and duration as a scheduled Pulse Flow, it shall post an estimate of the release magnitude and duration of the flow.

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Section 3. Reservoir Operation

1. Water Level Management. To meet the ecological, cultural, aesthetic, social, economic, recreational and Project operational needs, Licensee shall operate Project reservoirs in accordance with the following provisions. Lake level is defined as surface water elevation, expressed in PG&E datum and measured at Canyon Dam, Butt Valley Dam, and Belden Forebay Dam. PG&E datum is 10.2 feet lower than the USGS datum. All elevations noted within this Section are PG&E datum.

2. Lake Almanor Water Levels. Lake Almanor is a multi-season reservoir that typically fills from January through June and is then drafted from July through December. Licensee shall operate Lake Almanor as follows:

A. Wet and Normal Water Years: Under Wet and Normal Water Year Types, Licensee shall operate Lake Almanor so that by May 31, the water surface elevation is at or above 4485.0 feet, corresponding to approximately 908,000 acre-feet (AF). From June 1 through August 31, Licensee shall operate Lake Almanor so that the water surface elevation is at or above 4485.0 feet, corresponding to approximately 908,000 AF.

B. Dry Water Years: Under Dry Water Year Types, Licensee shall operate Lake Almanor so that by May 31, the water surface elevation is at or above 4483.0 feet, corresponding to approximately 859,000 AF. From June 1 through August 31, Licensee shall operate Lake Almanor so that the water surface elevation is at or above 4480.0, corresponding to approximately 787,000 AF.

C. Critically Dry Water Years: Under Critically Dry Water Year Types, the Licensee shall operate Lake Almanor so that by May 31, the water surface elevation is at or above 4482.0 feet, corresponding to approximately 835,000 AF. From June 1 through August 31, Licensee shall operate Lake Almanor so that the water surface elevation is at or above 4480.0 feet, corresponding to approximately 787,000 AF.

3. Butt Valley Reservoir Water Levels. Under all Water Year Types, Licensee shall operate Butt Valley Reservoir so that minimum water surface elevation from June 1 through September 30 is at or above elevation 4120.0 feet, corresponding to approximately 32,000 AF and from October 1 through May 30, is at or above elevation 4115.0 feet, corresponding to approximately 24,500 AF.

4. Belden Forebay Water Levels. Under all Water Year Types, Licensee shall operate Belden Forebay so that the minimum water surface elevation is 2905.0 feet, corresponding to approximately 300 AF.

5. Multiple Dry Water Years. In the event of multiple, sequential Dry or CD Water Year Types, Licensee shall be allowed to decrease surface water elevations beyond those specified in Paragraphs 2 through 4 above. By March 10 of the second or subsequent Dry or CD water year and the year following the end of a sequence of Dry or CD water

years, Licensee shall notify CDFG, FWS, SWRCB, FS, and Plumas of Licensee's drought concerns. By May 1 of these same years Licensee shall consult with representatives from CDFG, FWS, SWRCB, FS, Plumas, and Parties to discuss operational plans to manage the drought conditions. If the parties specified above agree on a revised operational plan, Licensee may begin implementing the revised operational plan as soon as it files documentation of the agreement with FERC. If unanimous agreement is not reached, Licensee shall submit the proposed plan to FERC, as well as both assenting and dissenting comments, should they exist, and request expedited approval.

6. Temporary Modifications. Licensee may temporarily modify the minimum water surface elevations specified in this Section upon unanimous agreement between Licensee, SWRCB, CDFG, FWS, FS, Plumas, and Parties or, if a timely agreement is deemed not possible by Licensee, upon FERC approval of a proposal filed by Licensee. Any agreement reached by the parties specified above may be implemented as soon as Licensee files documentation of the agreement with FERC. If no agreement is reached by the parties specified above, the Licensee shall provide a proposal to FERC for approval, such proposal shall contain any comments or recommendations received from SWRCB, FWS, CDF&G, FS and Plumas. Possible conditions that may warrant temporary modifications include substantial maintenance or repair work on Project facilities.

7. Emergencies. In the event of an Emergency, Licensee is authorized to take such immediate action as may be necessary to reduce the risk.

8. Exercise of Licensee's Water Rights. Nothing in this Section is intended to prevent or reduce Licensee's ability to fully exercise its water rights for storage and direct diversion at its facilities.

9. Maximum Water Surface Elevation. In addition to the management procedures contained in this Section, Licensee shall take such reasonable actions as may be prudent to keep the water surface elevation in Lake Almanor from exceeding elevation 4494.0 feet unless a higher level is approved by FERC and the California Department of Water Resources, Division of Safety of Dams.

10. Implementation of Water Surface Elevation Requirements. Licensee shall implement the requirements of this Section 3 within six months after license issuance.

11. Lake Almanor Information. Licensee shall make available daily midnight storage and water surface elevation of Lake Almanor, rounded to the nearest 100 AF and tenth of a foot, respectively, delayed between approximately 7 and 10 days, on the Internet through a third party or other mechanism.

12. Annual Meeting With Plumas. Licensee shall meet annually with a committee appointed by the Plumas County Board of Supervisors. This meeting shall be held between March 15 and May 15 to allow Licensee to inform the committee about Lake

Almanor water elevation levels predicted to occur between May 1 and September 30. In addition, should Licensee forecast that its obligation to deliver water to the State of California and Western Canal Water District pursuant to the January 17, 1986 agreement will require Licensee to deviate from the Lake Almanor water elevation levels set forth in this Section 3, Licensee shall schedule an additional meeting with the committee within one month of the forecast.

Section 4. Water Year Type

Reservoir operating levels, Minimum Streamflows, Pulse Flow occurrence, and recreation flows may vary depending on the predicted magnitude of the annual runoff from the river basin. Water years have been classified into four Water Year Types based on the California Department of Water Resources (DWR) records of annual inflow to Lake Oroville (Oroville) from 1930-1999: Wet, Normal, Dry, and Critically Dry (CD). Licensee shall determine Water Year Type based on the predicted, unimpaired inflow to Oroville and spring snowmelt runoff forecasts provided by Licensee and DWR each month from January 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.
CD:	Less than 2,505 TAF inflow to Oroville.

Licensee shall make a forecast of the Water Year Type on or about January 10th, notify FS, CDFG, FWS, SWRCB, Plumas, and Parties within 15 days, and operate the Project based on that forecast for the remainder of that month and until the next forecast. New forecasts will be made on or about the tenth of February, March, April, and May after the snow surveys are completed, and operations will be changed as appropriate. In making the forecast each month, average precipitation conditions will be assumed for the remainder of the water year. The May forecast shall be used to establish the Water Year Type for the remaining months of the year and until the next January 10, when forecasting shall begin again. Licensee shall provide notice to FERC, SWRCB, CDFG, FS, FWS, Plumas, and other Parties of the final Water Year Type determination within 15 days of making the determination.

Section 5. Water Quality Monitoring Program

1. Water Quality Monitoring. The Licensee shall conduct an ongoing water quality monitoring program for the Project to provide data to demonstrate the level of protection provided for Beneficial Uses of Project waters and to identify any trends in water quality conditions that may occur over time. If adverse water quality is shown to be a result of the Licensee's Project operations or maintenance, the Licensee shall develop and implement a plan and/or measures to mitigate Project-related effects on water quality.

2. Water Quality Study and Monitoring Plan

A. Selected Water Quality Monitoring: The Licensee shall conduct a special study to investigate the dissolved cadmium concentrations and specific conductance levels in waters of the UNFFR observed in 2002-2003. Licensee shall take water quality samples at 20 locations throughout the upper watershed each spring, summer and fall. Sampling shall include analysis of dissolved cadmium, total hardness and *in situ* parameters (temperature, dissolved oxygen ("DO"), pH, specific conductance, and turbidity). Water quality sampling shall include single grab samples at stream locations and both surface and bottom samples at three locations in Lake Almanor and one location in Butt Valley Reservoir.

Water samples for dissolved cadmium analysis shall be collected using the ultra clean field sampling techniques outlined in EPA Method 1669: *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels.* Dissolved cadmium concentrations shall be determined using EPA Method 1638: *Determination of Trace Metals in Ambient Waters by Inductively Coupled Plasma – Mass Spectrometry*.

1. Frequency: At a minimum, this monitoring shall be conducted in years 1 and 2 after license issuance. This monitoring program may be modified or terminated if agreed to by the Licensee and the Water Quality Parties that either (a) cadmium and specific conductance levels consistently meet water quality objectives outlined in the Basin Plan and the USEPA California Toxics Rule ("CTR") for Freshwater Aquatic Life and National Recommended Ambient Water Quality ("NRAWQ") or (b) the sources are non-Project related.

B. Bacteriological Sampling: The Licensee shall conduct bacteriological monitoring (consistent with Basin Plan objectives for protection of the REC-1 beneficial uses) at a total of 10 locations within the Project boundaries. Sampling shall include five annually rotating stations at Licensee-owned or managed recreation sites around Lake Almanor, three rotating stations at Licensee-owned or managed recreational sites around Butt Valley Reservoir, and two recreation sites on the Belden Reach of the UNFFR. The Licensee, in consultation with Water Quality Parties shall select sampling locations based on criteria that include areas where: (a) swimming and other water contact recreation activities are known to occur, and (b) there are sources for potential introduction of pathogens to the water column in the immediate vicinity. Five samples shall be collected at each of the 10 sampling locations during the 30-day period that spans either the Independence Day Holiday (June-July) or the Labor Day

Holiday (August-September), using the five samples in 30-days methodology as outlined in the Basin Plan.

1. Frequency: Bacteriological monitoring shall be conducted annually for the first five (5) years after license issuance, then once every other year through the term of the license. Licensee shall consult with SWRCB and the Water Quality Parties to determine the location of the rotating sampling stations no later than April 30 of each designated sampling year. This monitoring program may be modified or terminated if agreed to by the Licensee and the Water Quality Parties.

C. Fish Tissue Bioaccumulation Screening: The Licensee shall monitor the potential bioaccumulation of silver, mercury, and PCBs in tissue samples collected from resident catchable-sized fish in Project waters. Licensee shall collect fish samples from Lake Almanor, Butt Valley Reservoir, and Belden Forebay. Fish collected from Lake Almanor and Butt Valley Reservoir shall be analyzed for silver and mercury. Fish collected from Belden Forebay shall be analyzed for PCBs, silver, and mercury. All fish collected shall be within the legal "catchable" size range (minimum total length of 8 inches), with larger individuals targeted (i.e., total length of 10-12 inches and larger). The sampling strategy developed for Butt Valley Reservoir and Belden Forebay shall be consistent with the field methods developed in the relicensing process in coordination with the SWRCB's Toxic Substances Monitoring Program, as reflected in Table 1. Specific sampling strategies for Lake Almanor are listed in Table 2.

1. Frequency: The bioaccumulation fish tissue screening samples shall be collected once every 5 years, beginning the first year after license issuance. The monitoring shall continue through the term of the New Project License. During the term of the New Project License, the monitoring and reporting requirements may be modified or terminated if it is demonstrated to the satisfaction of the SWRCB and other agencies included as Water Quality Parties that the given requirement is no longer necessary.

Table 1. Butt Valley and Belden Fish Tissue Bioaccumulation Screening - Sampling Protocols

Butt Valley Reservoir
Assessment of *Silver* and *Mercury* uptake in resident fish species.

Sample:	Smallmouth Bass	(9 individuals)
	Brown Trout	(6 individuals)
	Rainbow Trout	(6 individuals)

Belden Forebay
Assessment of *Silver*, *Mercury* and *PCB* uptake in resident fish species.
Sample:

A)	Smallmouth Bass	(6 individuals)
	Rainbow Trout	(6 individuals)

		Sacramento Sucker	(2 composites[1] of 3 individuals)
or			
	B)	Smallmouth Bass	(3 composites[1] of 3 individuals)
		Rainbow Trout	(3 composites[1] of 3 individuals)
		Sacramento Sucker	(2 composites[1] of 3 individuals)

[1] Composites must fall within a 25% range in total length.

Table 2. Lake Almanor Fish Tissue Bioaccumulation Screening - Sampling Protocols

Lake Almanor

Assessment of *Silver* and *Mercury* uptake in resident fish species.

Sample:	Smallmouth Bass	(18 individuals)
	Brown Trout[1]	(9 individuals)
	Brown Bullhead	(2 composites[2] of 3 individuals)

[1] Sacramento Pikeminnow may be substituted, if brown trout cannot be reasonably obtained.

[2] Composites must fall within a 25% range in total length.

D. Canyon Dam Mitigation Measures Evaluation: In order to reduce odor and suspended metals while maintaining appropriate water temperatures in the Seneca Reach, Licensee shall implement the following "Canyon Dam mitigation measure" by switching from the low-level gate (4422' PG&E datum) at Canyon Dam to the upper-level gate (4467' PG&E datum) on September 15. The flow release will be switched back to the low-level gate on or after November 1. Licensee shall monitor and evaluate the adequacy and efficacy of the Canyon Dam mitigation measure by conducting one *in-situ* water quality profile per month near the Canyon Dam intake structure in Lake Almanor during the months of June, July, August, September and October. The profile of *in-situ* parameters shall include DO, temperature, pH, specific conductance, and turbidity collected at 1-meter intervals to monitor the onset of reduced oxygen conditions in the hypolimnion of Lake Almanor. During the September and October sampling events, Licensee shall also collect samples at the surface and bottom of Lake Almanor near the Canyon Dam intake structure and at three locations in the Seneca Reach and analyze them for hydrogen sulfide, iron, manganese, and arsenic. *In-situ* water quality parameters will also be collected at all stations. During the October sampling event, Licensee shall also collect and analyze one sediment sample near the Canyon Dam intake structure for hydrogen sulfide, sulfate, iron, arsenic and manganese.

Licensee shall coordinate the collection of the water quality and sediment samples described above with the Canyon Dam mitigation measure as follows: Licensee shall take the September samples before it switches from the lower gate to the upper gate at the Canyon Dam Intake structure and Licensee shall take the October samples after it has switched to the upper gate.

1. Frequency: The monitoring shall begin the first year after license issuance. At a minimum, monitoring shall occur in six (6) water years, with two (2) occurrences in Wet water years, two (2) occurrences in Normal water years, and two (2) occurrences in Dry/CD water years after license issuance. At the conclusion of the 6-year data collection effort, the program shall be evaluated to determine the effectiveness of the Canyon Dam mitigation measure. Based on data collected, the Licensee, in consultation with the Water Quality Parties, shall make a determination on the effectiveness of the Canyon Dam mitigation measure and the need (if any) for additional monitoring or development and implementation of alternative measures.

E. Lake Almanor Water Quality Monitoring Program: Licensee shall conduct water quality sampling in Lake Almanor to monitor long-term water quality trends. The monitoring program is designed to monitor the long-term trends observed in Lake Almanor and to determine if water quality parameters are protective of Beneficial Uses designated for Lake Almanor and meet water quality objectives outlined in the Basin Plan and the USEPA CTR and NRAWQ criteria. Licensee shall collect water samples at the surface and near the bottom of Lake Almanor at three (3) representative locations, one in the channel near the Canyon Dam Intake structure, one in western lobe, and one in the eastern lobe. The Licensee shall analyze these water samples for general minerals, metals, nutrients, and petroleum products (Table 3). Licensee shall also conduct an *in-situ* water quality profile at each of the three locations. *In-situ* water quality profiles shall include DO, temperature, pH, specific conductance, and turbidity measurements at 1-meter intervals. Licensee shall also collect a Secchi disc measurement at each location.

1. Frequency**:** Lake Almanor water quality monitoring shall be conducted seasonally (spring summer, and fall) once every five (5) years beginning in Year 3 after license issuance, and shall continue through the term of the New Project License. The sampling frequency may be increased to once every three (3) years for specific constituent(s) on Table 3 if the water quality monitoring results exhibit a statistically significant increasing trend over time, or if a constituent's concentrations that have been historically low, approach or exceed applicable federal or state water quality standards. During the term of the New Project License, the monitoring and reporting requirements may be modified or terminated if the Licensee, the SWRCB, and the other Water Quality Parties agree that the given requirement is no longer necessary or needs to be adjusted to more appropriately monitor for changes in Project operations, regulatory mandates, or to focus study needs.

Table 3. Sampling Parameters for the Lake Almanor Water Quality Monitoring Program.

Total Metals[1]	Aluminum	*Nutrients*	Nitrate+Nitrite
	Silver		Total Ammonia
	Arsenic		Orthophosphate
	Copper		Total Phosphorous
	Cadmium		Total Organic Nitrogen
	Iron		Total Kjeldahl Nitrogen
	Manganese		Chlorophyll-a
	Mercury		Total Organic Carbon
	Nickel		
	Zinc	*Petroleum*	MTBE
		Products	TPHG
Minerals	Calcium		BTEX (Surface only)
	Magnesium		
	Sodium	*In-Situ*	Temperature
	Potassium		Dissolved Oxygen
	Chloride		pH
			Specific Conductance
General	Hardness		Turbidity
	Sulfate		Secchi Disk
	Total Alkalinity		DO (% saturation)
	Total Suspended Solids		

[1] Dissolved concentrations shall be calculated and reported for cadmium, copper, lead, nickel, silver, and zinc as outlined in *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from A Dissolved Criterion (EPA 823-B-96-007)*.

3. Reporting and Agency Consultations

A. Within three months after license issuance, the Licensee shall develop, in consultation with the Water Quality Parties, monitoring plans that provide specific details, analytical methods, sampling protocols and QA/QC procedures that will be used in the initial monitoring studies described in Section 5, Paragraph 2. These water quality monitoring plans shall be submitted to the Water Quality Parties for review, and following approval by the Chief Division of Water Rights, SWRCB (or successor), shall be filed with FERC for its approval as soon as practicable.

B. The measures described in Section 5, Paragraph 2 and clarified by plans developed according to Section 5, Paragraph 3 (A) shall outline the monitoring efforts to be implemented in the first five years of the license. This monitoring program is intended to be adaptive in nature and may be modified to more effectively focus on specific Project-related water quality conditions identified in Project waters, if agreed to by the Licensee, SWRCB, and the Water Quality Parties.

C. Licensee shall begin the monitoring program as soon as reasonably practicable but no later than 3 months, after FERC's approval of the monitoring plans described in this Appendix A, Section 5, Paragraph 3 (A).

D. The Licensee shall prepare an annual water quality report that contains elements consistent with reporting requirements from all plans under Section 5. The annual report shall be provided to FERC and the Water Quality Parties no later than March 15 of the following year.

E. To facilitate the exchange of data and ensure dialogue between water quality and aquatic resources management agencies and Water Quality Parties, the Licensee shall convene a discussion group meeting once annually, following distribution of the annual water quality monitoring report. Invitation to participate in the annual water quality discussion group shall include, at a minimum, those entities listed as Water Quality Parties. The annual water quality meeting shall be noticed at the time of annual report distribution and shall provide a minimum of 30 days advance notice to invited participants. The meeting shall occur between April 15 and April 28 each year.

Section 6. Wildlife Habitat Enhancement

To enhance wildlife habitat, License shall prepare a Wildlife Habitat Enhancement Plan ("Plan") within 12 months of the date of license issuance. The Plan shall be developed in consultation with the FS, FWS, CDFG, SWRCB, and Plumas and submitted to FERC for approval. The enhancement efforts in the Plan shall be limited to lands owned by the Licensee on the shoreline of Lake Almanor from Last Chance Campground westward to approximately the northern edge of the flood control channel south of the Chester Airport. The Plan shall be designed to benefit a variety of sensitive biological resources including rare plants, wetlands, streamside riparian communities, cultural resources and sensitive wildlife habitat. The primary elements of the Plan shall be fencing and vehicle exclusion measures that will allow continued public foot access to the area to be implemented within two years of license issuance. Licensee's obligation to fund enhancement efforts in the Plan shall be limited to an initial investment of $20,000 (2005 dollars) and an ongoing annual maintenance investment of $5,000 (2004 dollars). The Plan shall include a provision for periodic review of enhancement efforts with the agencies noted above and shall include procedures for documenting initial and ongoing enhancement efforts.

Section 7. Recreation

Licensee shall implement the following recreation facility development, operation and maintenance, monitoring, plan review and revision, resource integration, and I&E programs over the term of the license as stipulated below. Within one year of license issuance, Licensee shall finalize the License Application's Draft UNFFR Recreation Resource Management Plan ("RRMP") in consultation with FS and Plumas for the purpose of describing the implementation of each of the following programs.

1. Recreation Facilities Development Program

The Licensee shall implement the recreation facility enhancement measures described in this Section after license issuance and during the license term, based on target completion dates indicated below and Recreation Monitoring Indicators and Standards contained in the Draft RRMP. The term "Accessible" below refers to ADA-accessibility improvements that shall be made in accordance with the Americans with Disability Accessibility Guidelines ("ADAAG") at the time the recreation facilities are upgraded or constructed.

A. Initial License Issuance Recreation Enhancement Measures

Licensee shall initiate and complete implementation of the following recreation measures within the specified target completion dates, as reasonably practicable.

1. Lake Almanor

a. Last Chance Family and Group Campground Target completion is 1-3 years after license issuance.

In accordance with ADAAG, Licensee shall modify two campsites and existing toilet buildings and provide an access route leading to the nearby creek (150 feet).

b. Rocky Point Campground and Day Use Area Target completion is 5-10 years after license issuance.

i. Licensee shall convert Loop 3 overflow camping area into a day use swim area containing an approximately 1-acre sand beach above the high water level (4,494-foot elevation, PG&E datum), swimming delineator, paved parking area for 35 to 40 vehicles, and double-vaulted toilet building.

ii. Licensee shall relocate the twenty campsites in the Loop 3 overflow area to the Loop 1 camp overflow area and provide a new double vaulted toilet building at this location.

iii. Licensee shall provide a new entrance kiosk, three fee-based shower facility buildings (one for each loop) with hot water, and bear-proof food lockers at each of the 151 campsites within the campground.

iv. Licensee shall replace older Klamath stoves (a low-style camp stove with a stovepipe) with campfire rings.

v. Licensee shall revegetate or harden significantly disturbed areas where erosion has been caused by pedestrian or vehicle traffic.

vi. Licensee shall implement the following Accessibility improvements in accordance with ADAAG:

a) Modify 10 campsites (four at Loop 1, three at Loop 2, and three at Loop 3).

b) Provide an Accessible route to the high water level (4,494-foot elevation, PG&E datum) at the sandy beach.

c) Modify the existing campground library box, telephones, and the envelope box at the pay station and provide appropriate Accessible access routes.

d) Modify existing water faucets near Accessible toilets and campsites.

e) Provide Accessible routes to the toilet buildings near the campground entrance and near campsite # 100.

f) Relocate the interior pay station directly across the road to a level, firm, and stable surface (Loop 2).

c. Forest Service Almanor Shoreline Facilities: Target completion 1-13 years after license issuance.

i. Licensee shall provide the FS with 40 percent matching funds up to a total maximum of $5,000,000 (2004 dollars) for the FS to construct recreation improvements at the following FS-owned recreation facilities: Almanor Family Campground, Almanor Group Campground, Almanor Amphitheater, Almanor Picnic Area, and Almanor Beach. Recreation improvements will include reconstruction of existing facilities and construction of new facilities. During the first thirteen years of the new license term, Licensee's annual obligation to provide matching funds shall be triggered by FS's ability to obtain its share of matching fund contributions. Although the FS will attempt to maintain the 40/60 percent split each year, FS may elect to require Licensee to provide a greater or lesser percentage of matching funds in any given year provided that the total cost to Licensee to fund recreation improvements at the above FS-owned recreation facilities shall not exceed $5,000,000 (2004 dollars). FS shall provide Licensee with its preliminary annual funding request no later than January 15 of the previous year and final funding request no later than April 15 of the previous year. FS will bill Licensee when FS share of funds have been allotted. Licensee shall make actual payments upon receipt of billing by the FS.

ii. If, at the end of the thirteenth year after the license is issued, the Licensee has not paid the FS the maximum $5,000,000 (2004 dollars) because the FS has been unable to obtain its corresponding share of the matching funds, then Licensee shall use the remaining funds (the difference between the amount Licensee has already

paid the FS in matching funds and the $5,000,000 cap (2004 dollars)) for recreation improvements at the Almanor Beach and East Shore Family Campground, which shall include the addition of up to 28 campsites in a third loop as funding permits. The FS will be responsible for all design and construction of recreation improvements at FS facilities, and will consult with the Licensee prior to adoption of the final design. The FS will maintain ownership of the facilities both before and after completion of construction of the recreation improvements.

iii. FS intends to use the matching funds provided by Licensee as described in the preceding paragraph to construct the following recreation improvements. FS may adjust these construction activities depending upon the ability of the FS to obtain its share of the matching funds, site limitations, or other appropriate factors.

a) **Almanor Family Campground and Amphitheater:** Reconstruct the North and South loops, including general improvement of travel ways and spurs, upgrade sanitation facilities, provide utility hook ups, and construct amphitheater.

b) **Almanor Group Campground:** Construct camping loops, group gathering area including pavilion, trailer dump station, and rehabilitate, restore and revegetate decommissioned overflow and group camp.

c) **Almanor Picnic Area:** Define and upgrade picnic sites, shade structures, and interpretation/orientation facilities.

d) **Almanor Beach:** Expand sandy beach area, expand parking area, and construct swim buoy.

iv. The reconstruction of the Almanor Boat Launch and Canyon Dam Boat Launch facilities is the responsibility of the FS and is being conducted outside the scope of this Settlement.

v. FS shall be responsible for any future Reconstruction of existing FS facilities.

d. East Shore Group Camp Area: Target completion is 1-3 years after license issuance.

i. Licensee shall convert the existing East Shore Picnic Area to a group reservation camp area that shall accommodate one group of 16 RVs or two groups of eight RVs. The entrance road shall be widened and internal road circulation shall be improved to accommodate RVs.

ii. Licensee shall provide one Accessible parking space near the existing double-vaulted toilet building and an Accessible access route to the nearby trash receptacles.

iii. Licensee shall provide bear-proof food lockers at each of the 16 sites, a non-paved, non-Accessible trail down to the shoreline, including switchbacks and stairs, and erosion control measures.

e. North Shore Public Boat Launch: Target completion is 3-5 years after license issuance.

i. Licensee shall provide a new and expanded public boat launching facility at North Shore Campground. This facility shall include paved parking for 40 single vehicles with trailers and 12 single vehicles, a double-vaulted toilet building, and a boarding float. In addition, Licensee shall dredge and maintain along the existing submerged river channel to provide an approximate 1,000-ft long, 50-ft wide, and 6-ft deep boat channel that provides boat access to approximately the 4,480-foot elevation (PG&E datum). The boat launch will be open for public use from April 1 to December 1 when the lake's elevation is at or above the 4,480-foot elevation (PG&E datum) and as snow on the ground permits.

ii. Licensee shall provide public access to the boat launch facility along an abandoned portion of Highway 36 located along the north side of the campground to reduce traffic impacts to the campground.

iii. Licensee shall relocate 22 campsites within the Project boundary that will be impacted by the reconstructed boat launch facility.

f. Stover Ranch Day Use Area: Target completion is 3-5 years after license issuance.

The Licensee shall develop the Stover Ranch Day Use Area to provide improved Lake Almanor shoreline access for Chester residents. This day use area shall include gravel parking for 10 to 20 vehicles, a double-vaulted toilet building, four picnic tables, a non-paved trail to the shoreline, and an interpretive sign. In addition, one RV site shall be constructed to accommodate a new seasonal Lake Almanor caretaker. The development of the Stover Ranch site shall be coordinated with the Chester Public Utility District and the Almanor Recreation and Park District.

g. Marvin Alexander Beach: Target completion is 1-3 years after license issuance.

The Licensee shall assume management responsibility of the PSEA Swim Beach and expand and improve the existing sandy beach to a .4-acre area above the high water level (4,494 foot elevation, PG&E datum). In addition, Licensee shall provide an improved gravel parking area for 30 to 45 single vehicles, replace the two single-vault toilet buildings, ten picnic tables, and provide a new swimming delineator. This PSEA Swim Beach shall be renamed to the Marvin Alexander Beach.

h. Canyon Dam Day Use Area: Target completion is 1-3 years after license issuance for this Licensee facility.

i. The Licensee shall provide an approximately .3-acre sandy beach above the high water level (4,494 foot elevation, PG&E datum), swim area delineator, an informational kiosk, improved vehicle circulation, and eight new Accessible picnic tables at the Canyon Dam Day Use Area.

ii. The Licensee shall modify eight existing picnic tables to make them Accessible, provide an Accessible parking space, and provide an Accessible route to the high water level (4,494-foot elevation, PG&E datum) at the swim beach area in accordance with ADAAG.

iii. The Licensee shall reserve approximately 1 acre of land adjacent to the Canyon Dam Day Use Area for potential future recreation development during the license term.

i. "East Shore" Day Use Area: Target completion is 1-5 years after license issuance**.**
Licensee shall designate a swimming area in the existing cove adjacent to the proposed new East Shore Campground. This day use area shall contain up to five picnic tables, non-paved shoreline access trails, a single vaulted toilet building, and parking for 10 to 20 vehicles.

j. Westwood Beach: Target completion is 1-3 years after license issuance. The Licensee shall provide a gravel parking area for 10 vehicles, six picnic tables, an Accessible single vaulted toilet building, an approximately .1-acre sandy beach, a swim delineator, and directional signage at the Westwood Beach. Licensee shall also provide shoreline erosion control measures to protect the shoreline from wind caused wave action.

k. Stumpy Beach: Target completion is 1-3 years after license issuance. The Licensee shall provide five picnic tables, directional signage, an approximately .7-acre sandy beach above the high water level (4,494 foot elevation, PG&E datum), and a swim delineator at Stumpy Beach. Licensee shall provide a single vaulted toilet building, if allowed by Plumas and California Department of Transportation set back regulations; otherwise, Licensee shall provide a seasonal portable toilet building. Eight to 10 paved parking spaces parallel to Highway 147 shall be provided with trails connecting to the beach's northern and southern portions. The southern trail shall be Accessible where feasible and the northern trail shall be non-paved. In addition, Licensee shall provide four benches for visitors to view Lake Almanor and the surrounding mountains. Licensee shall also provide shoreline erosion control measures to protect the shoreline from wind caused wave action.

l. Catfish Beach: Target completion is 3-5 years after license issuance. Licensee shall make a Good Faith effort to negotiate a reasonable easement across private lands to provide public road access and install a single vaulted toilet building to the Catfish beach area. Licensee shall not be required to seek to condemn the easement if the negotiations are unsuccessful. If the Licensee is able to negotiate the easement, Licensee shall monitor and maintain the toilet building and the site's cleanliness through arrangements with the North Shore Campground managers, the Stover Ranch caretaker, or other appropriate means.

m. Almanor Scenic Overlook: Target completion is 1-5 years after license issuance.
Licensee shall provide an Accessible parking space and route to the existing Accessible double-vaulted toilet building at the overlook and conduct vegetative brushing and clearing, as needed, to maintain views of Lake Almanor, Mt. Lassen and the Canyon Dam.

n. Southwest Shoreline Access Zone: Target completion is 1-5 years after license issuance.
The Licensee, in consultation with the FS, shall provide four shoreline access points at existing informally used locations along Lake Almanor's southwest shoreline between Prattville and Canyon Dam. These access areas shall provide vehicle access at or above the 4,494-foot elevation (PG&E Datum) and serve as pedestrian access areas to the adjacent shoreline. The Licensee shall provide four gravel parking areas that provide parking for up to 4 to 8 vehicles at two areas and 10 to 20 vehicles at the other two areas, vehicle barriers, regulatory, interpretive and informational signs, gravel access roads, and, if appropriate, single-vaulted toilet buildings at these access areas. Licensee shall close and rehabilitate other user-created vehicular access routes to the southwest shoreline as depicted in Site Plan 15 contained in the Draft RRMP and in consultation with the FS.

o. Camp Connery: Target completion 1-5 years after license issuance.
Licensee shall provide an Accessible parking space and a new bunk house cabin with Accessible toilet and user fee based hot shower, retrofit the existing telephone position and water faucet features to meet the ADAAG.

2. Butt Valley Reservoir

a. Powerhouse Trails: Target completion is 5-10 years after license issuance.
Licensee shall provide two improved angler access trails to two locations near the Butt Valley Powerhouse. The first trail shall be non-paved and approximately 200- feet constructed from the existing gravel parking area next to the Butt Valley Powerhouse down the steep slope east of the powerhouse to the levee below. If needed, stairs shall be constructed at this location. The second powerhouse trail shall be Accessible (compact base rock) and originate from an existing pullout along the Prattville-Butt Valley Road near the Butt Valley Powerhouse and extend approximately 700 feet to the eastern shoreline of the inlet near the levee. A new, compacted base rock trailhead parking area with barriers shall be developed for this trail.

b. Ponderosa Flat Campground: Target completion is 5-10 years after license issuance.

Licensee shall provide a single person, non-heated outdoor shower at Ponderosa Flat Campground. In accordance with ADAAG, Licensee shall make the following improvements:

i. Modify four campsites and retrofit the existing designated Accessible campsites in the campground to be Accessible. The picnic table, fire ring, cooking grill, tent or RV area, and water faucet at each of these campsites shall be retrofitted to be Accessible.

ii. Replace the vault toilets in the overflow area with one new Accessible single vaulted toilet building and modify all other existing designated Accessible toilet buildings to meet current ADAAG. Provide an Accessible access route to the toilet building near Site 45 and one Accessible paved parking space located near the toilet buildings.

iii. Provide a swimming area at the campground that is Accessible with an approximately .4-acre sandy beach above the high water elevation (4132-foot, PG&E Datum) and swim delineator.

iv. Provide a new Accessible fishing access trail and Accessible pier or platform north of the overflow area.

c. Cool Springs Campground: Target completion is 5-10 years after license issuance.

Licensee shall provide a two-person, non-heated outdoor shower at Cool Springs Campground. In addition, Licensee shall provide one new Accessible campsite. The picnic table, fire ring, cooking grill, tent or RV space, and water faucet at this campsite shall be made Accessible.

d. Alder Creek Boat Launch: Target completion is 5-10 years after license issuance.

Licensee shall expand the existing Alder Creek Boat Launch parking area to accommodate 10 to 20 additional vehicles with trailers and to improve circulation. New parking areas on the east side of the Butt Valley Reservoir Road shall be gravel while those on the west of this road shall be paved. In addition, Licensee shall modify the boat launch to be Accessible and provide one Accessible parking space near the existing double vaulted toilet building.

3. <u>Belden Forebay</u>

a. Belden Forebay Access: Target completion is 5-10 years after license issuance.

i. Licensee shall provide a car-top boat launch, a seasonal portable toilet building, and gravel parking area for 10 single vehicles at the Belden Forebay existing undeveloped parking area, which also serves as trailhead for the North Fork Fishing Trail.

ii. Provide suitable access for launching small, car top watercraft at the Belden Forebay.

iii. If Plumas passes an ordinance as specified in Appendix B, Section 2, Paragraph 3 (B) of this Settlement, Licensee shall post signage at Belden Forebay referring to this ordinance that will limit boat engine horsepower to 10 hp and boat speeds to 5 mph on Belden Forebay and prohibits swimming and boating within 0.25 mile of Belden Dam and at night at the Forebay.

b. **North Fork Fishing Trail**: Target completion is 1-3 years after license issuance. Licensee shall improve the North Fork Fishing Trail from the Belden Forebay parking area to the upstream side of the Caribou Powerhouse 1. Improvements shall include retrofitting the existing metal trail decking and railing at the powerhouse above the turbine outlets to provide enhanced access and safety, providing trail directional signs, and providing a wider, more even non-paved trail base along the chain-link fencing at the powerhouse yard and along Caribou Road from the parking area.

4. <u>Bypass River Reaches</u>

a. Upper Belden Reach River Access: Prior to initiation of any recreation river flow release, Licensee shall provide a river access point at the upstream end of the Belden Reach located at the spoil pile area. This access location shall include a seasonal portable toilet, a seasonal dumpster located over a concrete pad, and a non-paved parking area to accommodate 15 to 25 single vehicles.

b. Belden Reach Trails: Target completion is 1-3 years after license issuance. Licensee shall provide and maintain four trails to the Belden Reach shoreline from existing informal parking areas where public access can be provided in a safe manner.

c. Belden Rest Stop: Target completion is 3-5 years after license issuance. Licensee shall relocate the existing picnic tables to the lower level and disperse them within the area from the Eby Stamp Mill to the gazebo near the creek. Two of the tables shall be replaced with Accessible tables and Accessible routes shall be developed to the gazebo, overlook area next to the creek, and the Eby Stamp Mill historical features. The upper level area shall be closed and the existing cooking grills removed. Licensee shall provide improved I&E elements at the rest stop and erosion control measures on the slope between the parking lot and upper picnic area.

d. Lower Belden Reach River Access: If a determination is made to proceed with scheduled recreation river flow releases Licensee shall, upon FS request, provide up to a maximum of $125,000 (2005 dollars) to the FS for construction of non-Project river access to the lower Belden Reach. The FS will make a Good

Faith effort to obtain matching funds to help offset the cost of these improvements.

2. Future Recreation Enhancement Measures

The Licensee anticipates the following facility improvements may be needed over the term of the New Project License. Implementation of these measures is contingent on reaching the Recreation Monitoring Standards, contained in the Draft RRMP included in the License Application, over the New Project License term.

A. Lake Almanor

1. Camp Connery Reservation Group Camp Area

a. Licensee shall provide a new group reservation camping area adjacent to the existing Camp Connery Group Camp. This area shall either provide space for two groups of approximately eight self-contained RVs or one group of approximately 16 self-contained RVs. A centrally located bear-proof food facility, two user fee based indoor shower buildings with hot water and flush toilets shall be provided at this group camp.

b. Licensee shall repair and resurface the existing access road.

2. East Shore Family Campground

Licensee shall provide a new two-loop family campground on Licensee-owned land along the east shore of Lake Almanor. The new campground will be constructed in two phases, and shall contain approximately 63 new tent and RV campsites. This campground shall contain bear-proof food lockers at each campsite, two user fee, indoor hot shower buildings with flush toilets, approximately 20 boat moorage slips/buoys, and a camp host site. If the FS is unable to raise all of the matching funds specified in Section 7, Paragraph 1 (A) (1), (c), then the remaining funds shall be used for recreation improvements at the Almanor Beach and East Shore Family Campground, which shall include the addition of up to 28 campsites in a third loop as funding permits.

B. Butt Valley Reservoir

1. Ponderosa Flat Campground. Licensee shall provide approximately 20 new primitive tent campsites (likely to the north of the current overflow area), and a new 100-person capacity group camp area in the existing overflow area.

3. Project Boundary Adjustments

Within one year of license issuance Licensee shall apply to FERC to adjust the FERC Project boundary to include all Licensee-owned recreation improvements described under this Agreement, as well as the FS Canyon Dam Boat Launch and Day Use Area, Dyer View Day Use Area, and Almanor Boat Launch. Within 6 months after the FS has completed construction of each of the recreation improvements it has planned for the FS Almanor Family Campground and Amphitheater, Almanor Group Campground, and Almanor Beach, Licensee shall apply to FERC to adjust the Project boundary as needed to incorporate these facility components and to modify the license article that reflects Appendix A, Section 7, Paragraph 4 (Recreation Operation and Maintenance Program) of this Settlement to include these FS facilities.

4. Recreation Operations and Maintenance Program

Prior to the start of the first recreation season following license issuance, Licensee shall assume responsibility for Operational Maintenance and Heavy Maintenance at the following FS facilities:

- Dyer View Day Use Area
- Canyon Dam Boat Launch and Day Use Area, and
- Almanor Boat Launch

As each recreation facility is individually constructed by Licensee, Licensee shall assume responsibility for Operational Maintenance and Heavy Maintenance at the following FS facilities:

- Southwest Shoreline Access Zone facilities described in Paragraph 1(A)(1)(n) of this Section

Licensee shall not be responsible for Operational Maintenance and Heavy Maintenance of the Almanor Picnic Area.

Licensee's Operational Maintenance and Heavy Maintenance of the FS facilities described above shall be consistent with FS standards, applicable laws, regulations, codes, and other legal direction. Licensee shall not be responsible for any future Reconstruction of these facilities.

In accordance with FERC, FS, and applicable Department of Boating and Waterways regulations, Licensee shall collect and retain 100 percent of FS approved reasonable user fees at all FS recreation facilities that Licensee operates and maintains. User fees shall be used to offset Licensee's Operational Maintenance, Heavy Maintenance, and reasonable administrative costs, with the intent that the fees shall be sufficient to cover these costs over the term of the license, and as feasible, Licensee's matching contribution towards initial construction of recreation improvements at FS facilities defined in Section 7(1)(A)(1)(c). Licensee shall meet with the FS and Plumas every five years, or as necessary, to determine whether the fees are sufficient to meet these purposes, and if not,

to make necessary adjustments. Licensee shall track costs and revenues in a balancing account and shall provide the FS with an annual accounting. Funds derived from the user fees may be accumulated from year to year to address larger Heavy Maintenance projects. Licensee shall meet with the FS and Plumas at least annually to review the operation and maintenance of FS facilities included in the license and adjust maintenance levels as necessary. At the end of the license term, any remaining funds in the balancing account shall be used to offset Licensee's matching contribution toward initial construction of recreation improvements at FS facilities. Prior to Licensee assuming responsibility for Operational Maintenance and Heavy Maintenance of these FS recreation facilities, Licensee and FS shall enter into a FS approved operation agreement or other appropriate authorization, consistent with Licensee's obligations under this paragraph.

5. Fisheries

a. Belden Reach

As per the agreement under the existing license and subject to the limitations set forth in subsection (c) below, the Licensee shall continue to reimburse CDFG for stocking of approximately 5000 pounds of catchable trout per calendar year in the waters of the NFFR between its confluence with the East Branch NFFR and the Belden Diversion Dam. The cost to the Licensee for fish stocking shall be the actual average hatchery production cost per pound to the CDFG, and any additional applicable distribution and planting costs. Actual average cost per pound shall be determined by CDFG based on hatchery production costs for the period beginning July 1 and ending June 30 of the previous calendar year. At the request of the Licensee, CDFG's cost of carrying out the year's stocking plan is subject to audit by the Licensee for up to three years. If the Licensee performs an audit and disagrees with any expenditures of CDFG, then the Licensee and CDFG agree to meet and discuss the audit and make appropriate changes in the stocking plan budget.

b. Lake Almanor

Subject to the limitations set forth in subsection (c) below, the Licensee agrees to make funds available annually to augment CDFG's existing Lake Almanor fisheries program. The specifics of any fishery augmentation program will be defined by DFG and presented to the Licensee during February of each calendar year for discussion. A fisheries augmented program may include, but not limited to, such projects as the expansion of the pen rearing program and the construction of rearing habitat for warm water fish.

c. Annual Funding for Fishery Programs

Licensee shall make available up to $50,000 (2004 escalated dollars) per year for the term of the New Project License for items subsections (a) and (b) above. Unused portions of the $50,000 will not be rolled over to successive years.

6. Interpretation and Education (I&E) Program

Within two years after license issuance, Licensee shall develop an I&E Program for the Project in consultation with the FS, Plumas, and other Parties. The Licensee shall submit the portion of the I&E Program pertaining to FS facilities to the FS for its approval. Licensee shall implement the I&E Program within one year of Program acceptance by FERC. The I&E Program shall provide information to enhance recreation experiences and encourage appropriate resource protection, cooperation, and safe behaviors by Project visitors. The I&E Program shall include themes, media, media design, prioritized sites, and prioritized services. Potential themes include fish and wildlife resources, volcanic history, hydropower, Native American cultures, pioneers, recreation activities and facilities available in the Project area, and boating hazards. The I&E Program shall include improvements such as interpretive or informational signs, kiosks, reservoir boating safety and hazard information signs and brochures, and informational signs describing recreation facilities and opportunities in the area. The I&E Program improvements shall be developed at recreation sites owned by Licensee and FS that are to be included in the Project boundary. The I&E Program shall also identify funding partnership arrangements with the FS and other interested parties, and contain a schedule for implementation. Licensee and FS will review facility naming practices and re-name facilities with similar names in order to reduce visitor confusion. License and FS will agree on wording of entrance signs to facilities operated by Licensee but owned by the FS. I&E presentations may be provided by the FS at FS facilities. Licensee shall not be responsible for providing any I&E presentations at any Project recreation facility.

As part of the I&E Program, Licensee shall prepare a Lake Almanor bathymetry map within one year of license issuance. This map shall be provided in pamphlet form to area boaters and posted on signs at Lake Almanor public boat ramps.

7. Recreation Monitoring Program

Within 12 months of license issuance, the Licensee, in consultation with the FS, Plumas, and other interested Parties, shall complete a Recreation Monitoring Program. The Licensee shall submit the portion of the Recreation Monitoring Program pertaining to FS facilities to the FS for its approval. Licensee shall adopt a modified Limits-of-Acceptable Change (LAC)-based monitoring approach as described in the Draft RRMP contained in the Final License Application. This approach includes Recreation Monitoring Indicators and Standards that shall initiate management action to help maintain desired recreation experiences and resource conditions at Project recreation areas over the license term. Specific recreation areas to be monitored by the Licensee shall include at a minimum the water surface of Project reservoirs, Licensee and FS recreation facilities, and shoreline areas within the Project boundary. The Program shall include a schedule of information to be collected annually, every six years, or every 12 years. Licensee shall conduct more in-depth monitoring, such as visitor questionnaire surveys and general assessment of regional recreation trends at 12-year intervals. As part of the Recreation Monitoring Program, Licensee shall conduct annual recreation planning

and coordination meetings with other recreation providers in the Project area to discuss recreation resource management decisions for the Project area, implementation of Project recreation enhancements, recreation monitoring results, potential grant applications and other pertinent Project-related recreation issues that may arise over the term of the New Project License.

The Licensee shall prepare periodic monitoring reports every 6 years in conjunction with FERC Form 80 recreation facility and use monitoring requirements. Prior to submitting such reports to FERC, Licensee shall submit the portions of the report pertaining to FS facilities to the FS for its approval. These reports shall include but not be limited to changes in kinds of use and use patterns both on water surfaces and land, amount and types of recreational activities, kinds and sizes of recreational vehicles including boats, amount of day use versus overnight use, and recreation user trends within the Project area as well as summaries of annual monitoring. More in-depth questionnaire surveys and regional assessment results shall be incorporated into these reports at 12-year intervals.

If recreation river test flow releases are conducted, Licensee shall, in consultation with FS and other interested Parties, develop a study plan to monitor recreation use during the test flow period and produce a report on monitoring results.

8. Resource Integration and Coordination Program

Licensee shall hold annual meetings to integrate recreation resource needs with other resource management needs, such as cultural, wildlife, water quality, and aquatic resources. These meetings shall be held over the term of the New Project License with Parties and SWRCB, and shall be open to the public.

9. Recreation Resource Management Plan (RRMP) Review and Revision Program

Over the term of the New Project License, unforeseen recreation needs, changes in visitor preferences and attitudes, and new recreation technologies may occur. The frequency with which the RRMP is revised or updated by Licensee shall depend on significant changes to existing conditions, monitoring results, and management responses made over time. The frequency of RRMP updates shall not exceed every 12 years and shall be based on consultation with the FS, SWRCB, and other interested Parties during monitoring and coordination meetings and through other appropriate sources.

10. River Ranger. By March 1 of each year of the New Project License, the Licensee shall provide to the FS up to $25,000 (2004 dollars), to assist in funding a “River Ranger” position. The purpose of this position shall be to provide additional light maintenance, visitor information/assistance, and user safety and law enforcement presence in the Project’s bypassed river reaches.

The Licensee shall request that the FS provide Licensee by January 31 of each year a written summary of the previous year expenditures and River Ranger activities and the current year's planned expenditures and River Ranger activities.

11. Belden Interagency Recreation River Flow Management Plan. If a determination is made to proceed with scheduled recreation river flow releases, Licensee, prior to the start of the first full recreation season shall coordinate with the FS, Plumas, and Caltrans to develop a Memorandum of Understanding to produce a Belden Interagency Recreation River Flow Management Plan. The Plan shall address management and integration of recreation opportunities provided by the Belden Recreation River Flow release with other river recreation opportunities in the watershed. The Plan shall address establishment of visitor capacity thresholds, maintenance of facilities, signage, traffic management and monitoring. This Plan and Memorandum of Understanding would not be financially binding, but would document agency roles, responsibilities, and intentions related to river recreation management.

If after the Belden recreation river test flow evaluation period, recreation river flow releases in accordance with Section 2 of this Settlement are not continued, the Memorandum of Understanding and Plan would be terminated.

12. Traffic Use Survey. Within one year of license issuance, Licensee shall file with FERC a road traffic survey plan for roads used for Project purposes located on National Forest System lands. This plan shall be approved by the FS and include provisions for monitoring traffic every six years when Licensee is monitoring recreation use in accordance with FERC Form 80 requirements. At a minimum the road traffic survey shall include the Caribou Road (27N26) and the Caribou-Butt Valley Reservoir roads (27N26 and 27N60) and include:

- The number of vehicles per day, type of vehicle, such as log trucks, recreational vehicles, passenger cars, emergency vehicles (fire), or Licensee vehicles on these roads.
- A sampling approach for these roads that covers the fishing season and includes the opening weekend of fishing season, Memorial Day weekend, July 4th holiday weekend, the day before, the day of and the day after scheduled Belden Reach recreation river flow releases, Labor Day weekend, non-holiday weekends, and weekdays.
- Road traffic reports every six years to be filed with FERC, after FS review and comment.

Section 8. Land Management and Visual Resource Protection

The Licensee shall implement the following measures at existing facilities within 2 years after license issuance or as otherwise noted:

A. Paint the metal siding and roof of the hoist house on the Prattville Intake structure a dark green color similar to the current color;

B. Plant sufficient evergreen trees between the existing Prattville maintenance buildings and the shoreline to reduce visual domination of the buildings on the shoreline area. Monitor and oversee tree survival to ensure successful establishment through the first three summers.

C. Re-grade the Oak Flat road debris spoil piles along Caribou Road to create a more natural rolling topography along the roadside, and where possible, move spoil materials farther from the road. Establish native plantings where possible between the road and the spoil piles to help screen the active use areas from passing motorists.

D. In consultation with the FS, prepare a plan to annually apply dust palliatives or other measures, including regular grading, to help minimize dust emissions and improve the lower coupled segment of the Butt Valley-Caribou Road.

E. At the Belden Powerhouse, consult with the FS on color selection when maintenance or repair work is scheduled on the Belden Powerhouse penstocks, surge chamber, or other powerhouse facilities to reduce visual contrast as seen from State Route 70.

F. At Caribou Village, maintain the exterior and landscaping of the old clubhouse facility, houses, and grounds to preserve the historic features and character of the facility. Consult with the FS when maintenance or repair activities that affect exterior appearance are to take place to help preserve, as practical, the historic and visual appeal of the village landscaping and structures.

G. Within 60 days prior to any ground-disturbing activity on FS lands, the Licensee shall file with FERC a Visual Management Plan approved by the FS. At a minimum, the plan shall address:

- Clearing, spoil piles, and Project facilities such as diversion structures, penstocks, pipes, ditches, powerhouses, other buildings, transmission lines, corridors, and access roads.
- Facility configuration, alignment, building materials, colors, landscaping, and screening.
- Proposed mitigation and implementation schedule necessary to bring Project facilities into compliance with National Forest Land and Resource Management Plan direction.
- Locating road spoil piles either in approved areas on National Forest System lands or to a location off FS administered lands.

- Monitoring and eradication of noxious weeds as specified in the "Noxious Weeds Management Plan" license condition.
- Removal of all visible non-native materials, including construction debris from the surfaces of piles located on National Forest System lands.
- Stabilization and revegetation of all native material that is allowed to be left on National Forest System lands including compliance with visual quality objectives.

H. Within 30 days after license issuance, Licensee shall implement the Lake Almanor Shoreline Management Plan ("SMP") included in Licensee's final license application as amended for the Project. Licensee shall meet with the FS and Plumas, and other interested Parties a minimum of every 10 years to discuss the need to update the SMP. The need to update the SMP sooner may also be raised and discussed during the annual land use meetings with the FS, Plumas, and interested Parties.

I. Conduct annual meeting with the FS, CDFG and Plumas to coordinate ongoing Project-related land management activities including recreation management and use, fire suppression and related forest health activities, and the planning for commercial, residential and industrial developments adjacent to the Project boundary.

APPENDIX B: Measures Agreed to Among the Parties But Not to be Included in New Project License or Section 4(e) Conditions

Section 1. Plumas County Lake Almanor Water Quality Monitoring and Protection

1. Goals

The intent of this Section is to monitor and protect the water quality of Lake Almanor for the use and enjoyment of the public and for aquatic resources.

2. Water Quality Monitoring Plan

A. Within 90 days after issuance of a New Project License, a water quality monitoring plan shall be developed by Plumas and the Licensee, in consultation with the SWRCB, Regional Water Quality Control Board, FWS, CDFG, and other Water Quality Parties.

3. Water Quality Monitoring Plan Implementation

A. Plumas shall contract with the DWR or other party acceptable to the SWRCB, Regional Water Quality Control Board, FWS, CDFG, and other Water Quality Parties, to implement the water quality monitoring plan and prepare an annual report. The contract shall require the contractor to submit a water quality data report to Plumas and the Licensee by January 31 of the following year.

4. Annual Meeting

A. Between April 15 and April 28 the Licensee shall convene a meeting of SWRCB, Regional Water Quality Control Board, FWS, CDFG, and other Water Quality Parties to review the results of the Lake Almanor water quality monitoring program and revise the monitoring plan as necessary.

B. If adverse water quality effects are identified in Lake Almanor, Plumas and the Licensee shall consult with the SWRCB, Regional Water Quality Control Board, FWS, CDFG, and other Water Quality Parties to determine the reason for the adverse water quality. If the adverse water quality is shown to be a result of the Licensee's Project operations or maintenance, the Licensee shall develop and implement a plan and/or measures to mitigate Project-related effects on water quality. The plan and/or mitigation measures shall be developed in consultation with the SWRCB, Regional Water Quality Control Board, FWS, CDFG, and other Water Quality Parties. If the adverse water quality is shown to be a result of non-Project land use practices, Plumas County zoning practices, or Plumas County permitting practices, Plumas shall develop and implement a plan and/or mitigation measures for protecting the water quality in Lake Almanor. The plan and/or mitigation measures shall be developed in consultation with the SWRCB, Regional Water Quality Control Board, FWS, CDFG, and other Water Quality Parties.

5. Funding

A. The Licensee and Plumas shall each contribute up to a maximum of $20,000 (2004 dollars) annually in matching funds to implement water quality sampling in Lake Almanor in accordance with the *Settlement Agreement Covering Applications 28468 of Plumas County and 30414, 30257 and 30258 of PG&E Pending Before the State Water*

*Resources Control Board (*Dated 7/30/02). Funding for water quality sampling of Lake Almanor outlined in Section 5 of Appendix A shall be part of the matching funds outlined in this Paragraph. The Licensee and Plumas shall coordinate and consolidate water quality sampling in Lake Almanor with the monitoring program outlined in Appendix A, wherever possible.

B. Plumas and the Licensee recognize the DWR has monitored water quality in Lake Almanor and its tributaries since 1986. The preference of Plumas and the Licensee is that DWR continue its current sampling program, utilizing a significant portion of the Settlement matching funds to assist in funding DWR's total sampling effort. Plumas and the Licensee shall request the DWR to provide sampling and analytical services.

Section 2. Recreation

1. New Operations and Maintenance Terms. On January 1, 2009, Licensee shall assume responsibility for Operational Maintenance and Heavy Maintenance at FS Almanor Family Campground and Amphitheatre, Almanor Group Campground, and Almanor Beach. It is probable that assumption of Operational Maintenance and Heavy Maintenance responsibilities will precede completion of FS reconstruction of the facilities. Licensee's Operational Maintenance and Heavy Maintenance of these FS facilities shall be consistent with FS standards, applicable laws, regulations, codes, and other legal direction. Licensee shall not be responsible for any future Reconstruction of these facilities.

In accordance with FERC, FS, and applicable Department of Boating and Waterways regulations, Licensee shall collect and retain 100 percent of FS approved reasonable user fees at all FS recreation facilities that Licensee operates and maintains. User fees shall be used to offset Licensee's Operational Maintenance, Heavy Maintenance, and reasonable administrative costs, with the intent that the fees shall be sufficient to cover these costs over the term of the license, and as feasible, Licensee's matching contribution towards initial construction of recreation improvements at FS facilities defined in Section 7(1)(A)(1)(c). Licensee shall meet with the FS and Plumas every five years, or as necessary, to determine whether the fees are sufficient to meet these purposes, and if not, to make necessary adjustments. Licensee shall track costs and revenues in a balancing account and shall provide the FS with an annual accounting. Funds derived from the user fees may be accumulated from year to year to address larger Heavy Maintenance projects. Licensee shall meet with the FS and Plumas at least annually to review the operation and maintenance of FS facilities included in the license and adjust maintenance levels as necessary. At the end of the license term, any remaining funds in the balancing account shall be used to offset Licensee's matching contribution toward initial construction of recreation improvements at FS facilities defined in Section 7(1)(A)(1)(c). Prior to Licensee assuming responsibility for Operational Maintenance and Heavy Maintenance of these FS recreation facilities, Licensee and FS shall enter into a FS approved operation agreement or other appropriate authorization, consistent with Licensee's obligations under this paragraph.

FS may request Licensee to assume responsibility for operation and maintenance of the FS Almanor Picnic Area on January 1, 2009. FS shall reimburse Licensee for its actual costs, including reasonable administrative costs, to perform Operational Maintenance and Heavy Maintenance of this FS facility. Licensee shall not be responsible for any Reconstruction. Prior to Licensee assuming responsibility for operation and maintenance of the Almanor Picnic Area, Licensee and FS shall enter into an operation and maintenance agreement or other appropriate authorization, consistent with the terms of this paragraph.

2. Outside Funding for FS' Belden Reach Area River Access. If a determination is made to proceed with scheduled recreation river flow releases, the FS will within five years following signature of this Settlement, request matching funding from the California Department of Boating and Waterways and/or other appropriate sources for the Lower Belden Reach River Access facilities proposed pursuant to Section 7 of Appendix A of the Settlement. All Parties shall support approval for the request from the California Department of Boating and Waterways (or other appropriate organization).

3. Plumas County Ordinance. The Parties shall within one year following signature of this Settlement, request the Plumas County Board of Supervisors to pass county ordinances that:

A. Prohibit the travel of motorized wheel vehicles at Lake Almanor below the 4,500-foot contour elevation (PG&E datum) except in designated areas to preserve and improve ecological, cultural and recreation resources at Lake Almanor.

B. Limit boat engine horsepower to 10 hp and boat speeds to 5 mph on Belden Forebay and prohibit swimming and boating within 0.25 miles of Belden Dam and at night at the Belden Forebay. This ordinance is similar to the Plumas ordinance for Rock Creek-Cresta Reservoirs.

All Parties shall support the Plumas County Board of Supervisor's approval of these requests.

4. Plumas County Sheriff Shoreline Patrol. Upon passage of the Plumas County ordinance referenced in Paragraph 3 above, Licensee shall provide $25,000 per year (2004 dollars) for the term of the New Project License to Plumas to be used for Plumas County Sheriff patrols and enforcement in the Project shoreline areas.

By the end of each fiscal year (June 30), Plumas shall provide Licensee a summary of the previous year's expenditures and enforcement activities from these funds, and the planned expenditures and enforcement activities in the Project shoreline area for the upcoming year.

5. Lake Almanor Recreation Trail (LART) Southeast Shore Extensions. In addition to the trail easement previously provided to Plumas in the July 30, 2002 Agreement between Plumas and Licensee, Licensee shall contribute matching funds up to a maximum of $300,000 (2005 dollars) to Plumas for County construction of a non-

motorized recreation trail across lands owned by Licensee on the south side of Lake Almanor as a continuation of the LART to the East Shore Campground. At Plumas expense and at no expense to Licensee, the trail shall be maintained including, but not limited to, any repairs for damages that may be caused by Licensee raising and lowering the water in Lake Almanor. The LART and associated facilities in its entirety, now and in the future, shall not be considered, in whole or part, a Project feature or part of the Project. Licensee shall not be required to perform or contribute in any way to the operation and maintenance of the trail now or in the future.

Plumas agrees, to the extent it may legally do so, to indemnify Licensee against and to hold Licensee harmless from any loss or damage to any property, or injury to or death of any person whomever, proximately caused in whole or in part by any negligence of Plumas or its contractors or by any acts for which Plumas or its contractors are liable without fault in the exercise of the rights herein granted, save and excepting to the extent that such loss, damage, injury or death is proximately caused in whole or in part by any negligence of Licensee or its contractors, or by any acts for which Licensee or its contractors are liable without fault.

Appendix C

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

APPENDIX B

FOREST SERVICE FINAL SECTION 4(E) CONDITIONS

PAGES B-1 to B-96

FEIS

APPENDIX B

UNFFR PROJECT
FOREST SERVICE FINAL SECTION 4(E) CONDITIONS

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November 4, 2004

Via Electronic Filing

Ms. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D. C. 20426

Subject: FOREST SERVICE FINAL SECTION 4(e) CONDITIONS, SECTION 10(a) RECOMMENDATIONS AND RATIONALE
Upper North Fork Feather River Project, FERC. No. 2105

Dear Ms. Salas:

Enclosed for filing are the Forest Service Final Terms and Conditions for inclusion in a new license for this project, pursuant to Sections 4(e) and 10(a) of the Federal Power Act. Also included as Enclosure 2 is a revised rational document. The Federal Energy Regulatory Commission (FERC) Office of Energy Projects staff issued a Draft Environmental Impact Statement (DEIS) for the Upper North Fork Feather River Project, FERC No. 2105, in September, 2004. The project is located on lands administered by the Lassen and Plumas National Forests, USDA Forest Service.

This project does not conflict with any project of which we are aware that should be or has been constructed by the United States. It neither interferes with nor is inconsistent with the purposes for which the Lassen and Plumas National Forests were created or acquired. The Forest Service has no objection to a license being issued, subject to certain conditions necessary for the protection and utilization of National Forest System lands and resources affected by the project.

Enclosure 1 contains Section 4(e) conditions to be included in the license, necessary for the protection and utilization of the affected National Forest System lands as well as Section 10(a) recommendations addressing actions that indirectly affect National Forest System lands and resources. The conditions and recommendations are based on Forest Service review of the application, extensive coordination with Federal and State agencies and other members of the public, and consultation with the Licensee and reflect to a large measure the April 22, 2004, project Relicensing Settlement Agreement. These conditions are consistent with the goals, objectives, standards, and guidelines of the Lassen and Plumas National Forests Land and Resource Management Plans. Under authority delegated from the Secretary of Agriculture, the Forest Service considers these conditions necessary to avoid or mitigate resource and environmental impacts caused by proposed project operations.

Extensive revisions have been made to a number of the draft Enclosure 1 conditions and recommendations. The revisions reflect settlement negotiation progress made subsequent to December 1, 2003, submittal of the Forest Service draft Section 4(e) conditions, an update of standard condition format and content, incorporation of some stand alone conditions into other conditions, and deletion of some conditions. Together, these Section 4(e) conditions and the Section 10(a) recommendations encompass the suite of Protection, Mitigation, and Enhancement measures developed by the Project 2105 Collaborative Group. The Collaborative met with the Licensee over a two-year period to collaboratively determine study needs, discuss study results, and determine necessary measures that protect and enhance resource and recreational values and allow for the continued operation of the Upper North Fork Feather River Project.

Enclosure 2 contains a revised rationale document to accompany the Forest Service final Section 4(e) conditions and Section 10(a) recommendations. A preliminary rationale document accompanied the Forest Service draft Section 4(e) and Section 10(a) recommendations and is dated December 1, 2003. The revised rationale document describes the information and process used to develop and support the Section 4(e) conditions and Section 10(a) recommendations. The title and numbering of the Section 4(e) conditions cited in the revised rational document are consistent with the numbering of the final revised Section 4(e) conditions. The text has been updated to reflect the 2004 Sierra Nevada Forest Plan Amendment Record of Decision. Other edits for consistency have also been made.

Already part of the administrative record are citations of applicable Lassen and Plumas National Forest Land and Resource Management Plan Direction and tables describing physical, biological, species of concern, lake level/social and management attributes of project reservoirs and river reaches used to also develop and support Section 4(e) and Section 10(a) recommendations. The Forest Service also filed comments on the project DEIS on November 1, 2004.

Please contact Mike Taylor, Plumas National Forest (530) 532-7427, or Kathy Turner, Lassen National Forest (530-336-5521), if you have questions.

Sincerely,

Joshua Rider
Attorney
Office of General Counsel

Enclosures

cc: FERC service list
Forest Service mail list
Mike Taylor, Feather River Ranger District, Plumas NF
Kathy Turner, Hat Creek Ranger District, Lassen NF
Robert Hawkins, RHAT

Enclosure 1

PACIFIC SOUTHWEST REGION
USDA FOREST SERVICE
FINAL TERMS AND CONDITIONS

Upper North Fork Feather River Project
FERC Project No. 2105

Index

Final 4(e) Terms and Conditions and 10(a) Recommendations

Upper North Fork Feather River Project FERC Project No. 2105

I. Introduction

The Forest Service hereby submits its Final 4(e) Terms and Conditions (Conditions) and Section 10(a) recommendations, as applicable, for the Upper North Fork Feather River Project (FERC Project No. 2105), in accordance with 18 CFR 4.34(b)(1)(i). On April 22, 2004 the Forest Service signed a Relicensing Settlement Agreement with the Licensee and other parties. The Relicensing Settlement Agreement was filed with the Commission on April 30, 2004. The Forest Service agreed to propose as its Section 4(e) conditions the protection, mitigation, and enhancement measures (PM&E), which the Forest Service determined were within its jurisdiction to prescribe as Section 4(e) conditions, as stated in Appendix A of the Relicensing Settlement Agreement. Conditions 25 through 40 are proposed Section 4(e) conditions stated in nearly the exact wording as in the Relicensing Settlement Agreement. Wording that has been italicized in each of these conditions indicates that the Forest Service determined that this portion of the condition was not within its jurisdiction; however, the Forest Service fully supports the italicized wording and recommends it be included in the license under section 10(a) of the Federal Power Act.

Section 4(e) of the Federal Power Act 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 FERC, with the purpose of the reservation defined by the authorizing legislation or proclamation (see Rainsong v. FERC, 106 F.3d 269 (9th Cir. 1977). The 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)). These 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 Wilderness Act or the Wild and Scenic River Act), as such laws may be amended from time to time, and as implemented by regulations and approved Land and Resource Management Plans prepared in accordance with the National Forest Management Act. Specifically, the 4(e) conditions are based on the Land and Resource Management Plans (as amended) for the Lassen and Plumas National Forests, as approved by the Regional Forester of the Pacific Southwest Region.

Pursuant to Section 4(e) of the Federal Power Act, the Secretary of Agriculture, acting by and through the Forest Service, considers the following conditions necessary for the adequate

protection and utilization of the land and resources of the Lassen and Plumas National Forests. License articles contained in the Federal Energy Regulatory Commission's (hereinafter referred to as the Commission) Standard Form L-1 (revised October 1975) issued by Order No. 540, dated October 31, 1975, cover general requirements. Section II of this document includes standard conditions deemed necessary for the administration of National Forest System lands. Section III covers specific requirements for protection and utilization of National Forest System lands and shall also be included in any license issued.

II. Standard Forest Service Conditions

Condition No. 1 – Requirement to Obtain a Forest Service Special-Use Authorization

The Licensee shall secure a single comprehensive facility special-use authorization from the Forest Service for the occupancy and use of National Forest System lands. The comprehensive authorization shall apply to lands currently or previously authorized for use as well as lands identified in pending applications for use, and for National Forest System lands added to the licensed area. The permit shall not include road use authorization as described in Condition No. 42. The licensee shall obtain the executed authorization before beginning ground-disturbing activities on National Forest System lands or within 12 months of license issuance if no construction or reconstruction was proposed in the application for license.

The licensee may commence ground-disturbing activities authorized by the license and special-use authorization no sooner than 60 days following the date the licensee files the Forest Service special-use authorization with the Commission, unless the Commission prescribes a different commencement schedule.

In the event there is a conflict between any provision of the license and Forest Service special-use authorization, the special-use authorization shall prevail to the extent that the Forest Service, in consultation with the Commission, deems necessary to protect and utilize National Forest System resources.

Condition No. 2—Modification of 4(e) Conditions After Biological Opinion or Water Quality Certification

The Forest Service reserves the right to modify these conditions, if necessary, to respond to any Final Biological Opinion issued for this Project by the United States Fish and Wildlife Service, National Oceanographic and Atmospheric Administration, or any Certification issued for this Project by the State Water Resources Control Board.

Condition No. 3—Forest Service Approval of Final Design

Before any new construction of the Project occurs on National Forest System lands, the Licensee shall obtain prior written approval of the Forest Service for all final design plans for Project components, which the Forest Service deems as affecting or potentially affecting National Forest System resources. The Licensee shall follow the schedules and procedures for design review and approval specified in the conditions herein. As part of such written approval, the Forest Service may require adjustments to the final plans and facility locations to preclude or mitigate impacts and to insure that the Project is compatible with on-the-ground conditions. Should such necessary adjustments be deemed by the Forest Service, the Commission, or the Licensee to be a substantial change, the Licensee shall follow the procedures of Article 2 of the license. Any changes to the license made for any reason

pursuant to 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 Commission approval or license provisions to make changes to the Project, the Licensee shall obtain written approval from the Forest Service prior to making any changes in the location of 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 the Forest Service, and at least 60 days prior to initiating any such changes or departure, the Licensee shall file a report with the Commission describing the changes, the reasons for the changes, and showing the approval of the Forest Service for such changes. The Licensee shall file an exact copy of this report with the Forest Service at the same time it is filed with the Commission. This article does not relieve the Licensee from any amendment or other requirements of Article 2 or Article 3 of this license.

Condition No. 5—Consultation

Each year between March 15 and April 15, the Licensee shall consult with the Forest Service with regard to measures needed to ensure protection and utilization of the National Forest resources affected by the Project. Within 60 days following such consultation, the Licensee shall file with the Commission evidence of the consultation with any recommendations made by the Forest Service. The Forest Service reserves the right, after notice and opportunity for comment, to require changes in the Project and its operation through revision of the 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest resources.

When Forest Service section 4(e) conditions require the Licensee to file a plan with the Commission that is approved by the Forest Service, the Licensee shall provide the Forest Service a minimum of 60 days to review and approve the plan before filing the plan with the Commission. Upon Commission approval, the Licensee shall implement Forest Service required and approved plans.

Condition No. 6—Surrender of License or Transfer of Ownership

Prior to any surrender of this license, the Licensee shall provide assurance acceptable to the Forest Service that Licensee shall restore National Forest System resources to a condition satisfactory to the Forest Service upon or after surrender of the license, as appropriate. The restoration plan shall identify the measures to be taken to restore National Forest System resources and shall include adequate financial assurances such as a bond or letter of credit, to ensure performance of the restoration measures.

In the event of any transfer of the license or sale of the Project, the Licensee shall guarantee or assure that, in a manner satisfactory to the Forest Service, the Licensee or transferee will provide for the costs of surrender and restoration. If deemed necessary by the Forest Service to assist in evaluating the Licensee's proposal, the Licensee shall conduct an analysis, using experts approved by the Forest Service, to estimate the potential costs associated with surrender and restoration of the Project area to Forest Service specifications. In addition, the Forest Service may require the Licensee to pay for an independent audit of the transferee to assist the Forest Service in determining whether the transferee has the financial ability to fund the surrender and restoration work specified in the analysis.

Condition No. 7—Hazardous Substances Plan

Within 1 year of license issuance, the Licensee shall file with the Commission a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup for Project facilities on or affecting National Forest System lands. In addition, during planning and prior to any new construction or maintenance not addressed in an existing plan, the Licensee shall notify the Forest Service, and the Forest Service shall make a determination whether a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup is needed.

At a minimum, the plan must require the Licensee to (1) maintain in the Project area, a cache of spill cleanup equipment suitable to contain any spill from the Project; (2) to periodically inform the Forest Service of the location of the spill cleanup equipment on National Forest System lands and of the location, type, and quantity of oil and hazardous substances stored in the Project area; (3) provide an outline of Licensee’s procedures for reporting and responding to releases of hazardous substances, including names and phone numbers of all emergency response personnel and their assigned responsibilities, and (4) inform the Forest Service immediately of the nature, time, date, location, and action taken for any spill affecting National Forest System lands and Licensee adjoining property.

Condition No. 8—Use of Explosives

1. Use of explosives shall be consistent with State and local requirements.
   The Licensee shall use only electronic detonators for blasting on National Forest System lands and Licensee adjoining property, except near high-voltage powerlines. The Forest Service may allow specific exceptions when in the public interest.

2. In the use of explosives, the Licensee shall exercise the utmost care not to endanger life or property and shall comply with the requirements of the Forest Service. The Licensee shall be responsible for any and all damages resulting from the use of explosives and shall adopt precautions to prevent damage to surrounding objects. The Licensee shall furnish and erect special signs to warn the public of the Licensee's blasting operations. The Licensee shall place and maintain such signs so they are clearly evident to the public during all critical periods of the blasting operations, and shall ensure that they include a

warning statement to have radio transmitters turned off. The Licensee shall store all explosives on National Forest System lands in a secure manner, in compliance with State and local laws and ordinances, and shall mark all such storage places "DANGEROUS—EXPLOSIVES." Where no local laws or ordinances apply, the Licensee shall provide storage that is satisfactory to the Forest Service and in general not closer than 1,000 feet from the road or from any building or camping area.

3. When using explosives on National Forest System lands, the Licensee shall adopt precautions to prevent damage to landscape features and other surrounding objects. When directed by the Forest Service, the Licensee shall leave trees within an area designated to be cleared, as a protective screen for surrounding vegetation during blasting operations. The Licensee shall remove and dispose of trees so left when blasting is complete. When necessary, and at any point of special danger, the Licensee shall use suitable mats or some other approved method to smother blasts.

Condition No. 9—Fire Prevention, Response, and Investigation

A. Fire Prevention and Response Plan

Within one year of license issuance the Licensee shall file with the Commission a Fire Prevention and Response Plan that is approved by the Forest Service, and developed in consultation with appropriate State and local fire agencies. The plan shall set forth in detail the Licensee's responsibility for the prevention (excluding vegetation management as described in Condition No. 41), reporting, control, and extinguishing of fires in the vicinity of the Project.

At a minimum the plan shall address the following categories:

1. Fuels Treatment/Vegetation Management
    - Identification of fire hazard reduction measures to prevent the escape of project-induced fires.
2. Prevention
    - Availability of fire access roads, community road escape routes, helispots to allow aerial firefighting assistance in the steep canyon, water drafting sites and other fire suppression strategies.
    - Address fire danger and public safety associated with project induced recreation, including fire danger associated with dispersed camping, existing and proposed developed recreation sites, trails, and vehicle access.
3. Emergency Response Preparedness
    - Analyze fire prevention needs including equipment and personnel availability.
4. Reporting
    - Licensee shall report any project related fires to the Forest Service within 24 hours.
5. Fire Control/Extinguishing

- Provide the Forest Service with a list of the locations of available fire suppression equipment and the location and availability of fire suppression personnel.

Include appropriate measures from Condition 41 and assure fire prevention measures will conform to water quality protection practices as enumerated in USDA, Forest Service, Pacific Southwest Region, Water Quality Management for National Forest System Lands in California-Best Management Practices.

B. Investigation of Project Related Fires

The Licensee agrees to fully cooperate with the Forest Service on all fire investigations. The Licensee shall produce upon request all material and witnesses, over which the Licensee has control, related to the fire and its investigation including:

- All investigation reports
- All witness statements
- All photographs
- All drawings
- All analysis of cause and origin
- All other, similar materials and documents regardless of how collected or maintained

The Licensee shall preserve all physical evidence, and give custody to the Forest Service of all physical evidence requested.

Condition No. 10—Road Use by Government

The United States shall have unrestricted use of any road within the project area for all purposes deemed necessary and desirable in connection with the protection, administration, management, and utilization of National Forest System lands or resources and shall have the right to extend rights and privileges of use of such road to States and local subdivisions thereof, as well as to other users, including members of the public, except contractors, agents, and employees of the Licensee; provided that the agency having jurisdiction shall control such use so as not to unreasonably interfere with safety or security uses, or cause the Licensee to bear a share of the costs of maintenance greater than the Licensee's use bears to all use of the road.

Condition No. 11—Road Use

The Licensee shall confine all project vehicles, 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 Road Management Plan (refer to Condition No. 42). The 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 Licensee, to require reconstruction/construction by the Licensee to the extent needed to accommodate the Licensee's use. The Forest Service agrees to provide notice to the Licensee and the

Commission prior to road closures, except in an emergency, in which case notice will be provided as soon as practicable.

Condition No. 12—Maintenance of Improvements

The Licensee shall maintain all its improvements and premises on National Forest System lands to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the Forest Service. The Licensee shall comply with all applicable Federal, State, and local laws, regulations, including but not limited to, the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., the Resources Conservation and Recovery Act, 42 U.S.C. 6901 et seq., the Comprehensive Environmental Response, Control, and Liability Act, 42 U.S.C. 9601 et seq., and other relevant environmental laws, as well as public health and safety laws and other laws relating to the siteing, construction, operation, maintenance of any facility, improvement, or equipment.

Condition No. 13—Safety During Project Construction Plan

Sixty days prior to ground-disturbing activity related to new Project construction on or affecting National Forest System lands, the Licensee shall file with the Commission a Safety During Construction Plan approved by the Forest Service that identifies potential hazard areas and measures necessary to protect public safety. Areas to consider include construction activities near public roads, trails and recreation area and facilities.
The Licensee shall perform daily (or on a schedule otherwise agreed to by the Forest Service in writing) inspections of Licensee's construction operations on National Forest System lands and Licensee adjoining fee title property while construction is in progress. The Licensee shall document these inspections (informal writing sufficient) and shall deliver such documentation to the Forest Service on a schedule agreed to by the Forest Service. The inspections must specifically include fire plan compliance, public safety, and environmental protection. The Licensee shall act immediately to correct any items found to need correction.

Condition No. 14—Pesticide Use Restrictions

Pesticides may not be used to control undesirable woody and herbaceous vegetation, aquatic plants, insects, and rodents, undesirable fish, or other pests on National Forest System lands without the prior written approval of the Forest Service. The Licensee shall submit a request for approval of planned uses of pesticides. The request must cover annual planned use and be updated as required by the Forest Service. The Licensee shall provide information essential for review in the form specified. Exceptions to this schedule may be allowed only when unexpected outbreaks of pests require control measures that were not anticipated at the time the request was submitted. In such an instance, an emergency request and approval may be made.

The Licensee shall use on National Forest System lands only those materials registered by the U. S. Environmental Protection Agency for the specific purpose planned. The Licensee must strictly follow label instructions in the preparation and application of pesticides and disposal of excess materials and containers.

Condition No. 15—Erosion Control Measures Plan

Sixty days prior to beginning any new construction or non-routine maintenance projects with the potential for causing erosion and/or stream sedimentation on or affecting National Forest System lands (including but not limited to planned recreation-related construction), the Licensee shall file with the Commission an Erosion Control Measures Plan that is approved by the Forest Service. The Plan shall include measures to control erosion, stream sedimentation, dust, and soil mass movement.
The plan shall be based on actual-site geologic, soil, and groundwater conditions and shall include:

1. A description of the actual site conditions;
2. Detailed descriptions, design drawings, and specific topographic locations of all control measures;
3. Measures to divert runoff away from disturbed land surfaces;
4. Measures to collect and filter runoff over disturbed land surfaces, including sediment ponds at the diversion and powerhouse sites;
5. Revegetating disturbed areas in accordance with current direction on use of native plants and locality of plant and seed sources;
6. Measures to dissipate energy and prevent erosion; and,
7. A monitoring and maintenance schedule.

Condition No. 16—Valid Claims and Existing Rights

This license is subject to all valid rights and claims of third parties. The United States is not liable to the Licensee for the exercise of any such right or claim.

Condition No. 17—Compliance with Regulations

The Licensee shall comply with the regulations of the Department of Agriculture and all federal, state, county, and municipal laws, ordinances, or regulations in regards to the area or operations covered by this license, to the extent those laws, ordinances, or regulations are not preempted by federal law.

Condition No. 18—Protection of United States Property

The Licensee shall protect from damage the land and property of the United States covered by and used in connection with this license.

Condition No. 19—Indemnification

The Licensee shall indemnify, defend, and hold the United States harmless for any damages or losses sustained by the United States and for judgments, claims, or demands assessed against the United States, in connection with the Licensee's use or occupancy authorized by this license. The licensee's indemnification of the United States shall include, but not be limited to, any loss by personal injury, loss of life and damage to property in connection with the occupancy or use authorized by this license. Indemnification shall include, but not be limited to, the value of resources damaged and destroyed; the costs of restoration, cleanup, and other mitigation; fire suppression and other types of abatement costs; third party claims and judgments; and all administrative costs, interest, and other legal expenses. This paragraph shall survive the termination of this license, regardless of cause.

Condition No. 20—Surveys, Land Corners

The Licensee 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 are destroyed by an act or omission of the Licensee, in connection with the use and/or occupancy authorized by this license, depending on the type of monument destroyed, the Licensee 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 the Forest Service. Further, the Licensee shall ensure that any such official survey records affected are amended as provided by law.

Condition No. 21—Damage to Land, Property, and Interests of the United States

The Licensee has an affirmative duty to protect the land, property and interests of the United States from damage arising from occupancy and use of the license.

In addition to the general requirements of Article 22 and 24, the Licensee is strictly liable for and shall pay all damages, costs and expenses associated with damage to the land, property and interests of the United States caused by or in connection with the occupancy or use authorized by the license, including but not limited to damages, costs and expenses resulting from fire. Such damages, costs and expenses shall include, but not be limited to:

1. Fire suppression costs
2. Rehabilitation and restoration costs
3. Value of lost resources
4. Abatement costs
5. Investigative and administrative expenses

6. Attorneys' fees

Damages will be determined by the value of the resources lost or impaired, as determined by the Forest Service. The basis for damages will be provided to the Licensee. The licensee shall accept transaction registers certified by the appropriate Forest Service official as evidence of costs and expenses. The Licensee shall promptly pay to the United States such damages, costs and expenses upon written demand by the United States.

Condition No. 22—Risks and Hazards

As part of the occupancy and use of the license area, the Licensee has a continuing responsibility to identify and report all hazardous conditions within the project boundary that would affect the improvements, resources, or pose a risk of injury to individuals. Licensee will abate those conditions, except those caused by third parties 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 the Forest Service. In emergency situations, the Licensee shall notify the Forest Service of its actions as soon as possible, but not more than 48 hours, after such actions have been taken. Whether or not the Forest Service is notified or provides consultation; the Licensee shall remain solely responsible for all abatement measures performed. Other hazards should be reported to the appropriate agency as soon as possible.

Condition No. 23—Access

The Forest Service reserves the right to use or permit others to use any part of the licensed area on National Forest System 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. 24—Signs

The Licensee shall consult with the Forest Service prior to erecting signs on National Forest System lands covered by the license. Prior to the Licensee erecting signs or advertising devices on National Forest System lands covered by the license, the Licensee must obtain the written approval of the Forest Service as to location, design, size, color, and message. The Licensee shall be responsible for maintaining all Licensee-erected signs to neat and presentable standards.

III. Project Specific Forest Service Conditions

Condition No. 25—Streamflow

1. **Minimum Streamflows**. For the preservation and improvement of aquatic resources in the Project area, Licensee shall maintain specified Minimum Streamflows and release Pulse Flows below Project dams as measured at gages NF-2 and NF-70 in accordance

with the Tables A-1 and A-2 below. The Minimum Streamflows identified are minimum release requirements as per Paragraph 5 below. Minimum Streamflows shall commence within 60 days of License issuance, unless facility modifications are required.

Table A-1. Releases from Canyon Dam

Water Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Critically Dry	**75**	**75**	**90**	**90**	**90**	**80**	**75**	**60**	**60**	**60**	**60**	**70**
Dry	**90**	**100**	**110**	**110**	**110**	**110**	**80**	**70**	**60**	**60**	**60**	**75**
Normal	**90**	**100**	**125**	**125**	**125**	**125**	**90**	**80**	**60**	**60**	**60**	**75**
Wet	**90**	**100**	**125**	**150**	**150**	**150**	**95**	**80**	**60**	**60**	**60**	**75**

Table A-2. Releases from Belden Dam

Water Year type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Critically Dry	**105**	**130**	**170**	**180**	**185**	**90**	**80**	**75**	**75**	**75**	**85**	**90**
Dry	**135**	**140**	**175**	**195**	**195**	**160**	**130**	**110**	**100**	**100**	**110**	**115**
Normal	**140**	**140**	**175**	**225**	**225**	**225**	**175**	**140**	**140**	**120**	**120**	**120**
Wet	**140**	**140**	**180**	**235**	**235**	**225**	**175**	**140**	**140**	**120**	**120**	**120**

Where facility modification is required to implement the efficient release of Minimum Streamflows, the Licensee shall submit applications for permits within one year after license issuance and complete such modifications as soon as reasonably practicable but no later than two years after receipt of all required permits and approvals. Prior to completion of such required facility modifications, the Licensee shall make a Good Faith effort as defined in Paragraph 1.5 of the Relicensing Settlement Agreement to provide the specified Minimum Streamflows within the capabilities of the existing facilities. The requirements of this Paragraph 1 are subject to temporary modification if required by equipment malfunction, as directed by law enforcement authorities, or in emergencies as defined in Paragraph 1.5 of the Relicensing Settlement Agreement. The requirements of this condition are subject to temporary modification if required by an emergency, as defined herein in Paragraph 1.5 of the Relicensing Settlement Agreement. If the Licensee temporarily modifies the requirements of these conditions, then the Licensee shall make all reasonable efforts to promptly resume performance of such requirements and shall notify State Water Resources Control Board, Forest Service, U. S. Fish and Wildlife Service, NOAA Fisheries, and all

other Relicensing Settlement Agreement signatories pursuant to Paragraph 5.9 of the Settlement Agreement.

2. Streamflows in Lower Butt Creek. Licensee shall take no action to reduce dam leakage, tunnel leakage, spring or other natural flows that currently provide inflow to Lower Butt Creek below the Butt Valley Dam unless directed to do so by the Commission or other regulatory agency.

3. Pulse Flows in North Fork Feather River. Licensee shall implement Pulse Flows and gravel monitoring in the Seneca and Belden Reaches to further assist in the preservation and improvement of aquatic conditions in the Project area.

A. Pulse Flows: Licensee shall provide one Pulse Flow release from both Canyon Dam (Seneca Reach) and Belden Forebay Dam (Belden Reach) in each of January, February and March if the forecasted Water Year Type for that month, as defined in Condition 27, indicates that the water year is anticipated to be either Normal or Wet. No Pulse Flows are required in months where the Water Year Type forecast for that month indicates that the water year will be either Dry or Critically Dry. No Pulse Flows will be required in March in the respective reach if two successive days of mean daily water temperature greater than 10 degrees C are measured at gages NF-2 (Seneca Reach) or NF-70 (Belden Reach), or if rainbow trout spawning in either the Seneca or Belden Reaches is observed and reported to Licensee by the California Department of Fish and Game or Forest Service. In both the Seneca and Belden Reaches, the total volume of water released for each Pulse Flow event (including the water released during the ramp up and ramp down periods) shall not exceed 1,800 AF. Initially, the typical schedule will be to increase the streamflow at the Basic Ramping Rate as defined in Paragraph 6(A) below to reach the peak streamflow, and hold the peak streamflow for 12 hours. The peak streamflow is variable by month and Water Year Type as follows: 675 cfs in January of Wet and Normal water years; 1,000 cfs in February and March of Normal water years, and 1,200 cfs in February and March of Wet water years. In the Seneca reach during March of Normal and Wet years, streamflow will be reduced at the Basic Ramping Rate until 400 cfs is reached, held at that streamflow for 6 hours, and then reduced at the Basic Ramping Rate until the Minimum Streamflow specified in Table A-1 above is reached. The 6-hour period of constant streamflow during the ramp down shall occur between 9 AM and 3 PM of a weekend to allow recreational boating opportunities. In the Belden Reach, the peak streamflow will be reduced using the Basic Ramping Rate until the Minimum Streamflow specified in Table A-2 above is reached, but no period of constant flow during the ramp down will be required in any month.

B. Pulse Flow Monitoring (Gravel Monitoring Plan): The Licensee shall, within 12 months of license issuance, develop and begin implementing a Gravel Monitoring Plan, in consultation with the Forest Service, California Department of Fish and Game, United States Fish and Wildlife Service, State Water Resources Control Board, and other Relicensing Settlement Agreement signatories. The Gravel Monitoring Plan must be approved by the Forest Service and filed with the Commission before implementation. The plan shall evaluate movement of sediment that occurs in the Belden and Seneca

Reaches during scheduled Pulse Flow events and other flow events of similar magnitudes. Emphasis shall be placed on monitoring the movement of spawning-sized gravel and recruitment of similar-sized material into the Belden and Seneca Reaches. If, after review of the data collected through the Gravel Monitoring Plan, the Forest Service, California Department of Fish and Game, United States Fish and Wildlife Service, NOAA Fisheries, and State Water Resources Control Board determine that the Pulse Flow regime outlined in Paragraph 3(A) above could be improved to enhance the availability and distribution of spawning-sized gravel or enhance riparian function, the agencies specified above may propose revisions to the magnitude, duration, and/or frequency of the scheduled Pulse Flows, subject to the following limitations: (a) any proposed revised Pulse Flow events shall continue to occur in the months of January – March of Normal and Wet years; (b) the total volume of water released for revised Pulse Flows in January – March of each year (including the water released during the ramp up and ramp down periods) shall not exceed 5,400 AF; (c) the total volume of water released for revised Pulse Flows in January shall not exceed 1800 AF but the agencies may defer the January and/or February flows to February or March; (d) any proposed revised Pulse Flows shall not exceed the safe operating capabilities of the existing outlet works; and (e) any proposed schedule for revised Pulse Flow releases shall take into consideration the forecasted Water Year Type as that forecast is developing each year, and no revised Pulse Flows shall be required in a month where the Water Year Type is forecasted to be Dry or Critically Dry. If the agencies propose a revised Pulse Flow regime concept that meets these criteria, Licensee shall file the revised Pulse Flow regime with the Commission.

4. Pulse Flows in Lower Butt Creek. If determined to be necessary pursuant to Paragraph 8 below, Licensee shall provide Pulse Flows in Lower Butt Creek via use of the Butt Valley Reservoir spillway or an acceptable alternative. The magnitude, ramping, and duration of the Pulse Flow[s] will be determined by the Licensee in consultation with the Forest Service, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, California Department of Fish and Game and other Relicensing Settlement Agreement signatories and will consider the need to adequately move desired particle size material to the confluence with the Seneca Reach and address woody debris and live vegetation concerns. The timing of any Pulse Flows shall be coordinated with Pulse Flows in the Seneca Reach.

5. Streamflow Measurement. For the purpose of determining the river stage and Minimum Streamflow below Canyon Dam and Belden Forebay Dam, Licensee shall operate and maintain the existing gages at NF-2 and NF-70 (United States Geological Survey (USGS) gages 11399500 and 11401112, respectively) consistent with all requirements of FERC and under the supervision of the USGS. Any modification of the gage facilities at NF-2 and NF-70 that may be necessary to measure the new Minimum Streamflow releases shall be completed within three years after issuance of the New Project License. Licensee shall record instantaneous 15-minute streamflow as required by USGS standards at NF-2 and NF-70. The instantaneous 15-minute streamflow at these gages shall be at least 90 percent of the Minimum Streamflows set forth in Tables A-1 and A-2 above provided that the individual mean flows over a 24-hour period shall be equal to or greater than the Minimum Streamflow set forth in Table A-1 and A-2.

6. Ramping Rates. For the preservation and improvement of aquatic resources in the Project area, Licensee shall control river flows by ramping streamflow releases from Project dams as provided in this Paragraph 6. Ramping Rates shall not apply to releases from Project Powerhouses (excluding Oak Flat Powerhouse) or Uncontrolled Spills from Project dams.

A. Basic Ramping Rates: During periods when ramping can be controlled, Ramping Rates shall apply to releases made from Canyon Dam and Belden Dam. Ramping Rates shall be followed during releases made to provide Pulse Flows and recreation river flows, and all other releases from Canyon Dam and Belden Dam that the Licensee makes for operational purposes. Monthly changes in Minimum Streamflow releases shall be made in a single step because the change is always less than the Ramping Rate criterion. Licensee shall follow the Basic Ramping Rate as close as reasonably practicable given gate and other operating limitations:

Canyon Dam: 0.5 ft/hr up and down, in all months, as measured at NF-2; and
Belden Dam: 0.5 ft/hr up and down, in all months, as measured at NF-70.

Changes in Canyon Dam streamflow releases, because of gate size and other factors, may exceed the Ramping Rate in any particular hour, but Licensee shall make a Good Faith effort as defined in Paragraph 1.5 of the Relicensing Settlement Agreement to return to the overall Basic Ramping Rate in the next and subsequent hours.

B. Revision to Ramping Rates: In the event that studies or monitoring during the term of the License identify the need for modifications to ramping rates, the Licensee shall consult with the Forest Service, United States Fish and Wildlife Service, NOAA Fisheries, California Department of Fish and Game, State Water Resources Control Board and other Relicensing Settlement Agreement signatories to establish more appropriate rates. New Ramping Rates for Pulse Flows shall not result in an increase in the total volume of water that is required to be released when the new Ramping Rates are applied to geomorphic Pulse Flows The total volume of water released for a recreation river flow release shall not exceed 110% of the flow volume resulting from the releases specified in Condition 28, Table B when the new Ramping Rates are applied. For example, the volume of water released in addition to the Minimum Streamflow during a recreation river flow release in July of a Normal water year is 471 AF when the Basic Ramping Rate is applied to the required 750 cfs release amount set forth in Condition 28, Table B. If the Basic Ramping Rate is revised, the volume of water released in addition to the Minimum Streamflow for that same month when the revised Ramping Rate is applied shall not exceed 518 AF. Depending upon how the Basic Ramping Rate is revised, the volume limitations described above may require a corresponding change in the magnitude or duration of the scheduled Pulse Flows or recreation river flow release.

C. Unit Trips: Licensee shall make a Good Faith effort as defined in Paragraph 1.5 of the Relicensing Settlement Agreement to control streamflow releases to stay within the Basic Ramping Rates but shall not be in violation of the Basic Ramping Rates in the

event that the specified rates are exceeded due to a unit tripping off-line, and subsequent restoration, or other conditions beyond the reasonable control of Licensee.

7. Belden Block Loading. To (a) minimize the frequency of fluctuation in the river stage and (b) help meet Basic Ramping Rates at downstream Licensee dams, Licensee shall Block Load Belden Powerhouse at times when the Rock Creek Dam is spilling water in excess of the minimum streamflow required under the FERC license for Project No. 1962 but less than 3,000 cfs. Under Block Loading, a unit's generation level is not cycled but rather set at a constant level for a predetermined period of time. Licensee shall not be required to implement or continue this operation if the gate controls at downstream Licensee dams are shown to be able to meet the Ramping Rates specified in the Project No. 1962 license without such Block Loading. If the draft through Belden Powerhouse needs to be increased or decreased from Block Loading levels between 0 and 40 MW, Licensee shall, to the extent reasonably feasible, make adjustments to Belden Powerhouse drafts so as not to exceed ramping rates specified in the Project No. 1962 license. Because of operational constraints that limit Licensee's ability to operate Belden Powerhouse between 40 and 70 MW, Licensee shall not be required to comply with the Basic Ramping Rates if a transition through these MW levels is needed. Licensee shall attempt to accomplish this transition with as little impact on the Basic Ramping Rates as reasonably feasible.

8. Lower Butt Creek Streamflow and Habitat Monitoring. In addition to maintaining gages at NF-2 and NF-70 as provided in Paragraph 5 above, Licensee shall rehabilitate, as necessary, and maintain an existing streamflow gaging station located on Lower Butt Creek designated by Licensee as NF-9. An approximate rating curve shall be maintained with periodic spot checks and re-rating as necessary. The gage and the data collected at the gage shall not be required to meet USGS standards. This gage shall be read each year on or about April 1, June 1, August 1 and October 1.

Within 12 months of license issuance, Licensee in consultation with Forest Service, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, California Department of Fish and Game, and other Relicensing Settlement Agreement Signatories, shall develop and submit to the Commission for its approval a plan to monitor and assess aquatic habitat quality in Lower Butt Creek between Butt Valley Dam and the confluence with the NFFR. This monitoring plan shall include evaluation of habitat quality at intervals of 3 to 5 years, depending on Water Year Type and other appropriate factors. If the Licensee, in consultation with the Forest Service, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board and California Department of Fish and Game, concludes that habitat quality in Lower Butt Creek has degraded and that Pulse Flows would provide a significant benefit, then Licensee shall implement Pulse Flows as described in Paragraph 4 above.

If the monitoring plan data demonstrates that the Lower Butt Creek weir is blocking fish passage, then within one year after the evaluation of monitoring plan data that confirms fish passage blockage Licensee shall remove or modify the existing weir to allow fish passage.

Condition 26-Seneca, Butt Valley Creek, and Belden Reach Biological Monitoring

Within one year of license issuance, and after consultation with the Forest Service, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, California Department of Fish and Game and other Relicensing Settlement Agreement signatories, the Licensee shall file with the Commission a fish population, benthic macroinvertebrate, and amphibian monitoring plan approved by the Forest Service. The plan shall outline sampling to be conducted in the Upper North Fork Feather River Project, Seneca, Butt Creek and Belden bypass reaches. The plan shall include, at a minimum, the following components: (a) between years 10 and 12 after license issuance, Licensee shall initiate a cooperative aquatic monitoring program with the Forest Service, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, and California Department of Fish and Game. Sampling shall occur every two years over a six-year period, for a total of three sampling efforts. The program shall include monitoring of fish populations including condition and trend and benthic macroinvertebrates in at least three sites in the Belden and Seneca Reaches. Benthic macroinvertebrate monitoring shall include population robustness, feeding group and tolerance/intolerance trend monitoring. Sampling may be deferred to the following year in the event of a Critically Dry Year; (b) the amphibian monitoring plan for the Seneca, Butt Creek and Belden bypass reaches shall include targeted monitoring of Forest Service Sensitive amphibians conducted at three-year intervals beginning no later than three years following license issuance. Should target amphibians be located in Project reaches, focused annual monitoring of population health, life stages, reproductive success, and distribution will be required.

The Licensee shall provide results of monitoring and any flow change recommendations to the Commission, Forest Service, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, California Department of Fish and Game and other Relicensing Settlement Agreement signatories in a draft technical report prepared by June of the year following completion of each sampling effort. The Licensee shall finalize the technical report by the following December. In addition to describing the results, the report shall compare the results with those of previous surveys. The fish-based sampling shall discuss implications regarding trends in fish abundances. The benthic macroinvertebrate sampling report shall enumerate any changes over time regarding the composition of functional feeding groups, overall population heterogeneity and robustness, and pollution tolerance/intolerance trends.

At the conclusion of the aquatic monitoring program described in subsection (a) above, the Licensee, Forest Service, California Department of Fish and Game, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, Plumas County and other interested Relicensing Settlement Agreement signatories shall meet to review the results of the monitoring. If, after review of the data collected during the monitoring, the parties specified above in this paragraph determine that aquatic species or other ecological attributes may benefit from modifications to the Minimum Streamflows set forth in Tables A-1 and A-2 of Condition 25, the parties specified above in this paragraph shall evaluate and determine whether such modifications: (1) can be implemented within Licensee's operational capabilities; (2) will maintain the total annual volume of water that has been allocated for

Minimum Streamflows in any given Water Year Type as set forth in Tables A-1 and A-2 of Condition 25; and (3) will not adversely impact other Beneficial Uses, including hydroelectric power generation, Lake Almanor surface water elevation, and recreation. If all Relicensing Settlement Agreement signatories concur and propose revised Minimum Streamflows that meet these criteria, Licensee shall file the proposal with the Commission for its approval.

Condition No. 27-Water Year Type

Reservoir operating levels, Minimum Streamflows, Pulse Flow occurrence, and recreation flows may vary depending on the predicted magnitude of the annual runoff from the river basin. Water years have been classified into four Water Year Types based on the California Department of Water Resources (DWR) records of annual inflow to Lake Oroville (Oroville) from 1930-1999: Wet, Normal, Dry, and Critically Dry (CD). Licensee shall determine Water Year Type based on the predicted, unimpaired inflow to Oroville and spring snowmelt runoff forecasts provided by Licensee and DWR each month from January 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.
CD:	Less than 2,505 TAF inflow to Oroville.

Licensee shall make a forecast of the Water Year Type on or about January 10th, notify the Forest Service, California Department of Fish and Game, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, Plumas County, and other Relicensing Settlement Agreement signatories within 15 days, and operate the Project based on that forecast for the remainder of that month and until the next forecast. New forecasts will be made on or about the tenth of February, March, April, and May after the snow surveys are completed, and operations will be changed as appropriate. In making the forecast each month, average precipitation conditions will be assumed for the remainder of the water year. The May forecast shall be used to establish the Water Year Type for the remaining months of the year and until the next January 10, when forecasting shall begin again. Licensee shall provide notice to the Commission, Forest Service, State Water Resources Control Board, California Department of Fish and Game, United States Fish and Wildlife Service, NOAA Fisheries, Plumas County, and other Relicensing Settlement Agreement signatories of the final Water Year Type determination within 15 days of making the determination.

Condition No. 28-Recreation River Flow Management

1. Recreation River Flow Technical Review Group. Licensee shall, within 6 months after license issuance, establish a Recreation River Flow Technical Review Group (TRG) for the

purpose of consulting with Licensee in the design of recreation and resource river flow management and monitoring plans, review and evaluation of recreation and resource data, and in the development of possible recreation river flows in the Belden Reach. Licensee shall inform the Forest Service, California Department of Fish and Game, State Water Resources Control Board, United States Fish and Wildlife Service, NOAA Fisheries, National Park Service, Plumas County, and other signatories of the Relicensing Settlement Agreement of the formation of the TRG and seek their participation in the TRG. TRG meetings shall be open to and accept comments from the public. The Licensee shall maintain, and make public, records of TRG meetings, and shall forward those records with any recommendations to the Forest Service, State Water Resources Control Board and the Commission. The Licensee shall establish communication protocols in consultation with the TRG and Forest Service to facilitate interaction between TRG members, which allow for open participation, consultation with independent technical experts, and communication between all TRG participants.

2. Recreation Flow Implementation Plan. Licensee shall implement the following plan.

A. Determination to Proceed with Test Flows: Within six months after license issuance, Licensee shall convene the TRG to evaluate the existing available ecological information regarding recreation river flows and make a determination whether (i) sufficient information exists to conclude that recreation river flows will result in unacceptable impacts on sociological or ecological resources; or (ii) recreation test river flows as prescribed in Paragraph 3, Table B below should be conducted in order to further evaluate the ecological and social effects of recreation river flows in the Belden Reach. If the TRG determines that recreation test river flows should be conducted, test flows shall not exceed the frequency, magnitude or duration of flows prescribed for any given month in Paragraph 3, Table B below. Within six months of convening the TRG, Licensee shall forward the TRG recommendations regarding recreation test river flows to the Forest Service and State Water Resources Control Board.

B. Approvals to Proceed with Test Flows: If the TRG recommends that recreation test river flows in the Belden Reach should be conducted, Licensee shall request the Forest Service and State Water Resources Control Board to consult with appropriate state and federal agencies including the United States Fish and Wildlife Service, NOAA Fisheries, Licensee, tribal governments, and other interested Relicensing Settlement Agreement signatories prior to approving, denying or modifying the TRG's proposal. If the Forest Service and State Water Resources Control Board approve a proposed schedule for recreation river test flows that does not exceed the frequency, magnitude or duration of the flows prescribed for any given month in Paragraph 3, Table B below, Licensee shall submit the proposal to the Commission for its approval.

C. Conducting Test Flows: Upon approval from the Commission, Licensee shall conduct recreation test river flows as prescribed in Paragraph 3, Table B below for a 3-year period.D. Monitoring: Licensee shall prepare and submit to the Forest Service and State Water Quality Control Board for their review and approval, concurrent with the TRG recommendation, a Belden Reach Recreation Test River Flow Evaluation Plan.

Upon Forest Service and State Water Resources Control Board approval, Licensee shall file the plan with the Commission for its approval. The plan shall be designed to evaluate the effects of the recreation test river flow releases on ecological and social resources**,** and the metrics to be used in this determination. Upon approval of the plan by the Commission, Licensee shall implement the plan during the 3-year recreation test flow period.

E. Determination of Continued Flows: After the 3-year recreation test river flow period, Licensee shall convene the TRG to evaluate the existing available ecological and social information. Licensee shall request that the TRG make a recommendation regarding whether recreation river flows should be continued in order to meet the river flow management for recreation objective. If the TRG determines that recreation river flows should continue, the flows shall not exceed the frequency, magnitude or duration of flows prescribed for any given month in Paragraph 3, Table B below.

F. Approval of Results of Determination of Continued Flows: Licensee shall forward to the Forest Service and State Water Quality Control Board any recommendation by the TRG to continue recreation river flows. Licensee shall request that the Forest Service and State Water Resources Control Board consult with appropriate state and federal agencies including United States Fish and Wildlife Service, NOAA Fisheries, Licensee, tribal governments, and other interested Relicensing Settlement Agreement signatories prior to approving, denying or modifying the TRG's proposal. If the Forest Service and State Water Resources Control Board approve a proposed schedule for continued recreation river flows that does not exceed the frequency, magnitude or duration of the flows prescribed for any given month in Paragraph 3, Table B below, Licensee shall submit the proposal to the Commission for its approval.

3. Recreation River Flows. Subject to the conditions of Paragraph 2 above, Licensee shall implement the following recreation river flow schedule and other provisions presented in Table B, Belden Reach Recreation River Flow Schedule.

Table B – Belden Reach Recreation River Flow Schedule *

Month	Release amount in Cubic Feet per Second (cfs)		Release Days per Month				Boats Per Day Triggers	
	Dry/ Cri Dry	Normal/ Wet	Crit. Dry Start	Crit. Dry Cap	Dry/ Normal/ Wet Start	Dry/ Normal/ Wet Cap	Wet & Normal /Dry	
							Up	Down
July	650	750	1 day	1 day	1 day	2 days	>100	<100
Aug	650	750	1 day	1 day	1 day	2 days	>100	<100
Sep	650	750	1 day	1 day	1 day	2 days	>100	<100
Oct	650	750	1 day	1 day	1 day	2 days	>100	<100

* During Normal and Wet water years, recreation river flow releases at Belden Dam and measured at NF-70 shall occur between the hours of 10 AM and 4 PM for the first release day of each month, and between the hours of 10 AM and 2 PM for the second release day of each month. During Dry and Critically Dry water years, recreation river flow releases shall occur between the hours of 10 AM and 1 PM for both release days.

A. Recreation Flow Calendar: Licensee shall post, through a third party or other mechanism, an annual recreation flow calendar that schedules the initial recreation flow day per month. Licensee shall conduct an annual planning meeting with State Water Resources Control Board, Forest Service, and other interested Relicensing Settlement Agreement signatories each year in March to discuss expected Water Year Type, results of monitoring efforts, Licensee maintenance needs that may conflict with recreation flow releases, and other relevant issues.

B. Additional Flow Days: The desired date of the month for any additional recreation river flow release days triggered by number of boats per day as described in Paragraph 3(D) below will be recommended by the TRG and Forest Service based on evaluation of social and ecological considerations.

C. Recreation River Flow Postponement:

1. Emergencies: In the event of an Emergency as defined in Paragraph 1.5 of the Relicensing Settlement Agreement, Licensee may postpone any scheduled recreation river flow release. Licensee shall provide as much notice as reasonably practicable under the circumstances.

2. Postponed Recreation River Flows: To the extent reasonably practicable, Licensee shall reschedule postponed recreation river flow releases as recommended by the TRG and Forest Service.

D. Triggers for Adjustments: During scheduled recreation river flow releases, Licensee shall count observed boater use in number of boats per day to determine whether recreation river flow release days should be added or subtracted. All boats will be counted as 1 boat except for rafts 12' or greater in length will be counted as 2 boats. All boats observed on the Belden Reach for any part of a given day will be counted. If the number of boats per day on the first recreation river flow release day for a month exceeds 100 boats per day, one day of recreation river flow release shall be added to the recreation river flow release schedule in that month the next year. If the number of boats per day is less than 100 boats per day for both the recreation river flow releases in one month, one day of recreation river flow release shall be subtracted from the recreation river flow release schedule for that month in the next year. Recreation river flow releases shall not decrease below 1 day per month and shall not exceed the cap defined in Table B above. Recreation river flow release days shall not be added or subtracted during any period of recreation test river release flows conducted pursuant to Paragraph 2(C) above.

The Licensee shall develop and implement a visitor survey for up to three years to determine if visitors would choose to return to recreate on the Belden Reach based on their experience related to number of boats encountered on the river. The visitor survey questionnaire and methodology shall be statistically valid and approved by the TRG and Forest Service. Licensee shall request that the TRG and Forest Service evaluate the survey results and other data to determine if the trigger for adding/deleting days, based on number of boats per day, should be amended based on this analysis.

E. Ramping Rates: In implementing recreation river flow releases, Licensee shall apply the Basic Ramping Rates as defined in Paragraph 6(A) of Condition 25.

F. Streamflow Information: Through a third party or other mechanism, Licensee shall make available on the Internet, a calendar that lists the dates of the March Pulse Flow in the Seneca Reach and any scheduled Pulse Flow or recreation river flow releases in the Belden Reach. The calendar shall state the timing and magnitude of the scheduled flow release. The March Pulse Flow release in the Seneca Reach will be posted by February 15 and the scheduled summer releases in the Belden Reach shall be posted by May 15. If the Licensee anticipates releasing flows in the Seneca or Belden Reaches of a similar magnitude and duration as a scheduled Pulse Flow, it shall post an estimate of the release magnitude and duration of the flow.

Condition No. 29-Belden Interagency Recreation River Flow Management Plan

If a determination is made to proceed with scheduled recreation river flow releases, Licensee, prior to the start of the first full recreation season shall coordinate with the Forest Service, Plumas County, and California Department of Transportation to develop a Memorandum of Understanding to produce a Belden Interagency Recreation River Flow Management Plan. The Plan shall address management and integration of recreation opportunities provided by the Belden Recreation River Flow release with other river recreation opportunities in the watershed. The Plan shall address establishment of visitor capacity thresholds, maintenance of facilities, signage, traffic management and monitoring. This Plan and Memorandum of Understanding would not be financially binding, but would document agency roles, responsibilities, and intentions related to river recreation management.

If after the Belden recreation river test flow evaluation period, recreation river flow releases in accordance with Condition 28 are not continued, the Memorandum of Understanding and Plan would be terminated.

Condition No. 30-Reservoir Operation

1. Water Level Management. To meet the ecological, cultural, aesthetic, social, economic, recreational and Project operational needs, Licensee shall operate Project reservoirs in accordance with the following provisions. Lake level is defined as surface water elevation, expressed in PG&E datum and measured at Canyon Dam, Butt Valley Dam, and Belden Forebay Dam. PG&E datum is 10.2 feet lower than the USGS datum. All elevations noted within this Condition are PG&E datum.

2. Lake Almanor Water Levels. Lake Almanor is a multi-season reservoir that typically fills from January through June and is then drafted from July through December. Licensee shall operate Lake Almanor as follows:

A. Wet and Normal Water Years: Under Wet and Normal Water Year Types, Licensee shall operate Lake Almanor so that by May 31, the water surface elevation is at or above 4485.0 feet, corresponding to approximately 908,000 acre-feet (AF). From June 1 through August 31, Licensee shall operate Lake Almanor so that the water surface elevation is at or above 4485.0 feet, corresponding to approximately 908,000 AF.

B. Dry Water Years: Under Dry Water Year Types, Licensee shall operate Lake Almanor so that by May 31, the water surface elevation is at or above 4483.0 feet, corresponding to approximately 859,000 AF. From June 1 through August 31, Licensee shall operate Lake Almanor so that the water surface elevation is at or above 4480.0, corresponding to approximately 787,000 AF.

C. Critically Dry Water Years: Under Critically Dry Water Year Types, the Licensee shall operate Lake Almanor so that by May 31, the water surface elevation is at or above

4482.0 feet, corresponding to approximately 835,000 AF. From June 1 through August 31, Licensee shall operate Lake Almanor so that the water surface elevation is at or above 4480.0 feet, corresponding to approximately 787,000 AF.

3. Butt Valley Reservoir Water Levels. *Under all Water Year Types, Licensee shall operate Butt Valley Reservoir so that minimum water surface elevation from June 1 through September 30 is at or above elevation 4120.0 feet, corresponding to approximately 32,000 AF and from October 1 through May 30, is at or above elevation 4115.0 feet, corresponding to approximately 24,500 AF.*

4. Belden Forebay Water Levels. Under all Water Year Types, Licensee shall operate Belden Forebay so that the minimum water surface elevation is 2905.0 feet, corresponding to approximately 300 AF.

5. Multiple Dry Water Years. In the event of multiple, sequential Dry or Critically Dry Water Year Types, Licensee shall be allowed to decrease surface water elevations beyond those specified in Paragraphs 2 through 4 above. By March 10 of the second or subsequent Dry or Critically Dry water year and the year following the end of a sequence of Dry or Critically Dry water years, Licensee shall notify the Forest Service, California Department of Fish and Game, United States Fish and Wildlife Service, State Water Resources Control Board, and Plumas County of Licensee's drought concerns. By May 1 of these same years Licensee shall consult with representatives from the Forest Service, California Department of Fish and Game, United States Fish and Wildlife Service, NOAA Fisheries, State Water Resources Control Board, Plumas County, and other signatories to the Relicensing Settlement Agreement to discuss operational plans to manage the drought conditions. If the parties specified above agree on a revised operational plan, Licensee may begin implementing the revised operational plan as soon as it files documentation of the agreement with the Commission. If unanimous agreement is not reached, Licensee shall submit the proposed plan to the Commission, as well as both assenting and dissenting comments, should they exist, and request expedited approval.

6. Temporary Modifications. Licensee may temporarily modify the minimum water surface elevations specified in this Condition upon unanimous agreement between Licensee, Forest Service, State Water Resources Control Board, California Department of Fish and Game, United States Fish and Wildlife Service, NOAA Fisheries, Plumas County, and other Relicensing Settlement Agreement signatories or, if a timely agreement is deemed not possible by Licensee, upon Commission approval of a proposal filed by Licensee. Any agreement reached by the parties specified above may be implemented as soon as Licensee files documentation of the agreement with the Commission. If no agreement is reached by the parties specified above, the Licensee shall provide a proposal to the Commission for approval, such proposal shall contain any comments or recommendations received from the Forest Service, State Water Resources Control Board, United States Fish and Wildlife Service, NOAA Fisheries, California Department of Fish and Game and Plumas County. Possible conditions that may warrant temporary modifications include substantial maintenance or repair work on Project facilities.

7. Emergencies. In the event of an Emergency as defined in Paragraph 1.5 of the Relicensing Settlement Agreement, Licensee is authorized to take such immediate action as may be necessary to reduce the risk.

8. Exercise of Licensee's Water Rights. Nothing in this Condition is intended to prevent or reduce Licensee's ability to fully exercise its water rights for storage and direct diversion at its facilities.

9. Maximum Water Surface Elevation. In addition to the management procedures contained in this Section, Licensee shall take such reasonable actions as may be prudent to keep the water surface elevation in Lake Almanor from exceeding elevation 4494.0 feet unless a higher level is approved by the Commission and the California Department of Water Resources, Division of Safety of Dams.

10. Implementation of Water Surface Elevation Requirements. Licensee shall implement the requirements of this Condition within six months after license issuance.

11. Lake Almanor Information. Licensee shall make available daily midnight storage and water surface elevation of Lake Almanor, rounded to the nearest 100 AF and tenth of a foot, respectively, delayed between approximately 7 and 10 days, on the Internet through a third party or other mechanism.

12. Annual Meeting With Plumas County. Licensee shall meet annually with a committee appointed by the Plumas County Board of Supervisors. This meeting shall be held between March 15 and May 15 to allow Licensee to inform the committee about Lake Almanor water elevation levels predicted to occur between May 1 and September 30. In addition, should Licensee forecast that its obligation to deliver water to the State of California and Western Canal Water District pursuant to the January 17, 1986 agreement will require Licensee to deviate from the Lake Almanor water elevation levels set forth in this Condition, Licensee shall schedule an additional meeting with the committee within one month of the forecast.

Condition No. 31-Wildlife Habitat Enhancement

Within one year of license issuance, Licensee shall file with the Commission, a Wildlife Habitat Enhancement Plan (Plan) to enhance wildlife habitat. The Plan shall be developed in consultation with the Forest Service, United States Fish and Wildlife Service, California Department of Fish and Game, State Water Resources Control Board, and Plumas County. *The enhancement efforts described in the Plan shall be limited to lands owned by the Licensee on the shoreline of Lake Almanor from Last Chance Campground westward to approximately the northern edge of the flood control channel south of the Chester Airport. The Plan shall be designed to benefit a variety of sensitive biological resources including rare plants, wetlands, streamside riparian communities, cultural resources and sensitive wildlife habitat. The primary elements of the Plan shall be fencing and vehicle exclusion*

measures that will allow continued public foot access to the area to be implemented within two years of license issuance. Licensee's obligation to fund enhancement efforts in the Plan shall be limited to an initial investment of $20,000 (constant dollars not subject to escalation) and an ongoing annual maintenance investment of $5,000 (2004 dollars escalated as defined in Paragraph 4.4.5 of the Relicensing Settlement Agreement). The Plan shall include a provision for periodic review of enhancement efforts with the agencies noted above and shall include procedures for documenting initial and ongoing enhancement efforts.

Condition No. 32-Recreation

Licensee shall implement the following recreation facility development, operation and maintenance, monitoring, plan review and revision, resource integration, and I&E programs over the term of the license as stipulated below. Within one year of license issuance, Licensee shall finalize the License Application's Draft UNFFR Recreation Resource Management Plan (RRMP) in consultation with the Forest Service and Plumas County for the purpose of describing the implementation of each of the following programs.

1. Recreation Facilities Development Program. The Licensee shall implement the recreation facility enhancement measures described in this Section after license issuance and during the license term, based on target completion dates indicated below and Recreation Monitoring Indicators and Standards contained in the Draft RRMP. Improvements shall be made. The term "Accessible" below refers to ADA-accessibility improvements that shall be made in accordance with the Americans with Disability Accessibility Guidelines (ADAAG) at the time the recreation facilities are upgraded or constructed. All Forest Service recreation facilities shall be constructed in accordance with ADAAG at the time improvements are made.

A. Initial License Issuance Recreation Enhancement Measures

Licensee shall initiate and complete implementation of the following recreation measures within the specified target completion dates, as reasonably practicable.

1. Lake Almanor

a. Last Chance Family and Group Campground: *Target completion is 1-3 years after license issuance.*
In accordance with ADAAG, Licensee shall modify two campsites and existing toilet buildings and provide an access route leading to the nearby creek (150 feet.)

b. Rocky Point Campground and Day Use Area: *Target completion is 5-10 years after license issuance.*

i. *Licensee shall convert Loop 3 overflow camping area into a day use swim area containing an approximately 1-acre sand beach above the high water level*

(4,494-foot elevation, PG&E datum), swimming delineator, paved parking area for 35 to 40 vehicles, and double-vaulted toilet building.

ii. *Licensee shall relocate the twenty campsites in the Loop 3 overflow area to the Loop 1 camp overflow area and provide a new double vaulted toilet building at this location.*

iii. *Licensee shall provide a new entrance kiosk, three fee-based shower facility buildings (one for each loop) with hot water, and bear-proof food lockers at each of the 151 campsites within the campground.*

iv. *Licensee shall replace older Klamath stoves (a low-style camp stove with a stovepipe) with campfire rings.*

v. *Licensee shall revegetate or harden significantly disturbed areas where erosion has been caused by pedestrian or vehicle traffic.*

vi. *Licensee shall implement the following Accessibility improvements in accordance with ADAAG:*

   a) *Modify 10 campsites (four at Loop 1, three at Loop 2, and three at Loop 3).*
   b) *Provide an Accessible route to the high water level (4,494-foot elevation, PG&E datum) at the sandy beach.*
   c) *Modify the existing campground library box, telephones, and the envelope box at the pay station and provide appropriate Accessible access routes.*
   d) *Modify existing water faucets near Accessible toilets and campsites.*
   e) *Provide Accessible routes to the toilet buildings near the campground entrance and near campsite # 100.*
   f) *Relocate the interior pay station directly across the road to a level, firm, and stable surface (Loop 2).*

c. Forest Service Almanor Shoreline Facilities: Target completion 1-13 years after license issuance.

i. Licensee shall provide the Forest Service with 40 percent matching funds up to a total maximum of $5,000,000 (2004 dollars escalated as defined in Paragraph 4.4.5 of the Relicensing Settlement Agreement), for the Forest Service to construct recreation improvements at the following FS-owned recreation facilities: Almanor Family Campground, Almanor Group Campground, Almanor Amphitheater, Almanor Picnic Area, and Almanor Beach. Recreation improvements will include reconstruction of existing facilities and construction of new facilities. During the first thirteen years of the new license term, Licensee's annual obligation to provide matching funds shall be triggered by Forest Services' ability to obtain its share of matching fund contributions. Although the Forest Service will attempt to maintain the 40/60 percent split each year, Forest Service may elect to require Licensee to provide a greater or lesser percentage of matching funds in any given year provided that the total cost to Licensee to fund recreation improvements at the above Forest Service-owned recreation facilities shall not exceed $5,000,000 (2004 dollars escalated as defined in Paragraph 4.4.5 of the Relicensing Settlement Agreement). Forest Service

shall provide Licensee with its preliminary annual funding request no later than January 15 of the previous year and final funding request no later than April 15 of the previous year. Forest Service will bill Licensee when FS share of funds have been allotted. Licensee shall make actual payments upon receipt of billing by the Forest Service.

ii. If, at the end of the thirteenth year after the license is issued, the Licensee has not paid the Forest Service the maximum $5,000,000 (2004 dollars escalated as defined in Paragraph 4.4.5 of the Relicensing Settlement Agreement) because the Forest Service has been unable to obtain its corresponding share of the matching funds, then Licensee shall use the remaining funds (the difference between the amount Licensee has already paid the Forest Service in matching funds and the $5,000,000 cap (2004 dollars escalated as defined in Paragraph 4.4.5 of the Relicensing Settlement Agreement)) for recreation improvements at the Almanor Beach *and East Shore Family Campground, which shall include the addition of up to 28 campsites in a third loop as funding permits.* The Forest Service will be responsible for all design and construction of recreation improvements at Forest Service facilities, and will consult with the Licensee prior to adoption of the final design. The Forest Service will maintain ownership of the facilities both before and after completion of construction of the recreation improvements.

iii. Forest Service intends to use the matching funds provided by Licensee as described in the preceding paragraph to construct the following recreation improvements. Forest Service may adjust these construction activities depending upon the ability of the Forest Service to obtain its share of the matching funds, site limitations, or other appropriate factors.

a) **Almanor Family Campground and Amphitheater:** Reconstruct the North and South loops, including general improvement of travel ways and spurs, upgrade sanitation facilities, provide utility hook ups, and construct amphitheater.

b) **Almanor Group Campground:** Construct camping loops, group gathering area including pavilion, trailer dump station, and rehabilitate, restore and revegetate decommissioned overflow and group camp.

c) **Almanor Picnic Area:** Define and upgrade picnic sites, shade structures, and interpretation/orientation facilities.

d) **Almanor Beach:** Expand sandy beach area, expand parking area, and construct swim buoy.

d. East Shore Group Camp Area: *Target completion is 1-3 years after license issuance.*

i. Licensee shall convert the existing East Shore Picnic Area to a group reservation camp area that shall accommodate one group of 16 RVs or two groups of eight RVs. The entrance road shall be widened and internal road circulation shall be improved to accommodate RVs.

ii. *Licensee shall provide one Accessible parking space near the existing double-vaulted toilet building and an Accessible access route to the nearby trash receptacles.*

iii. *Licensee shall provide bear-proof food lockers at each of the 16 sites, a non-paved, non-Accessible trail down to the shoreline, including switchbacks and stairs, and erosion control measures.*

e. North Shore Public Boat Launch: *Target completion is 3-5 years after license issuance.*

i. *Licensee shall provide a new and expanded public boat launching facility at North Shore Campground. This facility shall include paved parking for 40 single vehicles with trailers and 12 single vehicles, a double-vaulted toilet building, and a boarding float. In addition, Licensee shall dredge and maintain along the existing submerged river channel to provide an approximate 1,000-ft long, 50-ft wide, and 6-ft deep boat channel that provides boat access to approximately the 4,480-foot elevation (PG&E datum). The boat launch will be open for public use from April 1 to December 1 when the lake's elevation is at or above the 4,480-foot elevation (PG&E datum) and as snow on the ground permits.*

ii. *Licensee shall provide public access to the boat launch facility along an abandoned portion of Highway 36 located along the north side of the campground to reduce traffic impacts to the campground.*

iii. *Licensee shall relocate 22 campsites within the Project boundary that will be impacted by the reconstructed boat launch facility.*

f. Stover Ranch Day Use Area: *Target completion is 3-5 years after license issuance. The Licensee shall develop the Stover Ranch Day Use Area to provide improved Lake Almanor shoreline access for Chester residents. This day use area shall include gravel parking for 10 to 20 vehicles, a double-vaulted toilet building, four picnic tables, a non-paved trail to the shoreline, and an interpretive sign. In addition, one RV site shall be constructed to accommodate a new seasonal Lake Almanor caretaker. The development of the Stover Ranch site shall be coordinated with the Chester Public Utility District and the Almanor Recreation and Park District.*

g. Marvin Alexander Beach: *Target completion is 1-3 years after license issuance. The Licensee shall assume management responsibility of the Pacific Service Employees Association (PSEA) Swim Beach and expand and improve the existing sandy beach to a 0.4-acre area above the high water level (4,494 foot elevation, PG&E datum). In addition, Licensee shall provide an improved gravel parking area for 30 to 45 single vehicles, replace the two single-vault toilet buildings, ten picnic tables, and provide a new swimming delineator. This PSEA Swim Beach shall be renamed to the Marvin Alexander Beach.*

h. Canyon Dam Day Use Area: *Target completion is 1-3 years after license issuance for this Licensee facility.*

i. *The Licensee shall provide an approximately 0 .3-acre sandy beach above the high water level (4,494 foot elevation, PG&E datum), swim area delineator, an*

informational kiosk, improved vehicle circulation, and eight new Accessible picnic tables at the Canyon Dam Day Use Area.

ii. *The Licensee shall modify eight existing picnic tables to make them Accessible, provide an Accessible parking space, and provide an Accessible route to the high water level (4,494-foot elevation, PG&E datum) at the swim beach area in accordance with ADAAG.*

iii. *The Licensee shall reserve approximately 1 acre of land adjacent to the Canyon Dam Day Use Area for potential future recreation development during the license term.*

***i. "East Shore" Day Use Area**: Target completion is 1-5 years after license issuance. Licensee shall designate a swimming area in the existing cove adjacent to the proposed new East Shore Campground. This day use area shall contain up to five picnic tables, non-paved shoreline access trails, a single vaulted toilet building, and parking for 10 to 20 vehicles.*

***j. Westwood Beach:** Target completion is 1-3 years after license issuance. The Licensee shall provide a gravel parking area for 10 vehicles, six picnic tables, an Accessible single vaulted toilet building, an approximately 0.1-acre sandy beach, a swim delineator, and directional signage at the Westwood Beach. Licensee shall also provide shoreline erosion control measures to protect the shoreline from wind caused wave action.*

***k. Stumpy Beach:** Target completion is 1-3 years after license issuance. The Licensee shall provide five picnic tables, directional signage, an approximately 0.7-acre sandy beach above the high water level (4,494 foot elevation, PG&E datum), and a swim delineator at Stumpy Beach. Licensee shall provide a single vaulted toilet building, if allowed by Plumas County and California Department of Transportation set back regulations; otherwise, Licensee shall provide a seasonal portable toilet building. Eight to 10 paved parking spaces parallel to Highway 147 shall be provided with trails connecting to the beach's northern and southern portions. The southern trail shall be Accessible where feasible and the northern trail shall be non-paved. In addition, Licensee shall provide four benches for visitors to view Lake Almanor and the surrounding mountains. Licensee shall also provide shoreline erosion control measures to protect the shoreline from wind caused wave action.*

***l. Catfish Beach:** Target completion is 3-5 years after license issuance. Licensee shall make a Good Faith effort as defined in Paragraph 1.5 of the Relicensing Settlement Agreement to negotiate a reasonable easement across private lands to provide public road access and install a single vaulted toilet building to the Catfish beach area. Licensee shall not be required to seek to condemn the easement if the negotiations are unsuccessful. If the Licensee is able to negotiate the easement, Licensee shall monitor and maintain the toilet building and the site's cleanliness through arrangements with the North Shore Campground managers, the Stover Ranch caretaker, or other appropriate means.*

m. Almanor Scenic Overlook: *Target completion is 1-5 years after license issuance. Licensee shall provide an Accessible parking space and route to the existing Accessible double-vaulted toilet building at the overlook and conduct vegetative brushing and clearing, as needed, to maintain views of Lake Almanor, Mt. Lassen and the Canyon Dam.*

n. Southwest Shoreline Access Zone: Target completion is 1-5 years after license issuance.
The Licensee, in consultation with the Forest Service, shall provide four shoreline access points at existing informally used locations along Lake Almanor's southwest shoreline between Prattville and Canyon Dam. These access areas shall provide vehicle access at or above the 4,494-foot elevation (PG&E Datum) and serve as pedestrian access areas to the adjacent shoreline. The Licensee shall provide four gravel parking areas that provide parking for up to 4 to 8 vehicles at two areas and 10 to 20 vehicles at the other two areas, vehicle barriers, regulatory, interpretive and informational signs, gravel access roads, and, if appropriate, single-vaulted toilet buildings at these access areas. Licensee shall close and rehabilitate other user-created vehicular access routes to the southwest shoreline as depicted in Site Plan 15 contained in the Draft RRMP and in consultation with the Forest Service.

o. Camp Connery: *Target completion 1-5 years after license issuance.*
Licensee shall provide an Accessible parking space and a new bunk house cabin with Accessible toilet and user fee based hot shower, retrofit the existing telephone position and water faucet features to meet the ADAAG.

2. Butt Valley Reservoir

a. Powerhouse Trails*: Target completion is 5-10 years after license issuance. Licensee shall provide two improved angler access trails to two locations near the Butt Valley Powerhouse. The first trail shall be non-paved and approximately 200- feet constructed from the existing gravel parking area next to the Butt Valley Powerhouse down the steep slope east of the powerhouse to the levee below. If needed, stairs shall be constructed at this location. The second powerhouse trail shall be Accessible (compact base rock) and originate from an existing pullout along the Prattville-Butt Valley Road near the Butt Valley Powerhouse and extend approximately 700 feet to the eastern shoreline of the inlet near the levee. A new, compacted base rock trailhead parking area with barriers shall be developed for this trail.*

b. Ponderosa Flat Campground: *Target completion is 5-10 years after license issuance.*
Licensee shall provide a single person, non-heated outdoor shower at Ponderosa Flat Campground. In accordance with ADAAG, Licensee shall make the following improvements:

i. *Modify four campsites and retrofit the existing designated Accessible campsites in the campground to be Accessible. The picnic table, fire ring, cooking grill, tent or RV area, and water faucet at each of these campsites shall be retrofitted to be Accessible.*
ii. *Replace the vault toilets in the overflow area with one new Accessible single vaulted toilet building and modify all other existing designated Accessible toilet buildings to meet current ADAAG. Provide an Accessible access route to the toilet building near Site 45 and one Accessible paved parking space located near the toilet buildings.*
iii. *Provide a swimming area at the campground that is Accessible with an approximately .4-acre sandy beach above the high water elevation (4132-foot, PG&E Datum) and swim delineator.*
iv. *Provide a new Accessible fishing access trail and Accessible pier or platform north of the overflow area.*

c. Cool Springs Campground: *Target completion is 5-10 years after license issuance. Licensee shall provide a two-person, non-heated outdoor shower at Cool Springs Campground. In addition, Licensee shall provide one new Accessible campsite. The picnic table, fire ring, cooking grill, tent or RV space, and water faucet at this campsite shall be made Accessible.*

d. Alder Creek Boat Launch: *Target completion is 5-10 years after license issuance. Licensee shall expand the existing Alder Creek Boat Launch parking area to accommodate 10 to 20 additional vehicles with trailers and to improve circulation. New parking areas on the east side of the Butt Valley Reservoir Road shall be gravel while those on the west of this road shall be paved. In addition, Licensee shall modify the boat launch to be Accessible and provide one Accessible parking space near the existing double vaulted toilet building.*

3. Belden Forebay

a. Belden Forebay Access: Target completion is 5-10 years after license issuance.
i. Licensee shall provide a car-top boat launch, a seasonal portable toilet building, and gravel parking area for 10 single vehicles at the Belden Forebay existing undeveloped parking area, which also serves as trailhead for the North Fork Fishing Trail.
ii. Provide suitable access for launching small, car top watercraft at the Belden Forebay.
iii. If Plumas County passes an ordinance as specified in Appendix B, Section 2, Paragraph 3(B) of the Relicensing Settlement Agreement, Licensee shall post signage at Belden Forebay referring to this ordinance that will limit boat engine horsepower to 10 hp and boat speeds to 5 mph on Belden Forebay and will prohibit swimming and boating within 0.25 mile of Belden Dam and at night at the Forebay.

b. **North Fork Fishing Trail**: Target completion is 1-3 years after license issuance. Licensee shall improve the North Fork Fishing Trail from the Belden Forebay parking area to the upstream side of the Caribou Powerhouse 1. Improvements shall include retrofitting the existing metal trail decking and railing at the powerhouse above the turbine outlets to provide enhanced access and safety, providing trail directional signs, and providing a wider, more even non-paved trail base along the chain-link fencing at the powerhouse yard and along Caribou Road from the parking area.

4. Bypass River Reaches

a. Upper Belden Reach River Access: Prior to initiation of any recreation river flow release, Licensee shall provide a river access point at the upstream end of the Belden Reach located at the spoil pile area. This access location shall include a seasonal portable toilet, a seasonal dumpster located over a concrete pad, and a non-paved parking area to accommodate 15 to 25 single vehicles.

b. Belden Reach Trails: Target completion is 1-3 years after license issuance. Licensee shall provide and maintain four trails to the Belden Reach shoreline from existing informal parking areas where public access can be provided in a safe manner.

c. ***Belden Rest Stop:*** *Target completion is 3-5 years after license issuance. Licensee shall relocate the existing picnic tables to the lower level and disperse them within the area from the Eby Stamp Mill to the gazebo near the creek. Two of the tables shall be replaced with Accessible tables and Accessible routes shall be developed to the gazebo, overlook area next to the creek, and the Eby Stamp Mill historical features. The upper level area shall be closed and the existing cooking grills removed. Licensee shall provide improved I&E elements at the rest stop and erosion control measures on the slope between the parking lot and upper picnic area.*

d. Lower Belden Reach River Access: If a determination is made to proceed with scheduled recreation river flow releases Licensee shall, upon Forest Service request, provide up to a maximum of $125,000 (constant dollars not subject to escalation) to the Forest Service for construction of non-Project river access to the lower Belden Reach. The Forest Service will make a Good Faith effort as defined in Paragraph 1.5 of the Relicensing Settlement Agreement to obtain matching funds to help offset the cost of these improvements.

2. Future Recreation Enhancement Measures. *The Licensee anticipates the following facility improvements may be needed over the term of the New Project License. Implementation of these measures is contingent on reaching the Recreation Monitoring Standards, contained in the Draft RRMP included in the License Application, over the New Project License term.*

A. Lake Almanor

1. Camp Connery Reservation Group Camp Area

a. Licensee shall provide a new group reservation camping area adjacent to the existing Camp Connery Group Camp. This area shall either provide space for two groups of approximately eight self-contained RVs or one group of approximately 16 self-contained RVs. A centrally located bear-proof food facility, two user fee based indoor shower buildings with hot water and flush toilets shall be provided at this group camp.

b. Licensee shall repair and resurface the existing access road.

2. East Shore Family Campground

Licensee shall provide a new two-loop family campground on Licensee-owned land along the east shore of Lake Almanor. The new campground will be constructed in two phases, and shall contain approximately 63 new tent and RV campsites. This campground shall contain bear-proof food lockers at each campsite, two user fee, indoor hot shower buildings with flush toilets, approximately 20 boat moorage slips/buoys, and a camp host site. If the Forest Service is unable to raise all of the matching funds specified in Section 7, Paragraph 1 (A) (1), (c) of the Relicensing Settlement Agreement, then the remaining funds shall be used for recreation improvements at the Almanor Beach and East Shore Family Campground, which shall include the addition of up to 28 campsites in a third loop as funding permits.

B. Butt Valley Reservoir

1. Ponderosa Flat Campground. *Licensee shall provide approximately 20 new primitive tent campsites (likely to the north of the current overflow area), and a new 100-person capacity group camp area in the existing overflow area.*

3. Project Boundary Adjustments. Within one year of license issuance Licensee shall apply to the Commission to adjust the FERC Project boundary to include *all Licensee-owned recreation improvements described under the Relicensing Settlement Agreement*, as well as the Forest Service Canyon Dam Boat Launch and Day Use Area, Dyer View Day Use Area, and Almanor Boat Launch. Within 6 months after the Forest Service has completed construction of each of the recreation improvements it has planned for the Forest Service Almanor Family Campground and Amphitheater, Almanor Group Campground, and Almanor Beach, Licensee shall apply to the Commission to adjust the Project boundary as needed to incorporate these facility components and to modify the license article that reflects Appendix A, Section 7, Paragraph 4 (Recreation Operation and Maintenance Program) of the Relicensing Settlement Agreement to include these Forest Service facilities. The boundary adjustment shall also include those portions of the Southwest Shoreline Access Zone components currently outside the project boundary.

4. Fisheries

a. Belden Reach

As per the agreement under the existing license and subject to the limitations set forth in subsection (c) below, the Licensee shall continue to reimburse the California Department of Fish and Game for stocking of approximately 5000 pounds of catchable trout per calendar year in the waters of the NFFR between its confluence with the East Branch NFFR and the Belden Diversion Dam. The cost to the Licensee for fish stocking shall be the actual average hatchery production cost per pound to the California Department of Fish and Game, and any additional applicable distribution and planting costs. Actual average cost per pound shall be determined by the California Department of Fish and Game based on hatchery production costs for the period beginning July 1 and ending June 30 of the previous calendar year. At the request of the Licensee, the California Department of Fish and Game's cost of carrying out the year's stocking plan is subject to audit by the Licensee for up to three years. If the Licensee performs an audit and disagrees with any expenditures of the California Department of Fish and Game, then the Licensee and the California Department of Fish and Game agree to meet and discuss the audit and make appropriate changes in the stocking plan budget.

b. Lake Almanor

Subject to the limitations set forth in subsection (c) below, the Licensee agrees to make funds available annually to augment the California Department of Fish and Games existing Lake Almanor fisheries program. The specifics of any fishery augmentation program will be defined by the California Department of Fish and Game and presented to the Licensee during February of each calendar year for discussion. A fisheries augmented program may include, but not limited to, such projects as the expansion of the pen rearing program and the construction of rearing habitat for warm water fish.

c. Annual Funding for Fishery Programs

Licensee shall make available up to $50,000 (2004 dollars escalated as defined in Paragraph 4.4.5 of the Relicensing Settlement Agreement) per year for the term of the New Project License for items subsections (a) and (b) above. Unused portions of the $50,000 will not be rolled over to successive years.

Condition No. 33-Recreation Operations and Maintenance

Prior to the start of the first recreation season following license issuance, Licensee shall assume responsibility for Operational Maintenance and Heavy Maintenance at the following Forest Service facilities:

- Dyer View Day Use Area
- Canyon Dam Boat Launch and Day Use Area, and
- Almanor Boat Launch

Operational Maintenance is defined as maintenance or reconditioning that neither materially adds to the value of the property nor appreciably prolongs its life. The work serves only to keep the facility in an ordinary, efficient operating condition. From an accounting or tax perspective, it is work that may be expensed. Examples include interior painting, repair of broken windows, light bulb replacement, cleaning, unplugging drains, preventative maintenance, normal wear and tear, water, sanitation, road maintenance, greasing, servicing, inspecting, oiling, adjusting, tightening, aligning, sweeping, and incidental snow removal.

Heavy Maintenance is defined as maintenance or reconditioning that arrests deterioration and appreciably prolongs the life of the property. From an accounting standpoint, the expenditures may be capitalized. Examples include installing a new roof, new floor, or new siding, replacing electrical wiring or heating systems, repairing or replacing pipes, pumps or motors, repairing or maintaining government property threatened or damaged by heavy snow or ice, repairing or maintaining the paths, lands, walks, roads, or walls adjacent to other government-owned structures, and performing exterior painting or refinishing.

As each recreation facility is individually constructed by Licensee, Licensee shall assume responsibility for Operational Maintenance and Heavy Maintenance at the following Forest Service facilities:

- Southwest Shoreline Access Zone facilities described in Paragraph 1(A)(1)(n) of Condition 32

Licensee shall not be responsible for Operational Maintenance and Heavy Maintenance of the Almanor Picnic Area.

Licensee's Operational Maintenance and Heavy Maintenance of the Forest Service facilities described above shall be consistent with FS standards, applicable laws, regulations, codes, and other legal direction. Licensee shall not be responsible for any future Reconstruction of these facilities.

In accordance with Commission, Forest Service, and applicable California Department of Boating and Waterways regulations, Licensee shall collect and retain 100 percent of Forest Service approved reasonable user fees at all Forest Service recreation facilities that Licensee operates and maintains. User fees shall be used to offset Licensee's Operational Maintenance, Heavy Maintenance, and reasonable administrative costs, with the intent that the fees shall be sufficient to cover these costs over the term of the license, and as feasible, Licensee's matching contribution towards initial construction of recreation improvements at FS facilities defined in Paragraph(1)(A)(1)(c) of Condition 32. Licensee shall meet with the

Forest Service and Plumas County every five years, or as necessary, to determine whether the fees are sufficient to meet these purposes, and if not, to make necessary adjustments. Licensee shall track costs and revenues in a balancing account and shall provide the Forest Service with an annual accounting. Funds derived from the user fees may be accumulated from year to year to address larger Heavy Maintenance projects. Licensee shall meet with the Forest Service and Plumas County at least annually to review the operation and maintenance of Forest Service facilities included in the license and adjust maintenance levels as necessary. At the end of the license term, any remaining funds in the balancing account shall be used to offset Licensee's matching contribution toward initial construction of recreation improvements at Forest Service facilities. Prior to Licensee assuming responsibility for Operational Maintenance and Heavy Maintenance of these Forest Service recreation facilities, Licensee shall enter into an operation agreement or other appropriate authorization approved by the Forest Service that is consistent with Licensee's obligations under this Condition.

Condition No. 34-Interpretation and Education (I&E) Program

Within two years after license issuance, Licensee shall develop an I&E Program for the Project in consultation with the Forest Service, Plumas County, Native American Tribes/groups and other parties and other Relicensing Settlement Agreement signatories and submit the plan to the Commission. The Licensee shall submit the portion of the I&E Program pertaining to Forest Service facilities to the Forest Service for its approval. Licensee shall implement the I&E Program within one year of Program approval by the Commission. The I&E Program shall provide information to enhance recreation experiences and encourage appropriate resource protection, cooperation, and safe behaviors by Project visitors. The I&E Program shall include themes, media, media design, prioritized sites, and prioritized services. Potential themes include fish and wildlife resources, volcanic history, hydropower, Native American cultures, pioneers, recreation activities and facilities available in the Project area, and boating hazards. The I&E Program shall include improvements such as interpretive or informational signs, kiosks, reservoir boating safety and hazard information signs and brochures, and informational signs describing recreation facilities and opportunities in the area. The I&E Program improvements shall be developed at recreation sites owned by Licensee and Forest Service that are to be included in the Project boundary. The I&E Program shall also identify funding partnership arrangements with the Forest Service and other interested parties, and contain a schedule for implementation. Licensee and Forest Service will review facility naming practices and re-name facilities with similar names in order to reduce visitor confusion. License and Forest Service will agree on wording of entrance signs to facilities operated by Licensee but owned by the Forest Service. I&E presentations may be provided by the Forest Service at Forest Service facilities. Licensee shall not be responsible for providing any I&E presentations at any Project recreation facility.

As part of the I&E Program, Licensee shall prepare a Lake Almanor bathymetry map within one year of license issuance. This map shall be provided in pamphlet form to area boaters and posted on signs at Lake Almanor public boat ramps.

Condition No. 35-Recreation Monitoring Program

Within 12 months of license issuance, the Licensee, in consultation with the Forest Service, Plumas County, and other interested Relicensing Settlement Agreement signatories, shall complete a Recreation Monitoring Program and submit the plan to the Commission. The Licensee shall submit the portion of the Recreation Monitoring Program pertaining to Forest Service facilities to the Forest Service for its approval. Licensee shall adopt a modified Limits-of-Acceptable Change (LAC)-based monitoring approach as described in the Draft RRMP contained in the Final License Application. This approach includes Recreation Monitoring Indicators and Standards that shall initiate management action to help maintain desired recreation experiences and resource conditions at Project recreation areas over the license term. Specific recreation areas to be monitored by the Licensee shall include at a minimum the water surface of Project reservoirs, Licensee and Forest Service recreation facilities, and shoreline areas within the Project boundary. The Program shall include a schedule of information to be collected annually, every six years, or every 12 years. Licensee shall conduct more in-depth monitoring, such as visitor questionnaire surveys and general assessment of regional recreation trends at 12-year intervals. As part of the Recreation Monitoring Program, Licensee shall conduct annual recreation planning and coordination meetings with other recreation providers in the Project area to discuss recreation resource management decisions for the Project area, implementation of Project recreation enhancements, recreation monitoring results, potential grant applications and other pertinent Project-related recreation issues that may arise over the term of the project license.

The Licensee shall prepare periodic monitoring reports every 6 years in conjunction with FERC Form 80 recreation facility and use monitoring requirements. Prior to submitting such reports to FERC, Licensee shall submit the portions of the report pertaining to Forest Service facilities to the Forest Service for its approval. These reports shall include but not be limited to changes in kinds of use and use patterns both on water surfaces and land, amount and types of recreational activities, kinds and sizes of recreational vehicles including boats, amount of day use versus overnight use, and recreation user trends within the Project area as well as summaries of annual monitoring. More in-depth questionnaire surveys and regional assessment results shall be incorporated into these reports at 12-year intervals.

If recreation river test flow releases are conducted, Licensee shall, in consultation with Forest Service and other interested Relicensing Settlement Agreement signatories, develop a study plan to monitor recreation use during the test flow period and produce a report on monitoring results.

Condition No. 36-Resource Integration and Coordination Program

Licensee shall hold annual meetings to integrate recreation resource needs with other resource management needs, such as cultural, wildlife, water quality, and aquatic resources. These meetings shall be held over the term of the project license with the Forest Service,

other interested Relicensing Settlement Agreement signatories and State Water Resources Control Board, and shall be open to the public.

Condition No. 37-Recreation Resource Management Plan (RRMP) Review and Revision Program

Over the term of the New Project License, unforeseen recreation needs, changes in visitor preferences and attitudes, and new recreation technologies may occur. The frequency with which the RRMP is revised or updated by Licensee shall depend on significant changes to existing conditions, monitoring results, and management responses made over time. The frequency of RRMP updates shall not exceed every 12 years and shall be based on consultation with the Forest Service, State Water Resources Control Board, and other interested Relicensing Settlement Agreement signatories during monitoring and coordination meetings and through other appropriate sources.

Condition No. 38-River Ranger

By March 1 of each year of the New Project License, the Licensee shall provide to the Forest Service up to $25,000 (2004 dollars escalated as defined in Paragraph 4.4.5 of the Relicensing Settlement Agreement), to assist in funding a "River Ranger" position. The purpose of this position shall be to provide additional light maintenance, visitor information/assistance, and user safety and law enforcement presence in the Project's bypassed river reaches.

The Licensee may request that the Forest Service provide Licensee by January 31 of each year a written summary of the previous year expenditures and River Ranger activities and the current year's planned expenditures and River Ranger activities.

Condition No. 39-Traffic Use Survey

Within one year of license issuance, Licensee shall file with the Commission a road traffic survey plan for roads used for Project purposes located on National Forest System lands. This plan shall be approved by the Forest Service and include provisions for monitoring traffic every six years when Licensee is monitoring recreation use in accordance with FERC Form 80 requirements. At a minimum the road traffic survey shall include the Caribou Road (27N26) and the Caribou-Butt Valley Reservoir roads (27N26 and 27N60) and include:

- The number of vehicles per day, type of vehicle, such as log trucks, recreational vehicles, passenger cars, emergency vehicles (fire), or Licensee vehicles on these roads.
- A sampling approach for these roads that covers the fishing season and includes the opening weekend of fishing season, Memorial Day weekend, July 4th holiday weekend, the day before, the day of and the day after scheduled Belden Reach recreation river flow releases, Labor Day weekend, non-holiday weekends, and weekdays.

Road traffic reports every six years to be filed with the Commission, after Forest Service review and comment.

Condition No. 40-Land Management and Visual Resource Protection

The Licensee shall implement the following measures at existing facilities within 2 years after license issuance or as otherwise noted:

A. Paint the metal siding and roof of the hoist house on the Prattville Intake structure a dark green color similar to the current color;

B. Plant sufficient evergreen trees between the existing Prattville maintenance buildings and the shoreline to reduce visual domination of the buildings on the shoreline area. Monitor and oversee tree survival to ensure successful establishment through the first three summers.

C. Re-grade the Oak Flat road debris spoil piles along Caribou Road to create a more natural rolling topography along the roadside, and where possible, move spoil materials farther from the road. Establish native plantings where possible between the road and the spoil piles to help screen the active use areas from passing motorists.

D. In consultation with the Forest Service, prepare a plan to annually apply dust palliatives or other measures, including regular grading, to help minimize dust emissions and improve the lower coupled segment of the Butt Valley-Caribou Road.

E. At the Belden Powerhouse, consult with the Forest Service on color selection when maintenance or repair work is scheduled on the Belden Powerhouse penstocks, surge chamber, or other powerhouse facilities to reduce visual contrast as seen from State Route 70.

F. At Caribou Village, maintain the exterior and landscaping of the old clubhouse facility, houses, and grounds to preserve the historic features and character of the facility. Consult with the Forest Service when maintenance or repair activities that affect exterior appearance are to take place to help preserve, as practical, the historic and visual appeal of the village landscaping and structures.

G. Within 60 days prior to any ground-disturbing activity on National Forest System lands, the Licensee shall file with the Commission a Visual Management Plan approved by the Forest Service. At a minimum, the plan shall address:

- Clearing, spoil piles, and Project facilities such as diversion structures, penstocks, pipes, ditches, powerhouses, other buildings, transmission lines, corridors, and access roads.
- Facility configuration, alignment, building materials, colors, landscaping, and screening.

- Proposed mitigation and implementation schedule necessary to bring Project facilities into compliance with National Forest Land and Resource Management Plan direction.
- Locating road spoil piles either in approved areas on National Forest System lands or to a location off FS administered lands.
- Monitoring and eradication of noxious weeds as specified in the "Noxious Weeds Management Plan" license condition.
- Removal of all visible non-native materials, including construction debris from the surfaces of piles located on National Forest System lands.
- Stabilization and revegetation of all native material that is allowed to be left on National Forest System lands including compliance with visual quality objectives.

H. Within 30 days after license issuance, Licensee shall consult with the Forest Service and other interested Relicensing Settlement Agreement signatories for the purpose of developing a final Shoreline Management Plan (SMP). The revised plan shall be implemented within one year of license issuance. The Forest Service will approve portions of the plan within the jurisdiction of the Forest Service. Licensee shall meet with the Forest Service and Plumas County, and other interested Relicensing Settlement Agreement signatories a minimum of every 10 years to discuss the need to update the SMP. The need to update the SMP sooner may also be raised and discussed during the annual land use meetings with the Forest Service, Plumas County, and other interested Relicensing Settlement Agreement signatories.

I. Conduct an annual meeting with the Forest Service, California Department of Fish and Game and Plumas County to coordinate ongoing Project-related land management activities including recreation management and use, fire suppression and related forest health activities, and the planning for commercial, residential and industrial developments adjacent to the Project boundary.

Condition No. 41-Vegetation Management Plan

Within one year of License issuance, Licensee shall file with the Commission a Vegetation Management Plan, approved by the Forest Service, for the purpose of identifying hazardous vegetative conditions surrounding project facilities that may accelerate the spread of a wildfire onto National Forest System lands as a result of Licensee activities or might place project facilities in jeopardy from an approaching fire. At a minimum the plan shall include provisions for: (1) analysis of live and dead fuel loading and potential fire behavior within 300 feet of project features; (2) treatments to be employed to reduce the hazard; (3) implementation schedule; and (4) provisions for the reassessment of hazard at 5 to 8 year intervals depending on regrowth of vegetation. Treatments extending onto adjacent National Forest System lands shall be approved by the Forest Service. When practicable coordinate implementation and accomplishment of hazard reduction activities with those of the Forest Service.

Condition No. 42—Road Management Plan

Within one year after license issuance, Licensee shall file with the Commission, a Road Management Plan approved by the Forest Service. The plan shall include all Forest Service and unclassified roads required by the Licensee to access the Project area.

The Project Road Management Plan shall include:

1) Identification of all Forest Service roads and unclassified roads on National Forest System lands needed for Project access, including road numbers.

2) A map of all Forest Service roads and unclassified roads on National Forest System lands used for Project access, including digital spatial data accurate to within 40 feet, identifying each road by Forest Service road number.

3) A description of each Forest Service road segment and unclassified roads on National Forest System lands needed for Project access including:
    a) Termini
    b) Length
    c) Purpose and use
    d) Party responsible for maintenance
    e) Level of maintenance
    f) Structures accessed
    g) Location and status of gates and barricades, if any
    h) Ownership of road segment and underlying property
    i) Instrument of authorization for road use
    j) Assessment of road conditions

4) Provisions for the Licensee to consult with the Forest Service in advance of performing any road construction, realignment, or closure involving Forest Service roads or lands.

5) The Licensee shall cooperate with Forest Service on the preparation of a condition survey and a proposed maintenance plan subject to Forest Service approval annually; beginning the first full-year after the Road Management Plan has been approved.

The Licensee shall obtain appropriate authorization (e.g. special use permit, road use permit, or maintenance agreement) in accordance with the Road Management Plan for all Project access roads that are under Forest Service jurisdiction outside the Project Boundary, including unclassified roads and Forest Service System roads needed for Project access. The term of the authorization shall be the same as the term of the license. The Licensee shall enter into the appropriate authorization mechanism with the Forest Service that will supersede the existing Special Use Permit. The Road Management Plan shall identify the Licensee's responsibility for road maintenance and repair costs commensurate with the Licensee's use and Project-induced use. The Road Management Plan shall specify road maintenance and management standards that provide for traffic safety; minimize erosion and damage to natural resources and that are acceptable to the Forest Service.

Licensee shall be responsible for any new construction, realignment, closure, or other road management actions proposed by Licensee in the future, subject to Forest Service standards in effect at the time, including related studies, analyses or reviews required by Forest Service.

Snow removal on Roads 27N26 and 27N60 and other Project roads shall be performed so as to minimize erosion during runoff periods. The Licensee shall be responsible for maintenance and replacement of aggregate that is damaged or lost due to snow plowing on the aggregate surfaced portion of Roads 27N26 and 27N60 and other roads from which snow is plowed. The Licensee shall be responsible for a share of the cost of needed maintenance and repairs of Roads 27N26 and 27N60 commensurate with the Licensee's use and Project induced use.

Condition No. 43—Heritage Resources

Within one year of license issuance, Licensee shall file with the Commission, a Heritage Properties Management Plan (HPMP) approved by the Forest Service for the purpose of protecting and interpreting heritage resources. The Licensee shall consult with the State Historic Preservation Officer, Native American Tribes, Forest Service, and other applicable agencies and communities during the preparation of the plan. The HPMP will be incorporated into the Programmatic Agreement of which the Forest Service will be a signatory. The HPMP, as appropriate, shall accurately define the area of potential effects, including effects of implementing Section 4(e) conditions, and take into account project effects on National Register properties; Native American traditional cultural values; and Project impacts to archaeological properties on National Forest System lands. The HPMP shall also provide measures to mitigate the identified impacts, a monitoring program, and management protocols for the ongoing protection of archaeological properties.
If, prior to or during ground-disturbing activities or as a result of project operations, items of potential cultural, historical, archeological, or paleontological value are reported or discovered, or a known deposit of such items is disturbed on National Forest System lands and Licensee adjoining fee title property, the Licensee shall immediately cease work in the area so affected. The Licensee shall then notify the Forest Service and shall not resume work on ground-disturbing activity until appropriate evaluation of the find has been completed and Licensee has received written approval from the Forest Service.

If deemed necessary, the Forest Service may require the Licensee to perform recovery, excavation, and preservation of the site and its artifacts at the Licensee's expense through provisions of an Archaeological Resources Protection Act permit issued by the Forest Service.

Condition No. 44—Special Status Species

The Licensee shall, beginning the first full calendar year after license issuance, in consultation with the Forest Service, annually review the current list of special status plant and wildlife species (species that are Federal Endangered or Threatened, Forest Service Sensitive, or Lassen and Plumas National Forest Watch Lists) that might occur within the Project Boundary. When a species is added to one or more of the lists, the Forest Service in

consultation with the Licensee shall determine if the species or un-surveyed suitable habitat for the species is likely to occur within the Project Boundary. For such newly added species, if the Forest Service determines that the species is likely to occur, the Licensee shall develop and implement a study plan in consultation with the Forest Service to reasonably assess the effects of the Project on the species. The Licensee 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 the Forest Service for review and approval. The Licensee shall file the report, including evidence of consultation, with the Commission and shall implement those resource management measures required by the Commission.

In addition, areas within the Project Boundary that have suitable habitat or known occurrences of selected special status wildlife or plant species shall be resurveyed every ten years in order to (a) determine if special status plant or wildlife species have changed in location (i.e. migrated into or moved within the Project Boundary), and (b) monitor for impacts caused by on-going Project activities. The licensee shall consult with the Forest Service to determine which species need to be resurveyed. The survey interval may be adjusted based on the amount of movement or impacts to the species that are observed. Survey results shall be provided to the Forest Service. If the Forest Service determines that negative impacts have occurred, the Licensee shall submit a proposal for actions to reduce or eliminate impacts to special status species. The Licensee shall file the report, including evidence of consultation, with the Commission and shall implement those resource management measures required by the Forest Service and approved by the Commission.

Condition No. 45-Protection of Threatened, Endangered, Proposed for Listing and Sensitive Species Plan

Before taking actions to construct new project features on National Forest System lands (including, but not limited to, proposed recreation developments) that may affect a species proposed for listing, or listed under the federal Endangered Species Act (ESA), or that may affect that species' critical habitat, or a Forest Service sensitive, or other special status species or their habitats, the Licensee shall prepare, in consultation with other appropriate agencies, a biological evaluation evaluating the potential impact of the action on the species or its habitat and submit it to the Forest Service for approval. In consultation with the Commission, the Forest Service may require mitigation measures for the protection of the affected species. Unless agreed to by the Forest Service, where current information on population occurrence for some species is lacking (e.g. valley elderberry longhorned beetle, terrestrial molluscs, and Pacific fisher) the Licensee shall perform necessary surveys prior to ground-disturbing activities. The biological evaluation shall include:

- Develop procedures to minimize adverse effects to listed species.
- Ensure project-related activities shall meet restrictions included in site management plans for listed species.
- Develop implementation and effectiveness monitoring of measures taken or employed to reduce effects to listed species.

Condition No. 46-Invasive Weed Management Plan

Within one year of license issuance, Licensee shall file with the Commission an Invasive Weed Management Plan, approved by the Forest Service, for the purpose of controlling and containing the spread of Project-related invasive weeds on *Licensee* and National Forest System lands, which might be related to the Licensee's activities. The Invasive Weed Management Plan shall include and address the following elements:

- Actions to be taken to ensure that Project staff is aware of the current location of invasive weeds and identifying characteristics of the invasive weeds likely to occur in the Project area.
- Treatment measures to be adopted for the control of invasive weeds (aquatic and terrestrial) located within the project boundary and adjacent to project features including recreation facilities, roads, and distribution and transmission lines within the project boundary.
- Inventory and mapping of new populations of invasive weeds within the area affected by project related operations or activities using a Forest Service compatible database and GIS software. The invasive weed GIS data layer will be updated periodically and shared with resource agencies.
- Actions or strategies that will be undertaken to prevent and control the spread of known populations or introductions of new populations within the area affected by project related operations or activities, such as vehicle/equipment wash stations.
- A schedule for eradication of all A, B, Q and selected other rated invasive weed species within the area affected by project related operations or activities, designated by resource agencies.
- Actions to be taken to eradicate A and B rated weed infestations within 12 months of detection. (A, B, C, & Q ratings refer to the California Department of Food & Agriculture Action Oriented Pest Rating System).
- A plan to treat all classes of invasive weeds located at sensitive sites such as recreation facilities. The list of sensitive sites shall be developed in consultation with the Forest Service.
- A plan for the inventory of noxious weeds at Project facilities and other possible points of introduction every five years using the current list of noxious weeds of concern to the Lassen and Plumas National Forests. This frequency may be adjusted based on the results of these inventories. This inventory will be used to help prevent the spread of noxious weeds and will also serve as monitoring for the weed introduction prevention measures.
- Monitoring information, in database and GIS formats, shall be provided to the Forest Service as part of the annual consultation on affected National Forest resources.
- Guidelines for restoration or revegetation of areas where treatment has eliminated invasive weeds to prevent the reintroduction of invasive weed species.
- Use of certified weed-free straw for all construction or restoration needs. If certified weed-free straw is not available, rice straw may be substituted. The Licensee shall use an approved mix of plant species native to the Lassen or Plumas National Forests as appropriate for restoration or erosion control purposes.

- Adoption of procedures to thoroughly clean all construction equipment and other equipment, including Licensee owned and rental equipment, that operates off the roads or moves soil, before entering the Project vicinity, and using reasonable cleaning methods to reasonably ensure that seeds of noxious weeds are not introduced.
- Monitoring of project-induced ground disturbing activities annually for the first 3 years after disturbance to detect and map new populations of noxious weeds.
- An adaptive management element to implement methods for prevention of aquatic noxious weeds, as necessary. These actions may include, but may not be limited to: 1) public education and signing of public boat access, 2) preparation of an Aquatic Plant Management Plan approved by the Forest Service, and in consultation with other agencies, and 3) boat cleaning stations at boat ramps for the removal of aquatic noxious weeds.

Condition No. 47-Bald Eagle Management Plan

Within 90 days of license issuance, the Licensee shall initiate consultation with the Forest Service and other appropriate agencies to develop a new Bald Eagle Management Plan for the Project area. Within two years of license issuance and after approval by all involved parties as well as by the Forest Service, the Plan shall be filed with the Commission. The plan shall be used to assist in the ongoing bald eagle recovery efforts and will be a tool for future management of all lands around these projects. As a minimum the plan shall include:

- Periodic monitoring of human use patterns to discern human/bald eagle interaction conflicts.
- Annual monitoring of bald eagle reproduction around Lake Almanor
- Coordination of Licensee activities on Licensee lands within the project boundary with the Forest Service and other appropriate agencies to achieve the goals and requirements set forth in this plan.
- Coordination of woodcutting activities on Licensee lands.

Enclosure 2

Rationale Document
Final 4(e) Terms and Conditions
Upper North Fork Feather River Project FERC No. 2105

Introduction

The purpose of this enclosure is to explain the Forest Service (FS) rationale for the attached "Final 4(e) License Terms and Conditions" (Enclosure 1), which are necessary for the adequate protection and utilization of the affected National Forest System lands as administered by the Lassen and Plumas National Forests. The Forest Service has the authority to prescribe license conditions under Section 4(e) of the Federal Power Act, when a direct or indirect connection between the project and effects to National Forest System lands (NFSL) can be demonstrated. It is mandatory for the Federal Energy Regulatory Commission (FERC) to incorporate 4(e) conditions into the project license. The Forest Service is also submitting "Recommendations", as allowed under Section 10(a) of the Federal Power Act. The "Recommendations" are applicable to areas where project effects do not directly affect National Forest System lands, and are optional for consideration by the FERC, as the lead federal agency. The "Recommendations" are shown in Enclosure 1 as italicized text. The rational for the "Recommendations" are included in Enclosure 2.

The Forest Service determined appropriate mandatory 4(e) license conditions for the Upper North Fork Feather River Project by comparing the "desired condition" of a particular resource (the condition towards which we are trying to move), with our knowledge of the existing condition of the resource (the state of the resources today). Comprehensive Forest Plan direction, Forest Service policy, rules, laws, and regulations were used as the basis for determining the desired conditions. The results of many studies completed by the Pacific Gas and Electric Company (Licensee), Forest Service data collection, observations of the affected resources and professional judgment were used as the basis for determining the existing resource condition. The Forest Service has used this comparison of "Existing" to "Desired" resource condition as a measure of project affects throughout much of the relicensing process. Where there are gaps between the "Existing" and "Desired" conditions, laws, rules, or policy are potentially not being met. Appropriate 4(e) license conditions are then prescribed to narrow the gap. With these license conditions, resources are expected to either meet, or move towards the "Desired Condition".

The Licensee as well as a number of interested parties entered into a settlement process for the purpose of resolving project associated resource issues. A subgroup of settlement participants composed of representatives of various federal, State, and county agencies as well as representatives of Non-Governmental Organizations developed Ecosystem and Management Attributes for the various project reaches and reservoirs. The Ecosystem and Management Attributes were subsequently adopted by the 2105 Collaborative as a means of directing settlement discussions as well as crafting of draft settlement language. Appendix 1 of the Forest Service Preliminary 4(e) Conditions dated December 1, 2003 contains the project Ecosystem and Management Attributes.

The decision on whether or not to relicense this hydroelectric project lies with the Federal Energy Regulatory Commission, as the lead federal agency. Therefore, the Forest Service mandatory 4(e) license conditions and any 10(a) recommendations accepted by the FERC, would become a portion of the overall license, if issued by the FERC.

The FERC license project boundary includes Licensee's facilities that produce hydroelectric energy (i.e. dams, intake, transformer sites, etc.), and those facilities that are appurtenant to, or result from hydroelectric generation facilities (e.g. roads, campgrounds, etc.). However, the limited extent of FERC project boundaries does not include, in all cases, the extent of the resources affected by the project and its appurtenances. For example, the Upper North Fork Feather River Project river reaches (those portions of the Upper North Fork Feather River between the Canyon Dam and Belden Powerhouse) are not included within the FERC license boundary. Yet the river reaches have been dramatically altered by the reduction of river summer base flows and winter storm and snowmelt runoff induced by Project hydropower generation. This reduction has had a substantial effect on the riverine biological and botanical resources. Since some of these project-affected river resources are located on National Forest System lands (NFSL) in the Seneca and Belden reaches of the Upper North Fork Feather River as well as Butt Creek below Butt Valley Reservoir, 4(e) license conditions for those resources associated with instream flows are prescribed. Another example of Project effects outside of the limited FERC license boundary is recreation. Recreation preferences and visitation to the project area has been influenced by Project streamflows and features. The area of Project effects varies by resource so it is not feasible to develop an "affected area" boundary.

The intent of this "Rationale" document is to demonstrate the Project to resource links, which are displayed below by resource area. Within each heading the applicable License Conditions are listed, following by a comparison of the "Existing" and "Desired" resource condition and the Rationale to move the resources to, or towards, the desired state. There is overlap between effects in these resource groupings, as one project-induced change may cause several resource effects (positive or negative) in other resource areas.

The December 1, 2003 Rationale Document has been edited to reflect the April 2004 Upper North Fork Feather River Project 2105 Relicensing Settlement Agreement and the January 2004 Sierra Nevada Forest Plan Amendment Record of Decision. In several instances, extensive citations of the 2004 Record of Decision have been added to the Rationale Document.

A. General, Standard and Project Specific Conditions

License Conditions

No. 1 –47: "General, Standard, and Project Specific Conditions"

Existing Condition

As briefly outlined above, and detailed below, the Upper North Fork Feather River Project has affected resource condition and function on National Forest System lands as administered by the USDA-Forest Service.

Desired Condition

A number of laws and regulations have been promulgated to ensure resource protection on National Forest System land. The following are the most germane to this relicensing:

- Federal Power Act of 1950
- Organic Administration Act of 1897
- Multiple-Use Sustained Yield Act of 1960
- National Forest Management Act of 1976, including Land and Resource Management Plan Standards and Guidelines

Rationale

The Forest Service has developed a set of "standardized" 4(e) license conditions, to be applied to each relicensing project. Standardized conditions No. 1-24 are included in order to meet the applicable laws and regulations that are germane to this project. Project Specific Conditions No. 25-47, have additional rational as discussed below.

B. Geomorphology, Hydrology and Aquatic Resources

License Conditions

No. 25-Streamflow
No. 26-Seneca, Butt Valley Creek and Belden Reach Biological Monitoring
No. 27-Water Year Type
No. 30-Reservoir Operation

Geomorphology, Hydrology and Aquatic Resource Existing Condition

The flow of the North Fork Feather River (NFFR) has been regulated since the construction of Canyon Dam in 1914 and the creation of Lake Almanor (Table 1). Flow has been further altered

by subsequent construction of Butt Valley Reservoir, Belden Forebay, and associated powerhouses.

Table 1. Flow Regimes of the North Fork Feather River Before and After Construction of Canyon Dam

Flow regime	Time Period[1]	Regime Before Canyon Dam (1908-1913)	Regime After Canyon Dam (1914-2001)[2]
Summer/early fall baseflow	June 15 – October 14	Flow usually between 500 and 800 cfs*	Flow less than 100 cfs in 68 years (77% of the years)
Late fall/winter baseflow	October 15 - March 14	Flow usually between 600 and 1000 cfs	Flow less than 200 cfs. in 74 years (84% of the years)
Snowmelt season	March 15 – June 14	Flow usually between 800 and 2500 cfs	Flow less than 200 cfs in 83 years (94% of the years)
Pulse flows	October 15 – May 15	In many years, 1-3 pulse flows of greater than 1,500 cfs	Over half of the annual peak flows are less than 1,000 cfs
Large flood flows	October 15 – May 15	Flows greater than 10,000 cfs probably occurred many years apart	Flows never exceed 2,710 cfs

Note: Regime data is from USGS Gauge 11399500, located at an elevation of 4390 feet approximately 0.5 mile downstream of Canyon Dam. The drainage area is 493 square miles.

* cubic feet per second

[1] Varies somewhat from year to year.
[2] Flows during all or part of the time period. Entries also reflect conditions prior to construction of the Caribou 2 Powerhouse and the Belden Forebay and Powerhouse

Topic 1. Flow of North Fork Feather River below Canyon Dam

- Baseflow is less than 25% of pre-dam baseflow in many years.

- Natural variation in baseflow has been compressed by more than 70% in many years since dam construction.

Pulse flows have been reduced in size and frequency. Before Canyon Dam was constructed, pulse flows greater than 1,500 cubic feet per second (cfs) occurred nearly every year. After Canyon Dam construction, in many years flows have not been greater than 1,000 cfs.

- Large flood flows have disappeared. Flows greater than 10,000 cfs probably occurred before flow regulation but since regulation rarely exceed 2,000 cfs.

The current project license provides for a minimum year-round flow of 35 cfs in the Seneca reach and, in the Belden reach, 140 cfs from the last Saturday in April through Labor Day, and 60 cfs for the remainder of the year. No minimum streamflow is required in Butt Creek below

Butt Valley Reservoir. (Dam leakage and discharge from springs results in streamflow at the mouth of Butt Valley Creek of 15 to 20 cfs.)

Topic 2. Loss of Riverine Habitats

- The impoundment of water in Lake Almanor and Belden Forebay resulted in the replacement of approximately half of the riverine habitats that existed within the project area with reservoir habitats. Reservoir habitats are less dynamic (smaller variations in temperature, size, sediment movement, etc.) than the riverine habitats they replaced, and they favor introduced species over native species.

Topic 3. Floodplain Inundation

- Before construction of Canyon Dam, the entire floodplain downstream of the dam was probably inundated frequently, with an average recurrence of perhaps 1.5 years. After Canyon Dam construction, many years pass before small areas of the floodplain are inundated.

Up to 3,000 cfs is needed to inundate the entire floodplain at all locations in the Seneca and Belden reaches, yet over half of the annual peak flows since 1914 have not exceeded 1,000 cfs.

Topic 4. Production and Distribution of Sediment and Channel Bed Material

- As a result of reduced flows, less erosion and deposition of sediment and channel bed material occurs.

- The minimum flow required to erode and rejuvenate the median-sized material in lateral and mid-channel bars is 1,600 to 3,000 cfs, depending on location. Before flow regulation, such flows occurred annually, and much greater flows typically occurred at least once within any five-year period. Since 1914, over half of the annual peak flows have been less than 1,000 cfs. This means erosion and deposition of material in the stream channel and floodplain are absent during many years. In addition, a reduction in the amount of fine-grained sediment and gravel in the Seneca and Belden reaches of the river is probable since completion of Canyon Dam. The dam has trapped sediment and gravel behind it that otherwise would have been distributed downstream during large flood flows. Such flows do not occur now because of river regulation.

Topic 5. Recruitment and Redistribution of Large Woody Debris

- Lack of recruitment and transport of large woody debris below dams is a well-recognized impact of dams on river systems and has almost certainly occurred in the Seneca and Belden reaches of the river. Inventory of large woody debris showed that the majority of

woody debris within and adjacent to the river is rather small.

Topic 6. Vegetation in the Floodplain

- Encroachment of riparian vegetation in the floodplain has occurred since flow regulation began in 1914. Encroachment accelerated following construction of the Caribou 2 Powerhouse and the Bleden Forebay and Belden Powerhouse. Thick vegetation currently lines the low flow channel at many locations.

- Before flow regulation, large flood flows periodically removed and regenerated much of the vegetation in the floodplain. Since flow regulation, flows necessary to scour riparian vegetation and provide propagules for seedling establishment – over 2,100 cfs in the Seneca reach and 3,500 cfs in the Belden reach – almost never occur.

Topic 7. Edgewater and Backwater Habitats for Amphibians and Fish

- Reduced flows since construction of Canyon Dam have resulted in a loss of transitional aquatic habitats between the baseflow elevation and the annual and/or spring runoff elevations. Such habitat is valuable to both juvenile salmonids and amphibian species.

Topic 8. Environmental Cues for Aquatic Organisms

- The activities and life histories of many aquatic organisms including reproduction, metamorphosis, movement, and feeding are dependent upon changes in temperature and streamflow, as well as other environmental factors. Taken together, these physical changes are often termed environmental cues. As streamflow and temperature decreased after dam construction, the biological communities that, through evolution, depend upon these environmental cues are likely to have been changed. However, the magnitude of these changes is unknown.

Topic 9. Physical Habitat for Aquatic Species

- Reduced flows after construction of Canyon Dam have resulted in a reduction in edgewater habitat, depth of pools, large wood recruitment and movement, and sediment and bedload movement, as well as increased vegetation encroachment and loss of interaction between the channel and the floodplain. These are key habitat elements for fish and other aquatic species.

Topic 10. Aquatic Habitat Connectivity

- Canyon Dam, as well as other dams on the NFFR, are physical barriers to the movement of aquatic species, as well as to the regeneration of habitat elements such as sediment and woody debris.

- Reduction in flow after the dam has contributed to the items listed above.

Topic 11. Stream Temperatures

- Before flow regulation, water in the Seneca reach of the NFFR in the summer was probably warmer than it is today. The river flowed through a long, wide valley upstream of the reach known as Big Meadows, which allowed for solar heating of the stream. The heating was tempered by the large cold water springs located in Big Meadows. Water in the Seneca reach is released through the lower outlet gates at Canyon Dam from a zone of cold water.

- Maximum temperatures in the Seneca reach measured at a location 11 miles downstream of Canyon Dam usually remain less than 16.0^{o} C in July and August. The cold water gradually warms as it flows downstream.

Topic 12. Lake Almanor

Lake Almanor is the uppermost reservoir on the NFFR. The reservoir was initially created in 1914 in what was historically called "Big Meadows", but did not reach its current size of 25,000 acres until 1963.

- Most of the reservoir is less than 60 feet deep when full.

- A water surface elevation of 4,474 feet results when the targeted minimum storage volume of 650,000 acre-feet is impounded. The annual high elevation occurs in May or June and is dependent on precipitation from the previous winter and carry over from the previous fall. Water surface level gradually declines to its targeted minimum in December or January. The decline in water surface elevation results in a significant decrease in the surface area of the reservoir.

- The reservoir is well-stratified from June through September. The epilimnion (warm upper layer) reaches to a depth of 30 feet, and temperature exceeds 20^{o}C.

- The thermocline extends between 30 and 40 feet below the surface.

The hypolimnion extends from 40 feet below the surface to the bottom, with temperatures between 10 and 14^{o}C. the hypolimnion decreases in volume throughout the summer and fall as the water surface elevation drops. The recreational fishery of the reservoir is of regional importance. Fish collected in surveys in 2002 included rainbow trout, brown trout, smallmouth bass, Sacramento sucker, brown bullhead, Sacramento pikeminnow, Sacramento perch, and carp.

<u>Geomorphology, Hydrology and Aquatic Resource Desired Condition</u>

For each of the existing-condition topics addressed above, the following conditions are desired after the relicensing the NFFR hydropower system.

Topic 1. Flow of North Fork Feather River below Canyon Dam

- Streamflow that mimics the flow diversity of the natural flow regime by incorporating year-to-year and seasonal variations, including:
  - variation in base flow that is proportionately similar to variation in natural base flow (but reflecting the diminished magnitude of flow releases compared to the pre-project condition),
  - a bankfull pulse flow at least biennially during wet and normal years at times when natural pulse flows are occurring, and
  - a pulse flow that results in 80% floodplain inundation at least every 5 years during wet and normal years at times when natural pulse flows are occurring.

These changes should move the aquatic ecosystem towards the desired conditions described for Topics 2 through 11 below.

Topic 2. Loss of Riverine Habitats

- Accepting that continued loss of riverine habitat above Canyon Dam is unavoidable, improvement of the riverine habitat downstream of the dam through increase flow diversity as described for Topic 1.

Topic 3. Floodplain Inundation

- Seasonal inundation of portions of the pre-dam floodplain, as described for Topic 1

Topic 4. Production and Distribution of Sediment and Channel Bed Material

Sediment and bedload movement and interaction of channel with floodplains and vegetation, resulting in energy inputs and nutrient processing that more closely resemble those found in the pre-project system. Mobilization of channel bars at least biennially during wet and normal periods.

Topic 5. Recruitment and Redistribution of Large Woody Debris

- Increased recruitment and transport of large woody debris, resulting from increased flow diversity.

Topic 6. Vegetation in the Floodplain

- Less encroachment of vegetation into the floodplain as a result of pulse flows described in Topic 1.
- Riparian plant communities are regenerated at a natural rate and are therefore diverse and healthy, providing essential ecological functions such as nutrient filtering, erosion protection, adequate temperature regulation, and wood recruitment.

Topic 7. Edgewater and Backwater Habitats for Amphibians and Fish

- Water quality in the river is maintained at a high level to meet a variety of biological and recreational objectives.

- Increase in the amount of transitional edgewater and backwater habitats for amphibians and fish as a result of increased flow diversity.

Topic 8. Environmental Cues for Aquatic Organisms

- Environmental cues that mimic pre-dam conditions as a result of increased flow diversity.

Topic 9. Physical Habitat for Aquatic Species

- Improvement in the amount and quality of aquatic habitat for fish and other aquatic species as a result of increased flow diversity.

Topic 10. Hydrologic Connectivity

- Improved passage for aquatic organisms and movement of sediment and woody debris through restoration of pulse flows.

Topic 11. Stream Temperatures

- Summer maximum temperatures in the Belden Reach that support a self-sustaining coldwater fishery.

- Conservation of the current extent of the lake so as to maintain habitat that supports the regionally-important recreational fishery.

- Conservation of the volume of the coldwater pool for the benefit of coldwater-dependent lake fish.

- Sustenance of the wetland at the north end of the lake and associated benefits to wildlife.

<u>Geomorphology, Hydrology and Aquatic Resource Rationale</u>

Aquatic Management Strategy

The Sierra Nevada Forest Plan Amendment Record of Decision (January, 2004) contains provisions for the conservation of aquatic resources. The strategy for aquatic management provides broad goals summarized below, which are endpoints toward which management moves watershed processes and functions, habitats, attributes, and populations. Moving ecosystem conditions toward these goals will restore and maintain the physical, chemical, and biological integrity of watersheds and the water derived from them as mandated by the Clean Water Act, and will support the Forest Service's mission to provide habitat for riparian and aquatic-

dependent species under the National Forest Management Act, Organic Act, Safe Drinking Water Act, Endangered Species Act, and Electric Consumers Protection Act. The following goals are part of the Aquatic Management Strategy:

- **Water Quality:** Maintain and restore water quality to meet goals of the Clean Water Act and Safe Drinking Water Act.
- **Species Viability:** Maintain and restore habitat to support viable populations of native and desired non-native plant, invertebrate, and vertebrate riparian-dependent species.
- **Plant and Animal Community Diversity:** Maintain and restore the species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows to provide desired habitats and ecological functions.
- **Special Habitats:** Maintain and restore the distribution and health of biotic communities in special aquatic habitats to perpetuate their unique functions and biological diversity.
- **Watershed Connectivity:** Maintain and restore spatial and temporal connectivity for aquatic and riparian species within and between watersheds.
- **Floodplains and Water Tables:** Maintain and restore the connections of floodplains, channels, and water tables to distribute flood flows and sustain diverse habitats.
- **Watershed Condition:** Maintain and restore soils with favorable infiltration characteristics and diverse vegetative cover to absorb and filter precipitation and to sustain favorable conditions of stream flows.
- **Streamflow Patterns and Sediment Regimes:** Maintain and restore in-stream flows sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.
- **Stream Banks and Shorelines:** Maintain and restore the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity.

A number of strategies have been adopted in order to achieve the above goals. Among the strategies is the utilization of Riparian Conservation Objectives. The Objectives contain linkages back to the broader aquatic management Goals. Within each Objective are a number of associated Standards and Guidelines. Standard and Guideline No. 106 commits the Forest Service to cooperate with other Federal agencies, tribal, State and local governments to secure in stream flows needed to maintain, recover, and restore riparian resources, channel conditions, and aquatic habitat. The Standard and Guideline further states that the Forest Service is to maintain in stream flows to protect aquatic systems to which species are uniquely adapted. The Forest Service is to minimize the effects of stream diversions or other flow modifications from hydroelectric projects on threatened, endangered, and sensitive species.

Flow Regime Characteristics

Policy Direction: The Record of Decision for the Sierra Nevada Forest Plan Amendment Project, 2004 directs the Forest Service among other things to minimize the effects of stream diversions or other flow modifications from hydroelectric projects on threatened, endangered, and sensitive species as described above.

The flow regimes in the bypassed reaches currently consist of relatively low static minimum flow releases of 35 to 140 cubic feet per second (cfs). The flow releases are low relative to unimpaired (without project) flows. Some flow variance is provided by tributary streams but their contribution to variance is diminished when added to the Upper North Fork. The channel geometry of the Upper North Fork remains essentially the same as it was in pre-project times. Some minor incision into the ancestral riverbed has probably taken place but the river no longer has the power to effect channel forming processes. The pre-project riverbed is essentially frozen in time and hidden beneath a dense riparian cover. Dry season unimpaired baseflow is approximately 600 cfs. The existing 35 to 140 cfs (with project) flow releases change only in the Belden reach. The change in the Belden reach is minimal since only two flows are prescribed annually. During the vast majority of each year, the minimum flow is the only flow released into each bypassed reach. Since Lake Almanor is managed to avoid spills because of dam safety considerations, flow variance in the Seneca reach resulting from releases from Canyon Dam occurs only during scheduled exercise of release gates, extraordinary storms or major equipment or facility failure.

The North Fork Feather River evolved under a regime of occasional moderate flooding of long duration (24 hours) and extreme floods of short-term duration (6 hours). If it is assumed that the area now occupied by Lake Almanor accumulated course grained sediment because of low gradient and overtopping of streambanks, all of the course bedload material occurring below Canyon Dam had to come from below the large meadow system.

Rivers evolved with rare, high flow disturbance and more common, moderate flow disturbances. These disturbances are necessary for proper riverine function and result in a variety of aquatic and riparian life. Stable river systems as is the case of the current Seneca and Belden reaches tend to stagnate at lower levels of biotic complexity. Large “pulse” flows tend to generate large “pulses” of aquatic organisms and a great variety of organisms.

River substrate material needs to be disturbed, otherwise the material becomes impacted and the amount of surface area available to flow, oxygenation, and attachment points for aquatic organisms is kept low. Disturbing the substrate material increases the amount of surface area and the ability of water to flow through that material. This important attribute of naturally flowing rivers is lost in lakes and below many dams (Terry Benoit, 2003, personal communication).

Flood flows or artificial project caused pulses benefit aquatic resources indirectly from flooding adjacent streambanks and floodplains which results in the exchange or deposition of fine-grained sediment, organic material and large woody debris. Higher pulses have the potential to undercut

banks and winnow finer materials from dry ravel deposits and landslides located adjacent to the stream thus adding new materials to the stream. Study results located in the Geomorphic Study (Volume 7, E3.1-12) shows that over-bank flow in portions of the Seneca reach begins at 700 to 1500 cfs with 900 to 1200 cfs discharges most common (Figures 5-25, 26, and 27, Geomorphic Study, Volume 7, E3.1-12).

Study results found in the Geomorphic Study (Volume 7, E3.1-12) shows that little cobble sized material is being transported and deposited in the Belden Forebay in spite of 54 days of discharges exceeding 1700 cfs at NF2. Additionally moderate numbers of rainbow trout redds were observed in the Seneca Reach. See IFIM Report (Volume 7, Appendix E3.1-10). The Sediment Incipient Motion Analysis (Volume 5, Attachment E2-A) shows that discharges in the Seneca reach required to initiate motion of 20 mm particles ranges from 100 to 450 cfs and that 30 mm sized material begins motion at discharges ranging from 300 to nearly 3000 cfs. With such a wide range it is difficult to select an optimum discharge for initiation of motion of any material size class.

The following is a listing of overarching characteristics of the North Fork Feather River. They helped to "scale" or define the boundaries of flow discussion. The result of discussions is a flow proposal designed to reinstate some of the seasonal biological triggers present in the river prior to construction of Lake Almanor and reestablishment of some component of fluvial geomorphic function by mimicking the pre-project hydrograph.

The results of various studies listed below focus and define the boundaries of the discussion hydrograph:

1) A gaging station (USGS 11399500) was installed on the North Fork near Prattville in January 1906. Review of the record showed that the annual hydrograph appeared unaltered by dam construction or reservoir operation through September 1911. This was determined by visual observation of the 1906 through 1911 annual water year hydrographs. The 1912 water year hydrograph and subsequent years was clearly different than the preceding years in that indicated discharges did not follow ordinarily expected patterns caused by rainfall or snowmelt.

   1906 through 1911 water year hydrograph characteristics:
   - October through mid-December: Slightly rising or steady discharge with some minor spikes. This period could extend into January. Flow is dominantly spring baseflow.
   - Mid-December to mid-April: Winter storm runoff from rain with 3 to 5 pulses. Baseflow steadily increases.
   - Mid-April through June: Snowmelt runoff with numerous small spikes in flow. Hydrograph is broadly dome shaped with no distinct peak.
   - July through September: Declining hydrograph with no or only minor pulses that represent a small percentage of existing flow.

2) The "without project" monthly median discharge of the North Fork from page 6 of the IHA analysis converted to a unit hydrograph.

3) Weighted useable area for adult rainbow trout in the Seneca reach peaks at 250 cfs under the depth calibration method and reaches an inflection point at 250 cfs under the one velocity calibration method as indicated on pages 70 and 71 and pages I-4 and I-5 of Appendix I of the IFIM study.
4) An improvement in juvenile rainbow trout Weighted Useable Area and macroinvertebrate diversity as indicated on pages 71 and 72 of the IFIM study as discharge declines from the lowest modeled streamflow.
5) Results of the Sediment Incipient Motion analysis indicate that sediment incipient motion thresholds for gravel ranging from 20mm to 30mm ranged from 250 cfs to 700 cfs. Volume 5, Sediment Incipient Motion Analysis, Figure 15.
6) In general, 1,600 cfs to 3,000 cfs is a minimum discharge needed to mobilize median bed material from representative sites in both the Seneca and Belden reaches. Cobble size material (90mm to 256mm) is mobilized and transported in both the Belden and Seneca reaches at 2,300 cfs. Volume 7, Geomorphic Study, page 5-74.
7) Between 1,300 and 2,000 cfs is needed to rejuvenate bar sediments at Site S-2. Volume 7, Geomorphic Study, page 5-73.
8) Discharges sufficient to move gravel-sized material have occurred in the Belden reach 6 times since the 1950's and fewer times in the Seneca reach. Cobble sized material (90mm to 256mm) is being mobilized and transported in the Belden and Seneca reaches assuming that 2,300 cfs is required to initiate motion. In the Belden reach 7 of the last 30 years discharge has exceeded 2,300 cfs while the Seneca reach has experienced no discharge over 2,300 cfs. Volume 7, Geomorphic Study, pages 5-74 and 5-75.
9) Discharges between 700 cfs and 1,500 cfs inundate floodplains in both reaches. Discharges of this magnitude have about a 4-to-7 year return interval today but probably occurred annually prior to the project. Volume 7, Geomorphic Study, page 5-77.
10) The water temperature at which foothill yellow-legged frogs are likely to initiate egg laying is not known for the upper North Fork but is known for the Poe reach. Until better information is available it is assumed that egg laying will begin any time after the mean daily temperature for two consecutive days equally 10 degrees Centigrade.
11) Given the physical limitations of releasing water from Canyon Dam and the Belden Forebay as well as the close proximity of the Caribou road to the North Fork Feather in the Caribou reach it is impractical to expect channel forming flow releases from the project.
12) Moving sediments on portions of mid-channel bars is possible

The proposed negotiated flow proposal includes and recognizes the following fluvial and geomorphic constraints and conditions:

1) The full range of fluvial geomorphic function cannot be reestablished in the North Fork system because of operational procedures established for Lake Almanor and physical limitations of the release structures at Canyon Dam and Belden Forebay. Additionally, high flows can potentially damage the access road to the Caribou powerhouses.
2) Manipulation of stremflow alone will not control the abundance of blackberry vines.
3) It is possible to release sufficient water from Lake Almanor or the Belden Forebay to move spawning sized gravels.

4) It is possible to release sufficient water from Lake Almanor or the Belden Forebay to inundate the existing bankful condition.
5) Accretion flow between Canyon Dam and Caribou can be reasonably estimated.
6) Review of the 1906 through 1911 streamflow record at Prattville provides a basic understanding of pre-project flow characteristics.
7) The relationship between streamflow and rainbow trout spawning, juvenile, and adult habitat is known.
8) The time during which amphibian egg laying and tadpole development would occur if present is reasonably known.
9) Use of water year type to determine releases from Canyon Dam and Belden Forebay will better match the range of natural variability in precipitation.
10) There is a finite and reasonably quantifiable volume of cold water (<20 degrees Centigrade) in Lake Almanor.
11) Due to flow release constraints, large woody debris management will not be a component of the flow schedule other than that incidentally moved during pulse events.

Flow Regime Development

A sub-group of the Collaborative was formed in order to focus discussion on a series of project flow regime proposals. Since the project is composed of several reservoirs and reaches, the first step in the flow development proposal process was to determine ecosystem and management attributes for each of the various project components. See Appendix 1 for a listing of ecosystem and management attributes developed by the collaborative subgroup for each project reach and reservoir. The attributes were arrayed in a table and identified by month as to whether the attribute was the "driver' of a critical biological or physical function or merely of secondary, non-critical importance. The rationale for selection of each attribute for a given reach or reservoir also appears in Appendix 1 of the Forest Service Preliminary 4(e) Conditions dated December 1, 2003.

The sub-group next prepared a series of "bookend" flow proposals spanning a wide array of objectives suggested by members of the Collaborative. These "bookend" proposals were issue or position driven and served the purpose of displaying interests in a flow format. As discussions continued the span of proposals began to diminish and several critical factors needing resolution or recognition prior to settlement on a final flow proposal emerged. The critical issues were: (1) Lake Almanor lake level during the summer recreation season, (2) Licensee's requirement to deliver water downstream and fully exercise the Licensee's water right, and (3) carryover storage in Lake Almanor following a wet water year is reflected in reservoir elevation for several years. The flow proposal developed for the Belden reach blends the desire to provide flow sufficient for production of native trout as well as providing angling opportunities in the lower portion of the reach. Removal of the fish barrier dam at Gansner Bar should allow rainbow trout from downstream to enter the Upper North Fork for spawning. Hardhead would also have access Upper North Fork for spawning.

Collaborative discussion of flow proposals revolved around how to best satisfy the Licensee's desire to generate power and meet downstream water right commitments, the desire of community and business interests in the Almanor Basin to keep Lake Almanor high during the

summer recreation months, and resource agency interests to modify flow releases to benefit aquatic processes by reintroducing flow variance that mimics natural flow. The proposed flow schedule does not completely satisfy all interests but it is a schedule that most participants can live with.

Table 1. Comparison of flow proposals on physical, biological, and social attributes of the Seneca and Belden reaches

Attribute	**Reach**			
	Seneca Existing	**Seneca Proposed**	**Belden Existing**	**Belden Proposed**
Sediment Transport	No pulse flows. Some flood flows	Pulse flow provided	No pulse flows. Some flood flows	Pulse flow provided
Hydrologic Process (Natural Flow regime)	Does not mimic	Mimics within constraints	Does not mimic	Mimics within constraints
Rainbow trout: Spawning (% WUA)	40	**96 - 99**	**99**	**96 - 99**
Rainbow trout: Juvenile (% WUA)	99	**86 – 98**	**96**	**86 - 98**
Rainbow trout: Adult (% WUA)	39	57 – 74	61	57 - 74
Sacramento sucker: Adult (% WUA)	25	45 – 62	49	45 - 62
Hardhead Juvenile WUA (5 WUA)	Not present	**74 - 92**	**88**	**74 - 92**
Hardead Adult (% WUA)	Not present	**88** - 100	100	**88** - 100
Macroinvertebrate	100	**67 - 98**	**93**	**67 - 98**
Whitewater boating	Not provided	Occasional March opportunity	Not Provided	Provided with threshold conditions
Accretion Flow	Accretion does enhance releases	Accretion does enhance releases	Little opportunity to enhance flow	Little opportunity to enhance flow
Spawning Substrate Cleansing	Not accommodated in flow schedule	Accommod-ated in flow schedule	Not accommodated in flow schedule	Accommod-ated in flow schedule
Woody Debris	Occasional high flows	Some distribution	Occasional high flows	Some distribution

	redistribute available pieces	of pieces	redistribute available pieces	of pieces
Spawning Gravel Recruitment	Occasional high flows redistribute gravel	Distribution and recruitment of gravel acceptable	Occasional high flows redistribute gravel	Distribution and recruitment of gravel acceptable

* Bolded numbers indicate percentages past peak of WUA (Weighted Useable Area) curve.

Sediment Transport: Ability of the flows provided to move and redistribute desirable sediment sizes and flush undesirable sizes that tend to diminish the quality of spawning gravels.

Hydrologic Processes (Natural Flow Regime): Evaluation is based on how closely the flow regime approaches the natural flow regime without the project in terms of annual variation and tracking of water year type.

Fish Habitat: Spawning: Percent of maximum Weighted Useable Area.

Fish Habitat: Juvenile: Percent of maximum Weighted Useable Area.

Fish Habitat: Adult: Percent of maximum Weighted Useable Area.

Hardhead, Juvenile and Adult Habitat: With removal of the Gansner Bar fish barrier dam, hardhead will gain access to the reach. Hardhead are a Forest Service Sensitive species.

Macroinvertebrates: Percent of maximum Weighted Useable Area.

Accretion Flow: Accretion flow will ordinarily improve habitat conditions in a downstream direction. Little accretion flow occurs in this reach.

Spawning Substrate Cleansing: Does the flow schedule provide for cleansing and replenishment of trout spawning gravels?

Woody Debris: Degree to which variations in discharge and wetted area facilitate the distribution of large woody debris.

Spawning Gravel Recruitment: Evaluation based on the probability that the magnitude and variance in flow will entrain sediment delivered by tributary streams, cause some bank erosion, and winnow spawning sized gravel from landslide and dry ravel materials.

Lower Butt Creek

No bypass or pulse flows are recommended at this time for Butt Creek below Butt Valley Reservoir. Large numbers of rainbow trout redds have been observed in the reach. Fine-grained sediment does not appear to adversely affect rainbow trout spawning. Provision has been made for pulse flows if monitoring appears that pulse flows would be beneficial.

Ramping Rates

Ramping rates are primarily important with respect to user safety (during up ramp) and stranding of aquatic species (during down ramp). Proposed ramping rates are similar to those currently utilized by the Licensee.

Solution to Existing Upper North Fork Project Aquatic Flow Regime Problems

To address the existing aquatic flow regime problems outlined in this rationale, the primary focus on the "Streamflow" 4(e) license condition, was to improve base flow conditions, seasonally vary the reach hydrographs to better match fish habitat and life cycle needs and to reintroduce pulse flows of sufficient magnitude and frequency to cleanse and in some cases move spawning sized and greater substrate materials. Monitoring of pulse flows will take place and flow magnitude will be modified is detrimental impacts are observed.

The Stream Flow Management section of the Relicensing Settlement Agreement addresses minimum stream flow, pulse flows, stream flow measurement, ramping rates and monitoring (Appendix A, Section 1, Table A-1 and A-2, 3, 4, 5, 6, 8, and 9).

Specified Relicensing Settlement Agreement stream flows for both the Beldan and Seneca reaches are a considerable improvement over existing baseline conditions. The Relicensing Settlement Agreement reestablishes a dynamic flow regime incorporating both inter-annual and intra-annual variation associated with the natural climactic cycle that is needed to support proper ecosystem function for a stream and coldwater fishery. The direct relationship between a dynamic flow regime and habitat diversity is well documented in the literature. (Instream Flow Council. 2002; Resh, et al., 1988; Poff, et al., 1997; Richter, et al.,1996; Heede, et al.,1990; Trush, et al., 2000; and Ward and Stanford, 1983).

- Minimum Stream Flows - Based on the Physical Habitat Simulation (PHABSIM) results (Volume 7, Upper NFFR Application), habitat values for trout life and other native fishes will significantly increase in both reaches during the time of the year when the PHABSIM results are applicable (March through September). (Instream Flow Council. 2002).

  Winter base flows (October through February) will be higher in the Seneca and Belden reaches expanding the wetted perimeter, improve habitat diversity, thus protecting the potential for aquatic biota productivity over the winter months.

Existing stream flows in Butt Valley Creek will be maintained. The present flow regime provides excellent spawning habitat for rainbow trout residing in the Seneca Reach.

- Annual Flow Regime and Water Year Types - The annual flow regime will again be dependent on water year type (wet, normal, dry or critical dry) and will again mimic the annual natural hydrology. In the Upper North Fork Feather River, the normal peak runoff occurs during the winter/spring period (February –May) while and low runoff occurs during the summer/fall period. Aquatic and riparian organisms native to the Upper North Fork Feather River have genetically adopted their reproductive behavior to coincide with the annual high and low flow variations in the hydrograph. However, under the existing baseline flows, the natural flow regime no longer exists. The flow regime in the Upper North Fork Feather River is presently a flow flatline due to the minimal variance in seasonal discharges. The habitat diversity found under the natural flow regimen no longer exists under flatline conditions. Loss in habitat diversity means loss of species diversity and abundance. Biological diversity is greatest in communities subject to moderate levels of disturbance (Ward and Stanford, 1983). A moderate level of disturbance is normally associated with annual hydrological fluctuations associated with an unregulated stream. When Ward and Stanford (1983) plotted species richness of selected stream macroinvertebrate communities, the greatest diversity occurred in streams moderately disturbed. Low diversity occurs when there are infrequent disturbances such as we now see in the Upper North Fork Feather River below Canyon Dam and below Belden Forebay Dam.

  Lack of the historical high winter/spring flows causes: 1) the stream channel to downgrade, 2) gravel bars and back waters once accessible for use by amphibians are lost, 3) the successful reproduction of riparian plants can be impacted, 4) the recruitment of spawning gravels needed by trout declines and 5) high flow are too infrequent to adequately cleanse the sediment that accumulates in the remaining spawning gravels. The results of these physical changes can reduce or eliminate the reproductive habitat for amphibians, trout, riparian plants and other aquatic dependant organisms (Resh, et al., 1988; Poff, et al., 1997; Richter, et al.,1996; Heede, et al.,1990; and Trush, et al., 2000.).

- Channel Maintenance Flows - To further assist in the improvement of aquatic and riparian habitat diversity, the Applicant has agreed to provide one pulse flow (Channel Maintenance Flow) release from both Canyon Dam (Seneca Reach) and Belden Forebay Dam (Belden Reach) in January, February and March during wet and normal years. Provisions for release of pulse flows into Butt Valley Creek below Butt Valley Dam are also included. (Resh, et al., 1988; Poff, et al., 1997; Richter, et al.,1996; Heede, et al.,1990; Trush, et al., 2000; and Ward and Stanford, 1983).

- Ramping Rates – Ramping rates are based on the knowledge gained from the Rock Creek-Cresta monitoring program and are to protect aquatic organisms from being dislodged or stranded during the winter pulse flows, summer recreation flows and other flow changes made for operational purposes.

- Monitoring and Adaptive Management – To evaluate the degree of success associated with the various flow improvements, the agreement includes a cooperative aquatic habitat monitoring program and provision for adaptive management.

Reservoir Operations

To meet the ecological, cultural, aesthetic, social, economic, recreational, and Project operational needs, the Applicant has agreed to operational goals that will limit lake level draw down during the summer recreational period in the three project reservoirs (Lake Almanor, Butt Valley Reservoir and Belden Forebay). The California Department of Fish and Game has a fifty-year history directed toward developing and maintaining the popular reservoir fishery in Lake Almanor. The goal to keep spring through summer lake levels high and reduced fluctuations is not only important for maintaining a quality fishery and shoreline wildlife habitat but it adds value to the quality of the angling experience. In a survey of angler preferences in California, anglers considered the beauty of their surroundings an important factor when selecting a site to fish (Fletcher and King, 1988). Therefore, summer lake level is very important in attracting anglers to Project lakes.

Water Temperature

The Relicensing Settlement Agreement is silent on water temperature criteria that assure the reasonable protection for a coldwater fishery. Appropriate project water temperature standards will be the subject of the State Water Resources Control Board water quality conditioning process for this project. Therefore the subject of reach water temperature will not addressed here but the Forest Service does support the designation of the Seneca and Belden reaches as coldwater fisheries.

Fish Stocking

The California Department of Fish and Game has a long history directed toward developing and maintaining the popular reservoir fishery in Lake Almanor. The fishery in Lake Almanor is primarily composed of salmonids (trout and related species) and bass (smallmouth and largemouth). Since the salmonid fishery is not self-sustaining, the Department annually stocks large numbers of hatchery-reared fish in Lake Almanor. The licensee has agreed to augment the Department's stocking program in Lake Almanor and to continue paying for the trout stocked in the Belden Reach. Many of the anglers who fish for the stocked fish utilize National Forest campgrounds and associated recreation enhancements.

C. Water Quality

<u>License Conditions</u>

No specific license condition

Water Quality Existing Condition

It is recognized that the State Water Resources Control Board has jurisdiction over establishment of water quality standards and criteria. The Forest Service is vitally interested in maintenance of water quality in project reservoirs and reaches in order to maintain high quality habitat for aquatic and riparian dependent species. Several water quality concerns were identified during the relicensing process. These water quality issues directly affect the resources and management of National Forest System lands.

- Water temperatures have exceeded "cold water fishery" objectives in the Belden reach.

- Low water temperature during the summer months in the Seneca reach resulting from coldwater discharge from Canyon Dam may adversely affect growth of fish and other aquatic organisms.

- There is a strong hydrogen sulfide odor associated with water discharged from Canyon Dam in the fall.

Water Quality Desired Condition

The desired condition for water quality as it is affected by this project includes:

- Meeting, or moving the existing condition towards achieving applicable Aquatic, Riparian, and Meadow Ecosystem and Associated Species Goals and Strategies, as directed by Forest Plans and the Sierra Nevada Forest Plan Amendment Record of Decision (2004).. Riparian Conservation Objective #1 (pge 35 of the Record of Decision) states "ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.
- Aquatic, Riparian, and Meadow Ecosystem and Associated Species Goals and Strategies for water quality states: "Maintain and restore water quality to meet goals of the Clean Water Act and Safe Drinking Water Act, providing water that is fishable, swimmable, and suitable for drinking after normal treatment."

- Implement Best Management Practices for protection or improvement of water quality, as described in *Water Quality Management for National Forest System lands in California"*.

Water Quality Rationale

The "existing" and "desired" water quality conditions above show differences, some of which are the result of project facilities, operations and maintenance. Forest Service 4(e) license conditions in this resource area, as well as in the overlapping resource areas of recreation, hydrology, geomorphology, and hydropower generation will drive the existing water quality project condition towards the desired condition.

Cadmium monitoring during the first and second yeas following issuance of the new license will provide additional data using the ultra clean technology for the measurement of dissolved cadmium. Subsequent years will provide additional information to determine if dissolved cadmium that has been measured in the North Fork Feather River (during CTR additional study) is project related. Data collected during 2000 was inadequate because the detection limit for dissolved cadmium was too high to compare to the respective criteria (due to the low hardness conditions). Data collected in 2002-2003 in the relicensing study results showed dissolved cadmium exceeded the respective criteria at NF1- North Fork Feather River near Chester, LA1-S – Lake Almanor near dam surface sample, and BV1 – Butt Valley Powerhouse Tailrace. Further study is required to determine the cause and extent of the exceedence of this parameter. The regional board water quality criterion for specific conductance (150 mhos/cm) was exceeded at several stations in the North Fork Feather River during the CTR additional monitoring of 2002 and 2003 water quality monitoring program. *In situ* parameters (including specific conductance) can be collected during the additional monitoring for dissolved cadmium at the North Fork Feather River stations to provide more data for resource management decisions and to determine the cause of the exceedence of this parameter. After sufficient data has been collected, some or all of the monitoring parameters can be deleted if it is determined that they are not project related.

Fecal coliform monitoring in years 1-5 after issuance of the new project license provides an evaluation of the Licensee maintained campsites, day use areas, and boat dock around Lake Almanor and Butt Valley. Subsequent monitoring through the term of the license will provide additional information.. Some or all of the monitoring stations for the remaining monitoring years may be deleted after sufficient data has been collected and indicates the lack of a water quality issue. Funding for the sampling of Lake Almanor coliform will be part of the $20,000 in matching funds that the Licensee and Plumas County agreed to for the water quality monitoring.

The silver, mercury, and PCB monitoring program will provide an indication of potential issues associated with bioaccumulation of these substances in adult fish in Belden Reservoir and Lake Almanor. Sampling in five-year increments will ensure that new adult fish are included in the monitoring program rather than potentially sampling the same fish in a year-to-year protocol. Some or all water quality parameters may be discontinued after sufficient data are collected to indicate a lack of a water quality issue.

Monitoring of temperature, dissolved oxygen, pH, hydrogen sulfide, iron, manganese, specific conductance, and turbidity will be measured at a number of locations. This monitoring program will provide data to evaluate the mitigation measures proposed for controlling the odor issue and dissolved metals at Canyon Dam and in the Seneca Reach of the North Fork Feather River. The

sampling will provide data for different water year types with two monitoring events for each of three water year types (wet, normal, and dry/critically dry). The program will be evaluated to determine the efficacy of the mitigation measure, and if required, the mitigation measure can be modified.

D. Biological Resources

License Conditions

No. 26-Seneca, Butt Valley Creek and Belden Reach Biological Monitoring
No. 31-Wildlife Habitat Enhancement
No. 44-Special Status Species
No. 45-Protection of Threatened, Endangered, Proposed for Listing and Sensitive Species Plan
No. 46-Invasive Weed Management Plan
No. 47-Bald Eagle Management Plan

Aquatic Resource Existing Condition

Changes to physical attributes outlined above have resulted in substantial changes in the aquatic communities of the project area, including:

- *Anadromous Fishes:* The NFFR within the project area once supported populations of both steelhead and spring-run Chinook salmon. These species were eliminated from the project area by construction of Big Bend Dam many miles downstream of the project in 1908. Oroville Dam located below the confluence of the forks of the Feather River in the foothills of the Sierra Nevada now precludes anadromous salmonids from entering the NFFR. Historically, adults returning from the ocean were a substantial source of nutrients for the system, and juveniles were undoubtedly abundant stream fishes.
- *Amphibian Species:* It is likely that both foothill yellow-legged frogs and Cascade frogs historically inhabited portions of the project area. Cascade frog habitat was lost when Lake Almanor was filled. Habitat for foothill yellow-legged frog has been lost as a result of reservoir inundation and lower stream flows. Additionally, habitat for both species has been degraded by changed sediment, flow, and water-temperature regimes, loss of edgewater habitat, and fragmentation of populations by dams and reservoirs.
- *Hardhead:* This Forest Service sensitive species was collected in 1981 in the lower project area (Moyle, 1983) and was found during entrainment monitoring at Belden Forebay in 2000. The species was probably once more abundant in the lower project area. No hardhead were found during project fish population surveys.
- *Non-Native Fish:* Only 10 of the 26 fish species found in the project area are native. The more a stream has been altered by human activity, the more likely it is to be dominated by introduced fishes (Moyle, 2002). Historically, fish assemblages in tributaries to the Sacramento River had low species richness.

- *Entrainment:* Fish are entrained at the intakes to Prattville, Caribou 1 and 2, and Belden Powerhouses and are drawn through the powerhouses.

Aquatic Resource Desired Condition

- Physical conditions that favor native over non-native species.
- Operations that minimize entrainment of native species.
- Flow releases that mimic the dynamic nature of natural systems in which native communities evolved.
- Increased and more seasonally variable instream flows released to the Project bypass reaches that can establish an aquatic condition more closely resembling the natural range of variability inherent in the watershed as defined in the Sierra Nevada Forest Plan Amendment (2004) Record of Decision Goals for Aquatic, Riparian, and Meadow Ecosystems an Associated Species. .
- Populations of invasive non-native fish species are largely confined to project reservoirs.
- Invasive non-native fish species that may yet be introduced to project waters would be maintained at levels where they do not significantly compete with species native to the watershed.
- Water quality in the Upper Feather River drainage is maintained at a high level to meet a variety of objectives including promoting trout fisheries.
- Plant communities in riparian areas and wetlands are diverse and healthy, and provide essential ecological functions such as nutrient filtering, erosion protection, adequate temperature regulation in winter and summer, down wood and other debris that contribute to stability and needed habitat complexity.
- Provide for aquatic species by maintaining the health and functionality of the aquatic habitat to which these species are uniquely adapted through implementation of Riparian Conservation Area Desired Conditions (Sierra Nevada Forest Plan Amendment Record of Decision (2004). Applicable Desired Conditions include:
  - Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act.
  - Habitat supports viable populations of native and non-native plant, invertebrate, and vertebrate riparian and aquatic-dependent species. New introductions of invasive species are prevented. Where invasive species are adversely affecting the viability of native species, the appropriate State and Federal wildlife agencies have reduced impacts to native populations.
  - Species composition and structural diversity of plant and animal communities in riparian, areas, wetlands, and meadows provide desired habitat conditions and ecological functions.
  - The distribution and health of biotic communities in special aquatic habitats perpetuates their unique functions and biological diversity.

- Spatial and temporal connectivity for riparian and aquatic-dependent species within and between watersheds provides, physically, chemically and biologically unobstructed movement for their survival, migration and reproduction.
- The connections of floodplains, channels, and water tables distribute flood flows and sustain diverse habitats.
- Soils with favorable infiltration characteristics and diverse vegetative cover absorb and filter precipitation and sustain favorable conditions of stream flows.
- In-stream flows are sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.
- The physical structure and condition of stream banks and shoreline minimizes erosion and sustains desired habitat diversity.

Aquatic Resources Rationale

The prescribed instream flow releases will measurably increase aquatic habitat variables that are conducive to an expanded aquatic ecosystem. Achieving a greater wetted perimeter, more diverse water depths, and a more naturally variable range of water velocities will produce measurably greater overall fish habitat. This condition better represents the natural range of variability otherwise inherent in the watershed.

The prescribed instream flow discharges to the Project bypassed reaches are a fraction of the flows naturally inherent to the same portion of the Upper North Fork Feather River watershed. Scientific evidence currently available to the Forest Service, however, strongly indicates that the prescribed flows will substantially increase and diversify aquatic riverine habitat. Aquatic organisms, including fish species, will therefore ultimately increase significantly in numbers, diversity, and overall health.

It is in the best interest of all parties to document the responsive changes to the Project bypassed river reaches to ensure that the desired conditions are ultimately achieved. The ensuing technical reports must also recommend changes that could more effectively achieve those conditions when and wherever applicable.

Benthic aquatic invertebrates comprise the foundation of the food web critical to all aquatic carnivores, including fish. The organisms are also indicative of the overall aquatic habitat condition in which they occur because different kinds of taxa predominate in differing habitat conditions.

The portion of the Feather River comprising the Project bypassed reaches and reservoirs will receive increasing public visitation pressure into the foreseeable future. Watershed development adjacent to Project facilities may also occur. The prescribed benthic invertebrate sampling will be key to monitoring the status of the aquatic populations that could be affected by Project-related disturbance sources. It is possible that, due to their primary role in the aquatic food web,

changes to the basic composition of the aquatic invertebrate fauna over time may be evident through this sampling prior to the changes becoming evident by fish or hydrologic sampling**.**

Hardhead, a Forest Service sensitive species is currently not present or only present in low number in the Belden bypass reach. Removal of the Gansner Bar fish barrier dam will likely make the Belden reach accessible to hardhead. Due to the status of hardhead, it is important for the Forest Service to assure that changes in the Project license do not adversely affect this species and move it on a trend towards listing. Removal of the Gansner Bar fish barrier dam should improve hardhead populations be making additional area available for spawning and rearing.

Monitoring the effects of the new instream flow regime would provide a better understanding of how the timing, magnitude, and duration of both high and low flows meshes with the timing of rainbow trout and hardhead spawning. Any future consideration of whitewater boating will depend on this knowledge to determine when this type of activity would be least detrimental to native fish. While amphibians such as foothill and mountain yellow-legged frogs have not been observed in the project area, it is possible that they may someday occupy the area. At that time monitoring information will be critical to management or altering the timing of pulse and whitewater boating flows.

Terrestrial Resources Existing Condition

- The Lake Almanor basin contains habitat for several bird species that are listed as threatened or endangered under the Endangered Species Act or are considered by the Forest Service to be sensitive species:
  - Bald eagle – Found primarily along the west shore and causeway (north end of Lake Almanor). Available habitat includes nesting and roosting sites in conifer stands adjacent to the lake.
  - Willow flycatcher – Found along the NFFR adjacent to Lake Almanor and in the wetlands at the north end of the reservoir. Required habitat includes willow shrubs with slow moving water. Occurrences are often associated with beaver activity.
  - Sandhill crane – Found within the causeway area north of Highway 36. Habitat needs include open wetlands and marsh.
  - Osprey – Numerous nests are located along the shore of Lake Almanor. Nesting and rooting takes place in conifer stands adjacent to the lake.
- Lake Almanor supports a number of waterfowl and shorebirds that either migrate through the area or are year-long residents. A great blue heron rookery has been reported to be located within the Belden reach downstream from Lake Almanor.
- Three bald eagle nest sites are located at Butt Valley Reservoir.
- Butt Valley Reservoir provides some habitat for waterfowl and shorebirds. Habitat may be limited due to freezing of the reservoir during winter.

- Portions of the Belden Reach were burned by the Storrie Fire in 2000. Patches of snags and an increase in the amount of shrubs on the slopes above the NFFR provide a unique but transitory habitat.
- No forest carnivores are known to occur within the project area.
- Surveys for bats were recently conducted primarily in and around structures associated with the project. A variety of species were found, however none of the bats conclusively identified are listed on the Region 5 sensitive species list.
- The recently delisted (1999) peregrine falcon is found on steeper slopes in the Seneca Reach. The nesting status is unknown.
- Both the Plumas and Lassen National Forests recognize riparian hardwood species as part of the Management Indicator Species (MIS) group. This group (including willow, aspen, alder, and cottonwood) is present throughout the project area. In addition to osprey, other MIS that likely occur within the project area are woodpeckers (pileated and hairy), bear, deer, bufflehead duck (Lake Almanor), mallard, Canada goose, and western gray squirrel. Currently little or no information is available about the numbers of these species, and occurrences within the project area likely fluctuate yearly with annual migration.
- Noxious weed surveys resulted in the location of145 occurrences of eight noxious weeds in the project area (Appendix E3.3-1, Final License Application). The following noxious weeds were identified:
  - Spotted knapweed *Centaurea maculosa* A-rated
  - Dalmatian toadflax *Linaria genistifolia* ssp. *dalmatica* A-rated
  - Hairy whitetop *Cardaria pubescens* B-rated
  - Canada thistle *Cirsium arvense* B-rated
  - Cheat grass *Bromus tectorum* C-rated
  - Yellow star-thistle *Centaurea solstitialis* C-rated
  - Klamathweed *Hypericum perforatum* C-rated
  - Bouncing-bet *Saponaria officinalis* C-rated

  Weed rating is based on a system adopted by the California Exotic Pest Council. A rated weeds are targeted for eradication or containment. B rated weeds are more widespread and difficult to contain and C rated weeds are most widespread and control efforts are not ordinarily undertaken except in nurseries or seed lots.

  Himalayan blackberry, although not listed by California Department of Food and Agriculture as “noxious”, is widely accepted as an invasive exotic plant. It was found throughout the NFFR corridor from the Belden Powerhouse to approximately 4200 feet elevation at Butt Valley Reservoir. However, this species was not mapped. Himalayan blackberry has grown to such a density in many locations that river access for recreational activities is not possible. Also, blackberry density may be reducing native plant regeneration.

- Occurrences of special status plants should generally not be threatened by the operation of Licensee's facilities (Appendix E3.3-1, Final License Application).
- Special status plants at the Last Chance Marsh area could be threatened by widely fluctuating water levels. A few species could be threatened by noxious weed populations in close proximity and that share the same habitat (Appendix E3.3-1, Final License Application).

Terrestrial Resources Desired Condition

- Project operation does not have an adverse effect on bald eagle occupancy and productivity.
- Project operation does not have an adverse effect on osprey occupancy and productivity.
- Variations in Lake Almanor surface elevation do not adversely affect sandhill crane nesting and rearing habitat.
- Variations in Lake Almanor surface elevation do not to adversely affect willow flycatcher nesting habitat.
- Project operation does not adversely affect peregrine falcon occupancy and productivity within the project area.
- Corrective action is taken if monitoring of peregrine falcon eyries indicates that project activities have indirect effects to the productivity of peregrine falcon.
- Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.
- Native riparian plant communities are diverse and have multiple seral stages.
- Noxious weed infestations on project lands are controlled by following a pre-determined management strategy as outlined in a noxious weed management plan. The plan is periodically reviewed by Licensee and the Forest Service and modified as necessary. The plan contains the following elements:
  - Prevention – Use of certified weed-free gravel for roads and certified weed-free mulch when available. Clean ground disturbing equipment prior to project initiation.
  - Containment and suppression – Conduct control measures on all identified A- and B-rated noxious weeds on the project site with appropriate phenological timing to prevent seed dispersal. Control all A- and B-rated weeds at all Licensee facilities with appropriate phenological timing to prevent seed dispersal. Control all A- and B-rated weeds on all Licensee roads with appropriate phenological timing to prevent seed dispersal. Control C-rated weeds of special concern.
  - Monitoring – Plan specifies yearly monitoring with appropriate phenological timing to identify A-, B-, and C-rated weeds prior to seed dispersal.

The area occupied by Himalayan blackberry does not adversely affect stream access or water-oriented recreation activities along the North Fork Feather River. Himalayan blackberry stands and patches that hinder recreational access/use and native plant regeneration are controlled.

Control options are selected from pre-approved management strategies that complement the noxious weed management strategy. Access locations where vegetative treatment options will be evaluated are identified. Control strategies include an evaluation of planting native vegetation to shade the vines to reduce growth and encroachment on the river.

Rationale for Terrestrial Resources

There is obvious overlap between aquatic and terrestrial biological resources, especially as they relate to habitat for aquatic flora and fauna, and land management activities as they relate to upland biological resources. Discussions for this resource are limited to those not covered elsewhere in this document.

How the Licensee manages project fee title lands and operates associated hydroelectric facilities has direct and indirect effects on National Forest biological resources. Biological resource license conditions were developed to restore or move the resources towards a condition that maximizes health and diversity of habitat as required by Forest Service comprehensive plans and other laws and regulations. Conditions were specifically designed to:

- Manage habitat for Federally listed T&E, candidate, State listed, and other special status species.
- Implement land and vegetation management activities for upland wildlife habitats.
- Manage riparian/aquatic/wetland habitats through a well-balanced flow regime,.
- Manage exotic species/noxious weeds so they do not interfere or degrade ecological function of native species or impair recreational experiences.
- Operate project facilities so they do not unduly harm or impede developing life stages.

Monitoring of biological resources becomes an important component of any license, as it is through this means that it can be determined if resource objectives are being met, and if not, what possible changes in license conditions are needed. Therefore, biological monitoring is also a license condition.

Rationale for Noxious Weed Management Plan

Noxious weeds pose a threat to the economic and ecological functions of ecosystems in the Sierra Nevada (USDA, FS Sierra Nevada Forest Plant Amendment 2001, volume 1). The spread of noxious weeds and nonnative invasive plant species reduces biological diversity, impacts threatened and endangered species and wildlife habitat, modifies vegetative structure and species composition, changes fire and nutrient cycles, and degrades soil structure.

Millions of acres of public lands in the West are undergoing a massive change due to the spread of invasive non-native plants (USDA, Forest Service 1998). Current inventories indicate that weeds are spreading at an increasing rate within the region.

Increased public awareness has initiated changes in noxious weed management within the state. Weed Management Areas (WMAs), which promote coordinated weed management across jurisdictional boundaries, now cover much of the state. National Forests have become active participants in WMAs. The California Department of Food and Agriculture, along with county agricultural commissioner offices, have increased efforts to address the statewide problem of noxious weed spread.

The primary goals of the USFS Region 5 noxious weed strategy are:

- Increase the understanding and awareness of noxious weeds and the adverse effects they have on wildland ecosystems.
- Develop and promote implementation of a consistent integrated pest management approach. Institutionalize consideration of noxious weeds in all planning and project analyses.
- Develop strong partnerships and cooperation with private landowners, county governments, state and federal agencies, extension service, universities, and the research community for a consolidated and united approach to managing invasive species.

As listed in the Forest Service Manual, 2080.2, Noxious Weed Management Objectives; it is the intention of the Forest Service to use an integrated weed management approach to control and contain the spread of noxious weeds on National Forest System lands and from National Forest lands to adjacent lands. Specific objectives to be achieved through noxious weed management include:

- Prevention of the introduction and establishment of noxious weed infestations.
- Containment and suppression of existing noxious weed infestations.
- Formal and informal cooperation with state agencies, local landowners, weed control districts and boards, and other federal agencies in the management and control of noxious weeds.
- Education and awareness of employees, users of National Forest System Lands, adjacent landowners, and state agencies about noxious weed threats to native plant communities and ecosystems.

The Plumas National Forest Land and Resource Management Plan states as a forest-wide general direction to "maintain viable populations of sensitive plant species." The forest-wide standards and guidelines direct the Plumas National Forest to "Protect sensitive and special interest plant species as needed to maintain viability. Inventory and monitor sensitive plant populations on a project-by-project basis. Develop species management guides to identify population goals and compatible management activities and/or prescriptions that will maintain viability."

The Sierra Nevada Forest Plan Amendment Record of Decision (2004) includes Standards and Guidelines for noxious weed management. A number of the guidelines are specific to this project and include direction for prevention of new noxious weed infestations, monitoring, employee awareness, control, and coordination of effort between agencies and cooperator.

Rationale for Bald Eagle Management Plan

This plan is needed to ensure the continued recovery of the species. The plan is made necessary by the Endangered Species Act (ESA), by Forest Service direction, and the Lassen and Plumas National Forest Land and Resource Management Plans. There are additionally Licensee management decisions regarding use of their lands that can affect bald eagle management on adjacent landownership, such as National Forest.

Rationale for Wildlife Mitigation and Monitoring

The proposals are mostly for non-TES species that are impacted by project operations.

- There is one peregrine falcon territory near the Seneca reach corridor. The species was recently de-listed but as part of the ongoing efforts to ensure recovery monitoring of the nest territory will continue.
- Several species of bats were found rooting in Licensee facilities. Where not unreasonable, a policy of accommodation has been adopted.

The development of a Wildlife Habitat Enhancement Plan for Licensee owned lands between Last Chance Campground and the flood control channel will provide a framework for improvement projects in what is probably the most critical aquatic and terrestrial habitat located along the perimeter of Lake Almanor.

Species Plan Rationale for the Protection of Threatened, Endangered, Proposed for Listing and Sensitive

This condition is necessary for the Licensee and the Forest Service to comply with the Endangered Species Act, the National Environmental Policy Act, the Northwest Forest Plan, current Forest Service direction, the two applicable Forest Land and Resource Management Plans and the Sierra Nevada Forest Plan Amendment Record of Decision (2004). There are a number of both botanical and wildlife species that are within "special status" designations and Project effects on these species must be considered.

During the project botanical survey, 114 occurrences of 12 special-status plant species were located. While the plant locations are primarily not threatened by Licensee facilities and operations, the possibility remains that changes in operation or establishment of new plant locations might threaten sensitive plant occurrences. The 4(e) condition for Threatened, Endangered and Sensitive plant species are necessary in order to meet Forest Service requirements of maintaining habitat and viable populations for the purpose of eventual de-listing of Sensitive plants that are found on both Forests. The 4(e) conditions are also necessary to

minimize or eliminate direct and indirect impacts from management activities on Threatened, Endangered and Sensitive plants unless the activity is designed to maintain or improve plant populations, and to evaluate all proposed projects for potential Threatened, Endangered, or Sensitive plant habitat.

E. Archaeological Resources

License Conditions

No. 43-Heritage Resources

Archaeological Resource Existing Condition

- Seven cultural resource properties within the Area of Potential Effect (APE) are located on lands administered by the USDA Forest Service. Of those 7, 4 have been determined ineligible for listing on the National Register of Historic Places (NRHP). The remaining 3 cultural resource properties, although not evaluated, are considered eligible for listing on the NRHP.
- The 3 eligible cultural resource properties (CA-PLU-284/H, CA-PLU-1718, LA-38) have been adversely affected by the existing project. Many project-related activities or forces adversely affecting these resources (e.g. wave action) are on-going and will continue with continued project operation.
- The Licensee has developed a draft agreement entitled *Programmatic Agreement among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and the California State Historic Preservation Officer for Managing Historic Properties that may be Affected by a License Issuing to Pacific Gas & Electric Company for the Continued Operation of the Upper North Fork Feather River Project (FERC 2105) in Plumas County, California.* The agreement stipulates that upon FERC relicensing of this project, the Licensee will begin implementation of a cultural resources management plan.
- Licensee has completed a Cultural Resources Management Plan for this undertaking. The plan describes general and site-specific treatment options using a tiered and staged strategy for managing the cultural resources. Licensee would produce an annual report detailing its compliance activities.
- Little to no public education about, or interpretation of, cultural resources within the APE is currently conducted.

Archaeological Desired Condition

- The project Cultural Resources Management Plan is implemented; and compliance, as well as effectiveness of compliance, are reviewed annually by the Licensee; and action is taken as necessary to assure compliance with the plan.

- Plans for public education and interpretation of cultural resources have been integrated into recreation management plans.

Archaeological Resource Rationale

The purpose of the project cultural resources management plan is to guide management of historic properties within the APE of the project. The licensing of the project is a federal undertaking. FERC is obligated to comply with Section 106 of the National Historic Preservation Act, which requires proponents of any federal undertaking to take into account the effect of the undertaking on historic properties, and affords the Advisory Council on Historic Preservation an opportunity to comment on the undertaking prior to issuance of the license (16 U.S.C. 36CFR 1800).

G. Land Management and Aesthetics

License Conditions

No. 39-Traffic Use Survey
No. 40-Land Management and Visual Resources Protection
No. 41-Vegetation Management Plan
No. 42-Road Management Plan

Land Management and Aesthetics Existing Condition

- Licensee facilities require periodic painting, light to heavy maintenance, and upgrading to meet current operational standards. In particular, structures require periodic painting and maintenance to maintain aesthetic appeal.

- The existing Licensee operated maintenance buildings located at the Prattville Intake visually dominate the Lake Almanor shoreline area.

- Spoil piles located on the Caribou Road at Oak Flat are clearly visible for the road and detract from the scenic quality of the area.

- The Butt Valley-Caribou Road (27N60 and 27N26) is quite dusty during the summer. The dust is a potential driving hazard.

- The historic structures located at the Caribou Village are in need of maintenance to prevent deterioration of the buildings and loss of historic character and value.

- An assessment of the risk posed by vegetation growing in the vicinity of project features has not been prepared.

- Page 235 of the project draft Environmental Impact Statement references the occurrence of 350 small fires in the Lake Almanor region between 1981 and 2001. The September 2000, Storrie fire came quite close to project facilities located in the Belden reach.

- Volume 8, Appendix E5-L of the project License Application displays the number of vehicles counted in the Seneca and Belden area between April and October. Observations of vehicles location in the Butt Valley, Seneca, and Belden reaches is displayed in sections E5.2.2.4.3, E5.2.2.4.4, and E5.2.2.4.5.

- Project facilities are located in a forested setting with heavy live and dead fuels.

Land Management and Aesthetics Desired Condition

- Visual conditions as a result of activities and projects meet adopted visual quality objectives (VQO) displayed in the PNF and LNF LRMPs.
- Where effects of past management activities did not meet adopted VQOs, visual rehabilitation during facility maintenance has been used to achieve the objectives.
- The metal siding and roof of the Prattville Intake Structure has been painted a dark green color similar to the current color.
- Evergreen trees have been planted between the Prattville Maintenance buildings and the shoreline of Lake Almanor to reduce visual domination of the buildings on the shoreline area. Tree survival to ensure successful establishment through the first three summers is being conducted.
- The Oak Flat spoil piles along Caribou Road have been regraded or removed to create a more natural rolling topography along the roadside and where possible moved farther from the road. Native plantings have where possible between planted along the road and the spoil piles to help screen the active use areas from passing motorists.
- In consultation with the Plumas National Forest, dust palliatives have been applied or other measures have been adopted, including regular grading, to help minimize dust emissions and improve the lower segment of the Butt Valley-Caribou Road.
- Following consultation with the Plumas National Forest on color selection, paint the Belden Powerhouse penstocks, surge chamber, and other powerhouse facilities seen from Highway 70 to reduce visual contrast when maintenance or repair work is scheduled.
- Building exteriors and landscaping of the old clubhouse facility and grounds at the Caribou Village are maintained to preserve the historic features and character of the facilities. Consultation with the Plumas National Forest takes place when maintenance or repair activities are to take place to help preserve, as practical, the historic and visual appeal of the village landscaping and structures.
- An annual meeting takes place between the Licensee, Forest Service and Plumas County to coordinating ongoing project related land management activities including recreation management and use, fire suppression and related forest health activities, and the planning for commercial, residential and industrial developments.

- Forest fuels surround project facilities are managed to minimize threats from wildfires to project facilities or the surrounding forest.

Land Management and Aesthetics Rationale

The Lassen and Plumas National Forest Land and Resource Management Plans define Visual Quality Objectives (VQO) for National Forest System lands in the project area. The Forest Service manual describes the visual management system, including the definition of various VQOs, how they are determined, and how they can be achieved. VQOs for the project area are intended to provide various degrees of a natural-appearing landscape. However, existing project facilities and operations are clearly visible on the landscape, with buildings, dams, and penstocks contrasting sharply with the surrounding forested setting. Project roads, campgrounds, and appurtenant facilities are also obvious to the causal observer. The desired conditions for this project would involve decreased conflicts with the established VQOs, while allowing for continued operation of the project.

The Sierra Nevada Forest Plan Amendment Record of Decision (2004) document among other things states that management of forest fuels to reduce the threat of catastrophic wildfire is of paramount importance. Management of fuel will reduce the threat to communities located in the urban wildland interface and the threat to wildland ecosystems. Licensee recreation facilities are located in wildland settings near the communities of Chester and Canyon Dam. Caribou Village operated by the Licensee in support of the Caribou 1 and 2 powerhouses is essentially an island in a forested ocean. Belden powerhouse is located across the North Fork Feather River from the community of Belden. The Sierra Nevada Forest Plan Amendment Record of Decision (2004) has established standards for the management of forest fuels located near communities at risk. Licensee facilities pose a risk to the surrounding forest from a project related fire and are at risk from a wildland fire approaching the facilities.

H. Recreation

License Conditions

No. 28-Recreation River Flow Management
No. 29-Belden Interagency Recreation River Flow Management Plan
No. 32-Recreation
No. 33-Recreation Operations and Maintenance
No. 34-Interpretation and Education (I&E) program
No. 35-Recreation Monitoring Program
No. 36-Resource Integration and Coordination Program
No. 37-Recreation Resource Management Plan (RRMP) Review and Revision Program
No. 38-River Ranger

Recreation Existing Condition – Facilities and Use

- Recreation facilities and use areas in the study area are owned and operated by several different entities including:

- Pacific Gas & Electric Company (Licensee),
- Lassen National Forest,
- Plumas National Forest, and
- Private entities.

- 24 public developed recreation facilities are in the Project area: 12 campgrounds, 7 day use areas, 3 boat launches, and 2 recreation trails.
- Approximately 50 dispersed recreation sites are in the Project area. These sites were identified through an inventory of all publicly accessible shoreline areas in the area; 22 sites are around Lake Almanor, 20 sites are in the Belden Reach, 3 sites are around Butt Valley Reservoir, and 2 sites are in the Seneca Bypass Reach. In addition, multiple sites are in the Southwest Shoreline Access Zone at Lake Almanor. Although there are a number of dispersed recreation sites induced by this Project, it is critical to note that the public is not using many of these sites appropriately. For example, both the Forest Service and Licensee have either orders or policy prohibiting overnight camping and campfires in dispersed sites around Lake Almanor. Licensee also prohibits vehicles below the 4,500 foot contour line (PG&E datum). Yet illegal camping, campfires, and vehicle usage are common occurrences at Lake Almanor. These uses are resulting in resource damage as addressed later in more detain in Rational.
- 22 privately owned and operated recreation facilities surround Lake Almanor. These facilities are operating either on privately owned land adjacent to Licensee-owned land or on Licensee-owned land where written agreements are in place for utilizing the adjacent land.
- Private recreation facilities at Lake Almanor are generally more developed than Forest Service and Licensee facilities. Private interests offer boating opportunities by means of marinas, gas docks, and boat rentals, and a wide variety of overnight accommodations by way of resorts, cabins, motels, and condos. These opportunities are not provided by the Forest Service or Licensee in the Project area.

Public Recreation Sites and Facilities at Lake Almanor

- The following facilities are present at Lake Almanor:
  - 6 campgrounds with 245 developed campsites (64% of total project area developed campsites).
  - 23 group campsites, at least 30 overflow campsites, and 40 primitive campsites.
  - 6 day use areas with 61 picnic sites (84 % of total project area picnic sites).
  - 2 boat launches.
- Most of the private and Licensee facilities at Lake Almanor are in good condition and require only maintenance; however, some repairs are needed, primarily of picnic tables, toilets, water faucets, and boat ramps. However, most recreational facilities on National Forest System lands do not meet current Forest Service standards including: “Meaningful

Measures Condition of Facilities" standards (which includes facilities not meeting current recreational vehicle design specifications such as length, width, etc.), Forest Land and Resources Management Plan standards and guidelines, and current Americans with Disability Act accessibility standards

- An estimated 22 dispersed undeveloped recreation sites are located adjacent to Lake Almanor (47 % of total project area dispersed recreation sites). 14 of the 22 lakeshore sites (64 %) provide vehicle access to the shoreline. Overnight camping occurs at some of these sites. Specifically, overnight use was documented at 12 dispersed sites (55 %). The remainder of the dispersed sites shows signs of day use only. Additional sites are located in the Southwest Shoreline Access Zone of Lake Almanor. However, as discussed in the 3rd bullet under this Existing Condition heading above, not all of this use is legitimate in the Lake Almanor area. While some on the historical day use in this area meets current policy, overnight use, campfires, and vehicles below the 4,500 foot contour elevation (PG&E datum) lake level do not meet that policy and regulations.

Public Recreation Sites and Facilities at Butt Valley Reservoir

- The following facilities are present at Butt Valley Reservoir:
  - 1 day use area/boat launch with 3 picnic sites (4 % of total project area picnic sites) and one boat ramp.
  - 2 campgrounds with 91 developed campsites (24 % of total project area campsites).
  - 20 overflow campsites.
- Most of the facilities at Butt Valley Reservoir are in good condition. Most facilities require only maintenance; however, some minor repair is needed, primarily of access roads, cooking grills, and water faucets.
- 3 dispersed, undeveloped recreation sites are adjacent to the reservoir (6 % of total dispersed recreation sites).

Public Recreation Sites and Facilities tin the Seneca Reach

- The only developed facility at the Seneca reach is the 1.5-mile fishing access trail beginning at the Caribou 1 Powerhouse.
- A few dispersed, undeveloped recreation sites are located in the Seneca reach. These sites are primarily used for dispersed overnight camping.

Public Recreation Sites and Facilities in the Belden Bypass Reach

- The following facilities are present at the Belden Bypass Reach:
  - 1 day use area with 4 picnic sites (5 % of total picnic sites in project area).
  - 3 campgrounds with 46 developed campsites (12 % of total developed campsites in the project area).

- Most facilities in the Belden reach are in good condition, with only minor maintenance needed at each of the campgrounds. However, some recreation facilities at Belden Rest Stop along State Route (SR) 70 are in need of maintenance or repair.
- 20 dispersed undeveloped recreation sites are located in the Belden reach (49 % of the total dispersed recreation sites in the project area). These sites are used primarily for dispersed overnight camping. Many of the sites may function as informal overflow areas for the developed campgrounds provided by the Forest Service.
- In addition to the developed recreation facilities provided by the Licensee and the Forest Service and the dispersed recreation sites, an informal parking area at the Belden Forebay provides fishing and hiking access to the forebay.

Other Recreation Resources

FERC requires that licensees provide information on National Recreation Trails and federal Wild and Scenic Rivers. The nearest Wild and Scenic River is the Middle Fork of the Feather River, which is distant from, and not potentially affected by the project. The Pacific Crest National Scenic Trail (PCT) is near the project area. It is one of eight National Scenic Trails, spanning 2,650 miles from Mexico to Canada through three western states. The PCT generally runs in a north-south direction west of the project area, crossing Highway 36 approximately 6 miles west of Lake Almanor. The PCT does run through one of the developed recreation sites in the project area: the Belden Rest Area on SR70. This highway rest area serves as a trailhead for the PCT.

The Lake Almanor Recreation Trail (LART) has been nominated and is currently pending designation as a National Recreation Trail. The trail meets the criteria for a National Recreation Trail in part due to the scenic views of Lake Almanor, which is a Project induced facility and recreational feature of the area.

Portions of Highways 36, 89, and 147, which encompass Lake Almanor, were designated in February of 2003 as a portion of the "Volcanic Legacy All American Road", a national designation that extends from Crater Lake to Susanville. An All American road is the highest designation in the nation for a scenic byway. Scenic values contributed by Project waters, and associated resources and recreation helped substantiate this designation.

<u>Recreation Existing Condition – Impacts of Developed Recreation Sites and Use Areas</u>

The following is a summary of observed use impacts at the develop recreation sites described above:

- Almost two-thirds (63 %) of the developed sites have areas of erosion; however, impacts are generally minimal.
- Over half (54 %) of the developed sites have areas of bare ground; however, these areas are small and are generally confined to the ground near fire rings and picnic tables.

- Over half (54 %) of the developed sites are in areas where the surrounding forest has been generally cleared of downed wood for use in campfires. However, some areas, such as the current Forest Service group campground and overflow area at Lake Almanor have 90 % bare ground, necessitating the complete rehabilitation and revegetation of this site as required in the Forest Service recreation 4(e) Conditions.
- Less than one-quarter (21 %) of the sites are located in or adjacent to riparian areas; and impacts on these sensitive areas as a result of visitor use appear to be minor.
- A small number (8 %) of the sites are located in or adjacent to wetland areas; however, impacts on these sensitive areas as a result of visitor use appear to be minor.
- Less than 20 % of the sites have been impacted by vegetation damage, litter, improper sanitation, or vandalism.
- Lake Almanor, the Licensee's largest Project forebay has induced high concentrations of human use around the lake shoreline. Almanor Campground, overflow area, and other Forest Service recreational facilities in the Lake Almanor area do not currently meet Forest Service Land and resource Management Plan standards and guidelines for other resources. Vegetation is disturbed and missing, erosion is occurring, riparian vegetation is damaged, and among other things, there is excessive litter and human waste around Project waters.

Existing Condition – Impacts of Dispersed Recreation

Use of the undeveloped, dispersed recreation sites described above can be characterized as follows:

- Almost two-thirds (64 %) of the sites have evidence of campfires and are utilized for overnight use.
- Almost two-thirds (64 %) of the sites adjacent to Lake Almanor currently provide for vehicle access to the shoreline or exposed low-pool areas of the reservoir.
- Over one-third (34 %) of the sites have evidence of off-highway vehicle (OHV) use, primarily in the low-pool areas of Lake Almanor, which are below the closure area imposed (but not enforced) by the Licensee. This usage is causing vehicle oils and fuels to enter Project waters due to inappropriate vehicle access to the edge of the lake. In other areas, OHV damage is currently occurring at the Forest Service overflow camping area. Here a vernal pool, providing critical habitat for *Orcuttia tenuis* a Threatened and Endangered listed plant, is being damaged by OHV use. Other sensitive plants and other resources on National Forest System lands are being adversely affected by illegal OHV use.
- Over half (57 %) of the sites are located in or adjacent to riparian areas, mostly in the Belden Reach.
- Over one-fifth (21 %) of the sites are located in or adjacent to wetland areas.
- Overall use levels (based on impact area) at the sites vary widely:

- Over one-fifth (21 %) of the sites have high levels of use.
- Almost half (47 %) of the sites have moderate levels of use.
- Almost two-thirds (32 %) of the sites have low levels of use.

The following is a summary of observed use impacts at these undeveloped sites:

- Over one-third (34 %) of the sites have areas of erosion; however, the impacts are generally minimal.
- Almost one-third (30 %) of the sites have evidence of vegetation damage, primarily to trees near the sites.
- Over one-quarter (26 %) of the sites have areas of bare ground; however, these areas are not extensive and are generally confined to the ground near fire rings.
- One-quarter (25 %) of the sites are in areas where the surrounding forest has been generally cleared of downed wood for use in campfires.
- A small number (11 %) of the sites have high amounts of litter.
- Less than 4 % of the sites have been impacted by litter, improper sanitation, vandalism, or the illegal dumping of household debris. Although Licensee acknowledges a small percentage of dispersed recreation sites as being impacted by litter, improper sanitation, and vandalism, the Lake Almanor are has a high percentage of these problems. Concentrated human use of the limited public shoreline has resulted in dispersed areas with high litter, vehicle fuel issues as previously addressed, and high levels of human waste adjacent to (and sometimes within) the low lake level pool. These issues must be addressed in this relicensing to provide for compliance with water quality standards, Land and Resource Management Plan standards, and other applicable laws and regulations.

Recreation Desired Condition

Desired recreation conditions would result in high quality public recreation experiences on National Forest System lands.

General Conditions

- A diverse array of recreational opportunities is provided – both developed and dispersed – that meets visitor and local community needs and is compatible with recreation carrying capacity, other local conditions, and biological and other resource objectives.
- A recreation plan is in place that is designed and implemented based on use triggers.
- Existing campgrounds, day use areas, trails, and boating facilities are expanded consistent with specific demand and resource-capability thresholds.

Specific Conditions

- Additional scenic drives, vista points, and photo points are developed.
- Safe swimming and beach-use opportunities are provided.
- Whitewater boating opportunities are provided in the river reaches consistent with biological constraints and facility availability.
- Lake level is maintained from Memorial Day to Labor Day at an elevation that does not adversely hinder visual resources or recreation opportunities.
- River reaches provide dispersed, water-oriented recreation opportunities.

Facility Access

- Adequate and safe access to facilities is provided.
- Vehicle access and OHV use is maintained at an adequate distance from Project waters and other sensitive resource areas to avoid contamination by vehicle fuels and oils, and to provide protection of fragile resources.
- Facilities in the project area comply with the American with Disabilities Act requirements.

Facility Maintenance

- Facilities are maintained to Meaningful Measures standards.
- Upgrade and expand Almanor Campground and other Forest Service recreational facilities in the Lake Almanor area to meet the Lassen National Forest Land and Resource Management Plan and the October 27, 2003 “Almanor Campground Restoration Project” environmental document.
- Trails within the project area are maintained as needed for specific management objectives.
- Heavily used sites are hardened to reduce erosion and vegetation damage.

Increased Licensee Responsibility

- It is desirable to transfer maintenance of Forest Service boat launches, campgrounds, and day use areas within the project area to the Licensee, under agreements that will result in high quality service to the public.
- Trends in site condition are monitored by the Licensee and compared with current baseline data, and facilities are improved, replaced, rehabilitated, or expanded by the Licensee to accommodate increased use over the license period.

- A project-wide interpretive plan emphasizing opportunities along the two State of California scenic byways and the All American Road in the project area has been developed and implemented jointly by the Forest Service and the Licensee.

Public Information

- Streamflow information for project-affected reaches is available to the general public and is adequate for water-oriented recreation use.
- Visitors have access to information about OHV regulations, impacts of visitor pedestrian use near water bodies (erosion and water quality degradation), impacts of gathering firewood near recreation sites, and regulations that prohibit campfires in some areas.

Recreation Rationale

This project has induced a large increase in recreational use, and increased the diversity of recreational experiences available to the public. Lake Almanor and Butt Valley Reservoir created by this project provides lake settings that provide new recreation opportunities including swimming, boating, water skiing, and lake fishing. Without this project it is likely that the Butt Valley area would have remained relatively undeveloped with some campgrounds constructed to accommodate demands much lower than currently experienced while the Chester area would have developed at a much slower rate. It is likely that without the project a road would have been built along the Belden bypass reach in the same location as the current Caribou road but the road would probably be paved only as far as Queen Lilly Campground. The road as currently configured, with pavement extending to the Caribou Village, provides opportunities for driving for pleasure, bird watching, picnicking, hunting and other outdoor pursuits that would be less satisfying if the road was not paved.

Currently approximately 11 percent of the perimeter of Lake Almanor is composed of National Forest System lands. The remaining perimeter lands are either privately owned or owned by the Licensee. The non-Licensee owned perimeter lands have been subdivided into many hundreds of parcels mainly occupied by single-family dwellings. The Lake Almanor recreation anomaly is that while the lake is one of the largest in California, public access is limited to National Forest System lands, Licensee lands and a limited number of private marinas and other points of access. There is little additional National Forest System land adjacent to the reservoir that is available for recreation development. Potentially available land is constrained by wildlife habitat needs. It has been a long-standing policy of both the Forest Service and the Licensee to locate the most highly developed project recreation facilities at Lake Almanor.

National Forest constructed and operated recreation facilities in some cases are located adjacent to Licensee operated facilities and are the direct result of Project induced recreation. Funding of recreation facility upgrades and improvements through a partnership between the Licensee have the following benefits, especially in the Lake Almanor area:

- It allows leveraging of capital improvement monies. Eventual assumption of operating responsibilities of National Forest campgrounds and associated facilities located within the project licensed area by the Licensee will result in economies of scale reductions in

maintenance costs. The public would be better served by turning over Forest Service Lake Almanor recreation facilities to the Licensee, as Forest Service funding is often too low and unpredictable to adequately maintain facilities and meet growing needs.

- The Licensee is capable of realizing all receipts received from the recreational facilities that provides significantly more revenues back in the facility for maintenance and standard upgrades over the life of the license. Currently, the Forest Service is only able to realize about 60 % of the profits to be used at the facilities.

- The Forest Service has provided funding and obtained grants (such as recent Department of Boating and Waterways grants) for all recreational funding for facilities located on National Forest System lands but induced by this hydroelectric Project since it was constructed many decades ago. Since presence of the project reservoir is responsible for inducing the large influx of tourists on National Forest lands, it is appropriate that the Licnesee provide the funding for the management of these facilities during the upcoming license period. It is important to note that the Forest Service has not given up all funding support for Project induced recreation. The Forest Service will among other things, continue funding 60 % of facility reconstruction at Lake Almanor facilities, as well as completing existing grants, providing administrative support to the Licensee, providing maps, brochures, and information to the visiting public at Forest Service facilities.

- Licensee is able to provide more consistent management over the life of the license than the Forest Service, which is subject to changing budgets based on Congressional appropriations. Additionally, adjacent lands will be managed more consistently rather than by ownership, reducing visitor confusion over management practices.

- Management by the Licensee is consistent with the Lassen Land and Resource Management Plan that provides for land management that minimizes administrative costs, that cost effectively serves the public, that allows expansion of the existing infrastructure to accommodate current and future demand including facilities for recreational vehicles.

- To provide more of the funding into the facilities in a more efficient and consistent manner should result in improved public service and increased user satisfaction.

In order to achieve certain operational efficiencies, it is desirable that transfer of operational and maintenance responsibilities for Forest Service campgrounds and associated recreation facilities at Lake Almanor be transferred to the Licensee no later than January 1, 2009. The Forest Service and Licensee shall enter into an operations and maintenance agreement to clarify responsibilities. The operations agreement shall address, but may not be limited to: Forest Service operation and maintenance standards, water, sanitation, Recreational Vehicle (RV) dump station, trail maintenance, capital improvement responsibilities, and campground road maintenance. To offset operation and construction costs, Licensee, in accordance with the Commission and Department of Boating and Waterways regulations, may charge Forest Service approved user fees at Forest Service facilities. The licensee will also be required to request a project boundary adjustment within 60 days of assuming operation of included facilities

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Recreation development at Butt Valley Reservoir has focused on a more primitive recreation experience in an attempt to provide a wide spectrum of opportunity from highly developed at Lake Almanor to primitive at Butt Valley Reservoir. Public response favors the approach.

There are no formal recreation opportunities available in the Seneca bypass reach. The reach is located in a steep and narrow canyon crossed by a single public road at Seneca. Fishing opportunities are limited and would be attractive to those desiring a strenuous and difficult hike to a fishing area. No recreation facilities or river access are planned for this reach. While no whitewater boating flows are proposed for this reach, the March pulse flow is designed to provide a "shelf" or pause in the down ramping portion of the pulse that is suitable for boating. It is anticipated that few boaters will take advantage of the opportunity due to the probability of very cold water, uncertain weather, and minimal hours of daylight.

Several campgrounds and numerous dispersed recreation sites are located on the Belden bypass reach. All recreation developments on the reach are operated and maintained by the Forest Service. This arrangement, with the exception of the expectation that the Licensee will fund minimal whitewater boating put in and take out facilities should boating take place, will continue.

It is the desire of the Forest Service and other participants in the Upper North Fork Collaborative process to continue coordination and adjustment of management objectives for the Project area as a whole. A number of stakeholders have oversight and interest in various natural resources, commercial, and community interests that can be impacted both positively and negatively by recreational pursuits. By having specific coordination meetings, results of surveys, and other input from prior years can be reviewed. Data from ongoing recreation surveys will assist in making any needed changes in management of the area and for future planning.

An interpretive plan will coordinate the types and delivery of information to assist existing users and, more importantly, potential users to orient them to the project resources and facilities. There is a tremendous need for information concerning such things as: What kind of wildlife will I see? Where can I launch a boat? What hiking trails exist in the area? What is the pre-historic and historic history of the area? A plan will look at these needs and project how best to get information to the audience.

A number of facility improvements are requested. These improvements will directly serve the National Forest, as is the case of Almanor Campground, or will serve to facilitate access and use of the project area by visitors to project lands and adjacent National Forest areas, as is the case of Almanor Beach improvement, local boat launch access, Almanor Boat Launch improvements, Dyer View Day Use, Canyon Dam Boat Launch and Day Use, and Belden Bypass Reach boating put-in and take-out.

<u>Recreation River Flow Management</u>

The objective of river flow management for recreation is to provide an appropriate range of flows within the Belden bypass reach to enhance an overall spectrum of river recreation

opportunity within the North Fork Feather River Canyon, that are consistent with other resource objectives (as identified by the Plumas National Forest Land and Resource Management Plan, the Sierra Nevada Forest Plan Amendment Record of Decision (2004), and the Sacramento and San Joaquin River Basin Plan as adopted by the Central Valley Regional Water Quality Control Board.

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

APPENDIX C

STAFF RESPONSES TO COMMENTS ON THE
UPPER NORTH FORK FEATHER RIVER
DRAFT ENVIRONMENTAL IMPACT STATEMENT

PAGES C-1 to C-56

FEIS

APPENDIX C

STAFF RESPONSES TO COMMENTS ON THE UPPER NORTH FORK FEATHER RIVER HYDROELECTRIC PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

AIR	additional information request
APE	area of potential effect
Basin Plan	Central Valley Regional Water Quality Control Board Basin Plan
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
DO	dissolved oxygen
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FCWCD	Plumas County Flood Control and Water Conservation District
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FS	U.S. Forest Service
FYLF	foothill yellow-legged frog
HPMP	historic properties management plan
I&E	information and education
IFIM	Instream Flow Incremental Methodology
Interior	U.S. Department of the Interior
LNFFR	Lower North Fork Feather River
LWD	large woody debris
MCDG	Maidu Cultural and Development Group
MIF	minimum instream flow
MOU	memorandum of understanding
NEPA	National Environmental Policy Act
NFFR	North Fork Feather River
NHPA	National Historic Preservation Act
PA	programmatic agreement
PG&E	Pacific Gas and Electric
PME	protection, mitigation, and enhancement
RRMP	recreation resource management plan
SA	Settlement Agreement
SHPO	State Historic Preservation Officer
SMP	shoreline management plan
SSC	California Species of Special Concern
SWRCB	State Water Resources Control Board
TCPs	traditional cultural properties
UNFFR	North Fork Feather River
WQC	water quality certification

The Federal Energy Regulatory Commission (Commission or FERC) issued its draft environmental impact statement (EIS) for the relicensing of the Upper North Fork Feather River (UNFFR) Project to the U.S. Environmental Protection Agency (EPA) on September 9, 2004, and EPA issued it on September 17, 2004. The Commission requested comments be filed by November 1, 2004. The following entities filed comments pertaining to the draft EIS:

Commenting Entities	**Date of Letter**
Dale Knutsen	September 27, 2004
Greenville Rancheria	October 14, 2004
Bob Baiocchi	October 15, 2004
National Marine Fisheries Service	October 21, 2004
Carol Ghens and Jeri Deane	October 26, 2004
Butt Lake Anglers Association	October 27, 2004
U.S. Department of the Interior (Interior)	October 27, 2004
State Water Resources Control Board (SWRCB)	October 27, 2004
Maidu Cultural and Development Group	October 29, 2004
Pacific Gas and Electric Company (PG&E)	October 29, 2004
Plumas County Board of Supervisors	October 29, 2004
West Almanor Community Services District and Fire Department	October 29, 2004
Ron Decoto	October 31, 2004
Almanor Fishing Association	November 1, 2004
American Whitewater, Chico Paddleheads, and Shasta Paddlers (AW)	November 1, 2004
California Department of Fish and Game (CDFG)	November 1, 2004
U.S. Forest Service (FS)	November 1, 2004
Plumas County Fish & Game Commission	November 15, 2004
Plumas Association of Realtors	November 28, 2004
U.S. Environmental Protection Agency	November 29, 2004
Plumas County Flood Control and Water Conservation District	December 27, 2004

In this appendix, we summarize the comments received, provide responses to those comments, and indicate where we have modified the text of the EIS. We have grouped the comments by topic.

In addition to the letters listed above, we received numerous letters from September 10, 2004, to November 30, 2004, from special interest groups and members of the public expressing their opposition to modifying the Prattville intake or Butt Valley reservoir with a floating curtain(s) and dredging sediments from the bottom of Lake Almanor. In its October 27, 2004, letter, the Butt Lake Anglers Association stated that using a floating curtain to draft cold water from Lake Almanor should not be considered a reasonable alternative. The Save Lake Almanor Committee filed petitions signed by more than 3,000 people expressing vehement opposition to installing floating curtains at Lake Almanor and Butt Valley reservoir as well as dredging 42,000 cubic yards of sediment from the bottom of Lake Almanor and placement of that sediment along the Lake Almanor shoreline.

At the meetings we held to receive comments on the draft EIS, several elected officials or their representatives provided comments on the thermal curtain and further evaluation of alternatives to provide cooler water to the lower NFFR. Representatives of Congressmen Doolittle and Herger, State Senator Aanestad, and Assemblymen Keene and LaMalfa noted that their constituency has expressed a widespread and deep opposition to installing or further study of a "thermal curtain," and recommended that other alternatives to provide cool water be evaluated more extensively.

GENERAL AND PROCEDURAL

General and Procedural Comment 1 (submitted by Interior, October 27, 2004): Interior states that page 8 of the draft EIS fails to mention its September 16, 2003, letter to the Commission stating that no decision had been reached on the Settlement Agreement (SA) and that negotiations were not complete.

Response: We could not locate a letter from Interior dated September 16, 2003. However, we revised section 1.6, *Settlement Agreement*, to include the October 16, 2003, letter from Interior.

General and Procedural Comment 2 (submitted by Interior, October 27, 2004): Interior states that the draft EIS reference to PG&E's proposed protection, mitigation, and enhancement (PME) measures on page 12 appears to refer to the SA and not those measures submitted to the Commission in the final license application.

Response: In section 3.1 of the SA, the parties to the settlement requested that FERC accept and incorporate, without material modification, as license articles all of the PME measures included in appendix A of the SA. On page 9 of the draft EIS, we stated that we consider the final SA to represent the proposed measures of PG&E and other signatory parties to the agreement, superceding previous recommendations made by these respective entities. The list of PME measures proposed by PG&E in section 2.1.2 of the final EIS includes measures proposed in the SA as well as additional measures from the final license application that are not addressed in the SA.

General and Procedural Comment 3 (submitted by Plumas County, October 29, 2004): Plumas County states that it was unaware that PG&E had not applied to the SWRCB for its required water quality certification (WQC). Plumas County states its concerns with the time required to prepare a California Environmental Quality Act (CEQA) document and obtain the water quality certification.

Response: As discussed in section 5.6.1, *Water Quality Certification*, of the draft EIS, PG&E initially applied to the SWRCB for WQC on October 9, 2002, and then withdrew that application and refiled it on September 22, 2003. In the final EIS, we add that PG&E most recently withdrew its application and refiled it with the SWRCB on August 29, 2005. The SWRCB has 1 year to act on PG&E's application. In section 5.6.6, *California Environmental Quality Act*, of the draft EIS, we point out that CEQA guidelines state that when federal review of a project also is required, state agencies are encouraged to integrate the two processes to the fullest extent possible, which may include a joint environmental impact report (EIR)/environmental impact statement (EIS). We also point out that, even though the UNFFR Project EIS is not a joint EIR/EIS, the SWRCB has the opportunity to use this document, as appropriate, to satisfy its responsibilities under CEQA.

General and Procedural Comment 4 (submitted by Plumas County, October 29, 2004): Plumas County requests that the Commission acknowledge the Red River Deed while developing license conditions for the UNFFR Project.

Response: We revised our discussion of the shoreline management plan in section 3.3.6, *Land Use and Aesthetics*, of the final EIS to include information about the Red River Deed reservation. The Red River Deed reservation is a special deed reservation held by property owners whose property was formerly owned by the Red River Lumber Company. The intent of the deed reservation appears to be to ensure that local residents and users will always have the use of Lake Almanor waters for their enjoyment.

General and Procedural Comment 5 (submitted by CDFG, November 1, 2004, and SWRCB, October 27, 2004): The SWRCB recommends that the Commission consider the licensing history of other projects within the North Fork Feather River (NFFR) watershed and provide discussion in the final EIS supporting a sound and conservative approach to granting the new UNFFR Project license term. The SWRCB and CDFG believe that a 30-year license term would be consistent with intent expressed by the licensee and other parties to the Rock Creek-Cresta Project SA. CDFG and the SWRCB point out that the Rock Creek-Cresta Project license was set at 33 years in anticipation of future licenses for the UNFFR and Poe projects, both of which are in the same watershed as the Rock Creek-Cresta Project.

Response: After considering appropriate information, the Commission will make its determination regarding any new license term for this project in the license order. Under the authority of the FPA, the Commission can issue licenses with terms ranging from 30 to 50 years. In issuing new and subsequent licenses, it is the Commission's policy to coordinate the expiration dates of licenses in the same river basin to the maximum extent possible, to maximize future consideration of cumulative impacts at the same time in contemporaneous proceedings at relicensing (see 18 C.F.R. § 2.23 [2004]).

General and Procedural Comment 6 (submitted by the FS, November 1, 2004): The FS suggests adding Settlement Agreement (SA) and California Species of Special Concern (SSC) to the *List of Acronyms and Abbreviations* included in the front of the final EIS.

Response: We have added SA and SSC to the list of acronyms and abbreviations in the front of the final EIS.

General and Procedural Comment 7 (submitted by the FS, November 1, 2004): The FS points out that footnote 8 on page 9 of the draft EIS lists the signatories of the April 22, 2004, SA and references the Plumas National Forest specifically. The FS notes that although Jim Peña, Forest Supervisor of the Plumas National Forest, signed the agreement, it was with concurrence and on behalf of the Lassen National Forest and that the SA is applicable to both the Plumas and Lassen National Forests.

Response: We have added the Lassen National Forest to the list of signatories to the SA included in footnote 8 of the final EIS.

General and Procedural Comment 8 (submitted by the FS, November 1, 2004): The FS requests that we modify the proposed environmental measure listed in section 2.1.2, *Proposed Environmental Measures*, related to maintaining Lake Almanor water levels. The FS points out that the fourth bullet included in that measure should be modified to reflect more recent language in the SA that provides for consultation with interested parties. The FS also states that its final Section 4(e) condition will reflect the current SA wording.

Response: In sections 2.1.2, *Proposed Environmental Measures*, and 5.2.1, *Recommended Alternative*, of the final EIS, we modified the fourth bullet included in the measure related to maintaining Lake Almanor water levels to include the more detailed language regarding consultation included in both the SA and the FS' final Section 4(e) condition no. 30.

General and Procedural Comment 9 (submitted by the Baiocchi Family, October 15, 2004): The Baiocchi family believes that the Project 2105 SA is grossly deficient because there was no environmental review before the agreement was signed and also no review of the SA by the public in Plumas County before it was signed to determine whether any of the agreed-upon terms and conditions of the SA would adversely affect the human environment of the UNFFR watershed.

Response: On September 15, 2004, we provided public notice that the Project 2105 SA had been filed with the Commission and was available for public inspection. With that notice, we also solicited public comment on the SA by November 1, 2004. The final EIS provides our environmental review of the terms and conditions included in the SA.

General and Procedural Comment 10 (submitted by the Baiocchi Family, October 15, 2004): The Baiocchi family believes that the draft EIS gave the impression that the terms and conditions of the SA were valid and in accordance with the National Environmental Policy Act (NEPA), CEQA, and other applicable state and federal statutes. The Baiocchi family believes that the final EIS should identify each term and condition on a line-by-line basis to determine whether the specific agreed-upon term and condition does not have any effect on the human environment of the NFFR and whether that term and condition is in accordance with state and federal law.

Response: We note that each term and condition of the SA was disclosed and analyzed in the text of each resource section of the draft EIS.

General and Procedural Comment 11 (submitted by the Baiocchi Family, October 15, 2004): The Baiocchi family states that the draft EIS cannot serve as a supplement for a CEQA document as recommended by the SWRCB because CEQA requires mitigation

and also requires studies to be conducted before the document is submitted for public review.

Response: In section 5.6.6, *California Environmental Quality Act*, of the draft EIS, we point out that CEQA guidelines state that, when federal review of a project is also required, state agencies are encouraged to integrate the two processes to the fullest extent possible, which may include a joint EIR/EIS.

General and Procedural Comment 12 (submitted by the Baiocchi Family, October 15, 2004): The Baiocchi family states that the draft EIS did not disclose PG&E's compliance record in maintaining the FERC-ordered mandatory environmental minimum daily flow requirements downstream of Canyon dam and also downstream of the Belden forebay dam in the NFFR. The Baiocchi family also states that the draft EIS did not disclose PG&E's comprehensive compliance record in maintaining the FERC-ordered mandatory environmental daily flows downstream of all of PG&E dams on the NFFR. The Baiocchi family believes that the public needs to know PG&E's compliance record and how FERC staff monitors and mandates full compliance of minimum flow requirements for the term of the existing license. The Baiocchi family further believes that the draft EIS should disclose how FERC would monitor and enforce any mandatory environmental minimum daily flows required in any new license issued for the UNFFR Project.

Response: The Commission will evaluate PG&E's compliance history and ability to comply with the new license in any license order issued for the UNFFR Project. In section 5.2.1, *Recommended Alternative,* of the final EIS we recommend that PG&E operate and maintain existing gages on the NFFR to determine river stage and minimum streamflow below Canyon dam (NF-2) and Belden forebay dam (NF-70) under the supervision of the USGS. We also recommend that PG&E complete any modification to the two gage facilities that may be necessary to measure the new minimum streamflow releases within 3 years of license issuance.

General and Procedural Comment 13 (submitted by EPA, November 29, 2004): EPA recommends that the final EIS provide additional information about the No-action Alternative to describe the environmental effects of continuing to operate the project under the terms and conditions of the current license.

Response: Continuing to operate the project under the terms and conditions of the current license would essentially result in a continuation of the environmental conditions that we describe in the *Affected Environment* sections for each resource area. We clarify this point in section 5.1 of the final EIS.

General and Procedural Comment 14 (submitted by EPA, November 29, 2004): EPA recommends that the final EIS include a concise summary of the environmental analysis performed in section 3 of the draft EIS to clearly compare the effects of all

alternatives, including the No-action Alternative. EPA suggests that the comparison should clarify (1) the effects of the hydroelectric project operation on each resource, (2) the PME measures that are proposed under each alternative, and (3) the effects of the project after implementing the PME measures under each alternative. EPA further suggests summarizing and displaying this information in tabular format.

Response: We note that the information specified by EPA is presented in the text of each resource section of the draft EIS.

General and Procedural Comment 15 (submitted by EPA, November 29, 2004): EPA recommends that the final EIS clearly describe the environmental review and public involvement processes that will be used after issuance of the FERC license to evaluate actions that are related to possible changes to the Prattville intake and that would have the potential to cause environmental impacts.

Response: The Commission accepted oral testimony on the draft EIS at two meetings: one held on October 19, 2004, in Chester, California, and one held on October 20, 2004, in Chico, California. At the Chester meeting, PG&E presented the results of recent modeling studies that investigated the effects of potential changes in project structures and operation on water temperatures within and downstream of project reaches of the NFFR, as well as the impacts of these potential changes on limnological and ecological conditions in Lake Almanor and Butt Valley reservoir. On December 17, 2004, the Commission requested that PG&E file the study reports it mentioned at the October meeting because the studies described potential measures for mitigating the project's effects on water temperature. PG&E provided the requested information to the Commission on January 13, 2005, and we analyze this information in section 3.3.1, *Water Resources*, of this final EIS. With this final EIS we are requesting public comment on our analysis of this information.

General and Procedural Comment 16 (submitted by EPA, November 29, 2004): EPA recommends that the final EIS describe the status of the Clean Water Act 401 WQC that PG&E has requested from the SWRCB.

Response: Section 5.6.1, *Water Quality Certification*, of the final EIS states that PG&E most recently withdrew its application for WQC and refiled it with the SWRCB on August 29, 2005. The SWRCB has 1 year to act on PG&E's application.

General and Procedural Comment 17 (submitted by EPA, November 29, 2004): EPA believes that several PME measures recommended in the draft EIS have the potential to affect air quality from construction or prescribed burning including road maintenance, removal of fish barriers, development of recreational facilities, bramble control, and woody debris management. EPA recommends that the final EIS include a discussion of existing air quality and conformity with state and federal air regulations. EPA recommends that the final EIS describe and estimate air emissions from potential

construction and other activities as well as proposed mitigation measures to minimize those emissions.

Response: We initially defined the issues that we intended to address in our SD1, issued on April 25, 2003, and these issues did not include air quality. No parties commented on the need to address air quality in response to the SD1, and our SD2 reflected our final view of the issues that we intended to address in the EIS. We indicate on page 3 of the draft EIS that operation of the UNFFR Project would displace about 100,000 metric tons of carbon emissions from fossil-fueled generation plants in a year. Construction equipment needed for the relatively minor proposed and recommended modifications to the existing project would be operated in accordance with applicable air quality standards.

General and Procedural Comment 18 (submitted by EPA, November 29, 2004): EPA recommends that the final EIS include an evaluation of environmental justice communities within the geographic scope of the project. If such communities exist, EPA recommends that the final EIS document the public involvement methods used to communicate with those communities.

Response: We modified section 3.3.8, *Socioeconomic Resources*, of the final EIS to include a discussion of the demographics of the UNFFR Project area. We have not identified any disproportionate, adverse effect of the proposed action on any minority or low-income population or Indian tribe.

CUMULATIVE EFFECTS

Cumulative Effects Comment 1 (submitted by NOAA Fisheries, October 21, 2004): NOAA Fisheries requests that we analyze the cumulative impacts of FERC-licensed dams and other impacts on anadromous fisheries in the NFFR watershed. NOAA Fisheries suggests that this analysis should include project-related impacts on flow fluctuations and water quality and the relative contribution of each project to negative impacts on anadromous fishes in the watershed.

Response: Our analysis of the cumulative effects of FERC-licensed dams and other effects on anadromous fishes is contained in section 3.3.2, *Aquatic Resources,* of this final EIS. Because anadromous fishes are currently only present downstream of Lake Oroville we conclude that the UNFFR Project or other projects upstream of Lake Oroville have no influence on anadromous fishes in the North Fork Feather River watershed. However, if in the future anadromous fishes should be reintroduced upstream of Lake Oroville, our discussion of the cumulative effects of the project on water resources (section 3.3.1.3 of the final EIS) and fisheries (section 3.3.2.3 of the final EIS) describes habitat conditions for anadromous fishes.

Cumulative Effects Comment 2 (submitted by the FS, November 1, 2004): The FS requests that we include amphibians (or herpetofauna) as a cumulatively affected

resource. The FS states that there have been numerous discussions on how low water temperatures and an unnatural hydrograph may prevent environmental cues for amphibian species to complete a normal life-cycle and therefore create conditions that are not suitable for amphibian species within the Belden and Seneca reaches. The nearest confirmed foothill yellow-legged frog (FYLF) population is some distance downstream but the FS asserts that the project has significantly altered streamflow allowing encroachment of riparian vegetation on previously open and dynamic gravel bars that may have provided FYLF breeding, basking, and rearing habitat.

Response: We did not include amphibians or herpetofauna as a cumulatively affected resource in SD2 or section 3.2 of our draft EIS because of the substantial distance downstream of the UNFFR Project that the nearest confirmed population of FYLF is located. This species is the only known sensitive species of herpetofauna that could be influenced by hydroelectric project operation in the North Fork Feather River watershed. High spring flow and water temperature cues are suspected as being important for triggering reproduction of FYLF during the spring. Rearing of Sierra populations of FYLF during late spring and summer appears to primarily occur in low velocity, edgewater habitat where the temperature generally ranges from 20 to 23 degrees C. Our discussion of the cumulative effects of the UNFFR Project on water resources in section 3.3.1.3 of the final EIS provides an indication of potential influences of project operations on downstream flow and water temperature, which could influence downstream FYLF habitat.

Cumulative Effects Comment 3 (submitted by The Baiocchi Family, November 3, 2004): The Baiocchi family states that the draft EIS failed to disclose and evaluate the cumulative effects on water quality (turbidity), water temperatures, wild trout and planted trout species and their habitat, macroinvertebrate species and their habitat, frog species and their habitat, public angling and wading, other public benefits such as public camping and family fishing, and public safety (children, families, camping, swimming) caused by short-term whitewater flows in the reaches of the NFFR below Belden forebay dam, Rock Creek dam (FERC Project No. 1962), Cresta dam (FERC Project No. 1962), and Poe dam (FERC Project No. 2107). The Baiocchi family would like for us to the revise the EIS to include this information and also include mitigation for adverse effects.

Response: We disclosed the resources that we intended to evaluate in our cumulative effects analysis and our basis for doing so in our SD2 and section 3.2 of the draft EIS. We consider conditions that relate to increased turbidity and, in most instances, water temperature to be project-specific effects and therefore analyze such factors in section 3.3.1.2 of our final EIS. We discussed cumulative effects of the proposed project on aquatic resources (fish and invertebrates) in section 3.3.2.3 of the draft EIS. See the previous response regarding frog species. We consider the recreational resources mentioned by the Baiocchi family to be site-specific in nature and therefore analyze them in section 3.3.5.2 of the final EIS.

Cumulative Effects Comment 4 (submitted by EPA, November 29, 2004): EPA recommends that the final EIS provide a substantive discussion of, and quantify where possible, the cumulative effects of the project when considered with other past, present, or reasonably foreseeable projects, regardless of what agency or person undertakes those actions. EPA also recommends that the final EIS propose mitigation for all cumulative impacts and clearly state the lead agency's mitigation responsibilities and the mitigation responsibilities of other entities.

Response: We identified resources that could be cumulatively affected by the relicensing of this project (water quality and quantity, fisheries, and bald eagles) in section 3.2, *Scope of Cumulative Effects Analysis*, of the draft EIS. We discussed and quantified, to the extent that data is available, the cumulative effects on these resources in sections 3.3.1.3, *Cumulative Effects on Water Resources*, 3.3.2.3, *Cumulative Effects on Aquatic Resources*, and 3.3.4.3, *Cumulative Effects on Bald Eagles*, of the draft EIS. We identify environmental measures, and the responsible entities, that would address cumulative effects, as appropriate, in these respective sections of the EIS.

WATER RESOURCES

Water Resources Comment 1 (submitted by Interior, October 27, 2004): Interior points out that the mean annual flow in lower Butt Creek as described on page 37 of the draft EIS is inconsistent with the value shown in table 3-2 and on page 97.

Response: Interior's comment regarding the mean annual flow in lower Butt Creek results from misunderstanding our statement on page 37 and a typographical error on page 97. The mean annual flow at the NF9, Butt Creek near Caribou Station, is 29 cfs as indicated in table 3-2, which is "about 30 cfs" as stated on page 37. We revised this text in the final EIS to indicate that the mean annual flow at this station is 29 cfs. On page 97 of the draft EIS, we inadvertently left the word "typically" out of the description of flows, which is based on the monthly percent exceedance analysis. We modified the text in section 3.3.2, *Aquatic Resources*, of the final EIS to reflect this clarification.

Water Resources Comment 2 (submitted by PG&E, October 29, 2004, and EPA, November 29, 2004): EPA recommends that the final EIS disclose the 2002 and 2003 water monitoring results for cadmium, lead, mercury, and silver and compare those results to applicable criteria and discuss their significance. Along with its comments on the draft EIS, PG&E provided the results of its 2002–2003 water quality studies and analysis of the California Department of Water Resources trend data.

Response: As we indicated in the draft EIS, the 2002–2003 cadmium, lead, mercury, and silver data were not available when that document was prepared. We have revised section 3.3.1, *Water Resources*, of the final EIS to include our analysis of PG&E's 2002–2003 monitoring results for trace metal concentrations in water, along with our analysis

of other water quality data that were filed by PG&E on November 1, 2004, after release of the draft EIS.

Water Resources Comment 3 (submitted by PG&E, October 29, 2004, and EPA, November 29, 2004): EPA recommends that the final EIS (1) include the results of the 2002 and 2003 fish tissue studies that were not available for the draft EIS, (2) discuss the level of risk that bioaccumulation of reported concentrations of mercury or PCBs in fish could present to human health and the health of other predators, and (3) describe possible mitigation measures to address those effects. Along with its comments on the draft EIS, PG&E provided the results of its 2002 and 2003 fish contaminant testing in Butt Valley reservoir, Belden forebay, and downstream of the forebay in Belden reach.

Response: As described in the draft EIS, results of PG&E's 2002-2003 bioaccumulation studies were not available when the document was prepared. On November 1, 2004, PG&E filed the results of these studies with the Commission. We revised section 3.3.1, *Water Resources*, of the final EIS to include our analysis of PG&E's 2002-2003 monitoring results for bioaccumulation of mercury and PCBs in fish and the level of health risks to humans and other predators.

Water Resources Comment 4 (submitted by Plumas County Board of Supervisors, October 29, 2004, and the FS, November 1, 2004): Plumas County concurs with the recommended revision of the Shoreline Management Plan (SMP) but would like for PG&E to meet with local citizens and the 2105 Committee prior to finalizing the plan and filing it with the Commission. The FS points out that the version of the SMP included in the final license application does not contain edits provided to PG&E by the FS and other parties in July 2004. The FS states that PG&E needs to review and incorporate these additional edits prior to implementation of the SMP.

Response: We concur with Plumas County and the FS that it would be worthwhile for PG&E to consult with the 2105 Committee, the FS, and local citizens prior to revising the SMP and have revised our recommendation in the final EIS accordingly.

Water Resources Comment 5 (submitted by Plumas County Board of Supervisors, October 29, 2004): Plumas County does not believe that the members of the Rock Creek-Cresta Ecological Resource Committee have the authority to make the final decision on PG&E implementation of any modifications to the Prattville intake. Plumas County disagrees with the statement on page 47 of the draft EIS that indicates that the Rock Creek-Cresta SA requires PG&E to develop and implement a water temperature management plan, conduct modeling to evaluate the anticipated effectiveness of Prattville intake modification measures, and implement Prattville intake modifications determined by representatives of the parties signing the agreement to be reasonable and practicable measures to maintain daily mean temperatures of 20°C or less in the Rock Creek and Cresta bypassed reaches.

Response: We agree with Plumas County that the Rock Creek-Cresta SA signatories do not have the authority to make the final decision regarding PG&E's implementation of Prattville intake modifications. However, we point out that the Rock Creek-Cresta SA directed PG&E to evaluate the feasibility and effectiveness of modifying the Prattville intake and implementing other potential structural and operational measures to maintain daily mean temperatures of 20ºC or less in the Rock Creek and Cresta bypassed reaches. PG&E has been doing this for the past few years and has filed several reports containing the effectiveness, feasibility, and secondary effects of a wide range of potential measures that it had evaluated to address this issue on January 13, 2005, in response to an additional information request (AIR) issued by the Commission on December 17, 2004. On July 29, 2005, PG&E filed a report for Project No. 1962 that summarizes numerous water temperature control measures that were evaluated to provide cooler water temperatures in the Rock Creek-Cresta Project. PG&E is continuing to evaluate alternative potential measures to address the warm summer temperatures in the LNFFR. At some point in the future, PG&E and/or the Rock Creek-Cresta Ecological Resource Committee may support implementation of one of these measures. However, neither of these entities has the authority to require that a specific measure be implemented.

Water Resources Comment 6 (submitted by Plumas County Board of Supervisors, October 29, 2004): Plumas County disagrees that, under the terms of the Rock Creek-Cresta SA, PG&E is required to evaluate and potentially modify the Prattville intake as well as implement other options for using the coldwater supply in Lake Almanor and Butt Valley reservoir to attain cooler temperatures in the NFFR downstream of the Caribou developments as stated on page 71 of the draft EIS. Plumas County believes that the Rock Creek-Cresta SA does not limit the coldwater temperature reductions to only using the coldwater supply in Lake Almanor and Butt Valley reservoir but directs PG&E to seek any and all potential options, including re-operation of its Caribou facilities, stream course enhancement, water tower coolers, etc.

Response: The Rock Creek-Cresta SA obligates PG&E to evaluate the effectiveness and feasibility of implementing measures to maintain mean daily water temperatures of 20ºC or less in the Rock Creek and Cresta bypassed reaches. This SA specified that PG&E must evaluate modifying the Prattville intake, and it indicates that other measures may need to be evaluated.

Water Resources Comment 7 (submitted by Plumas County Board of Supervisors, October 29, 2004): Plumas County would like to see the list of potential project modifications on page 76 of the draft EIS expanded to include additional viable options to meet the stream temperature objective desired by the SWRCB, including those options suggested by 2105 LG during its October 14, 2004, meeting.

Response: The list that Plumas County refers to in the draft EIS is not intended to be an all-encompassing list of potential options to meet the stream temperature objective but rather a list of recommendations provided by the FS in its preliminary Section 4(e)

conditions filed on December 1, 2003. Therefore, we have not revised this list as recommended by Plumas County.

Water Resources Comment 8 (submitted by Plumas County Board of Supervisors, October 29, 2004): Plumas County patently refutes that a 1.8 to 2.5°C change in water temperature is a substantial reduction and requests that FERC modify the reference to obsolete data.

Response: While the context of this comment is not entirely clear, we used the best available information while preparing the draft EIS, and, as we stated on page 77 of the draft EIS, "… available information [was] not sufficient to determine the effects that modifying the Prattville intake in conjunction with PG&E proposed and agency recommended water level and flow regime restrictions for the project would have on the thermal regime of Lake Almanor, Butt Valley reservoir, and the NFFR." To remedy this situation, the Commission issued an AIR to PG&E on December 17, 2004, to obtain the results of studies that had been conducted to evaluate the effectiveness, feasibility, and secondary effects of potential options to maintain daily mean water temperatures of 20ºC or less in the LNFFR. On January 13, 2005, PG&E filed several reports with the Commission addressing these issues. We evaluated these reports along with other pertinent information that is available to evaluate a wide range of potential measures to provide cooler water in the LNFFR and incorporate this analysis into the final EIS. This analysis shows that some of the options to cool water in the lower NFFR could reduce temperatures by more than 2.5°C in some reaches.

Water Resources Comment 9 (submitted by Plumas County Board of Supervisors, October 29, 2004): Plumas County believes that federal and state water pollution regulations do not allow any entity the right to erode the property of others and requests that the Commission require PG&E to mitigate for what it considers to be severe shoreline erosion that has occurred since the normal maximum water level was permanently raised to elevation 4,494 (PG&E datum) in 1976. Plumas believes that it is the Commission's responsibility to ensure that PG&E protect the environmental resources within the project boundary that are affected by shoreline erosion. Plumas County would like for the Commission to order PG&E to consult with Plumas County and the resource agencies to develop site-specific erosion control plans. Plumas County expressed its willingness to work with PG&E to identify those erosion areas for which specific erosion control plans should be prepared.

Response: In section 5.2.1, *Recommended Alternative*, of the final EIS, we recommend that PG&E finalize the SMP in consultation with the SWRCB, CDFG, the FS, Plumas County, the Maidu community, the 2105 Committee, and local citizens to evaluate potential adverse effects of shoreline erosion resulting from implementation of any altered lake level management requirements for water quality, aquatic resources, cultural resources, recreation, and aesthetics that may be included in a new license for this project.

Water Resources Comment 10 (submitted by Plumas County Board of Supervisors, October 29, 2004): Plumas County recommends the following alternatives to modify downstream temperatures to improve fish habitat: (1) modeling appropriate Seneca releases from the appropriate Canyon dam gate to offset heating at the Rock Creek, Cresta, and Poe projects in conjunction with reoperating Caribou Nos. 1 and 2, and taking Caribou Nos. 1 or 2 offline for the month of August; (2) adopting a CDFG management plan for the UNFFR by addressing poaching, regulations and staffing; and (3) considering revegetation of Indian Creek in conjunction with possible irrigation alternatives to improve the quality and quantity of water at Belden.

Response: In section 3.3.1.2, *Water Temperature and Dissolved Oxygen Management*, of the final EIS, we analyzed the effects of increasing minimum instream flow releases to the Seneca reach, reducing Butt Valley and Caribou powerhouse discharges, reoperating Caribou Nos. 1 and 2, and revegetating the riparian corridor along Indian Creek. CDFG is responsible for managing its budget and personnel to enforce its regulations, thus we did not analyze the effects of these actions in this final EIS. Water rights issues in the East Branch of the NFFR and its tributaries are also beyond the scope of the Commission's jurisdiction and there is an absence of available information on this subject, hence we do not address the effects of possible irrigation alternatives in this document. Please see section 5.2 of the final EIS for our recommendations that address the water temperature issue.

Water Resources Comment 11 (submitted by Plumas County Board of Supervisors, October 29, 2004): Plumas County believes that a water quality monitoring program with 5-year monitoring intervals is insufficient to monitor trends efficiently. Plumas County believes that with the rapid growth in home construction, the increase in recreational facilities, and the increase in recreational activity on Lake Almanor, there is ample justification for monitoring at 3-year, rather than 5-year, intervals. Plumas County believes that monitoring the water quality of Lake Almanor only once every 5 years would unnecessarily prolong determination of any adverse effects that may occur and could delay implementation of corrective actions. Plumas County also requests additional bacteriological monitoring sites in non-swimming areas.

Response: We acknowledge that during the term of any new license issued for this project, there is potential for an increase in the number of recreationists using the project area, which could result in an increase in coliform bacteria and human pathogen concentrations in project waters. In light of this potential, we recommend that PG&E provide/upgrade sanitary facilities at appropriate locations in the project area. Details of these types of recreation-related measures would be specified in our recommended recreation resource management plan (RRMP). Depending on the type of sanitary facilities that are installed, it may be appropriate to monitor coliform concentrations in adjacent project waters to ensure that the facilities are operating as intended. Such monitoring would be specified in the RRMP. Because we recommend measures that are

intended to ensure that the project satisfies applicable water quality standards, we recommend sampling only to verify that this occurs, not to determine trends. We conclude that monitoring the limnology of Lake Almanor at 5-year intervals is sufficient to accomplish our goal.

Water Resources Comment 12 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto notes that various springs are listed on page 34 of the draft EIS. Mr. Decoto asks if Pratt Spring and Dotta Spring are presently active and why Bailey Springs and Mud Creek Spring were not included.

Response: The current understanding of inflow from springs to Lake Almanor is limited because of the many springs that are submersed under the lake during most periods. PG&E (2002a) reported that numerous springs were visible near the lake's edge in the Big Spring area during periods of low lake levels in 2000 and 2001. We revised section 3.3.1, *Water Resources*, of the final EIS to include information on the estimated amount of inflow from submerged springs and conclude that these springs have minimal effect on the overall water quality of Lake Almanor. However, we are not aware of any recent indication of the status of Pratt or Dotta springs. We did not discuss Bailey Springs or Mud Creek Spring in the draft EIS because we did not have any information about these springs.

Water Resources Comment 13 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto believes that three water quality monitoring locations in Lake Almanor are insufficient and recommends a minimum of six locations and then provides a list of eight locations. These include one in the channel near the Canyon dam outlet tower, three in the east arm of the lake, one near the Prattville intake structure, and three in the west arm of the lake.

Response: While monitoring water quality at additional locations in Lake Almanor would provide greater coverage of conditions in the lake, we do not believe that it is needed to verify that the changes in project operations have the anticipated effects on water quality in the lake and are in compliance with applicable water quality standards, which are the objectives of our recommended monitoring effort. In our environmental effects discussion in section 3.3.1, *Water Quality*, of the final EIS, we conclude that monitoring water quality in Lake Almanor in the channel near the Canyon dam outlet tower structure, and one station each in the eastern and western lobes of the lake would be appropriate to detect project-related changes in water quality.

Water Resources Comment 14 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto states his opposition to PG&E's proposal to switch Canyon dam releases without a study of the effects on salmonid habitat, dissolved oxygen (DO), and water temperature. Mr. Decoto also inquires if PG&E's proposal to increase the minimum instream flow (MIF) in the Seneca reach from 35 cfs year-round to 60–150 cfs, depending on month

and hydrologic water year type, would change water levels in Lake Almanor. Mr. Decoto adds that he would oppose this proposal if it does.

Response: In 2001, PG&E conducted a short-term study to evaluate the effects that switching from using the Canyon dam lower-level gates to the upper-level gates along with increasing flow releases would have on water temperature, DO, other water quality, and odors. On pages 79 to 82 of the draft EIS, we discussed the results of the short-term study and the general insight into the effects of implementing such a measure. We conclude that the concept of switching from the Canyon dam outlet tower's low-level gates (invert elevation of 4,422 feet, PG&E datum) to the upper-level gates (invert elevation of 4,467 feet, PG&E datum) is a reasonable approach to improving water quality in the NFFR downstream of Canyon dam and odors in the vicinity of the dam. However, we note that PG&E should consult with the appropriate resource agencies prior to changing the typical-use pattern of the Canyon dam outlet tower gates to ensure that stakeholder concerns are addressed appropriately, in particular water temperatures. We hold to our conclusion and recommend that PG&E consult with appropriate resource agencies to develop a monitoring plan to document concentrations of sulfide, iron, manganese, arsenic, and other water quality parameters that result from seasonal releases from Canyon dam and implement the plan in the first year of any new project license. We believe that this monitoring along with other recommended water temperature monitoring would effectively evaluate the effects of releasing water from the upper-level gates of Canyon dam. PG&E has not directly linked its proposed MIFs from Canyon dam with its proposed Lake Almanor water levels. PG&E's modeling and our analysis of the effects of the increased Canyon dam releases assume a corresponding reduction in Butt Valley powerhouse discharges when the change is less than or equal to the discharges, which is generally the case. As discussed on page 127 of the draft EIS, PG&E proposes to maintain higher Lake Almanor water levels during the late spring/summer period than it is required to under the existing license.

Water Resources Comment 15 (submitted by CDFG, November 1, 2004): CDFG points out that no coldwater standard has been proposed for the Seneca, Belden, or lower Butt Creek reaches and recommends that 20°C be the maximum allowable temperature for these reaches. CDFG states that temperatures near 20°C have been broadly used in various literature reviews as an upper limit in describing suitable trout habitat and believes that a standard of 20°C would be consistent with the criterion that has been set for the lower reaches of the NFFR at Rock Creek and Cresta.

Response: We agree with CDFG and continue to base our evaluation of water temperatures for the Seneca, Belden, and Butt Creek bypassed reaches on an upper limit of 20ºC and changes from the existing condition.

Water Resources Comment 16 (submitted by the FS, November 1, 2004): The FS states that peaking of the Belden powerhouse was recognized as a significant contributor to the number and magnitude of spill flows occurring at Rock Creek dam and explains

that, during settlement negotiations, PG&E agreed to block load (i.e., maintain a constant generating load for a predetermined period) the Belden powerhouse to reduce the number of spill flows at Rock Creek dam. The FS points out that a Belden powerhouse block loading protocol was included in the UNFFR SA and is reflected in its final Section 4(e) condition no. 25. The FS also believes that peaking of the Belden powerhouse may not be occurring at this time.

Response: We acknowledge that PG&E also agreed to block load the Belden powerhouse in the Rock Creek-Cresta SA, although it is not required to do so under the current UNFFR Project license. We revised section 3.3.1, *Water Resources*, of the final EIS accordingly.

Water Resources Comment 17 (submitted by the FS, November 1, 2004): In reference to lines 9 to 10 of page 66 of the draft EIS, the FS points out that the SA includes a provision for pulse flows if monitoring of lower Butt Valley Creek indicates that a pulse flow or multiple pulse flows would benefit the fishery.

Response: We acknowledge that the SA includes a provision for providing pulse flows in lower Butt Creek if the habitat quality has degraded in lower Butt Creek and pulse flows would provide a significant benefit. We also revised section 3.3.1 of the final EIS to clarify that no measure proposed for this license explicitly reduces flows below the Butt Valley dam.

Water Resources Comment 18 (submitted by the FS, November 1, 2004): The FS points out that its final Section 4(e) conditions will not include a condition related to water quality. The FS also states that it supports the water quality component of the project SA.

Response: We revised section 3.3.1 of the final EIS to reflect the FS support of the water quality component of the SA.

Water Resources Comment 19 (submitted by the Baiocchi Family, November 3, 2004): The Baiocchi family states that there is an agreement between the CDWR and PG&E to deliver water from Lake Almanor to the Oroville reservoir. The Baiocchi family believes that the final EIS should include a delivery schedule that shows how the water would be delivered by PG&E without affecting any portion of the river environment of the NFFR and also not affecting the public trust fish and aquatic resources.

Response: The agreement that the Baiocchi family refers to is an agreement entered into on January 17, 1986, between CDWR, PG&E, and Western Canal Water District. We acknowledged this agreement in the footnote to table 3-4 on page 41 of the draft EIS. We revised this footnote to provide additional information about the agreement to clarify that the required annual release of 145,000 acre-feet from storage between March 1 and

October 31 is used for irrigation downstream of Lake Oroville. There is no indication that PG&E intends to alter its release schedule for this obligation.

Water Resources Comment 20 (submitted by SWRCB, October 27, 2004): The SWRCB describes how the Central Valley Regional Water Quality Control Board Basin Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins designates beneficial uses of the NFFR (municipal and domestic water supply, power, contact recreation (including canoeing and rafting), non-contact recreation, cold freshwater habitat, coldwater spawning, and wildlife habitat) and Lake Almanor (power, contact recreation, cold freshwater habitat, warm freshwater habitat, warmwater spawning, and wildlife habitat). The SWRCB recommends that the final EIS include a clear assessment of how each of these designated beneficial uses can be protected with continued operation (or re-operation) of the UNFFR Project.

Response: In both the draft and final EIS, we analyze the effects that the proposed and recommended alternatives would have on the beneficial uses designated in the Basin Plan.

Water Resources Comment 21 (submitted by SWRCB, October 27, 2004): The SWRCB disagrees with our conclusion that water quality monitoring programs for Lake Almanor, including water column sampling for compliance with Basin Plan bacteria, biostimulatory substances, chemical constituents and toxicity objectives, should be limited to the first 3 years following issuance of the license. The SWRCB points out that any new license issued for the UNFFR Project would be for at least 30 years and asserts that baseline conditions developed during the first 3 years may not be at all representative of the pathogen or constituent levels measured under future use conditions. The SWRCB states that, in the draft EIS, we identify various project-related sources and conditions that have potential to alter water quality conditions over the extended life of a 30-year license. The SWRCB believes that monitoring must be conducted throughout the license term at intervals not to exceed 5 years to track continuing compliance with state and federal water quality criteria and demonstrate protection of the beneficial uses designated for this water body during the license term.

Response: We agree with the SWRCB that it would not be appropriate to monitor water quality for 3 years if the objective is to monitor long-term trends. However, we have a different objective than the SWRCB and the signatories of the UNFFR Project SA for the water quality monitoring that we recommend. We view water quality monitoring as a means to verify that the project meets the applicable water quality standards rather than a means to detect violations over the term of the license. We recommend site-specific measures to address adverse effects of project operations on water quality and anticipate that these measures would allow the project to meet applicable water quality standards. Although we conclude that our recommended monitoring plans would be sufficient to demonstrate that the project meets applicable water quality standards, we do not object to

PG&E conducting additional water quality monitoring as agreed to in the SA for this project.

Water Resources Comment 22 (submitted by SWRCB, October 27, 2004): The SWRCB points out that the draft EIS did not propose any measures to reduce seasonal water temperatures that typically climb above conditions suitable for cold freshwater biota in waters of the NFFR affected by the UNFFR Project. The SWRCB states that the final EIS should include an evaluation of the effects of the Prattville intake modification and a range of other feasible options to mitigate for environmental impacts under the direct and indirect control of the UNFFR Project features or operations. The SWRCB states that compliance with CEQA and the subsequent development of a conditioned 401 WQC for licensing of the UNFFR Project will require the appropriate assurances that the Basin Plan water temperature standard for the NFFR can be protected with continued operation.

Response: The Commission issued an AIR to PG&E on December 17, 2004, to obtain the results of studies that had been conducted to evaluate the effectiveness, feasibility, and secondary effects of potential options to maintain daily mean water temperatures of 20ºC or less in the LNFFR. On January 13, 2005, PG&E filed several reports with the Commission addressing these issues. We used these reports along with other pertinent information that is available to analyze a wide range of potential measures to provide cooler water in the NFFR and incorporate this analysis along with our recommendation to address the high water temperature issue into the final EIS.

Water Resources Comment 23 (submitted by SWRCB, October 27, 2004): The SWRCB states that the final EIS should analyze a full range of alternatives for mitigation of temperature impairments and must demonstrate how the UNFFR Project may be operated in a manner that achieves adequate protection of cold freshwater habitat downstream through all affected stream reaches of the NFFR. The SWRCB states that the final EIS should provide information adequate to evaluate the controllable factors related to restoration and protection of cold freshwater habitat in the NFFR watershed. This information should include but not be limited to the analyses of (1) selective temperature withdrawal from Lake Almanor through a modified Prattville intake structure, (2) selective withdrawal through a modified Caribou No. 2 deepwater intake structure in combination with the Caribou No. 1 intake, (3) seasonal re-operation of the Canyon dam variable outlet tower, and (4) increased minimum flows in the Seneca reach as released through the low-level outlet at Canyon dam. In addition, the SWRCB believes that the final EIS should analyze a range of non-Lake Almanor alternatives that have the potential, individually or collectively, to reduce thermal conditions in the Belden reach, the Rock Creek and Cresta reaches, and the Poe reach of the NFFR.

Response: See response to previous comment.

Water Resources Comment 24 (submitted by SWRCB, October 27, 2004 and the Plumas County Flood Control and Water Conservation District (FCWCD), December 27, 2004): The SWRCB concurs with our recommendation for development and implementation of a monitoring plan to document DO concentrations in Lake Almanor, Butt Valley reservoir, and in the NFFR downstream of the Caribou powerhouse tailrace(s). The SWRCB and the Plumas County FCWCD recommend that the final EIS explore alternatives for increasing DO concentrations in the hypolimnion layer of large water bodies, and then analyze feasible measures with potential to increase DO in Lake Almanor and Butt Valley reservoir.

Response: The objectives of the DO monitoring that we recommended in the draft EIS were to (1) collect data to support the Rock Creek-Cresta Project's modeling effort for Prattville intake modifications, and (2) document DO levels after modification of the Prattville intake or implementation of other water temperature control measures, as appropriate. Based on our analysis of information concerning options to control water temperatures in the NFFR filed in response to our December 17, 2004, AIR, we do not consider modifying the Prattville intake to be a reasonable, practicable control measure to maintain daily mean temperatures at 20ºC or lower in the Rock Creek and Cresta bypassed reaches. Therefore, we no longer recommend development and implementation of a plan to monitor DO concentrations to meet the objectives stated above.

Although DO concentrations are low in the hypolimnion of Lake Almanor and Butt Valley reservoir under existing conditions, they are typical of stratified deep reservoirs and natural lakes. Our review of table 3-8 indicates that the low DO levels in these reservoirs are typically not propagated downstream to the project bypassed reaches. Under existing conditions, Lake Almanor supports a coldwater and warmwater fishery, and Butt Valley reservoir supports a trophy rainbow and brown trout fishery. Therefore, we conclude that there is not sufficient evidence to warrant augmentation of DO in the hypolimnion of either Lake Almanor or Butt Valley reservoir. PG&E monitors DO concentrations at four vertical-profile monitoring stations in both Lake Almanor and Butt Valley reservoir as part of its ongoing implementation of the FERC-approved Water Temperature Monitoring Plan for the Rock Creek-Cresta Project. In addition, we recommend that DO concentrations be monitored as part of the Lake Almanor water quality monitoring program with the objective of documenting the lake's limnology including DO levels resulting from operating the project according to the requirements of any new license.

Water Resources Comment 25 (submitted by EPA, November 29, 2004): EPA states that the final EIS should include a discussion of the potential for PCBs and mercury exposure to human populations that may be at elevated risk due to subsistence consumption of fish. EPA states that the discussion should disclose, if known, information about current and historical consumptive practices of exposed populations, existing body burdens of those groups, plans to gather that information if one does not

currently exist, and a strategy to advise individual consumers of the elevated exposure risks.

Response: On page 74 of the draft EIS, we state that biomagnification of methylmercury and PCBs in fish and crayfish could lead to elevated concentrations of these contaminants in predators of these organisms including humans and birds of prey. We also note that PG&E had not yet filed the results of its 2002 and 2003 fish tissue studies and that we could not determine the level of risk that bioaccumulation of mercury and PCBs may present to human health and the health of other predators based on the available information. On November 1, 2004, PG&E filed the results of its 2002 and 2003 fish tissue bioaccumulation studies. We incorporated our analysis of these study results, along with our assessment of the risk to human populations and other predators into the final EIS. We note that human populations practicing subsistence consumption of fish would have higher risks than populations with lower fish consumption levels, although we have seen no evidence that subsistence consumption of fish occurs in the area. Gathering information on the existing body burdens of these contaminants in human populations is not a responsibility of PG&E. Therefore, we do not recommend a measure to do so in any new license for the project. We recommend that as part of our recommended water quality monitoring program, PG&E consult with the appropriate agencies to aid in developing a strategy to advise anglers of the elevated exposure if the results of the recommended fish tissue bioaccumulation screening study indicates a significant elevation in the risk to human health.

AQUATIC RESOURCES

Aquatic Resources Comment 1 (submitted by NOAA Fisheries, October 21, 2004): NOAA Fisheries requests including a discussion regarding Central Valley steelhead trout and Central Valley spring-run Chinook salmon in section 3.3.4.1, *Threatened and Endangered Species*, and section 5.6.4, *Endangered Species Act.*

Response: We address these two species in sections 3.3.2, *Aquatic Resources,* and 5.6.4, *Endangered Species Act*, in the final EIS. Because these two species do not occur in the project area, an analysis in section 3.3.4, *Threatened and Endangered Species*, is not warranted.

Aquatic Resources Comment 2 (submitted by the Department of Interior, October 27, 2004): Interior indicates that the draft EIS does not accurately characterize the difference in flow volume and habitat benefit between the SA and its recommended minimum flow schedule. Interior contends that the flows proposed in the SA fall significantly below optimal habitat flows than do Interior-recommended flows.

Response: We respectfully disagree with Interior. Our original analysis accurately depicts the likely differences in habitat availability for several life stages of rainbow trout, Sacramento sucker, and macroinvertebrates as a result of the proposed flow

schedules. The increase in adult rainbow trout habitat resulting from Interior's flow recommendation would result in a decrease in habitat for juvenile trout and a reduction in macroinvertebrate community diversity. The flow schedule that we have recommended would result in substantial increases in suitable habitat for all life stages of trout and increase macroinvertebrate diversity as compared to baseline conditions. We conclude that our recommended flows would provide greater benefits to the overall aquatic environment as compared to those recommended by Interior. We added text to section 5.4, *Fish and Wildlife Agency Recommendations,* in the final EIS to further support our conclusion.

Aquatic Resources Comment 3 (submitted by the Department of Interior, October 27, 2004): Interior indicates that the draft EIS evaluates the benefits of pulse flows solely on their effect on spawning gravel in the streambed.

Response: We expanded our analysis regarding the benefits of pulse flows to include information on substrates other than spawning gravels in section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources* of the final EIS. Additionally, based on the information provided by Interior, we now recommend a pulse flow of 700 cfs in water years classified as dry and modified section 5.2.1, *Recommended Alternative,* of the final EIS accordingly.

Aquatic Resources Comment 4 (submitted by the Department of Interior, October 27, 2004): Interior notes that the draft EIS neglects to assess the potential long-term effects of recreational flow releases on the aquatic biota in Belden reach.

Response: We assessed the effects of recreational releases on aquatic biota on pages 119 through 121 of the draft EIS. Our recommendation on page 336 of the draft EIS calls for the establishment of a Technical Review Group (TRG), including Interior, within 6 months of license issuance. The objective of the TRG would be to develop and implement a plan to monitor both the short-term and long-term effects of recreational releases on ecological resources in the Belden reach. We conclude that our original recommendation as stated in the draft EIS is appropriate.

Aquatic Resources Comment 5 (submitted by PG&E, October 29, 2004): PG&E states that it is uncertain as to the intended purpose of the adaptive management plan recommended by Interior in its 10(j) recommendation no. 13 and included in the staff's alternative. PG&E believes that the adaptive management plan as described is too vague and also that limits to maximum change under the adaptive management plan also need to be established to allow assessment of the potential impact on project purposes relative to the costs.

Response: As we state on pages 125 and 343 of the draft EIS, we consider the adaptive management plan to be an overarching plan that would encompass specific aquatic and wildlife monitoring plans that we recommend elsewhere in the EIS. We expect the

specific goals and objectives of each monitoring plan that are included in the biological monitoring and adaptive management plan to be identified during our specified plan development consultations as well as specification of the monitoring results that would trigger implementation of actions. Potential actions could include such straightforward measures as an increase, modification, decrease, or elimination of the monitoring. Actions could also entail such measures as re-examination of the specifics of a license condition, such as elements of the flow regime that may be specified in a license order. When actions taken pertain to items specified in the license order, a license amendment may be necessary. We added text to section 5.2.1, *Recommended Alternative,* of the final EIS, where our recommended biological and adaptive management plan is described, to clarify our intentions.

Aquatic Resources Comment 6 (submitted by PG&E, October 29, 2004; Ron Decoto, October 31, 2004; **and the Baiocchi Family, November 3, 2004)**: PG&E, Mr. Decoto, and the Baiocchi family expressed concern about the frequency of our recommended biological monitoring for aquatic resources. PG&E asserts that the frequency we recommend is excessive, and Mr. Decoto and the Baiocchi family feel we should recommend more frequent monitoring.

Response: Our biological monitoring schedule (discussed on pages 123 and 124 with our recommendation on page 342 of the draft EIS) was developed so that data could be collected on both the short-term (beginning during the fourth year from license issuance and continuing during the fifth year) and long-term (every 5 years after the initial 2-year sampling effort) effects of the recommended flow schedules. Over the course of a new license, our recommended monitoring schedule would allow for PG&E to evaluate the response of the aquatic biota, to determine whether populations are trending in the right direction and to make adjustments to project operations if necessary. Because the measure proposed in the SA does not call for monitoring until years 10–12, we are concerned that changes, negative or positive, to the fish, amphibian, and macroinvertebrate communities would not be detected and any adjustments would not be implemented in a timely manner. As we state in the draft EIS, we conclude that, upon implementation of a new flow regime under a new license, populations of aquatic biota would undergo a period of flux during years 1 to 3, and therefore monitoring during this period would not be particularly meaningful. We conclude that changing the monitoring frequency that we recommend in our draft EIS is not warranted.

Aquatic Resources Comment 7 (submitted by PG&E, October 29, 2004): PG&E does not support the proposed woody debris management plan included in the recommended alternative in the draft EIS for several reasons: large woody debris (LWD) was found to have limited influence on channel morphology in the project area streams, placing enough LWD to have any significant effect on aquatic resources in the Seneca reach would be difficult due to access constraints, and placing LWD in the Belden reach may be hazardous to recreationists.

Response: We continue to support the implementation of a woody debris management plan for the Seneca and Belden bypassed reaches. Although the function of LWD in the system may be limited in scope and influence as suggested by the studies conducted by PG&E, it is likely that a management plan, drafted in consultation with CDFG, SWRCB, FS, and FWS, in concert with the new minimum and pulse flow schedules would enhance long-term LWD-related geomorphic function (e.g., debris jams, floodplain inundation) and that these actions would enhance aquatic habitat by increasing habitat complexity. If, based on information gathered from LWD studies, the resource agencies decide to go forward with the physical placement of LWD, we recommend including flagging, marking, and an educational campaign to warn recreational boaters about the potential hazards of LWD in the bypassed reaches.

Aquatic Resources Comment 8 (submitted by the Plumas County Board of Supervisors, October 29, 2004): Plumas County states that the estimated 4°C decrease in temperature as a result of modifications to the Prattville intake in the Belden reach has been revised and should be corrected in the final EIS.

Response: The temperature analysis for the draft EIS was based on the SNTEMP models provided by PG&E. In response to an AIR issued by the Commission on December 17, 2004, PG&E filed several reports addressing this issue with the Commission on January 13, 2005, which were used for our analysis in the final EIS. These studies indicate that a temperature change of 4^{o}C in the Belden reach is not likely as a result of modifications to the Prattville intake. We revised section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources* of the final EIS.

Aquatic Resources Comment 9 (submitted by the Plumas County Board of Supervisors, October 29, 2004): Plumas County requests that the Commission require PG&E to maintain Lake Almanor reservoir levels as described in the draft EIS and the SA if any modification to pulse or instream flows are made as a result of adaptive management actions.

Response: Although we do not expect pulse and instream flows to alter Lake Almanor levels in a manner that would adversely affect recreation, water quality, and resource availability, we adjusted section 5.2.1, *Recommended Alternative,* in the final EIS to clarify that the reservoir levels specified in the SA must be maintained.

Aquatic Resources Comment 10 (submitted by the Plumas County Board of Supervisors, October 29, 2004 and the FS, November 1, 2004): Plumas County and the FS express support for the removal of the Gansner Bar fish barrier. Plumas County recommends that the Commission conduct further analysis to determine the original purpose of the barrier and assess the benefits of barrier removal. The FS believes removal of the fish barrier would allow rainbow trout and hardhead residing in the river downstream of the junction of the East Branch and the North Fork to regain access to the upper Belden reach.

Response: We agree that the removal of the Gansner Bar fish barrier would likely result in an increased capacity for fish to move freely throughout this section of the reach. We have revised section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources* of the final EIS to better express staff's conclusion that the removal of the Gansner Bar fish barrier could positively benefit fish by enhancing connectively between river reaches. The draft EIS discusses in detail the original purpose of the dam (pages 96 and 97), and we therefore conclude that no additional analysis is necessary.

Aquatic Resources Comment 11 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto questions PG&E's proposal to remove the Gansner Bar fish barrier and believes that allowing Sacramento suckers free access to this reach would be detrimental to the trout population.

Response: Sacramento suckers are native to the Feather River and are already present upstream of the Gansner Bar fish barrier. Efforts to remove this species after installation of the Gansner Bar fish barrier were largely ineffective when viewed on a relatively long-term time scale. Further, Sacramento suckers and rainbow trout are two species typical of coldwater riverine systems in California and have evolved to coexist in these systems. As indicated on page 131 of our draft EIS, we conclude that the removal of the Gansner Bar fish barrier would likely have little effect on the interaction between these two species in the Belden reach and that removal of the barrier would likely improve connectivity within this river reach.

Aquatic Resources Comment 12 (Plumas County, October 29, 2004 and Ron Decoto, October 31, 2004): Plumas County agrees that monitoring of salmonid and wakasagi populations in Lake Almanor and Butt Valley Reservoir would be important if Prattville intake modifications were to proceed. Mr. Decoto recommends evaluating all fish populations in Lake Almanor and Butt Valley reservoir, not just salmonid and wakasagi populations.

Response: Our recommendation in the draft EIS to monitor only salmonid and wakasagi populations is based on data gathered from reservoir studies and entrainment studies. These studies indicate that potential effects of Prattville intake modifications would be related to changes in the thermocline and in turn to species that are associated with this component of the Lake Almanor ecosystem, which are primarily salmonids and the wakasagi. We do not see the need to monitor and evaluate additional fish populations.

Aquatic Resources Comment 13 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto questions the accuracy of the Lake Almanor fisheries surveys used to characterize the fish composition in project waters because they failed to capture tui chub, which Mr. Decoto describes as one of the most abundant species in Lake Almanor. Mr. Decoto recommends including tui chub on the list of species to be monitored in Lake Almanor and Butt Valley reservoir. Mr. Decoto also recommends adding smallmouth bass to that

list because Lake Almanor supports one of the top trophy smallmouth bass fisheries in California.

Response: Although tui chub were not captured in the fisheries surveys conducted by PG&E, they were identified as a component of the Lake Almanor fish community in section 3.3.2.1, *Affected Environment,* in *Aquatic Resources* of our draft EIS. As mentioned in our response to Aquatic Resources Comment 12, our recommendation in the draft EIS to monitor the effects of potential modifications to the Prattville intake involved only salmonid and wakasagi populations because data gathered from reservoir fisheries and entrainment studies indicates that these species have the potential to be adversely affected based on their habitat preferences and spatial distribution within the reservoir (i.e., mid- to lower water column). Consequently, we did not, and in the final EIS we do not, recommend that additional analysis be conducted on tui chub or smallmouth bass populations in Lake Almanor.

Aquatic Resources Comment 14 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto questions the statement in the draft EIS that the average water depth in Lake Almanor is 60 feet and states that he recalls the depth to be approximately 39 feet.

Response: After additional analysis, we have determined that the average depth of Lake Almanor is closer to 40 feet as Mr. Decoto has indicated. We have adjusted the text in section 3.3.2.1, *Aquatic Resources,* of the final EIS, accordingly.

Aquatic Resources Comment 15 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto questions the accuracy of characterizing the angler catch in Lake Almanor based on one creel survey and states that CDFG has conducted extensive creel census surveys during the past 35 years and that these should be used to more accurately portray angler catch in Lake Almanor.

Response: The creel survey conducted by PG&E in 2001 was designed in consultation with the resource agencies (i.e., Interior, CDFG, and FS) and was intended to provide a current indication of angler success at Lake Almanor. We consider it appropriate to rely on the most recent data available to characterize the existing conditions, which serves as our analytical baseline.

Aquatic Resources Comment 16 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto disagrees with the statement in the draft EIS that wakasagi tend to aggregate around the thermocline and states that his observations show that wakasagi prefer depths less than 25 feet. Mr. Decoto recommends conducting more extensive surveys on the distribution and population size of wakasagi in both Lake Almanor and Butt Valley reservoir.

Response: Our original analysis was based on data from hydroacoustic surveys conducted in Lake Almanor in 2001 (HTI, 2002) and on data from netting in the tailwater

of Butt Valley powerhouse. These studies indicate that wakasagi tend to be aggregated at the thermocline and that wakasagi make up 98.8 percent of the tailwater catch. Hydroacoustic data from the Prattville intake on Lake Almanor during the entrainment study indicate that these fish were entrained at an average depth of 33 to 46 feet. In addition, we contacted Dennis P. Lee, (Senior Fisheries Biologist [Supervisor], CDFG Fisheries Programs Branch) to corroborate the statement made in the draft EIS. According to Mr. Lee "wakasagi concentrate below the thermocline in reservoirs such as Folsom and Oroville during the summer months and near the outlet structures. A thermocline typically develops in these reservoirs at a depth of about 45 feet and wakasagi are usually found at deeper depths, sometimes to 100 feet during the summer months. They appear to prefer cooler water temperatures than other introduced species such as threadfin shad in the same waters." We conclude that the same type of behavior is likely for wakasagi in Lake Almanor. Based on the entrainment data for wakasagi in the project reservoirs, we conclude that this species would likely be associated with the thermocline during summer stratification. We conclude that the data is sufficient and that our original analysis in the draft EIS does not need to be modified.

Aquatic Resources Comment 17 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto notes that table 3-15 should have been referenced on page 94 (line 13) in the draft EIS. Mr. Decoto also questions the accuracy of the text in the draft EIS (page 94, line 13) when discussing trout more than 17 inches long comprising a substantial portion of the angler catch.

Response: We have adjusted the reference to table 3-15 in section 3.3.2.1, *Affected Environment,* in *Aquatic Resources*, of the final EIS, as Mr. Decoto suggests. Results of the creel survey conducted by EA in 2001 indicate that 37 individual trout measuring greater than 17 inches were captured in Butt Valley reservoir, which equates to 33 percent of the catch, as stated in the draft EIS.

Aquatic Resources Comment 18 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto notes that the draft EIS states that it is not known if wakasagi reproduce in Butt Valley reservoir (page 94, line 16). Mr. Decoto indicates that he has observed wakasagi spawning in the Butt Valley powerhouse tailrace area and at the mouth of Butt Creek.

Response: At the time we prepared the draft EIS, we did not have information on wakasagi spawning behavior in Butt Valley reservoir. After further analysis, we have determined that it is likely that wakasagi spawn in the reservoir. We agree with Mr. Decoto and have revised the text in section 3.3.2.1, *Affected Environment,* in *Aquatic Resources* of the final EIS.

Aquatic Resources Comment 19 (submitted by Ron Decoto, October 31, 2004): Mr. Decoto states that he suspects Sacramento perch have been entrained at the Prattville intake and recommends including Sacramento perch on the list of species to be monitored in Lake Almanor and Butt Valley reservoir. Mr. Decoto also points out that in the draft

EIS Sacramento perch is listed in table 3-13 as a species identified in Butt Valley reservoir, but that Sacramento perch is not discussed in the text as a species occurring in Butt Valley reservoir.

Response: Mr. Decoto provides no data to support his assertion that Sacramento perch are entrained at the Prattville intake. The applicant collected 91,616 fish during the entrainment study conducted in 2002. Of that total, none were Sacramento perch. Because entrainment studies have shown that the applicant's Lake Almanor facilities are likely having little effect on Sacramento perch, we do not recommend that this species be studied in more detail. Further, any proposed modification of the Prattville intake would not be likely to affect Sacramento perch, because this species does not occupy habitats associated with the thermocline.

We have revised section 3.3.2.1, *Affected Environment,* in *Aquatic Resources* of the final EIS to include Sacramento perch in the text of the final EIS as a species that occurs in Butt Valley reservoir.

Aquatic Resources Comment 20 (submitted by the California Fish and Game Department, Regional Headquarters, Rancho Cordova, California, November 1, 2004): CDFG recommends adequate planning and coordination of field data collection efforts to avoid potentially confounding the results of one study with activities associated with another study. Specifically, CDFG recommends that macroinvertebrate monitoring occur prior to any fish monitoring using electrofishing. CDFG also recommends that any reduction of flows done to accommodate electrofishing does not change the boundaries of the wetted channel perimeter.

Response: In section 5.2.1, *Recommended Alternative*, of the final EIS, we have recommended development of an aquatic monitoring plan in consultation with CDFG, FS, FWS, and SWRCB. During the development of that plan, CDFG should provide its expertise on data collection efforts.

Aquatic Resources Comment 21 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, U.S. Forest Service, November 1, 2004): The FS states that the Sacramento perch is not an FS sensitive species for either the Lassen or Plumas National Forests.

Response: We have revised the text in section 3.3.2.1, *Affected Environment,* in *Aquatic Resources* of the final EIS accordingly.

Aquatic Resources Comment 22 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, U.S. Forest Service, November 1, 2004): The FS points out that the emergency and planned maintenance outage spill plan originally recommended in its preliminary Section 4(e) condition no. 30 was not included in the list of final Section 4(e) conditions. The FS believes that the intent of this condition is met by Belden block

loading and ramping rates defined in the SA (section 1, items 6 and 7) and reflected in its final Section 4(e) condition no. 25.

Response: We have revised the text in section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources* of the final EIS accordingly.

Aquatic Resources Comment 23 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, U.S. Forest Service, November 1, 2004): The FS points out that its preliminary Section 4(e) condition no. 33 has been replaced with its final Section 4(e) condition no. 26, which reflects the SA (section 1, item 9). The FS also explains that fish entrainment monitoring is not included in either the final Section 4(e) conditions or the SA.

Response: We have revised the text in section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources* of the final EIS to reflect the environmental measures specified in the FS final Section 4(e) conditions.

Aquatic Resources Comment 24 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, U.S. Forest Service, November 1, 2004): The FS states that it supports modification or removal of human-made fish barriers but does not support manipulation of natural barriers and provides revised text for inclusion in the final EIS.

Response: It is not our intent to recommend the removal of any natural fish barriers in the project reaches. We have revised the text in section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources* of the final EIS to make this clear.

Aquatic Resources Comment 25 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, U.S. Forest Service, November 1, 2004, the Baiocchi Family, November 3, 2004, and by the Plumas County Flood Control and Water Conservation District, December 27, 2004): The FS cautions that if fish passage over Belden forebay dam is provided as discussed in NOAA Fisheries preliminary Section 18 fish passage prescription, the possible effects on hardhead should be investigated because hardhead would gain access to the Belden reach with removal of the Gansner Bar fish barrier dam. The Baiocchi family asserts that the Commission must require PG&E to fully cooperate with NOAA Fisheries because PG&E dams in the NFFR affect the upstream migration of spring-run salmon and steelhead species to their historical spawning and rearing habitat. Plumas County FCWCD opposes the introduction of Central Valley spring-run Chinook salmon and Central Valley steelhead into the NFFR because it believes that the spawning, rearing and holding areas are inadequate under current and proposed conditions.

Response: A modified Section 18 prescription was submitted by NOAA Fisheries on March 11, 2005, which does not include upstream fish passage over Belden dam. Therefore, the effects on hardhead are no longer relevant as they would not have access

to waters upstream of the Belden dam. Consequently, the potential effects of passing fish over Belden dam have not been analyzed in greater detail in the final EIS. However, we have analyzed the potential effects of NOAA Fisheries' modified Section 18 fish passage prescription for introducing anadromous salmonids into the UNFFR in section 3.3.2.2, *Environmental Effects*, in *Aquatic Resources*, of the final EIS. Because the capture and subsequent release of anadromous fish into the UNFFR is tied directly to the relicensing of the Oroville Project (P-2100), we expect that a substantial amount of the associated environmental analyses will be undertaken pursuant to federal actions associated with that project.

Aquatic Resources Comment 26 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, U.S. Forest Service, November 1, 2004, and Plumas County Flood Control and Water Conservation District, December 27, 2004): The FS points out that if anadromous fish are introduced into the Seneca reach, there is the potential for the inadvertent introduction of fish pathogens into the NFFR as well and states that reintroduction planning should include an investigation of the risk of disease introduction. Plumas County FCWCD is also concerned with the genetic uncertainty of the strain to be introduced and the possible introduction of disease into the watershed. Plumas County FCWCD suggests an alternative site for species reintroduction in waters unaffected by the UNFFR Project.

Response: We expect that, prior to any introduction of anadromous fish to historical habitat in the project area, NOAA Fisheries would assess the potential for the introduction of fish pathogens and determine the appropriate genetic strain of fish species selected for introduction. Commission staff analysis of this issue would be conducted in association with the Oroville licensing proceeding.

Aquatic Resources Comment 27 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, U.S. Forest Service, November 1, 2004): The FS states that it is not entirely the licensee's decision to recommend a change to the pulse flow schedule, even though PG&E would petition the Commission to make the change.

Response: We agree with the FS' comment and have clarified our recommended measure in the final EIS to reflect the interagency collaborative effort required for both the assessment of the effectiveness of pulse flows and any related recommendations for a change to the pulse flow schedule. Ultimately, the Commission would need to approve any proposed change in the pulse flow schedule that may be specified in a license for this project.

Aquatic Resources Comment 28 (submitted by James Pena, Forest Supervisor of the Plumas National Forest, United States Forest Service, November 1, 2004): The FS points out that the draft EIS did not include text that was specified in the SA regarding adjustments to ramping rates for recreational flow releases. The SA states that the total

volume of water released as a result of modifications would not exceed 110 percent of the original volume of water scheduled for release.

Response: We have revised the text in section 5.2.1, *Recommended Alternative*, of the final EIS, to specify that if changes to ramping rates for recreational flows are implemented as a result of monitoring, the total volume would not exceed 110 percent of the original recreational flow release volume.

Aquatic Resources Comment 29 (submitted by The Baiocchi Family, November 3, 2004): The Baiocchi family points out that CDFG Code 5937 is mandatory and requires dam owners to release water at all times to keep fish in good condition. The Baiocchi family believes that the SA is not in compliance with Code 5937 because it does not include mandatory daily flow requirements from Butt Valley dam into Butt Creek.

Response: Our recommended alternative includes a provision that PG&E would not reduce existing dam leakage, tunnel leakage, spring or other natural flows that currently provide inflow to lower Butt Creek downstream of the Butt Valley dam (SA section 1, item 2). Our analysis in the draft EIS shows that a combination of accretion and dam leakage results in an instream flow of 14 to 21 cfs into Butt Creek, providing approximately the maximum amount of riverine habitat (weighted usable area) available for adult and juvenile rainbow trout as modeled by the IFIM study. Our analysis also shows that macroinvertebrate community diversity is also maximized within this range of flows. We will defer to the CDFG on whether the terms of the SA violate CDFG Code 5937.

Aquatic Resources Comment 30 (submitted by the Baiocchi Family, November 3, 2004): The Baiocchi family noted that the draft EIS did not evaluate the cumulative effects of whitewater releases on trout and macroinvertebrates.

Response: We consider the interaction of scheduled whitewater releases on trout and macroinvertebrates to be a site specific rather than cumulative effect, and analyzed this effect on page 119 of the draft EIS.

Aquatic Resources Comment 31 (submitted by SWRCB, October 27, 2004): The SWRCB believes that the conclusions provided on pages 109 and 132 of the draft EIS are not supported by the analysis of temperature data or by current scientific literature. SWRCB would like the final EIS to reconsider the temperature data and provide additional analysis of the effects of temperature on aquatic species.

Response: In response to SWRCB's comment we included additional analyses on the effects of temperature on aquatic species in the bypassed reaches of the UNFFR Project in section 3.3.2.2, *Environmental Effects*, in *Aquatic Resources* of the final EIS.

Aquatic Resources Comment 32 (submitted by Plumas County Flood Control and Water Conservation District, December 27, 2004): Plumas FCWCD believes that pulse flows in dry and critically dry years are inconsistent with a natural hydrograph. Plumas County FCWCD does not agree that these flows are necessary and is confident the proposed recreational flow schedule for dry and critically dry years is sufficient to promote diversity in the reaches downstream of Belden

Response: In the draft EIS, our initially recommended pulse flow schedule was consistent with Plumas County FCWCD's comments; however, after additional analysis, we agree with a component of Interior's Section 10(j) recommendation no. 2 that calls for pulse flow releases of 700 cfs in the Seneca and Belden bypassed reaches in March of dry years, if releases in the preceding January or February have not occurred. We have modified section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources*, of the final EIS to include additional analysis of the effects of our recommended pulse flows.

Aquatic Resources Comment 33 (from Mr. Aaron Seandel, public comment made during DEIS meeting in Chester, CA, October 19, 2004): During the public meeting on October 19, 2004, Mr. Seandel requested that the recommended alternative included in the final EIS clearly show that no pulse flows would be required in dry or critically dry years.

Response: The recommended pulse flow regimes are presented in tabular form in both the draft EIS and the final EIS. We have recommended the flows described in the SA and table 3-18 accurately presents the pulse flows to be implemented. After additional analysis, which is presented in section 3.3.2.2, *Environmental Effects,* in *Aquatic Resources* of the final EIS, we have modified our recommendation on pulse flows to include releases of 700 cfs in the Seneca and Belden bypassed reaches in March of dry years, if releases in the preceding January or February have not occurred.

Aquatic Resources Comment 34 (from Mr. Aaron Seandel, public comment made during DEIS meeting in Chester, CA, October 19, 2004): During the public meeting on October 19, 2004, Mr. Seandel asserted that our statement on page 41 of the draft EIS regarding the designation of the beneficial use of the Feather River as cold freshwater habitat was inaccurate.

Response: The draft EIS states that Lake Almanor is designated as cold freshwater habitat. Section 303 of the federal Clean Water Act authorizes the delineation of beneficial uses for the navigable waters of the United States. The Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins has defined cold freshwater as an existing beneficial use of the Feather River.

TERRESTRIAL RESOURCES

Terrestrial Resources Comment 1 (submitted by PG&E, October 29, 2004): PG&E points out that the bramble control program originally proposed in its license application was modified during settlement discussions and replaced in the final SA with a provision that it would provide and maintain four trails to the shoreline of the Belden reach from existing informal parking areas where public access could be provided in a safe manner. PG&E requests that the final EIS incorporate this change.

Response: We have removed text referring to the proposed bramble control program from sections 2.1.2, *Proposed Environmental Measures*; 3.3.3.2, *Terrestrial Resources*; and 5.2.1, *Recommended Alternative,* of the final EIS. As discussed in the draft EIS, the original purpose of the bramble control program was to facilitate angler access to the Belden bypassed reach. We discussed the proposal for the four trails to the Belden bypassed reach in section 3.3.5.2, *Recreational Resources*, of the draft EIS and concluded that the proposed trails would provide safe access to the Belden bypassed reach, and would also protect riparian areas. Therefore, providing and maintaining four trails in the Belden reach would achieve the original goal of the bramble control program. Section 5.2.1, *Recommended Alternative,* of the final EIS includes our recommendation to provide the four trails in the Belden reach.

Terrestrial Resources Comment 2 (submitted by the FS, November 1, 2004): The FS points out that the provisions included in its preliminary Section 4(e) condition no. 35 recommending a vegetation management plan have been incorporated into its final Section 4(e) condition no. 40 specifying land management and visual resource protection.

Response: We appreciate the FS' cooperation in addressing vegetation management issues in final Section 4(e) condition nos. 40 and 41. We have revised the text in sections 3.3.3 2, *Terrestrial Resources*, and 3.3.4.2, *Threatened and Endangered Species*, of the final EIS to reflect the change.

Terrestrial Resources Comment 3 (submitted by the FS, November 1, 2004): The FS points out that its final Section 4(e) condition no. 41 specifies that PG&E prepare a vegetation management plan that addresses assessing and treating hazardous fuels surrounding project facilities.

Response: We have modified the text of sections 3.3.3 2, *Terrestrial Resources,* and 3.3.4.2, *Threatened and Endangered Species,* of the final EIS to include the appropriate final Section 4(e) conditions provided by the FS and have modified section 5.2.1, *Recommended Alternative,* of the final EIS to include the FS final 4(e) conditions.

Terrestrial Resources Comment 4 (submitted by the FS, November 1, 2004): The FS specifies that the wildlife habitat enhancement plan as addressed in its final Section 4(e) condition no. 31 and the threatened, endangered, proposed for listing, and sensitive species protection plan as addressed in its final Section 4(e) condition no. 45 should be

two distinct plans. The FS believes these two plans should be separated because the wildlife habitat enhancement plan only addresses an area of PG&E land located primarily in the Lake Almanor causeway area and the threatened, endangered, proposed for listing, and sensitive species protection plan addresses PG&E's responsibilities on any NFS lands within the project boundary.

Response: We have revised section 3.3.3.2, *Terrestrial Resources*, of the final EIS to clarify the rationale for combining the two plans. The final SA measure to design and implement a wildlife habitat enhancement plan would benefit a variety of sensitive biological resources at the UNFFR Project, including rare plants, wetlands, streamside riparian communities, cultural resources, and sensitive wildlife habitat. Development of such a plan to manage wildlife habitat, even if only for a limited geographic area, would require the same type of systematic, cooperative approach that would be needed for development of a plan to manage and protect threatened, endangered, proposed for listing and sensitive species on all lands within the project boundary, and would involve consultation with the same resource agencies, landowners, and other interested parties. For these reasons, we conclude that incorporating the threatened, endangered, proposed for listing, and sensitive species protection plan as one element of wildlife habitat enhancement plan would prove more practical and cost effective than development of a separate plan. During development of this plan, it may be helpful for PG&E to organize the document in such a manner that elements of the plan that only apply to specific geographic areas be clearly identified (e.g., presented as separate chapters), and we encourage the FS to work with PG&E during the consultation that would occur during development of the plan to facilitate this organization.

Terrestrial Resources Comment 5 (submitted by the FS, November 1, 2004): The FS points out that its final Section 4(e) condition no. 46 addresses the broad headings included in the discussion of the noxious weed management plan in the draft EIS and provides additional detail on identifying, controlling, and monitoring invasive plants.

Response: We have added a discussion of the FS-specified noxious weed management plan measures specified in final Section 4(e) condition no. 46 to section 3.3.3.2, *Terrestrial Resources*, of the final EIS. In its license application and in the SA, PG&E proposed preparing a plan for identifying, monitoring, and controlling and containing the spread of noxious weeds on NFS lands within the project boundary.

Terrestrial Resources Comment 6 (submitted by the Plumas Association of Realtors, November 28, 2004): The Plumas Association of Realtors states that it is unclear if the whitewater boating releases will create a positive impact on the riparian zone in the area of release.

Response: Effects of flow releases on riparian habitat are discussed on pages 153 through 155 in section 3.3.3.2, *Terrestrial Resources*, of the draft EIS. Proposed whitewater boating flows would increase water velocities which would decrease sediment

deposition and reduce further encroachment of vegetation in the stream channel. The minimum instream flows would be shaped seasonally to more accurately mimic the natural hydrograph by allowing for larger flows in the spring and lesser flows in the summer and fall.

We recognize that riparian vegetation occupies a very small proportion of the landscape at the project and that the short-term loss of this habitat type as a result of increased flows in the UNFFR reaches could alter habitat used for forage, hiding, nesting, or denning by associated wildlife. However, the long-term benefits of higher instream flows are likely to outweigh the adverse effects of short-term habitat loss and alteration. Additionally, monitoring the response of riparian vegetation to the flow regime specified in any license issued for this project, would ensure that sufficient re-establishment of riparian vegetation consistent with the new flow regime occurs to support the dependent beneficial aspects of the aquatic and wildlife communities.

Terrestrial Resources Comment 7 (submitted by EPA, November 29, 2004): EPA states that the final EIS should include a map that clearly identifies wetlands and other waters of the United States within the project area. EPA states that the text in the final EIS should quantify the total acreage of these areas as well as the amount of wetlands and waters of the United States that will be affected by the proposed project.

Response: Discussion of wetland and other aquatic resources, including vegetation series maps and delineation methodologies, are contained in the license application for the UNFFR Project. The license application is an integral part of the record for this proceeding and can also be reviewed on-line at the Commission's website via the FERC eLibrary. We relied on this information to conduct our analysis but do not duplicate all of it in our NEPA document.

Based upon the information available to us, relicensing the project would not significantly affect wetlands.

THREATENED AND ENDANGERED SPECIES

Threatened and Endangered Species Comment 1 (submitted by the FS, November 1, 2004): The FS states that it recognizes that jurisdictional limitations will at times not adequately encompass the requirements of a comprehensive management plan and that its final Section 4(e) condition no. 47 specifying development of a bald eagle management plan now includes the statement, "Coordination of licensee activities on licensee lands within the project boundary with the Forest Service and other appropriate agencies to achieve the goals and requirements set forth in this plan" in place of the statement "Coordination of any plans for timber harvest or mining on licensee lands within the larger Lake Almanor area with the FS and other appropriate agencies, to reach the goals and requirements set forth in this plan."

Response: We have modified section 3.3.4.2, *Threatened and Endangered Species*, of the final EIS to reflect this clarification.

Threatened and Endangered Species Comment 2 (submitted by EPA, November 29, 2004): EPA states that the final EIS should include a discussion of the project's compliance with Section 7 of the ESA, provide an update of the status of consultation with the FWS regarding impacts on the bald eagle, and include the Biological Opinion if it has been issued by FWS.

Response: The Biological Opinion was issued by FWS on January 25, 2005. The FWS concurred with our determination that the project is not likely to adversely affect the threatened valley elderberry longhorn beetle and the California red-legged frog, and would have no effect on slender orcutt grass. It is FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the bald eagle with implementation of our recommended environmental measures. We modified sections 3.3.4.2 and 5.6.4 of the final EIS to reflect this new information.

RECREATION RESOURCES

Recreation Resources Comment 1 (submitted by Interior, October 27, 2004): Interior points out that the citation in Table 3-32 on page 221 in the draft EIS to PG&E 2002a may be incorrect because the reference appears to correspond to the schedule for the Rock Creek and Cresta reaches, not the Belden reach.

Response: Table 3-32, included in section 3.3.5, *Recreation Resources*, of the draft EIS is taken from Table B of the Project 2105 relicensing settlement agreement. The reference has been corrected in the final EIS.

Recreation Resources Comment 2 (submitted by Plumas County, October 29, 2004): Plumas County states that it anticipated PG&E receiving a license for the UNFFR Project by November 2004 and that it agreed with the timeline for recreation maintenance and improvements included in the SA because it believed it was contingent on that date. Plumas County requests that the completion dates for the recreation measures included in the SA be modified to reflect the difference between the actual license issuance date and November 2004.

Response: In Section 5.2.1, *Recommended Alternative*, of the final EIS, we have recommended finalization of the draft RRMP in consultation with Plumas County, the FS, CDFG, and Interior. The recreation facilities development program is an element of the RRMP, and it defines the schedules for completion of the proposed recreation development projects. During the finalization of the RRMP, Plumas County should suggest modification of the timeline for recreation maintenance and improvements included in the SA.

Recreation Resources Comment 3 (submitted by Plumas County, October 29, 2004): Plumas County states that the Lake Almanor Recreation Trail (LART) should be added to Appendix A and that the lighting of Goose Island and the peninsula were not included in the document.

Response: The final, signed Project 2105 relicensing settlement agreement (SA) was filed with the Commission on April 30, 2004. Appendix B of the SA, which includes measures agreed to among the parties to the SA, addresses the LART but also clearly states that these measures were not to be included in any new project license, Section 4(e) conditions, or any other mandatory license conditions. Therefore, we have not included any of the measures listed in appendix B of the SA in our recommended alternative. The lighting of Goose Island and the peninsula was not proposed in either the final SA or the final license application, and has not been addressed in the final EIS.

Recreation Resources Comment 4 (submitted by Ron Decoto, October 29, 2004): Mr. Decoto states that the inaccessibility of the Alder Creek boat launch to those members of the public with special needs is preventing a substantial number of recreation users from enjoying the Butt Valley reservoir and recommends modifying the boat launch during the first year after license issuance.

Response: In Section 5.2.1, *Recommended Alternative*, of the final EIS, we have recommended finalization of the draft RRMP in consultation with Plumas County, the FS, CDFG, and Interior. The recreation facilities development program is an element of the RRMP, and it defines the schedules proposed for completion of the proposed recreation development projects. Improvements to the Alder Creek boat launch are included in the draft recreation facilities development program and are proposed for completion within 5 to 10 years following license issuance. We agree that modifying the boat launch facility sooner, rather than later, would benefit those members of the public with special needs, and we suggest that Mr. Decoto propose accelerating the modification of the Alder Creek boat launch to the agencies involved with the finalization of the RRMP.

Recreation Resources Comment 5 (submitted by Ron Decoto, October 29, 2004): Mr. Decoto states his concern with limited lake access for shore based anglers because of development of private lands around Lake Almanor. Mr. Decoto recommends that PG&E deed their lake and creek frontage property at the Hamilton Branch powerhouse to CDFG because this location provides angler access during winter months to both Lake Almanor and the tailrace of the Hamilton Branch powerhouse since PG&E removes snow from County Road A147 to the powerhouse. Mr. Decoto also states his concern with the sale of Lassen View Resort, which is the site where the Lake Almanor Fishing Association and CDFG rear trout in netpens. Mr. Decoto states that this has been a highly successful program and may be terminated following the sale of the property unless the program can be moved to PG&E lake frontage property.

Response: The Hamilton Branch powerhouse and associated lands are not part of the UNFFR Project and activities at the Hamilton Branch Project are beyond the scope of this relicensing.

Recreation Resources Comment 6 (submitted by the FS, November 1, 2004): The FS states that operation and maintenance (O&M) of recreation facilities is discussed in the draft EIS, but does not utilize the specific definitions provided in the SA that were developed after much discussion between PG&E and the Forest Service. The FS points out that the intent of these definitions is to clearly specify PG&E's responsibilities in operating Forest Service recreational facilities following their reconstruction. The FS provides the definitions for "heavy maintenance" and "operational maintenance" and asks that we use these terms in the final EIS as applicable rather than the more generic term "O&M." The FS states that its final Section 4(e) condition will reflect this wording.

Response: We have modified the text of sections 2.1.2, *Proposed Environmental Measures*, 3.3.5.2, *Recreation Resources*, and 5.2.1, *Recommended Alternative* of the final EIS to include the terms 'operational maintenance' and 'heavy maintenance,' and their definitions, as described in the SA and in final FS Section 4(e) condition no. 33.

Recreation Resources Comment 7 (submitted by the FS, November 1, 2004): The FS points out that the recreational facilities discussed in the proposed environmental measure regarding the adjustment of the project boundary are located on both the Plumas and Lassen National Forests, and that the measure should indicate that.

Response: We have modified the text of sections 2.1.2, *Proposed Environmental Measures*, 3.3.5.2, *Recreation Resources*, and 5.2.1, *Recommended Alternative* of the final EIS to include the Plumas National Forest.

Recreation Resources Comment 8 (submitted by the FS, November 1, 2004): The FS suggests a number of changes to Table 3-26 to eliminate name redundancy and to provide clarity and consistency with the SA and Section 4(e) documents. The FS suggests making these changes throughout the final EIS.

Response: We have modified the text of section 3.3.5, *Recreation Resources*, of the final EIS to include the suggested modifications to the text.

Recreation Resources Comment 9 (submitted by the FS, November 1, 2004): The FS points out that Almanor campground south and the Almanor campground north are now combined under the one facility name "Almanor Family Campground." The FS suggests making this change throughout the final EIS.

Response: We have modified the text in section 3.3.5, *Recreation Resources*, of the final EIS referring to the Almanor campground south and the Almanor campground north to only refer to the Almanor Family Campground.

Recreation Resources Comment 10 (submitted by the FS, November 1, 2004): The FS points out that the California State University Chico Research Foundation (CSUCRF) is no longer the FS concession permittee. To allow for changing permittee names the FS suggests using more generic wording to describe facilities currently operated and maintained under a special-use permit such as a "concession or Forest Service operation."

Response: We have removed the California State University Chico Research Foundation (CSUCRF) from the text in section 3.3.5, *Recreation Resources*, of the final EIS and replaced it with more generic wording.

Recreation Resources Comment 11 (submitted by the FS, November 1, 2004): The FS notes that the SA addresses the need for changing the names of project facilities with similar names in order to reduce visitor confusion under the "Interpretation and Education Program."

Response: We have modified our discussion of the proposed I&E Program in Section 3.3.5.2, *Recreation Resources*, of the final EIS to include the missing SA text addressing facility naming practices.

Recreation Resources Comment 12 (submitted by the FS, November 1, 2004): The FS provides modified text for describing the Lake Almanor Recreation Trail (LART).

Response: We have moved the discussion of the LART in section 3.3.5, *Recreation Resources*, of the final EIS under the subheading *FS facilities* and included the suggested modifications to the text.

Recreation Resources Comment 13 (submitted by the FS, November 1, 2004): The FS requests clarification of the Almanor campground listed in Table 3-27.

Response: The Almanor Campground listed in Table 3-27 of the draft EIS refers to the north and south loops of the Almanor Family Campground operated and maintained by the FS. Table 3-27 has been modified in the final EIS to clarify the campground listed.

Recreation Resources Comment 14 (submitted by the FS, November 1, 2004): The FS states that it does not consider the draft RRMP complete and that additional review and edits are needed prior to finalization. The FS states that it will designate a representative(s) for future RLA Working Group meeting attendance.

Response: We also consider the RRMP included in the final license application and addressed in the SA to be a draft and have recommended finalization of the RRMP in section 5.2.1, *Recommended Alternative,* of the final EIS.

Recreation Resources Comment 15 (submitted by the Baiocchi Family, October 15, 2004 and the FS, November 1, 2004): The Baiocchi family states that all existing and proposed recreation facilities must be compatible for the handicapped and recommends that the final EIS include a list of recreational facilities which are not compatible for the handicapped and show how they will be improved to be compatible for the handicapped. The FS provides some suggested modifications to Table 3-31, including specification of the location of various FS facilities (on either the Plumas or Lassen National Forest).

Response: Table 3-31 included in section 3.3.5, *Recreation Resources,* of the final EIS summarizes the accessibility of existing PG&E and FS facilities according to ADA guidelines. We have modified the facility names listed in Table 3-31 to be consistent with other facility names that have been modified throughout the EIS. However, some of the changes suggested by the FS do not reflect the results of the ADA-accessibility study conducted by PG&E. Improvements to recreation facilities, including improvements in accordance with ADAAG, have been proposed by PG&E and recommended by the FS. These improvements are detailed and discussed in section 3.3.5.2, *Recreation Resources,* of the draft EIS. While Section 2.7(b) of the Commission's regulations require a project licensee to consider the needs of the physically disabled in the design and construction of public recreational facilities on project lands and waters, including public access to such facilities, the Commission has no statutory role in implementing or enforcing the ADA as it applies to its licenses. A licensee's obligation to comply with the ADA exists independent of its project license. We have suggested that it would be helpful if the final RRMP developed by PG&E for project recreational facilities included a discussion of how the licensee considered the needs of physically disabled individuals in the design and construction of the proposed recreational enhancements.

Recreation Resources Comment 16 (submitted by the FS, November 1, 2004): The FS states that text has been added to its final Section 4(e) condition no. 32 regarding its jurisdiction over ADA compliance for recreation facilities located on National Forest System lands.

Response: We have modified the text of section 3.3.5.2, *Recreation Resources,* of the final EIS, to include text in the FS final Section 4(e) condition no. 32 that specifies that all FS recreation facilities be constructed in accordance with ADAAG guidelines at the time the recreation facilities are upgraded or constructed.

Recreation Resources Comment 17 (submitted by the FS, November 1, 2004): The FS addresses the discussion in section 3.3.5.2, *Recreational Resources,* of the draft EIS of its funding partnership with PG&E to complete recreation improvements. The FS agrees

that PG&E will provide matching funding with a maximum cap of $5,000,000 (2004 dollars) but disagrees that this amount will be exactly 40 percent of the costs. The FS requests clarification of the wording to indicate that PG&E proposes providing approximately 40 percent of the needed funding.

Response: We have revised the discussion of the proposed funding partnership between PG&E and the FS included in section 3.3.5.2, *Recreation Resources*, and have revised the text of section 5.2.1, *Recommended Alternative*, of the final EIS, to indicate that PG&E proposes providing approximately 40 percent of the matching funding up to a total maximum of $5,000,000 (2004 dollars) for the FS to complete recreation improvements, including reconstruction of existing facilities, and construction of new facilities at the following FS-owned recreation facilities: the Almanor Family Campground, the Almanor Group Campground, the Almanor amphitheater, the Almanor picnic area, and the Almanor beach.

Recreation Resources Comment 18 (submitted by the FS, November 1, 2004): The FS requests that our discussion of the disposition of any remainder of the $5,000,000 provided by PG&E that may result because the FS is unable to raise their proportionate share, should be included in both section 3.3.5, *Recreational Resources*, and in section 5.2.1, *Recommended Alternative*, of the final EIS.

Response: We have modified the text of section 5.2.1, *Recommended Alternative*, of the final EIS, to include the discussion of the disposition of any remainder of the $5,000,000 provided by PG&E that may result because the FS is unable to raise their proportionate share.

Recreation Resources Comment 19 (submitted by the FS, November 1, 2004): The FS requests clarification of the discussion regarding the reconstruction of the Almanor Family Campground and Amphitheater, the Almanor Group Campground, the Almanor Picnic Area, and the Almanor Beach to show that PG&E will only provide matching funding (up to a maximum cap of $5,000,000) to the FS who will be responsible for the actual construction at these sites.

Response: We have revised the text of section 3.3.5.2, *Recreational Resources*, of the final EIS, to clarify that the FS recommended that PG&E provide matching funding to the FS, who would then be responsible for the actual construction at these sites.

Recreation Resources Comment 20 (submitted by the FS, November 1, 2004): The FS points out that their earlier recommendation that PG&E take over full operation, maintenance and interpretation at the Almanor picnic area under an annual operations agreement with the Forest Service is now obsolete and should be removed from the final EIS.

Response: We have revised section 3.3.5.2, *Recreational Resources*, of the final EIS, to include text of the FS final Section 4(e) condition nos. 32(1)A.1.c and 33, which clearly state that the FS does not recommend that PG&E be responsible for operational maintenance and heavy maintenance of the Almanor Picnic Area.

Recreation Resources Comment 21 (submitted by the FS, November 1, 2004): The FS points out that its recommendation for the Canyon dam day-use area should have been a Section 10(a) recommendation and not a Section 4(e) condition and its final Section 4(e) condition no. 32 reflects that change.

Response: We have revised the text of section 3.3.5.2, *Recreational Resources*, of the final EIS, to clarify that the FS preliminary Section 4(e) condition no. 44E.7 should have actually been FS preliminary Section 10(a) condition no. 44E.7.

Recreation Resources Comment 22 (submitted by the FS, November 1, 2004): The FS emphasizes that it has recommended that PG&E take over full O&M of the southwest shoreline access points, as they are constructed, under an annual operations agreement with the Forest Service." The FS points out that this recommendation is reflective of language in the SA.

Response: We have revised our discussion of the southwest shoreline access points in section 3.3.5.2, *Recreational Resources*, of the final EIS, to include PG&E's proposal to assume O&M responsibility for each of them as they are constructed. We have also included text from FS final Section 4(e) condition no. 33, which specifies that PG&E assume responsibility for operational maintenance and heavy maintenance of the southwest shoreline zone access facilities as they are constructed.

Recreation Resources Comment 23 (submitted by the FS, November 1, 2004): The FS points out that the timeline specified in its final Section 4(e) condition no. 32 for construction of the Butt Valley powerhouse trails is reflective of the timeline included in the SA.

Response: We have revised section 3.3.5.2, *Recreational Resources*, of the final EIS to include text of the FS final Section 4(e) condition no. 32(1)A.2.a, which specifies a timeline of 5–10 years following license issuance for completion of the Butt Valley powerhouse trails, consistent with the SA.

Recreation Resources Comment 24 (submitted by the FS, November 1, 2004): The FS states that it supports retrofitting the catwalk around the Caribou No. 1 powerhouse but in a manner that will not deter some potential users. The FS also points out that the timeline specified in its final Section 4(e) condition no. 32 for completion of the North Fork fishing trail access improvement is reflective of the timeline included in the SA.

Response: We have revised section 3.3.5.2, *Recreational Resources*, of the final EIS, to include text of the FS final Section 4(e) condition no. 32(1)A.3.b, which specifies a timeline of 1–3 years following license issuance for completion of the North Fork fishing trail access improvement, consistent with the SA.

Recreation Resources Comment 25 (submitted by the FS, November 1, 2004): The FS provides information regarding recreation operation and maintenance that they would like included in the final EIS, including: (1) consideration of the local recreating public, including a seasonal boat launch pass at FS facilities, if PG&E institutes fees; (2) continuation of similar seasonal operating periods at recreation facilities currently under FS administration; and (3) inclusion of detailed discussions of fees and use of fees by PG&E according to the SA and final Section 4(e) specifications in the appropriate O&M plan.

Response: We address each of the elements mentioned by the FS separately:

(1) In its preliminary Section 4(e) condition no. 44A.3, the FS specified that PG&E consider a seasonal pass at a reduced rate for local residents in any future fee plan in order to maintain access for local residents at the boat launch and beach facility. However, this recommendation was not included in the final SA, or in the final Section 4(e) conditions submitted by the FS on November 4, 2004. In section 5.2.1, *Recommended Alternative*, of the final EIS, we recommend finalization of the draft RRMP in consultation with Plumas County, the FS, CDFG, and Interior. The recreation O&M program is an element of the RRMP, and it addresses PG&E's proposal to collect and retain 100 percent of FS-approved reasonable user fees in accordance with FERC, FS, and applicable California Department of Boating and Waterways regulations at all FS recreational facilities that PG&E operates and maintains. During the finalization of the RRMP, the need for a seasonal boat launch pass at FS facilities for the local recreating public should be considered. PG&E also proposes meeting with the FS and Plumas County every 5 years to discuss the adequacy of the current user fees and it may also be appropriate to discuss this issue during these meetings.

(2) Continuation of similar seasonal operating periods at recreation facilities currently under FS administration was not addressed in the final SA or in the preliminary or final Section 4(e) conditions. In section 5.2.1, *Recommended Alternative*, of the final EIS, we have recommended finalization of the draft RRMP in consultation with Plumas County, the FS, CDFG, and Interior. The recreation O&M program is an element of the RRMP, and it addresses operation of FS recreation facilities. During the finalization of the RRMP, the continuation of similar seasonal operating periods at recreation facilities currently under FS administration should be considered.

(3) Our discussion of the proposed recreation O&M program, included in section 3.3.5.2, *Recreation Resources*, on pages 210 and 211 of the draft EIS included a

discussion of fees and the use of fees by PG&E that was provided in both the final SA and in the FS preliminary 4(e) condition no. 44. We have modified our discussion of the proposed recreation O&M program in section 3.3.5.2, *Recreation Resources*, of the final EIS, to include additional information on the proposed program.

Recreation Resources Comment 26 (submitted by the FS, November 1, 2004): The FS points out that its final Section 4(e) condition no. 34 specifying development of the I&E program includes consultation with Native American tribes/groups as well as the FS, Plumas County and other relicensing SA signatories and that the timeline for its development is reflective of the timeline included in the SA.

Response: We have revised section 3.3.5.2, *Recreational Resources*, of the final EIS, to include text of the FS final Section 4(e) condition no. 34, which specifies that PG&E develop an I&E Program in consultation with Native American tribes and groups as well as the FS, Plumas County, and other parties within 2 years, consistent with the SA.

Recreation Resources Comment 27 (submitted by the FS, November 1, 2004): The FS states that the text of its preliminary Section 4(e) condition no. 42 has been edited and incorporated into its final Section 4(e) condition no. 35. The FS also points out that text included in its preliminary Section 4(e) condition no. 42 reserving the right of the FS to require changes in the project and its operation has been removed from this Section 4(e) condition and is reserved elsewhere.

Response: We have revised section 3.3.5.2, *Recreational Resources*, of the final EIS to include text of the FS final Section 4(e) condition no. 35, which provides for the development of a recreation monitoring program. We note that FS final Section 4(e) condition no. 5 now incorporates FS text included in FS preliminary Section 4(e) condition no. 42 reserving the right, after notice and opportunity for comment, to require changes in the project and its operation through revision of the 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest resources.

Recreation Resources Comment 28 (submitted by the FS, November 1, 2004): The FS states that the text of its preliminary Section 4(e) condition no. 41 has been incorporated into its final Section 4(e) condition nos. 35, 36, and 37.

Response: We have revised section 3.3.5.2, *Recreational Resources*, of the final EIS to include FS final Section 4(e) condition nos. 35, 36, and 37, which provide for the development of a recreation monitoring program, a resource integration and coordination program, and an RRMP review and revision program, respectively.

Recreation Resources Comment 29 (submitted by the FS, November 1, 2004): The FS recommends including monitoring frequency in the bulleted text briefly describing the recreation monitoring program, which is an element of the Recreation Resources Management Plan (RRMP). The FS believes that this description should specifically address monitoring at 1-, 6-, and 12-year intervals and identify the specific elements to be monitored at those timeframes.

Response: We have modified the text of section 5.2.1, *Recommended Alternative,* of the final EIS, to clarify that the recreation monitoring program included in the final RRMP would identify the frequency at which the various recreational resource monitoring activities would be conducted.

Recreation Resources Comment 30 (submitted by the FS, November 1, 2004): The FS recommends expanding the description of the measure recommending finalization of the RRMP to include the 12-month timeline for finalization of the RRMP and the 12-year review frequency.

Response: We have modified the text of section 5.2.1, *Recommended Alternative,* of the final EIS to recommend that PG&E finalize the draft RRMP within one year of license issuance and to clarify that updates of the RRMP would not occur more frequently than once every 12 years, as agreed to in the SA.

Recreation Resources Comment 31 (submitted by the Baiocchi Family, October 15, 2004 and the Plumas Association of Realtors, December 15, 2004): The Baiocchi family recommends that PG&E develop a public safety plan addressing protection of the public (children, adults, elderly, swimmers, waders) near, adjacent, and within the three public campgrounds located along the river adjacent to Caribou Road from surges of water such as whitewater boating flows, increased fish flows, and other project operations such as the delivery of water to Oroville Reservoir by PG&E. The Plumas Association of Realtors states that the draft EIS does not appear to consider public safety issues in the affected zone.

Response: In section 5.2.1, *Recommended Alternative,* of the final EIS, we have recommended finalization of the draft RRMP in consultation with Plumas County, the FS, CDFG, and Interior. The recreation operations and maintenance program is an element of the RRMP, and it addresses public safety and law enforcement and defines PG&E's commitment to working with the Plumas County Sheriff's Department to provide for adequate safety on project lands and waters. We expect that public safety related to recreational use would be an important consideration for PG&E and the consulted agencies and would be addressed in the final RRMP.

Recreation Resources Comment 32 (submitted by the West Almanor Community Services District, October 15, 2004): The West Almanor Community Services District

states that the draft EIS failed to address the effect an increase in the number of recreational users on the local public safety organizations and believes that the final EIS should address a mitigation strategy to deal with the increase of man-hours and resources on the local public safety agencies. The West Almanor Community Services District shares its concerns because 22 percent of the calls they have received in the last several years were directly associated with incidents at PG&E facilities.

Response: We have modified our discussion of the proposed Recreation O&M Program in section 3.3.5.2, *Recreation Resources,* of the final EIS to include additional information demonstrating how the proposed O&M program addresses public safety and law enforcement and defines PG&E's commitment to working with the Plumas County Sheriff's Department to provide for adequate safety on project lands and waters. PG&E proposes developing a new Memorandum of Understanding with the Plumas County Sheriff's Department to address proposed activities at the UNFFR Project. In section 5.2.1, *Recommended Alternative,* of the final EIS, we recommend finalization of the draft RRMP (the recreation O&M program is an element of the RRMP) in consultation with Plumas County, the FS, CDFG, and Interior.

Recreation Resources Comment 33 (submitted by the Plumas Association of Realtors, December 15, 2004): The Plumas Association of Realtors wonders why the whitewater boaters can't run the river during the winter and spring when high flows occur naturally.

Response: As reported in section 3.3.5, *Recreation Resources*, of the draft EIS, the results of the whitewater controlled flow assessment conducted by PG&E revealed that in the Belden Reach of the NFFR, flows from 600 cfs to 1,200 cfs are needed for quality whitewater boating opportunities. A review of the daily flows from the Belden dam into the Belden reach of the NFFR from October 1969 until September 2002 showed that very few days met those criteria in the Belden reach of the NFFR. In fact, boatable flows occurred in only 13 of the 33 years reviewed. In 1970, there were 6 days of boatable flows, 9 days in 1995, 15 days in 2000, 22 days in 1974, 33 days in 1997, and 49 days in 1975. There was only 1 day of boatable flows provided in 1973, 1980, 1983, 1984, 1986, 1988, and 2 days in 1982. These flows occurred from December until June, with the majority of boatable flows occurring in January and April. However, boatable flows are not only limited in occurrence, but they are also unpredictable. The current lack of real time streamflow information for the Belden reach further limits the ability of boaters to take advantage of boatable flows when they do occur.

Recreation Resources Comment 34 (submitted by the EPA, November 29, 2004): EPA notes that the recommended alternative included in the draft EIS includes dredging and maintaining an approximately 1,000-foot-long, 50-foot-wide, and 6-foot-deep boat channel at the North Shore Public Boat Launch but does not include any discussion of the applicability of Section 404 of the Clean Water Act and Section 10 of the Rivers and

Harbors Act to this or other project operations and maintenance. EPA recommends that the final EIS include discussion of the applicability of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act to this and other project operations and maintenance as well as clearly identifying the potential environmental impacts from dredging activities, discussing both the permit requirements under these statutes and the role of the Army Corps of Engineers in implementing these programs.

Response: The recreation facilities development program is an element of the RRMP, and it addresses both the need for PG&E to acquire all necessary permits and approvals prior to construction of any of the proposed recreation facilities and the intention of PG&E to include agency and public review of all planned recreation development. We anticipate that dredging activities would occur during the fall, when the lake level is typically lower and much, if not all, of the work could be conducted "in the dry." We have modified our discussion of the proposed recreation facilities development program in section 3.3.5.2, *Recreation Resources*, of the final EIS, to include additional information on the proposed program and section 5.2, *Recommended Alternative*, of the final EIS to include consultation with the Army Corps of Engineers during the finalization of the draft RRMP.

LAND USE AND AESTHETICS RESOURCES

Land Use and Aesthetics Comment 1 (submitted by Interior, October 27, 2004): Interior points out that on page 249 (lines 24–27), the draft EIS states that water surface elevations specified in the SA provide for surface elevations 5 to 10 feet higher than current levels. Interior believes these numbers seem excessive compared to the levels shown in table 3-3 in which the SA criteria are close to the 90 percent exceedance values. Interior believes that the differences should be rechecked and/or the derivation of them stated in the final EIS.

Response: Section 3.3.6, *Land Use and Aesthetic Resources*, of the final EIS has been modified to clarify that the Lake Almanor water levels proposed by PG&E in the SA provide for water surface elevations from June 1 through August 31 that are 10 feet higher than the current required levels in wet and normal water year types and 5 feet higher in dry and critically dry water year types.

Land Use and Aesthetics Comment 2 (submitted by Plumas County, October 29, 2004): Plumas County states that it anticipated PG&E receiving a license for the UNFFR Project by November 2004 and that it agreed with the timeline for application of dust palliatives included in the SA (within 2 years of license issuance) because it believed it was contingent on that date. Plumas County requests modification of the implementation date for this measure, which is included in the SA, to reflect the difference between the actual license issuance date and November 2004.

Response: We will consider Plumas County's request when developing the final license order for the UNFFR Project.

Land Use and Aesthetics Comment 3 (submitted by the FS, November 1, 2004): The FS states that it has divided fire management into two emphasis areas. The first focuses on fire prevention at project facilities, adoption of procedures that minimize the risk of a fire start, and implementation of measures in the event of a fire caused by licensee activities. These types of measures are specified its final Section 4(e) condition no. 9. The second addresses the treatment of live and dead fuels surrounding project facilities for the purpose of reducing the possible damage caused by a wildfire in its final Section 4(e) condition no. 41.

Response: We have modified our description and discussion of the fire prevention and response plan included in section 3.3.6, *Land Use and Aesthetic Resources*, of the final EIS to include the revised fire prevention and response plan specified by the FS in its final Section 4(e) condition filed with the Commission on November 4, 2004.

Land Use and Aesthetics Comment 4 (submitted by the Plumas Association of Realtors, December 6, 2004): The Plumas Association of Realtors states that the draft EIS does not appear to address the effect of increased traffic on Highway 70.

Response: California State Route (SR) 70, the Feather River Highway, bisects the Sierra Nevada Mountains along the NFFR canyon and passes through Quincy, California, and onto a connection with U.S. Highway 395. California SR 70 is a major public road with dedicated maintenance and high year-round use levels well above and outside of any project use levels or effects. Therefore, our discussion of traffic use in section 3.3.6, *Land Use and Aesthetic Resources*, of the final EIS focuses on roads and road segments currently or historically used by project personnel and visitors to access project lands and waters and our recommendation for a road traffic survey plan focuses on roads used for project purposes on NFS lands.

CULTURAL RESOURCES

Cultural Resources Comment 1 (submitted by Plumas County Board of Supervisors, October 29, 2004, the MCDG, October 29, 2004, and the Greenville Rancheria, December 15, 2004): Plumas County believes that PG&E should provide financing for a portion or all of a curation facility and/or an interpretive center as retribution for the tribal lands covered by Lake Almanor and Butt Valley reservoir. The MCDG also requests that a curation facility and interpretive center along with deeded land be required as mitigation for the continued effects of this project on the Maidu. The Greenville Rancheria believes that PG&E should set aside lands for a cultural and interpretive center for the Maidu community.

Response: We addressed the issue of a Maidu curation and interpretive center on pages 277 and 279 of the draft EIS. In its October 29, 2004, comments on the draft EIS, PG&E points out that it currently holds no cultural materials from the project area requiring curation. PG&E also states that if, during the term of the new license, archaeological excavations are conducted in accordance with the procedures outlined in the Historic Properties Management Plan (HPMP), then PG&E would consult with the Maidu community regarding the appropriate curation of recovered cultural materials. Further, before considering any funding for a new Maidu curation or interpretive center, PG&E would request additional information from the Maidu community about details for such a facility and the source of other funds to be used for the creation and/or operation of a curation/interpretive center. PG&E also points out that there are several museums near the project that house Maidu cultural materials and that there is an existing Maidu Interpretive Center in Roseville, California. PG&E has agreed to consult with the Maidu community, the Lassen and Plumas National Forests, the California State Historic Preservation Officer (SHPO), and the Commission regarding additional interpretive opportunities and a public education program. In Item 6 of Section 7 of the SA, PG&E proposes developing an information and education (I&E) plan within 2 years following license issuance; one of the themes to be addressed in the I&E plan would be Native American culture. We have modified section 3.3.7, *Cultural Resources*, of the final EIS to reflect the new information provided by PG&E and to address the need for PG&E to document its consultation regarding these matters in the final HPMP that we have recommended.

Cultural Resources Comment 2 (submitted by the MCDG, October 29, 2004, and the Greenville Rancheria, December15, 2004): The MCDG requests that PG&E deed land to them as mitigation for the continued effects of this project on the Maidu and for access for gathering and tending of plants. The Greenville Rancheria states that it would like to be granted some portion of land on the shoreline of Lake Almanor and/or Butt Valley reservoir with full right-of-way access and land rights and provides a brief legal description of the location of the land it would prefer.

Response: We addressed the issue of setting aside specific project lands for traditional cultural practices on pages 278 and 282 of the draft EIS. PG&E may volunteer to discuss with representatives of the Maidu community the possibility of conveying tract(s) of project lands that it owns, or granting easements to the Maidu community for traditional cultural practices or other uses. In its license application, PG&E committed to working with the Maidu community to develop an agreement regarding access to project lands to gather plants for traditional uses. We expect that the results of such consultations would likely be documented in the final HPMP. PG&E proposed in the SA to prepare a wildlife habitat enhancement plan within 1 year of the license issuance. This plan would address the protection of rare plants and cultural resources. In its October 29, 2004, letter commenting on the draft EIS, PG&E points out that pursuant to the recent settlement of its bankruptcy case PG&E has committed to protecting approximately 140,000 acres of its watershed lands within its service area by conservation easements or fee simple donations to public entities or qualified non-profit corporations. PG&E describes how the Pacific Forest and Watershed Land Stewardship Council was created out of the bankruptcy settlement and is charged with developing a Land Conservation Plan. PG&E will submit any land transactions recommended by the Stewardship Council to the appropriate regulatory agencies. We modified section 3.3.7.2 of the final EIS to reflect our expectation that conservation easements or donations of project lands by PG&E would likely be discussed in the final HPMP that we have recommended.

Cultural Resources Comment 3 (submitted by the FS, November 1, 2004, and the Greenville Rancheria, December 15, 2004): The FS believes that an historic site has been affected by project operation and continues to be in jeopardy; the FS also states its willingness to discuss modifying the area of potential effect (APE) with PG&E to include this site within the APE. The Greenville Rancheria states that it would like the APE extended to cover 2 miles outside of the current FERC project boundary.

Response: We discussed and analyzed the APE on pages 250 and 280 of the draft EIS. The SHPO concurred with the APE as defined by PG&E in cultural resources reports submitted to that office. The FS has provided no new evidence to support the agreed-upon APE. As discussed in section 3.3.7.2 of the final EIS, the HPMP will have provisions for amending the APE if new information indicates a need to do so.

Cultural Resources Comment 4 (submitted by the MCDG, October 29, 2004, and the Greenville Rancheria, December 15, 2004): The MCDG states that there should be specific mitigation measures to benefit the Maidu community. The MCDG does not believe that PG&E's proposed use of signage and public education would adequately mitigate effects on historic properties and that PG&E's proposed three-stage approach would not be practical and most sites would be further degraded with its use. The Greenville Rancheria requests mitigation for changing lake levels, wave action, and recreational use.

Response: We discussed the HPMP and mitigation of effects on adversely affected historic properties in section 3.3.7.2 of the draft EIS. The purpose of the HPMP is to present PG&E's proposed mitigation measures that would reduce or avoid adverse effects on historic properties. The HPMP specifically discusses mitigation of effects from changing lake levels, wave action, and recreational use. The current HPMP, which is in draft form, will be finalized after PG&E further consults with representatives of the Maidu community, including the Greenville Rancheria and the MCDG. We expect that the results of these consultations would be to formulate mitigation measures that are practical.

Cultural Resources Comment 5 (submitted by the Susanville Indian Rancheria, December 21, 2004; MCDG October 29, 2004; EPA, November 29, 2004; and the Greenville Rancheria, December 15, 2004): The Susanville Indian Rancheria questions whether the Commission is adhering to its trust responsibilities and properly consulting with Indian tribes. The MCDG appreciates being included as a consulting party in the Section 106 of the National Historic Preservation Act (NHPA) consultation and requests that the meetings for the various proposed studies be held in the project area where it will be easier for the various Maidu groups to attend. EPA states that the final EIS should provide additional information on the process and outcome of government-to-government consultations with the tribes in accordance with Executive Order 13175. EPA states that the final EIS should also clarify the role the Commission will play in meeting its trust responsibilities to the tribes in light of issues and concerns raised by the tribes as PG&E finalizes the draft HPMP.

Response: Consultation with Indian tribes is discussed in the draft EIS in section 3.3.7.1 on page 251, and in section 3.3.7.2 on page 281. We believe that the Commission has properly consulted with federally recognized Indian tribes, according to our Policy Statement on Consultations with Indian Tribes in Commission Proceedings issued July 23, 2003. Prior to the filing of PG&E's application on October 23, 2002, Commission staff met with the tribal council of the Greenville Rancheria on two occasions (July 23 and September 4, 2002). Our Tendering Notice, issued October 29, 2002, Notice of Acceptance of Application, issued December 26, 2002, Notice of Intent to Prepare an Environmental Impact Statement, issued April 25, 2003, and Notice of Application Ready for Environmental Analysis, issued August 25, 2003 were all sent to federally recognized Indian tribes, including the Susanville Indian Rancheria, Greenville Rancheria, Taylorsville Rancheria, Moorehouse Rancheria, Berry Creek Rancheria, and Enterprise Rancheria, as well as non-federally recognized organizations, including the MCDG, Honey Lake Maidu, Mountain Maidu, Roundhouse Council, United Maidu Nation, and Tasman Koyomn Foundation. The Greenville Rancheria and the Susanville Indian Rancheria were the only two federally recognized Indian tribes to request to be consulting parties in this proceeding. Indian tribes have had the opportunity to communicate with the Commission through written comments on our public notices and

issuances as well as through comments on the draft EIS. All comments on the draft EIS are addressed in this final EIS.

Cultural Resources Comment 6 (submitted by Plumas County Board of Supervisors, October 29, 2004, and the Greenville Rancheria, December 15, 2004): The Greenville Rancheria and Plumas County express concern about the effect of thermal curtains on cultural sites.

Response: PG&E has conducted several studies of potential measures to lower water temperature in the UNFFR pursuant to the Rock Creek-Cresta (P-1962) relicensing SA. On December 17, 2004, we requested that PG&E provide us with the results of those studies. On January 13, 2005, PG&E provided the requested study results. PG&E examined 23 alternative methods of lowering water temperature in the North Fork Feather River, including the use of floating thermal curtains in Lake Almanor, or in Butt Valley reservoir, or in both reservoirs. Sections 3.3.1.2, *Water Resources*, and 3.3.2.2, *Aquatic Resources*, of the final EIS, includes our analysis of PG&E's studies regarding measures for lowering the temperatures in the NFFR, including a discussion of various alternatives and a disclosure of potential effects from recommended measures. Section 3.3.7.2, *Cultural Resources*, of the final EIS has been revised to include an analysis of the potential effects on cultural resources of installing a thermal curtain.

Cultural Resources Comment 7 (submitted by MCDG, October 29, 2004): The MCDG disagrees that some ethnographic sites identified by PG&E and listed in the draft EIS do not retain the quality of traditional cultural properties (TCP) and objects to our recommendation for no mitigation at those sites.

Response: PG&E identified nine ethnographic sites as not retaining the qualities of a TCP. No treatment was recommended for only four of those sites, and one of those locations is inundated. PG&E recommended some form of treatment for the other five sites identified as not qualifying as TCP, including PG&E developing a public education program regarding project-specific ethnohistory, and negotiating with the Maidu community to allow access to plant gathering locations. The SHPO has not commented on the PG&E report. Nevertheless, PG&E states it would treat all sites that have not been officially determined eligible for the National Register as if they are eligible. Thus, the ethnographic sites that can be tied to a physical location would be treated as if they are eligible. We have recommended that PG&E finalize the HPMP and we expect that the protection of those sites and mitigation of potential effects on those sites would be addressed in the final HPMP, which will be finalized in consultation with the Maidu community. We have also recommended that PG&E develop and implement an Information and Education program relating to the region's cultural history as proposed mitigation for effects on potential TCPs such as Big Meadow and Butt Valley.

Cultural Resources Comment 8 (submitted by PG&E, October 29, 2004): Page 278 of the draft EIS discussed how Plumas County and the FS have requested copies of the

cultural resources reports, including the ethnography study completed by Albion. PG&E points out that on January 22, 2003, it transmitted copies of Volumes 1 and 2 of the Native American Traditional Cultural Properties Identification and Description for the Upper North Fork Feather River Project prepared by Albion Environmental Inc. to Mr. Kevin McCormick, Plumas National Forest Archaeologist, and to Ms. Diane Watts, Lake Almanor Ranger District (Lassen National Forest) Archaeologist. Further, PG&E notes that the MOU for the Traditional Cultural Properties Consultation for the Upper North Fork Feather River Relicensing Project between the Greenville Rancheria, Albion Environmental Services, and PG&E limits distribution of the report and that any requests for this information need to be made to the Greenville Rancheria.

Response: We have modified section 3.3.7.2, *Cultural Resources*, of the final EIS to reflect this information.

Cultural Resources Comment 9 (submitted by PG&E, October 29, 2004, and the FS, November 1, 2004): PG&E states that it has no objection to inviting either Plumas County or NPS to the UNFFR Cultural Resources Working Group meetings, including them as cultural resources consulting parties, and providing them with confidential cultural resources reports and data as long as it can be assured that confidential information discussed in the meetings or provided in the reports is not provided to the public. However, PG&E believes that Maidu participants in the Cultural Resources Working Group should be permitted to agree that such involvement by Plumas County, NPS, or others is appropriate. The FS states that it is unsure as to the status of the Cultural Resources Working Group and requests that PG&E contact the appropriate archaeologists on the Plumas and Lassen National Forests when the working group reconvenes.

Response: PG&E established the Cultural Resources Working Group as part of its First Stage Consultation process and in its license application listed past working group meetings. We discussed the Cultural Resources Working Group on pages 278 and 281 of the draft EIS. We encourage PG&E to invite all consulting parties to the Cultural Resource Working Group meetings that it would organize in the future for this project. We suggest that these meetings should be held in the project vicinity so that local members of the Maidu community may attend. We expect that procedures for organizing future working group meetings will be addressed in the final HPMP. We have modified section 3.3.7.2, *Cultural Resources*, of the final EIS to reflect this information.

Cultural Resources Comment 10 (submitted by the FS, November 1, 2004): The FS lists several pages in the draft EIS that refer to the HPMP and points out that there is no mention of the FS being an involved party. The FS states that some of the project-affected sites are located on the Plumas and Lassen National Forests, so the FS needs to be included and listed for review and development of the HPMP. Final Section 4(e) condition no. 43 specifies that PG&E must consult with the FS in regard to historic properties.

Response: We discussed the HPMP in section 3.3.7.2 of the draft EIS, on pages 277 to 282. The final EIS has been modified to identify the FS as a consulting party in the process of compliance with Section 106 of the NHPA. We have included the FS final Section 4(e) condition no. 43 related to management of historic properties in section 3.3.7.2, *Cultural Resources*, of the final EIS.

Cultural Resources Comment 11 (submitted by the FS, November 1, 2004): The FS states that it should be a signatory to the PA as it applies to decisions on NFS lands, not just a concurring party. In its final Section 4(e) condition no. 43, the FS specifies that it will be a signatory to the PA.

Response: It has been the Commission's practice in hydropower relicensing cases to restrict signatories to a PA to the Commission, the SHPO, and the ACHP to ensure that the Commission remains in control of its ability to issue a license in a timely manner. The FS, as a federal land-managing agency, retains its ability to manage historic properties on NFS lands through its Section 4(e) conditions and various other federal laws and regulations, including but not limited to the Native American Graves Protection and Repatriation Act. The responsibilities of the FS arise out of these statutes, not as a result of the PA. Section 3.3.7.2, *Cultural Resources*, of the final EIS has been modified to reflect this information.

Cultural Resources Comment 12 (submitted by the Greenville Rancheria, December 15, 2004): The Greenville Rancheria states its concern with the damage that would be done to gathering sites within the UNFFR Project boundary because of the UNFFR Project.

Response: In section 3.3.7.2, *Environmental Effects*, in *Cultural Resources* of the draft EIS, we indicated that PG&E expected the UNFFR Project to affect some gathering locations identified in the TCP study. To mitigate effects on those locations, PG&E recommended protecting certain species and conferring with the Maidu community to reach an agreement on how and where future gathering could be done. In the SA, PG&E proposes a condition that would require PG&E to produce and implement a habitat enhancement plan to protect rare plants, wetlands, riparian communities, and cultural resources.

Cultural Resources Comment 13 (submitted by Plumas County, October 29, 2004): Plumas County states that the cottages at Camp Caribou are exemplary examples of style and design in worker housing at old company towns but are in disrepair and need exterior maintenance.

Response: In the SA, PG&E proposes to maintain the exterior and landscaping of the old clubhouse, houses, and grounds at Camp Caribou and to consult with the FS when planning maintenance and repair activities. The FS also specifies this maintenance in final Section 4(e) condition no. 40F. The draft HPMP indicated that any major repairs or

modifications made to National Register-eligible historic project structures during the tenure of the new license would be performed in accordance with the Secretary of the Interior's Standards for Rehabilitation and in consultation with the SHPO. We expect that the final HPMP would likely contain site-specific treatment measures for the historic standing structures at Camp Caribou (also known as Camp 9, or site P-32-1643 through 1652). Section 3.3.7.2, *Cultural Resources*, of the final EIS has been modified to reflect this information.

DEVELOPMENTAL ANALYSIS

Developmental Analysis Comment 1 (submitted by Interior, October 27, 2004): Interior believes that the annualized cost estimate for its Section 10(j) recommendation no. 1 (instream flow schedules for the Belden and Seneca bypassed reaches and lower Butt Creek) listed in table 5-1 (on page 355) and in the text on page 359 is inconsistent and should be checked and corrected as appropriate.

Response: The incremental annualized cost of $469,000 associated with implementing Interior's Section 10(j) recommendation no. 1 over the staff recommendation is the difference between $4,153,200 (the cost of Interior's 10(j) recommendation no. 1) and $3,684,200 (the cost of the staff recommended measure). Our cost estimates in the draft EIS are consistent and do not require correction.

Developmental Analysis Comment 2 (submitted by Plumas County, October 29, 2004): Plumas County wants the Commission to keep in mind that the speculative net benefits of any modifications to the lake waters should never be allowed to impair the now analyzed, quantified benefits of the Almanor lake levels (page 127, lines 5–12, and page 348, lines 30–35) in the SA and the draft EIS.

Response: The Commission will make any future decision regarding modification of agreed-upon lake levels after considering appropriate information and whether or not it is in the public interest.

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

APPENDIX D

ADVANTAGES AND DISADVANTAGES OF POTENTIAL MEASURES TO CONTROL WATER TEMPERATURES IN THE NORTH FORK FEATHER RIVER

PAGES D-1 to D-18

FEIS

APPENDIX D

ADVANTAGES AND DISADVANTAGES OF POTENTIAL MEASURES TO CONTROL WATER TEMPERATURE IN THE NORTH FORK FEATHER RIVER

Table D-1. Summary of advantages and disadvantages of potential measures to control water temperature in the North Fork Feather River with the objective of providing daily mean water temperatures of less than 20°C, along with potential measures to address water quality and odor in the Seneca reach.

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
1. 2105 SA proposed MIFs with first 5-year required flows for Rock Creek and Cresta[a] (Sources: Bechtel and TRPA, 2004; PG&E, 2004a, 2003a)	• Minor temperature reductions in Seneca reach. • Negligible to minor temperature reduction in Belden reach in dry years.	• Negligible temperature reduction in Belden reach during average hydrologic conditions. • Frequent July/August temperatures >20°C in Belden, Rock Creek, and Cresta reaches. • Major reduction in Lake Almanor water surface elevations during dry years.	Yes

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
2. 600-cfs Seneca reach flows from low-level gates (PG&E, 2003a, 2002)	• Generally minor to moderate reductions in Belden reach temperatures.	• Generally moderate to major temperature increases in Seneca reach from July to September. • Generally minor to moderate temperature reductions with average hydrology in Seneca reach during June. • Negligible to minor temperature increases in Belden reach during September of dry years • Major depletion of <20°C water available for withdrawal from Lake Almanor by early August.	No
3. 900-cfs Belden reach flows with 75-cfs Seneca flows from low-level gates (PG&E, 2003a)	• Moderate to major temperature reductions in Belden reach during June. • Generally negligible to moderate temperature reductions in Belden reach during July.	• Negligible to minor temperature increases in Belden reach from August to September • Belden reach temperatures of >20°C frequently during July to August and occasionally during June and September.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
4. Required third 5-year Rock Creek and Cresta flow releases[a] along with proposed increases in Seneca and Belden reach flows (Source: PG&E, 2004a)	• Generally negligible to minor reductions of temperatures that exceed the 20°C criterion in Rock Creek and Cresta reaches in June to August compared to 2105 SA proposed flow releases.	None	No
5. Increase in Poe reach flows from 50 to 150 cfs, as proposed by PG&E (Source: PG&E, 2005a)	• Reduction of lower Poe reach temperatures by ~1.5ºC during July, ~1.0ºC during June and August, and ~0.5ºC during September	None	No
6. Increase in Poe reach flows to 500 cfs or greater (Source: PG&E, 2003b)	• Compliance with the 20ºC criterion at flows of 500 cfs and greater under wet and normal conditions.	• Flows of 1,250 cfs would not satisfy 20ºC criterion under extreme conditions.	No
7. Increase Canyon dam low-level flow releases to 200 cfs during July and 400 cfs during August, and reduce Butt Valley and Caribou powerhouse flows to compensate for differences from Project 2105 SA minimum flows (McGurk and Tu, 2005; PG&E and Bechtel, 2005)	• Increase in the frequency of ≤ 19°C at Belden dam during July and August compared to Project 2105 SA proposed flow releases (50% versus 18% during July and 30% versus 0% during August).	• Effects on Butt Valley and Caribou power generation and economics of Project 2105. • Effects on Butt Valley reservoir water temperatures and fishery.	Yes

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
8. Increase Canyon Dam low-level releases to 200 cfs during July and 400 cfs during August and reduce Butt Valley and Caribou powerhouse flows to compensate for differences from Project 2105 SA minimum flows along with an additional 260 cfs in July and 460 cfs in August (McGurk and Tu, 2005; PG&E and Bechtel, 2005)	• Increase in the frequency of ≤ 19°C at Belden dam during July and August compared to 2105 SA proposed flow releases (70% versus 18% during July and 70% versus 0% during August).	• Effects on power generation levels, schedules, and the economics of Projects 2105, 1962, and 2107. • Delayed filling of Lake Almanor to avoid effects on downstream water delivery schedule. • Effects on Butt Valley reservoir water temperatures and fishery.	No
9. Shut down Butt Valley and Caribou powerhouses and increase Canyon dam low-level releases to 325 cfs, while providing minimum flows proposed in the 2105 SA to the Belden reach, required by the second 5-year plan for Rock Creek and Cresta reaches,[a] and 150 cfs for the Poe reach (McGurk and Tu, 2005)	• Typical daily mean temperatures likely to satisfy the 20°C criterion throughout the Seneca, Belden, and Rock Creek reaches and in most of the Cresta reach.	• Effects on power generation and project economics. • Deeper Lake Almanor thermocline. • Effects on Butt Valley reservoir water temperatures, water quality, and fishery.	No
10. Preferential use of Caribou No. 1 over Caribou No. 2 development (Sources: PG&E, 2004a, 2003c)	• Short-term temperature reductions of ~4-6°C in Caribou complex discharges, 0.5–2.5°C in Belden reach, 1°C in Rock Creek reach, and 0.5°C in Cresta reach.	• Reduction of thermal stratification and cold water in Butt Valley reservoir.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
11. Preferential use of Cresta dam outlet gates (Source: PG&E, 2003c)	None	• Negligible benefit due to lack of stratification in Cresta forebay	No
12. Bottom sill with crest elevation of 4,450 feet (Source: Ettema et al., 2004)	• Promotes coldwater storage in Lake Almanor by drafting <1°C warmer water through the Prattville intake during June.	• Construction-related water quality effects.	No
13. Bottom sill with crest elevation of 4,460 feet (Source: Ettema et al., 2004)	• Promotes coldwater storage in Lake Almanor by drafting 1–2°C warmer water through the Prattville intake with levees in place during June and ~2°C warmer water with levees removed during June. • Larger temperature increases at lower flows.	• Construction-related water quality effects.	No
14. Curtain 1 (Source: Ettema et al., 2004)	• August Prattville outflow reduced ~1.0°C at 1,600 cfs.	• Visual effects. • Boating safety effects. • Reduction of coldwater habitat in Lake Almanor.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
15. Curtain 2 (Source: Ettema et al., 2004)	• August Prattville outflow reduced ~2.5°C at 1,600 cfs.	• Visual effects. • Boating safety effects. • Reduction of coldwater habitat in Lake Almanor.	No
16. Curtain 3 (Source: Ettema et al., 2004)	• August Prattville outflow reduced ~3.1°C at 1,600 cfs.	• Visual effects. • Boating safety effects. • Reduction of coldwater habitat in Lake Almanor.	No
17. Curtain 4 (Source: Ettema et al., 2004)	• Prattville outflow reduced ~3.5°C during August and ~4.3°C during June and July at 1,600 cfs.	• Visual effects. • Boating safety effects. • Reduction of coldwater habitat in Lake Almanor.	Yes

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
18. Curtain 4 with levees removed (Source: Ettema et al., 2004; PG&E, 2004b)	• Prattville outflow temperature reduction by an additional ~1.5–1.7°C at 1,600 cfs during July/August due to levee removal. • Caribou discharge-weighted temperature reduction of ~1.5–2°C during July and ~1.5–2.5°C during August compared to without Curtain 4.	• Visual effects. • Boating safety effects. • Dredging-related water quality effects. • Potential effects to Native American burial grounds. • Reduction of coldwater habitat in Lake Almanor.	Yes
19. Curtain 4, levees removed, and further excavation (Source: Ettema et al., 2004)	• Negligible additional temperature effects with further excavation.	• Visual effects. • Boating safety effects. • Dredging-related water quality effects. • Effects on Native American burial grounds. • Reduction of coldwater habitat in Lake Almanor.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
20. Curtain 5 (Source: Ettema et al., 2004)	• ~4.5°C temperature reduction in Prattville outflow of 1,600 cfs during August.	• Visual effects. • Boating safety effects. • Reduction of coldwater habitat in Lake Almanor.	No
21. Curtain 6 (Source: Ettema et al., 2004)	• ~3.0°C temperature reduction in Prattville outflow of 1,600 cfs during August	• Visual effects. • Boating safety effects. • Reduction of coldwater habitat in Lake Almanor.	No
22. Short pipe with hooded inlet, and levees removed (Source: Ettema et al., 2004)	• ~2.1°C temperature reduction in Prattville outflow of ~950–2,120 cfs during August.	• Geotechnical instability of sideslopes. • Cessation of Butt Valley powerhouse operations while connecting pipe to intake. • Dredging-related water quality effects. • Effects on Native American burial grounds. • Reduction of coldwater habitat in Lake Almanor.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
23. Long pipe with hooded inlet (Source: Ettema et al., 2004)	• ~2.0°C temperature reduction in Prattville outflow of ~1,000–2,120 cfs during August.	• Cessation of Butt Valley powerhouse operations while connecting pipe to intake. • Dredging-related water quality effects. • Effects on Native American burial grounds. • Reduction of coldwater habitat in Lake Almanor.	No
24. Long pipe with hooded inlet, and levees removed (Source: Ettema et al., 2004)	• ~3.8°C temperature reduction in Prattville outflow of ~1,000–2,120 cfs during August.	• Cessation of Butt Valley powerhouse operations while connecting pipe to intake • Dredging-related water quality effects. • Effects on Native American burial grounds. • Reduction of coldwater habitat in Lake Almanor.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
25. Very long pipe connected to Prattville intake (Source: Ettema et al., 2004)	• Anticipated major temperature reduction in Prattville outflow.	• Cessation of Butt Valley powerhouse operations while connecting pipe to intake. • Dredging-related water quality effects associated with installation of >3-mile-long submerged pipeline. • Effects on Native American burial grounds. • Reduction of coldwater habitat in Lake Almanor.	No
26. Skimmer wall in Butt Valley reservoir (Source: Bechtel, 2003)	• 900-foot-long skimmer wall up-reservoir of Caribou intakes likely a feasible means of routing cold water through Butt Valley reservoir.	• Increase in the thermal stratification in reservoir. • Construction-related water quality effects.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
27. Curtain 4 with levees removed at Prattville intake and a curtain at the lower end of Butt Valley reservoir (Source: PG&E, 2004b)	• Caribou weighted discharge reduction of ~1-2.5°C during July and ~0.5–1°C during August compared to without Butt Valley reservoir curtain.	• Visual effects at Lake Almanor and Butt Valley reservoir. • Boating safety effects on Lake Almanor and Butt Valley reservoir. • Reduction of coldwater habitat in Lake Almanor. • Increase in the Butt Valley reservoir near surface and mid-level summer temperatures.	No
28. Curtain 4 with levees removed at Prattville intake and curtains at the upper and lower ends of Butt Valley reservoir (Source: PG&E, 2004b)	• Caribou weighted discharge reduction of ~0.5°C during July and August compared to single Butt Valley reservoir curtain.	• Visual effects at Lake Almanor and Butt Valley reservoir. • Boating safety effects on Lake Almanor and Butt Valley reservoir. • Reduction of coldwater habitat in Lake Almanor. • Further increase of Butt Valley reservoir near surface and mid-level summer temperatures.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
29. 860-foot-long, 16-foot-diameter pipeline to invert elevation 4,072 feet connected to Caribou No. 2 intake (Source: Ryan, 2000)	None	• Would not selectively draw cooler water from Butt Valley reservoir; need to extend another ~10 feet lower to be effective.	No
30. Pipe UNFFR water from upstream of Caribou powerhouses to immediately downstream of the Belden dam (Source: PG&E, 2005b)	• Design for 2.5ºC temperature reduction at upper end of Belden reach.	• Major effects on Caribou powerhouses and Caribou road. • Risk of pipeline failure from auto collisions. • Fish passage issues at diversion dam. • Visual effects.	No
31. Pipe Yellow Creek water to immediately downstream of the Rock Creek dam (Source: PG&E, 2005b)	• Design for 1.2ºC temperature reduction at upper end of Rock Creek reach.	• Major effects on Highway 70. • Fish passage issues at diversion dam. • Visual effects.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
32. Pipe water from Bucks Creek powerhouse to immediately downstream of the Cresta dam (Source: PG&E, 2005b)	• Design for 1.2ºC temperature reduction at upper end of Cresta reach.	• Major effects on Highway 70. • Elimination of cool water refuge in 0.5-mile-long reach between Bucks Creek and Rock Creek powerhouses. • Visual effects.	No
33. Pipe Poe tunnel adit no. 1 water to near Bardees Bar (Source: PG&E, 2005b)	• Negligible to minor temperature reduction in lower Poe reach.	• Potential erosion associated with the 0.25-mile long pipeline.	No
34. Pump cool Lake Oroville water to Rock Creek, Cresta, and Poe dams (Source: PG&E, 2005b)	• Design for 3ºC temperature reduction at upper end of Rock Creek, Cresta, and/or Poe reaches.	• No feasible pipeline route. • Construction-related major disruption of railroad and Highway 70 traffic. • Potential water quality effects. • Visual effects.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
35. Delivery of well water to river downstream of Rock Creek, Cresta, and Poe dams (Source: PG&E, 2005b)	• Design for 3ºC temperature reduction at upper end of Rock Creek, Cresta, and Poe reaches.	• Aquifer in canyon likely inadequate. • Inadequate space available. • New electrical transmission lines and substations needed. • Potential adverse water quality effects.	No
36a. Mechanical cooling towers and water chiller systems for Belden reach (PG&E, 2005c; Project 2105 Committee, 2005)	• Two possible locations in Belden reach; 100-foot x 300-foot footprint available just downstream of Belden dam.	• Visual effects.	No
36b. Mechanical cooling towers downstream of Rock Creek, Cresta, and Poe dams (Source: PG&E, 2005b)	• Design for 1ºC temperature reduction at upper end of Rock Creek, Cresta, and Poe reaches.	• Inadequate space. • Auto safety issues. • Visual effects.	No
36c. Mechanical cooling tower along Rock Creek reach (PG&E, 2005c)	• Adequate space (200-foot x 900-foot footprint) at Rogers Flat.	• Visual effects.	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
37. Mechanical water chiller systems near Rock Creek, Cresta, and Poe dams (Source: P G&E, 2005b)	• Design for 1ºC temperature reduction at upper end of Rock Creek, Cresta, and Poe reaches.	• Inadequate space. • Auto safety issues. • Visual effects of cooling towers.	No
38. Enlarge Round Valley reservoir located about 3 miles south of Greenville, California (Source: PG&E, 2005b)	• Minor temperature reduction in lower portion of Belden reach	• Negligible temperature reduction downstream of Belden powerhouse. • Unlikely to obtain water right. • Unlikely annual refilling of reservoir.	No
39. Construction and operation of a large reservoir in a tributary to the NFFR (Source: PG&E, 2005b)	• Minor temperature reduction in lower portion of Belden reach.	• Negligible temperature reduction downstream of Belden powerhouse. • Unlikely to obtain water right. • Potential water quality effects due to hypolimnetic releases.	No
40. Management of streamside vegetation along the East Branch of the North Fork Feather River and its tributaries to promote river shading (Source: PG&E, 2005b)	• Local temperature reduction in EBNFFR and its tributaries.	• Negligible temperature reduction in NFFR	No

Potential Measure(s)	Advantages	Disadvantages	Further Evaluation
41. Blending of Canyon dam outflows (Sources: Bechtel and TRPA, 2004; PG&E, 2004a)	• Negligible to minor improvement in Seneca reach trace metal concentrations and odors.	• Increase in temperature throughout most of Seneca reach.	Yes
42. Use of Canyon dam upper-level gates in fall[b]	• Moderate improvement in Seneca reach trace metal concentrations and odors.	• Increase in temperature in Seneca reach.	Yes

[a] The Rock Creek-Cresta Project license requires different minimum instream flows (MIFs) during the license period depending on month, water year type, year of the license period, and testing results. The license requires that the MIFs set for the first and second 5-year periods be implemented during years 1 to 5 and years 6 to 10, respectively. If the second 5-year test period is interrupted by a critically dry year, implementation of the second 5-year MIFs shall be extended to complete the test period. After completion of the second 5-year test period, required MIFs will be adjusted based on test results, but will not exceed "cap flows" set in the license. The cap flows were used when modeling potential measure #4.

[b] The Project 2105 SA indicates use of the upper gates from September 15 to at least November 1; *Canyon Dam Outlet Tower Gate Rehabilitation Project Description* (November 22, 2004) indicates September 1–October 15.

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COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT
Project No. 2105-089

APPENDIX E

BASIS FOR FURTHER ANALYSIS OF THE EFFECTS OF
POTENTIAL MEASURES ON WATER TEMPERATURE IN THE
NORTH FORK FEATHER RIVER BASIN

PAGES E-1 to E-5

FEIS

APPENDIX E

BASIS FOR FURTHER EVALUATION OF THE EFFECTS OF POTENTIAL CONTROL MEASURES ON WATER TEMPERATURE IN THE NORTH FORK FEATHER RIVER BASIN

As discussed in section 3.3.1.2 of this final EIS, we selected the five following temperature control measures to further evaluate:

- Proposed MIF
- Modified MIF
- Proposed MIF with Curtain 4
- Proposed MIF with Curtain 4 and removal of levees
- Proposed MIF with Curtain 4 and Canyon dam blending

Our analysis of the potential effects of these five measures on water temperatures is primarily based on results of PG&E's use of a modified version of MITEMP3 (a one-dimensional lake temperature model developed by Massachusetts Institute of Technology) to model the water temperature in Lake Almanor, Butt Valley reservoir, and their outflows; and SNTEMP (a steady-state stream temperature model developed by the FWS) to model temperatures in the Seneca, Belden, Rock Creek, Cresta, and Poe reaches. We used the best available data to further evaluate the effects that these measures are likely to have on water temperatures during normal, reasonable extreme, and extreme hydrological and meteorological conditions. Since PG&E did not provide model results for the Modified MIF in a way that allows determining effects under each of these hydrological and meteorological conditions, we do not include it in the following discussion. However, we do discuss the effects that this measure would have on water temperatures in section 3.3.1.2 of this final EIS.

Table E-1 summarizes the modeling approaches that we used to characterize each of the other four potential measures we evaluated further. Most of PG&E's evaluations compared the effects of potential temperature control measures to modeled conditions for its proposed MIFs and not existing conditions, which led to the best representation of "existing" conditions being based on one year of data. In contrast, the four potential measures further evaluated are based on 33 years of inflows. However, it is important to note that the model results for the 33-year period are based on a single season of meteorological data. Although these factors limit how representative modeled temperatures are of the actual temperatures that would occur and the comparability of model results, we conclude that they provide valuable information to indicate or suggest the effects of each potential temperature control measure further evaluated.

Table E-1. Summary of data sources and statistical procedures used to characterize normal, reasonable extreme, and extreme hydrological conditions.[a] (Sources: PG&E, 2003c; Bechtel and TRPA, 2004, as modified by staff)

Potential Measure	Normal	Reasonable Extreme	Extreme
Existing conditions	Used ANEA21A model results, which had:	Used DNEA21A model results, which had:	Used DWEA21A model results, which had:
	Inflows based on 1980 (50%) and groundwater accretion based on conditions in 2000 (255 cfs in Lake Almanor).	Inflows based on 1976 (12%) and groundwater accretion based on conditions in 2001 (200 cfs in Lake Almanor).	
	Inflow water temperatures were based on monthly median and ranges of monthly variation in monitored temperatures for the period of record.		
	Meteorological conditions based on monthly median and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur.	Meteorological conditions based on months with 10% exceedance monthly values and monthly variation of long-term data from Chester, Canyon dam, and McArthur.	
	Storage in reservoirs based on 2000.	Storage in reservoirs based on 1994.	
	Canyon dam releases of 35 cfs from low-level gate, preferential use of Caribou No. 2 powerhouse, and Belden dam releases of 140 cfs.		

Potential Measure	Normal	Reasonable Extreme	Extreme
Project 2105 SA proposed MIFs	Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.
	Inflows consisted of 33 years based on historical records. Groundwater accretion in Lake Almanor was set at 430 cfs for normal years and 375 cfs for dry years.		
	A single season of inflow water temperatures was developed based on monthly median and ranges of monthly variation in monitored temperatures for the period of record and used for all years.		
	Storage in reservoirs was set equal to historical conditions.		
	MITEMP3 meteorological data were developed based on monthly median and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur and used for each modeled year.		
	SNTEMP meteorological data were developed based on monthly median and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur and used for each modeled year.	SNTEMP meteorological data were developed based on monthly 10% exceedance values and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur and used for each modeled year.	

Potential Measure	Normal	Reasonable Extreme	Extreme
	Canyon dam and Belden dam instream flow releases were set at Project 2105 SA proposed MIFs, and all Canyon dam releases were assumed to be routed through the low-level gates.		
Project 2105 SA proposed MIFs with Curtain 4	Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.
	Used same inflows, inflow water temperatures, meteorology, storage in reservoirs, instream flows and their release points as "Project 2105 SA proposed MIFs."		
	Assumed modification of Prattville intake with a floating curtain (PG&E datum).		
Project 2105 SA proposed MIFs with Curtain 4 and removal of levees	Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.
	Used same inflows, inflow water temperatures, meteorology, storage in reservoirs, instream flows and their release points as "Project 2105 SA proposed MIFs."		

Potential Measure	Normal	Reasonable Extreme	Extreme
	Assumed modification of Prattville intake with a floating curtain and removal of levees along submerged channel (PG&E datum).		
Project 2105 SA proposed MIFs with Curtain 4, removal of levees, and Canyon dam blending	Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.
	Used same inflows, inflow water temperatures, meteorology, storage in reservoirs, instream flows and their release points as "Project 2105 SA proposed MIFs".		
	Assumed modification of Prattville intake with a floating curtain and removal of levees along submerged channel (PG&E datum).		
	Assumed Canyon dam releases consisted of 60 cfs from low-level gates and the remainder from the upper gates.		

[a] All model simulations assumed unaltered Lake Almanor water surface elevations even though the Project 2105 SA includes a measure for higher lake levels. Thus modeled temperatures for the Prattville intake, Caribou powerhouses, and NFFR are warmer than would occur if the project were operated to meet the higher lake levels.