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Revised Draft Environmental Impact Report for the Upper North Fork Feather River Hydroelectric Project FERC Project No. 2105

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CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Revised Draft Environmental Impact Report for the Upper North Fork Feather River Hydroelectric Project

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Pursuant to:
California Environmental Quality Act, Public Resources Code, section 21000 et seq.;
California Code of Regulations, title 14, section 15000 et seq. (CEQA Guidelines)

Lead Agency:
State Water Resources Control Board

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The Upper North Fork Feather River Project Revised Draft Environmental Impact Report is being made available to the public in accordance with the California Environmental Quality Act.

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Executive Summary

1.1 Introduction

The State Water Resources Control Board (State Water Board) prepared this Revised Draft Environmental Impact Report (RDEIR) in response to Pacific Gas and Electric Company's (PG&E's) application for a water quality certification for operation of its Upper North Fork Feather River Hydroelectric Project (UNFFR Project) under a new license from the Federal Energy Regulatory Commission (FERC). When the State Water Board considers issuing a water quality certification for a project, it evaluates whether the project will comply with the applicable water quality control plan (basin plan), in this case the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan) (Central Valley Regional Water Quality Control Board 2011). The State Water Board must protect water quality standards in any water quality certification it issues.

The UNFFR Project is located in the upper reaches of the North Fork Feather River watershed in Plumas County, California. The UNFFR Project was originally licensed by FERC in 1955 and is referenced in FERC documents as FERC Project No. 2105. Before FERC can issue a new license, PG&E must obtain a water quality certification from the State Water Board pursuant to Section 401 of the Clean Water Act (33 U.S.C. § 1341). The California Environmental Quality Act (CEQA) requires a public agency with discretionary authority to issue a certification, permit, or other approval to evaluate the environmental impacts of its action. The State Water Board has prepared this EIR to comply with CEQA (Pub. Resources Code, § 21000 et seq.) before acting on PG&E's application for water quality certification.

The State Water Board's determination of whether to issue a water quality certification for the operation of the UNFFR Project under a new license from FERC will be based on an evaluation of whether UNFFR Project operations are consistent with the Basin Plan. The Board must include in the certification any conditions necessary to ensure compliance with applicable water quality standards and other appropriate requirements. Among other things, the State Water Board must determine: (1) the extent to which UNFFR Project operations increase temperatures in the North Fork Feather River, and (2) the extent to which PG&E can reduce temperatures in the North Fork Feather River by implementing reasonable temperature control measures. The State Water Board must also ensure that UNFFR Project operations, including any water quality measures designed to protect the beneficial uses in the North Fork Feather River, will not unreasonably affect water quality in Lake Almanor.

This EIR includes a discussion of the compliance of UNFFR Project operations with the Basin Plan, and the water quality benefits of three alternatives. The purpose of this discussion is to explain the basis for developing the three alternatives evaluated in this RDEIR. This discussion also serves to inform the public of the two separate and distinct responsibilities before the State Water Board—ensuring compliance with the Clean Water Act and complying with CEQA —when considering whether to issue a water quality certification for the UNFFR Project, and what conditions to include in the certification.

As required by CEQA, this EIR discloses significant adverse impacts that may be caused by operation of the UNFFR Project under a new FERC license, including impacts that may be caused by conditions that the State Water Board may include in the water quality certification for the UNFFR Project in order to ensure compliance with the Basin Plan. The RDEIR also identifies mitigation measures to reduce the significance of identified impacts.

1.2 Definition of the Proposed Project in This EIR

For the purposes of this EIR and in accordance with CEQA, a “project” is defined as “the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment” and that is “an activity involving issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.” (Cal. Code Regs., tit. 14, § 15378, subd. (a)(3).) Further, the “term ‘project’ refers to the activity which is being approved and which may be subject to discretionary approvals by one or more agencies subject to CEQA. The term ‘project’ does not mean each separate governmental approval.” (Cal. Code Regs., tit. 14, § 15378, subd. (c).) In this EIR, the Proposed Project is generally defined as the continued operation of the UNFFR Project under a new FERC license, as outlined in PG&E’s application to FERC, measures from the *Project 2105 Relicensing Settlement Agreement* (2004 Settlement Agreement), federal agencies’ mandatory conditions, and FERC’s Staff Alternative; further described in Chapter 3 of this EIR. Chapter 3, Proposed Project and Alternatives, of the EIR identifies three alternatives; Alternative 1, 2, and 3, that were developed to address the ongoing impacts of the UNFFR Project on temperature in the North Fork Feather River.

As described in section 3.7, this EIR evaluates the No Project Alternative and considers what would happen to the UNFFR Project if the State Water Board denies PG&E’s application for water quality certification for the UNFFR Project. In the event that the UNFFR Project water quality certification application is denied, FERC would not be able to issue a new license for the hydroelectric project. Some facilities would likely be removed or left unused, and uses of other facilities and lands would be altered.

1.3 Overview of the UNFFR Project

The UNFFR Project is one of the upstream-most projects in a series of water resource development and hydroelectric projects in the North Fork Feather River watershed. The UNFFR Project is a resource that is important to the operation of PG&E’s Feather River hydroelectric system as a whole; it contributes to PG&E’s energy production portfolio and plays a part in meeting the electrical generation capacity requirements of both PG&E and the state of California. The UNFFR Project consists of the following existing facilities:

- three dams that form Lake Almanor, Butt Valley reservoir, and Belden forebay, respectively;
- five powerhouses (Butt Valley, Caribou No. 1, Caribou No. 2, Oak Flat, and Belden) containing eight hydroelectric generating units with a total nameplate capacity of 342.6 megawatts;
- tunnels and penstocks connecting the reservoirs to the powerhouses; and
- transmission, recreation, operations and maintenance, and access facilities.

PG&E’s license to operate the UNFFR Project expired in October 2004. In accordance with the Federal Power Act and FERC regulations, PG&E submitted an application to FERC for a new license on October 23, 2002 (Pacific Gas and Electric Company 2002). As part of its review of the PG&E application, FERC prepared the *Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project* under the National Environmental Policy Act to evaluate the environmental consequences of operation of the UNFFR Project under a new license, including proposed measures from the 2004 Settlement Agreement, an agreement between most of the participants in the relicensing process that resolved most but not all of the issues pertaining to the continued operation of the UNFFR Project under a new license. State Water Board staff actively participated in the collaborative process in order to provide advice concerning the State Water Board's regulatory process, but the State Water Board was not a party to the 2004 Settlement Agreement and is not a signatory to it. The Final FERC EIS was completed in December 2005 (Federal Energy Regulatory Commission 2005). Since the UNFFR Project license expired in 2004, PG&E has continued to operate the UNFFR Project under annual extensions to the license.

1.4 Proposed Project and Alternatives Evaluated in This EIR

The Proposed Project, as described in Chapter 3 of this EIR, is composed of the elements of PG&E's application to FERC along with modifications made in accordance with the 2004 Settlement Agreement, mandatory conditions, and the FERC staff alternative. Many of the potential impacts of the Proposed Project have been evaluated in the Final FERC EIS. As allowed by Section 15150 of the CEQA Guidelines, the State Water Board incorporates, by reference, certain sections of the Final FERC EIS, including sections that analyze the impacts of the Proposed Project.

In 2006, the United States Environmental Protection Agency (USEPA) listed the North Fork Feather River upstream of Lake Oroville as a water quality limited segment under Section 303(d) of the CWA. The listing was based on the State Water Board's determination that elevated water temperatures are impairing the cold freshwater habitat beneficial use of the North Fork Feather River. The State Water Board cited hydromodification and flow regulation as potential sources of the impairment (State Water Board Resolution No. 2006-0079). Water temperature was one of the issues identified in the 2004 Settlement Agreement as not being resolved.

In an effort to address unresolved water quality issues, the State Water Board used a tiered approach—known as levels 1, 2, and 3—to develop an array of measures that could reduce water temperatures in the North Fork Feather River below Canyon dam. Various measures were evaluated at each level to assess their feasibility and ability to meet specific screening criteria. Although many measures were determined to be potentially feasible, three of the measures (i.e., thermal curtains at the Prattville intake, thermal curtains at the Caribou intakes, and increased Canyon Dam flow) were carried forward for analysis in this EIR. Three alternatives were included in the CEQA analysis:

- **Alternative 1:** Thermal curtain at the Prattville intake on Lake Almanor, increased summertime releases up to 250 cfs from Canyon Dam, and thermal curtain at the Caribou intakes on Butt Valley reservoir.
- **Alternative 2:** Thermal curtains at Prattville intake and Caribou intakes.
- **Alternative 3:** Increased summertime releases up to 250 cfs from Canyon Dam.

In addition to the specified water quality measures, all the alternatives evaluated the flow release schedule, including pulse flows described for the Proposed Project (i.e., the minimum instream flow schedules put forth in the 2004 Settlement Agreement).

Alternative 1: Thermal Curtains at Prattville Intake and Caribou Intakes with increased summertime releases from Canyon Dam to the Seneca Reach

Alternative 1 includes a thermal curtain at the Prattville intake on Lake Almanor, a thermal curtain at the Caribou intakes on Butt Valley reservoir, the minimum instream flow schedules put forth in the 2004 Settlement Agreement, and increased cold-water releases to the Seneca reach up to 250 cfs between June 16 and September 15.

The Prattville intake thermal curtain would entail installation of a U-shaped thermal curtain around the Prattville intake structure on the west shore of Lake Almanor. To ensure maximum efficiency under fluctuating lake levels, two galvanized steel bin-type walls would be constructed, and the curtain would be attached to a trolley on the walls to allow it to move up and down as lake levels fluctuate. The purpose of the thermal curtain would be to create a barrier that prevents the flow of warm surface water into the Prattville intake. Warm water would be retained above the curtain while cool water would be drawn into the intake from the lake bottom through the open area under the curtain. By itself, the curtain would not affect the Prattville intake with respect to volume or operation and would not require modifications to other components of the UNFFR Project.

Increased Canyon dam flow releases may require modification of the Canyon dam outlet structure to increase the cool water discharge into the Seneca reach to as much as 250 cfs between mid-June and mid-September. Modification of the outlet structure, which focuses on one of the low-level gates near the bottom of the facility, would ensure that the UNFFR Project has the ability to provide releases of cool water from Lake Almanor as needed to reduce water temperatures in the North Fork Feather River downstream of Canyon dam during the summer months. Modifications would involve installing a prefabricated steel bulkhead, approximately 5 feet wide by 10 feet tall, to the low-level gate 5. The bulkhead would allow controllable releases to be increased, as needed. The overall capacity of the outlet structure and tunnel would need to be maintained to allow up to 2,000 cfs to be released in an emergency. Increasing Canyon dam releases would require decreasing the Prattville intake flow commensurately to avoid lake level fluctuations or changes agreed to in the 2004 Settlement Agreement. The decrease in flows through the Butt Valley powerhouse would modify the volume and timing of water delivered to Butt Valley reservoir to varying degrees (more from June 16 to September 15) and subsequently made available to the Caribou intakes.

A fixed Γ-shaped thermal curtain would be installed near the Caribou No. 1 and No. 2 intakes at the downstream end of Butt Valley reservoir. Similar to the Prattville intake thermal curtain, the purpose of the thermal curtain would be to create a barrier that prevents the flow of warm surface water into either of the intakes. Warm water would be retained above the curtain while cool water would be drawn from the bottom of the reservoir into the intakes through the open area under the curtain. The Γ-shaped curtain would not affect flow to the spillway at Butt Valley dam in the event that the reservoir capacity is exceeded (which has never occurred). The installation and operation of the thermal curtain would not affect operation of the Caribou intakes and would not require modifications to other UNFFR Project operations.

Alternative 2: Thermal Curtains at Prattville Intake and Caribou Intakes and Associated Flows to the Seneca and Belden Reaches

Alternative 2 consists of installation of thermal curtains at the Prattville intake on Lake Almanor and at the Caribou intakes on Butt Valley reservoir, as described for Alternative 1. It also includes the minimum instream flow schedules put forth in the 2004 Settlement Agreement for both Seneca and Belden reaches. It does not include increased cold-water releases to the Seneca reach up to 250 cfs between June 16 and September 15.

Alternative 3: Increased summertime releases from Canyon Dam to the Seneca Reach

Alternative 3 consists of the minimum instream flow schedules put forth in the 2004 Settlement Agreement for both Seneca and Belden reaches, and increased cold-water releases to the Seneca reach up to 250 cfs between June 16 and September 15. It does not include installation of thermal curtains at the Prattville intake on Lake Almanor and at the Caribou intakes on Butt Valley reservoir.

1.5 Summary of Impacts and Mitigation Measures

A detailed analysis of environmental impacts associated with the Proposed Project and Alternatives 1, 2, and 3, including pertinent support data and mitigation measures if necessary, can be found in the specific resource sections in Chapter 5, Environmental Setting and Environmental Impacts, of this EIR. Table ES-1 summarizes the environmental impacts and mitigation measures for each resource area. The EIR identifies potentially significant impacts for the following resources:

- Air Quality;
- Geology, Geomorphology, and Soils;
- Water Quality;
- Fisheries;
- Noise;
- Vegetation, Wildlife, and Sensitive Biological Resources;
- Cultural Resources;
- Recreation;
- Transportation and Traffic;
- Hazards and Hazardous Materials; and
- Aesthetics

These potential effects are discussed in each resource section in Chapter 5. As part of the environmental impact assessment for each resource area, mitigation measures have been identified that reduce most of these impacts to less-than-significant levels, with the exception of Aesthetics and Recreation.

Recreation is identified as a significant and unavoidable impact under Alternatives 1 and 2, as further described in Chapter 5.8 Recreation, of this EIR. The construction of the bin walls and trolley system for the thermal curtain within the Marvin Alexander day use area could be potentially significant. While a mitigation measure is identified, an alternative site to mitigate the loss of the Marvin Alexander day use area may not be available, and therefore this impact is identified as potentially significant and unavoidable.

Aesthetics is identified as a significant and unavoidable impact under Alternatives 1 and 2, as further described in Chapter 5.9 Aesthetics, of this EIR. In the localized areas around the Prattville intake, the Prattville thermal curtain has the potential to detract from the existing scenic views of the surrounding forests and mountains or the overall visual quality of Lake Almanor in that area.

Cumulative impacts of the Proposed Project and both alternatives with other reasonably foreseeable future projects in the vicinity of the UNFFR Project were also evaluated. The geographical scope of the cumulative impact analysis is the North Fork Feather River watershed, and the temporal scope is 40 to 50 years into the future, which correlates to the period of time requested by PG&E for a new FERC license for the UNFFR Project. No significant cumulative impacts are anticipated to result from the Proposed Project or the alternatives. Chapter 6, Cumulative Impacts and Other CEQA Considerations, of the EIR also provides a discussion of other considerations required in an EIR (e.g., growth inducing impacts). Implementation of the Proposed Project or any of the alternatives would not induce growth in the vicinity of the UNFFR Project.

1.6 Areas of Known Controversy and Issues to be Resolved

The public scoping period held in the fall of 2005 and circulation of the 2014 Draft EIR generated a number of comments from federal, local and state agencies and representatives, Tribes, non-governmental organizations and other stakeholders concerning potential impacts, including comments related to: the installation of thermal curtains; and changes in water quality and impacts to beneficial uses in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River. The State Water Board heard from many stakeholders regarding the effect of the thermal curtains on Lake Almanor and Butt Valley reservoir. Additional information concerning these areas of controversy and others can be found in the Scoping Report and transcripts from the CEQA Scoping Meeting held on September 27, 2005 in Chester, California (Appendix B). This RDEIR discloses the potential impacts of the thermal curtains and the flow schedule in the Seneca and Belden reaches and attempts to resolve concerns related to these issues. Many water quality measures were considered by the State Water Board to determine the most feasible measures to analyze further. For the reasons noted in Chapter 3, thermal curtains at the Prattville and Caribou intakes and increased summertime releases were determined to be the most feasible. Based on a thorough evaluation of possible measures and the analyses presented in this RDEIR, issues raised during the scoping period and comments on the 2014 Draft EIR have been addressed in this RDEIR.

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
5.2 Land Use and Mineral Resources (LU)				
Impact LU-1: Construction activities associated with the Proposed Project or alternatives could disrupt other land uses in or near the activity areas.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact LU-2: Implementation of the Proposed Project or alternatives could conflict with adjacent land uses.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact LU-3: The Proposed Project or alternatives could be inconsistent with the goals, policies, and objectives of the Plumas County General Plan, County Zoning Ordinances, or the Lassen and Plumas National Forest Land and Resource Management Plans.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact LU-4: Implementation of the Proposed Project or alternatives could disrupt locatable mining activities in the North Fork Feather River — Seneca and Belden Reaches.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.3 Geology, Geomorphology, and Soils (GGS)				
Impact GGS-1: Construction activities associated with the Proposed Project or alternatives could cause erosion in disturbed areas, resulting in increased sedimentation in the North Fork Feather River and reservoirs.				

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Mitigation Measures	Mitigation Measure GGS-1: Approval of Construction Activities by the State Water Board (Turbidity and Total Suspended Solids)	Mitigation Measure GGS-1: Approval of Construction Activities by the State Water Board (Turbidity and Total Suspended Solids)	Mitigation Measure GGS-1: Approval of Construction Activities by the State Water Board (Turbidity and Total Suspended Solids)	Mitigation Measure GGS-1: Approval of Construction Activities by the State Water Board (Turbidity and Total Suspended Solids)
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact GGS-2: Implementation of the Proposed Project or alternatives could increase exposure of people and structures to geologic hazards, such as erosion, landslides, or rockslides.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact GGS-3: Implementation of the Proposed Project or alternatives could modify the channel morphology of the North Fork Feather River as a result of changes in flow.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact GGS-4: Implementation of the Proposed Project or alternatives could affect the location and severity of shoreline erosion along Lake Almanor.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.4 Water Resources (WR)				
Impact WR-1: Construction activities associated with the Proposed Project or alternatives could require use of water from Lake Almanor or Butt Valley reservoir that is not approved under existing water rights.				
Mitigation Measures	None	None	None	None

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact WR-2: Implementation of the Proposed Project or alternatives could increase the potential for flooding along the Seneca and Belden reaches as a result of modified flows in the North Fork Feather River.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact WR-3: Implementation of the Proposed Project or alternatives could modify water deliveries from Lake Almanor, affecting existing water uses downstream.				
Mitigation Measures	None	None	None	None
Final Level of Significance	No impact	No impact	No impact	No impact
5.5 Water Quality (WQ)				
Impact WQ-1: Implementation of the Proposed Project or alternatives could affect water temperature in Lake Almanor.				
Mitigation Measures	Mitigation Measure WQ-1: Implement Water Quality and Fish Monitoring, Augment Stocking of Cold Water Fishery in Lake Almanor, and Adaptively Manage Canyon Dam Releases	Mitigation Measure WQ-1: Implement Water Quality and Fish Monitoring, Augment Stocking of Cold Water Fishery in Lake Almanor, and Adaptively Manage Canyon Dam Releases	Mitigation Measure WQ-1: Implement Water Quality and Fish Monitoring, Augment Stocking of Cold Water Fishery in Lake Almanor, and Adaptively Manage Canyon Dam Releases	Mitigation Measure WQ-1: Implement Water Quality and Fish Monitoring, Augment Stocking of Cold Water Fishery in Lake Almanor, and Adaptively Manage Canyon Dam Releases
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact WQ-2: Implementation of the Proposed Project or alternatives could affect water temperature in Butt Valley reservoir.				
Mitigation Measures	None	None	None	None

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact WQ-3: Implementation of the Proposed Project or alternatives could affect water temperatures in the North Fork Feather River below Canyon dam and Belden dam.				
Mitigation Measures	None	None	None	None
Final Level of Significance	No impact (Beneficial)	No impact (Beneficial)	No impact (Beneficial)	No impact (Beneficial)
Impact WQ-4: Implementation of the Proposed Project or alternatives could affect dissolved oxygen levels in water discharged from Canyon dam and Butt Valley powerhouse.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact WQ-5: Implementation of the Proposed Project or alternatives could cause water released from Canyon dam to have an undesirable taste or odor.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact WQ-6: Implementation of the Proposed Project or alternatives could cause a change in the character or quantity of dissolved metal concentrations or other contaminants in Lake Almanor or the North Fork Feather River.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact WQ-7: Construction activities associated with the Proposed Project or alternatives could result in temporary increases in turbidity and total suspended solids in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.				
Mitigation Measures	Mitigation Measure GGS-1	Mitigation Measure GGS-1	Mitigation Measure GGS-1	Mitigation Measure GGS-1

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact WQ-8: Hazardous materials spills during construction activities associated with the Proposed Project or alternatives could cause contamination of Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.				
Mitigation Measures	Mitigation Measure WQ-8: Approval of Construction Activities by the State Water Board (Hazardous Materials)	Mitigation Measure WQ-8: Approval of Construction Activities by the State Water Board (Hazardous Materials)	Mitigation Measure WQ-8: Approval of Construction Activities by the State Water Board (Hazardous Materials)	Mitigation Measure WQ-8: Approval of Construction Activities by the State Water Board (Hazardous Materials)
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
5.6 Fisheries (FS)				
Impact FS-1: Construction activities associated with the Proposed Project or alternatives would affect fish populations in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River through direct and indirect impacts on individuals or habitat.				
Mitigation Measures	Mitigation Measure GGS-1 and WQ-8	Mitigation Measure GGS-1, WQ-8, and FS-1 FS-1: Minimum instream flows at Canyon Dam during construction activities	Mitigation Measure GGS-1, WQ-8, and FS-1 FS-1: Minimum instream flows at Canyon Dam during construction activities	Mitigation Measure GGS-1, WQ-8, and FS-1 FS-1: Minimum instream flows at Canyon Dam during construction activities
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact FS-2: Implementation of the Proposed Project or alternatives would alter aquatic habitat conditions in Lake Almanor.				
Mitigation Measures	Mitigation Measure WQ-1	Mitigation Measure WQ-1	Mitigation Measure WQ-1	Mitigation Measure WQ-1
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact FS-3: Implementation of the Proposed Project or alternatives would alter aquatic habitat conditions in Butt Valley reservoir.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant (Beneficial)	Less than significant (Beneficial)	Less than significant (Beneficial)
Impact FS-4: Implementation of the Proposed Project or alternatives would alter cold freshwater habitat conditions in the North Fork Feather River over the long term.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant (Beneficial)	Less than significant (Beneficial)	Less than significant (Beneficial)	Less than significant (Beneficial)
Impact FS-5: Implementation of the Proposed Project or alternatives would adversely affect the recreational fishery of Butt Valley reservoir as a result of reduced forage fish in the reservoir.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.7 Vegetation, Wildlife, and Sensitive Biological Resources (BR)				
Impact BR-1: Construction activities associated with the Proposed Project or alternatives could affect special-status plants or their habitat through removal of individuals, habitat modification, or the spread of invasive plants.				

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	**Alternative 1**	**Alternative 2**	**Alternative 3**
Mitigation Measures	Mitigation Measure BR-1a: Prevent Weed Introduction Mitigation Measure BR-1b: Avoid Disturbance of Special-Status Plants	Mitigation Measure BR-1a: Prevent Weed Introduction Mitigation Measure BR-1b: Avoid Disturbance of Special-Status Plants	Mitigation Measure BR-1a: Prevent Weed Introduction Mitigation Measure BR-1b: Avoid Disturbance of Special-Status Plants	Mitigation Measure BR-1a: Prevent Weed Introduction Mitigation Measure BR-1b: Avoid Disturbance of Special-Status Plants
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-2: Construction activities associated with the Proposed Project or alternatives could affect western pond turtles or their habitat through impacts on individuals, disturbance, or habitat modification.				
Mitigation Measures	Mitigation Measure BR-2a: Avoid Disturbance of Western Pond Turtle BR-2b: Avoid Disturbance of Special Status Amphibians Mitigation Measure GGS-1:	Mitigation Measure BR-2a: Avoid Disturbance of Western Pond Turtle BR-2b: Avoid Disturbance of Special Status Amphibians Mitigation Measure GGS-1:	Mitigation Measure BR-2a: Avoid Disturbance of Western Pond Turtle BR-2b: Avoid Disturbance of Special Status Amphibians Mitigation Measure GGS-1:	Mitigation Measure BR-2a: Avoid Disturbance of Western Pond Turtle BR-2b: Avoid Disturbance of Special Status Amphibians Mitigation Measure GGS-1:
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-3: Construction activities associated with the Proposed Project or alternatives could affect special-status bats or their habitat through impacts on individuals, disturbance, or habitat modification				

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Mitigation Measures	Mitigation Measure BR-3: Avoid Disturbance of Special-Status Bat Roosts	Mitigation Measure BR-3: Avoid Disturbance of Special-Status Bat Roosts	Mitigation Measure BR-3: Avoid Disturbance of Special-Status Bat Roosts	Mitigation Measure BR-3: Avoid Disturbance of Special-Status Bat Roosts
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-4: Construction activities associated with Proposed Project or the alternatives could affect forest carnivores (Pacific fisher, Sierra Nevada red fox, ringtail cat, and American marten) or their habitat.				
Mitigation Measures	Mitigation Measure BR-4: Avoid Disturbance of Special Status Ringtails	Mitigation Measure BR-4: Avoid Disturbance of Special Status Ringtails	Mitigation Measure BR-4: Avoid Disturbance of Special Status Ringtails	Mitigation Measure BR-4: Avoid Disturbance of Special Status Ringtails
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-5: Construction activities associated with Proposed Project or the alternatives could affect nesting birds or their habitat.				
Mitigation Measures	Mitigation Measure BR-5: Avoid disturbance of nesting birds	Mitigation Measure BR-5: Avoid disturbance of nesting birds	Mitigation Measure BR-5: Avoid disturbance of nesting birds	Mitigation Measure BR-5: Avoid disturbance of nesting birds
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-6: Construction activities associated with Proposed Project or the alternatives could result in adverse impacts on federally regulated wetlands.				

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Mitigation Measures	Mitigation Measure BR-6: Comply with Federal and State Laws and Regulations that Protect Wetlands	Mitigation Measure BR-6: Comply with Federal and State Laws and Regulations that Protect Wetlands	Mitigation Measure BR-6: Comply with Federal and State Laws and Regulations that Protect Wetlands	Mitigation Measure BR-6: Comply with Federal and State Laws and Regulations that Protect Wetlands
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-7: Implementation of the Proposed Project or alternatives could restrict movement of wildlife species through the activity areas.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.8 Recreation (RE)				
Impact RE-1: Construction activities associated with the Proposed Project or alternatives could disrupt recreational activities at Lake Almanor and Butt Valley reservoir.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact RE-2: Implementation of Proposed Project or the alternatives could reduce the quality of recreational opportunities at Lake Almanor or Butt Valley reservoir and create hazards for recreationists.				
Mitigation Measures	None	Mitigation Measure RE-2: Relocation of Marvin Alexander Day Use Area	Mitigation Measure RE-2: Relocation of Marvin Alexander Day Use Area	None
Final Level of Significance	Less than significant	Significant and Unavoidable	Significant and Unavoidable	Less than significant

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact RE-3: Implementation of the Proposed Project or alternatives could affect the quality of recreational fishing opportunities in the North Fork Feather River below Canyon dam by increasing flows in the Seneca and Belden reaches.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.9 Aesthetics (AE)				
Impact AE-1: Construction activities associated with the Proposed Project or alternatives could temporarily degrade the visual quality of Lake Almanor or Butt Valley reservoir.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact AE-2: The Proposed Project or alternatives could degrade or obstruct scenic views from visual assessment units.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Significant and unavoidable	Significant and unavoidable	Less than significant
Impact AE-3: The Proposed Project or alternatives could substantially change the character of, or be disharmonious with, existing land uses and aesthetic features around Lake Almanor or Butt Valley reservoir or along the North Fork Feather River.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Significant and Unavoidable	Significant and Unavoidable	Less than significant
Impact AE-4: The Proposed Project or alternatives could create a new source of light or glare at Lake Almanor or Butt Valley reservoir.				
Mitigation Measures	None	None	None	None

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.10 Public Services and Utilities (PS)				
Impact PS-1: Construction activities associated with the Proposed Project or alternatives could result in the temporary disruption of utility services in the area.				
Mitigation Measures	None	None	None	None
Final Level of Significance	No impact	No impact	No impact	No impact
Impact PS-2: The Proposed Project or alternatives could create public safety hazards and increase the demand for emergency response services, resulting in the need for new or expanded facilities that could affect the environment.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.11 Hazards and Hazardous Materials (HM)				
Impact HM-1: Construction activities associated with the Proposed Project or alternatives could expose people or the environment to hazards associated with the use of hazardous materials.				
Mitigation Measures	Mitigation Measure WQ-8:	Mitigation Measure WQ-8:	Mitigation Measure WQ-8:	Mitigation Measure WQ-8:
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact HM-2: Implementation of the Proposed Project or alternatives could increase the potential for wildfires and expose people to hazards from wildfires.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
5.12 Cultural Resources (CR)				
Impact CR-1: Construction activities associated with the Proposed Project or alternatives could disturb or damage underwater historical or archaeological resources listed or eligible for listing in the National Register of Historic Places or California Register of Historic Resources.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact CR-2: Construction activities associated with the Proposed Project or alternatives could disturb or damage previously undiscovered historical or archaeological resources or human remains.				
Mitigation Measures	Mitigation Measure CR-2a and CR-2b	Mitigation Measure CR-2a and CR-2b	Mitigation Measure CR-2a and CR-2b	Mitigation Measure CR-2a and CR-2b
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
5.13 Transportation and Traffic (TT)				
Impact TT-1: Construction activities associated with the Proposed Project or alternatives would generate a short-term increase in traffic and could affect traffic flow on local highways and roads.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact TT-2: Construction activities associated with the Proposed Project or alternatives could increase traffic hazards and impede emergency access.				
Mitigation Measures	Mitigation Measure TT-2: Implement Traffic Control Plan	Mitigation Measure TT-2: Implement Traffic Control Plan	Mitigation Measure TT-2: Implement Traffic Control Plan	Mitigation Measure TT-2: Implement Traffic Control Plan

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
5.14 Air Quality (AQ)				
Impact AQ-1: Construction activities associated with the Proposed Project or alternatives would generate fugitive dust and contribute to local violations of particulate matter standards.				
Mitigation Measures	Mitigation Measure AQ-1: Implement a Fugitive Dust and Emission Control Plan	Mitigation Measure AQ-1: Implement a Fugitive Dust and Emission Control Plan	Mitigation Measure AQ-1: Implement a Fugitive Dust and Emission Control Plan	Mitigation Measure AQ-1: Implement a Fugitive Dust and Emission Control Plan
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact AQ-2: Construction traffic associated with the Proposed Project or alternatives would contribute to air pollution along access routes.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
Impact AQ-3: The Proposed Project or alternatives could generate odors that would affect sensitive receptors at Lake Almanor and along the North Fork Feather River.				
Mitigation Measures	None	None	None	None
Final Level of Significance	No impact	Less than significant	No impact	Less than significant
5.15 Noise (NO)				
Impact NO-1: Construction activities associated with the Proposed Project or alternatives could increase noise levels above acceptable standards and may expose sensitive receptors to excessive noise or ground borne vibrations.				

Table ES-1 Summary of Impacts and Mitigation Measures

	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Mitigation Measures	Mitigation Measure NO-1: Implement Noise Reduction Measures	Mitigation Measure NO-1: Implement Noise Reduction Measures	Mitigation Measure NO-1: Implement Noise Reduction Measures	Mitigation Measure NO-1: Implement Noise Reduction Measures
Final Level of Significance	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact NO-2: Implementation of the Proposed Project or alternatives could increase ambient noise levels around Lake Almanor and Butt Valley reservoir or along the North Fork Feather River.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant
5.16 Climate Change (CC)				
Impact CC-1: Implementation of the Proposed Project or alternatives could indirectly increase greenhouse gas emissions and conflict with policies adopted to reduce greenhouse gas emissions.				
Mitigation Measures	None	None	None	None
Final Level of Significance	Less than significant	Less than significant	Less than significant	Less than significant

Chapter 1 Introduction

The State Water Resources Control Board (State Water Board) prepared this Revised Draft Environmental Impact Report (RDEIR) in response to Pacific Gas and Electric Company's (PG&E) application for a water quality certification for operation of its Upper North Fork Feather River Hydroelectric Project (UNFFR Project) under a new license from the Federal Energy Regulatory Commission (FERC). This chapter provides background information on the UNFFR Project and water quality certification process and presents an overview of the RDEIR and the California Environmental Quality Act (CEQA) process.

1.1 Background

The UNFFR Project is located in the upper reaches of the North Fork Feather River watershed, upstream of Lake Oroville in Plumas County, California (Figure 1-1). It consists of three reservoirs with dams: Lake Almanor, Butt Valley reservoir and Belden forebay; five powerhouses; tunnels and penstocks connecting the reservoirs to the powerhouses; and transmission, operation and maintenance, and access facilities. The five powerhouses include eight hydroelectric generating units with a total nameplate capacity of 362.3 megawatts (MW).

Before FERC can issue a new license for the UNFFR Project, PG&E must obtain a water quality certification from the State Water Board pursuant to Section 401 of the CWA. Public agencies with discretionary authority over a project must comply with CEQA (Pub. Resources Code, § 21000 et seq.), which requires evaluating and disclosing the environmental impacts of their decisions. "Discretionary authority" means an agency can approve or deny a request for a permit or certification. The State Water Board has prepared this EIR to comply with CEQA before acting on PG&E's application for water quality certification.

The Regional Water Quality Control Boards (Regional Water Boards) prepare basin plans that designate the beneficial uses of waters to be protected and establish the water quality objectives necessary to protect those uses, as required under section 303 of the CWA (33 U.S.C. § 1313) and sections 13240 and 13241 of the California Water Code. When establishing water quality objectives, the Regional Water Boards consider the past, present, and future beneficial uses of the water bodies; their environmental characteristics; economics; and water quality conditions that could be reasonably achieved through coordinated control of the factors affecting water quality. When the State Water Board considers issuing a water quality certification for a project, it evaluates whether the project will comply with the applicable basin plan and whether the beneficial uses of the applicable water bodies will be protected.

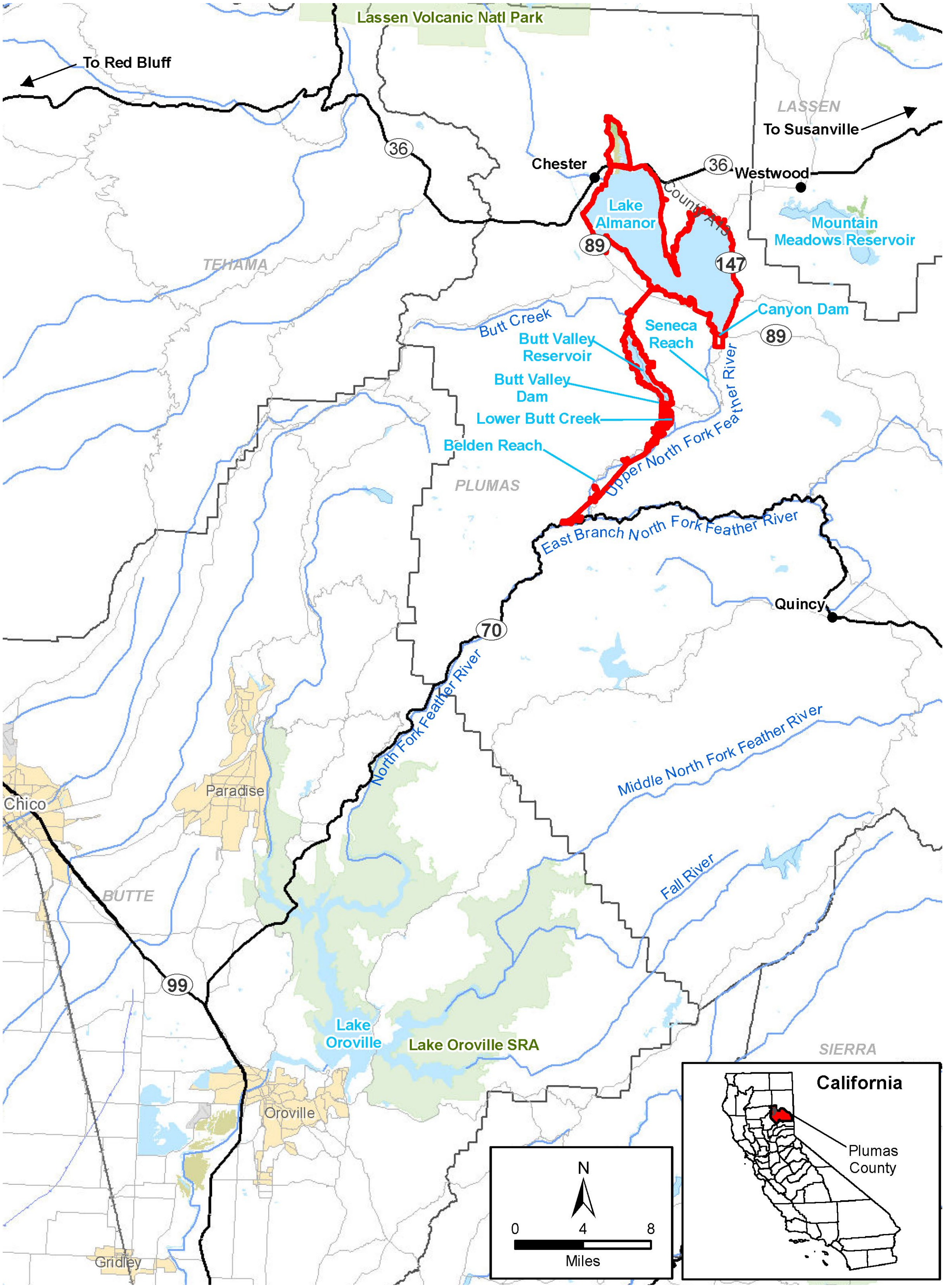

Figure 1-1 Vicinity Map

In 2006, the United States Environmental Protection Agency (U.S. EPA) listed the North Fork Feather River upstream of Lake Oroville as a water quality limited segment under Section 303(d) of the Clean Water Act (CWA). The listing was based on the State Water Board's determination that elevated water temperatures are impairing one of the beneficial uses—cold freshwater habitat—of the North Fork Feather River. The State Water Board cited hydromodification and flow regulation as potential sources of the impairment (State Water Board Resolution No. 2006-0079). The determination resulted in the State Water Board developing alternatives to reduce the water temperature in the North Fork Feather River, as described in this RDEIR.

The State Water Board's decision of whether, and under what conditions, to issue a water quality certification for the continued and future operation of the UNFFR Project will depend on the following:

- whether project operations under a new FERC license, including proposed infrastructure improvements, will be consistent with the water quality objectives designed to reasonably protect the beneficial uses of Lake Almanor and the North Fork Feather River set forth in the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan) (Central Valley Regional Water Quality Control Board 2016);
- the extent to which project operations increase temperatures in the North Fork Feather River;
- the extent to which PG&E can feasibly reduce temperatures in the North Fork Feather River by implementing reasonable temperature control measures; and
- the State Water Board's determination that project operations, including any temperature control measures designed to benefit the North Fork Feather River, and will not unreasonably affect water quality in Lake Almanor.

1.2 Environmental Impact Report Type, Purpose, and Authority

As provided for in Section 15088.5 of the CEQA Guidelines, this document is a Revised Draft EIR (RDEIR). The RDEIR is a revised version of the Draft EIR, dated November 2014, that the State Water Board prepared for the UNFFR Project. The main ways the RDEIR differs from the November 2014 Draft EIR are:

- Certain portions have been reorganized for clarity and readability.
- Certain analyses have been updated to incorporate more recent information.
- Certain analyses were revised to address comments received on the Draft EIR.
- An additional alternative (Alternative 3) is evaluated.
- Where appropriate, the environmental setting and environmental impact discussions and the mitigation measures for the resource sections in Chapter 5 have been updated using the best available information. References and citations have also been updated.

This RDEIR is an informational document that discloses information about the environmental impacts of implementing the Proposed Project (section 3.4) and the alternatives developed by the State Water Board (section 3.5). CEQA requires government agencies to consider the environmental consequences of their actions—in this case, the State Water Board's issuance of a water quality certification—before approving plans and policies or committing to a course of action on a project. This RDEIR was prepared to fulfill the following CEQA objectives:

- identify any significant adverse environmental impacts associated with the State Water Board's decision on PG&E's application for a water quality certification for the UNFFR Project,
- summarize revisions made to the 2014 Draft EIR (see section 1.10),
- indicate the manner in which any adverse impacts can be mitigated or avoided,
- facilitate public involvement, and
- foster coordination among various governmental agencies.

The environmental impacts of the project and alternatives described in sections 3.4 and 3.5 are analyzed in this RDEIR in accordance with CEQA Guidelines Section 15146. This RDEIR addresses the potentially significant environmental impacts that may be associated with the operation of the UNFFR Project under a new FERC license and the alternatives. It also identifies appropriate and feasible mitigation measures that may be adopted to significantly reduce or avoid the identified potential environmental impacts.

1.3 Objectives

Identifying project objectives is a required component of an EIR. The objectives are used in evaluating alternatives to determine whether and to what degree the alternatives achieve the intent of the Proposed Project. The degree of consistency of an alternative with the objectives must be considered in addition to the presence of potentially significant impacts.

The primary goal of the State Water Board is to ensure that the UNFFR Project complies with the CWA and is consistent with the Basin Plan requirements for both Lake Almanor and the North Fork Feather River.

The following are the State Water Board's objectives:

1. Ensure that the project will comply with the water quality objectives described in the Basin Plan designed to reasonably protect the beneficial uses of Lake Almanor and the North Fork Feather River.
2. Ensure reasonable protection of the beneficial uses described in the Basin Plan that apply to Lake Almanor and the North Fork Feather River, including water supply, power, recreation, warm and cold freshwater habitat, warm and cold water spawning, and wildlife habitat.

3. Improve water quality in the North Fork Feather River downstream of Canyon Dam, while protecting the cold-water beneficial uses associated with Lake Almanor.
4. Effectively and reliably reduce water temperatures in the North Fork Feather River below Canyon Dam during the summer months to achieve a preliminary temperature target of 20°C, consistent with temperature objectives identified in the Rock Creek–Cresta Relicensing Settlement Agreement.
5. Ensure that the selected alternative:
   - Is technologically feasible, reliable, and maintainable, and
   - Can be implemented under current legal obligations and logistical constraints.
6. Ensure that controllable factors (e.g., flow release volumes, timing, and durations) that could reduce water temperature in the North Fork Feather River below Canyon Dam are not overridden by uncontrollable physical factors (e.g., lack of river shading, air temperature, etc.).

1.4 Relationship of RDEIR to the UNFFR Environmental Impact Statement and Settlement Agreement

PG&E submitted an application to FERC in October 2002 to renew its license for operation of the UNFFR Project, which expired on October 31, 2004. Serving as the lead agency under the National Environmental Policy Act (NEPA), FERC prepared an environmental impact statement (EIS) for the continued operation of the UNFFR Project (Federal Energy Regulatory Commission 2005) to comply with NEPA and the FERC regulations implementing NEPA (18 Code of Federal Regulations Part 380). Because a new long-term license was not issued before the original license expired, FERC has issued annual licenses allowing PG&E to continue operating the UNFFR Project until a decision is made on the new license.

Concurrent with the FERC NEPA process, PG&E organized and facilitated a collaborative effort by a broad-based group of resource agencies, public entities, and non-governmental organizations to reach agreement on protection, mitigation, and enhancement (PM&E) measures for inclusion in the new license. As described in Chapter 3, the collaborative group, known as the Project 2105 Licensing Group or 2105 Collaborative, was able to reach agreement on numerous PM&E measures, which are contained in the Project 2105 Relicensing Settlement Agreement dated April 22, 2004 (2004 Settlement Agreement; see Appendix A to this RDEIR).

Although State Water Board staff participated in the deliberations leading up to the 2004 Settlement Agreement, the State Water Board did not sign the agreement because the Board could not prejudge PG&E's application for water quality certification. The State Water Board and its staff are therefore not considered Relicensing Participants within the meaning of the term used in the 2004 Settlement Agreement.

The role of State Water Board staff during settlement discussions was to provide guidance, input, and analysis for the development of new license conditions and potential measures proposed by the Relicensing Participants that related to water quality standards and other applicable state law. Concerns not resolved by the 2004

Settlement Agreement include shoreline erosion, water temperature, flow effects on water temperature in the Belden and Seneca reaches of the North Fork Feather River, the term of a new UNFFR Project license, angler access improvements in the Seneca Reach, and offsite mitigation for impacts on wetland and riparian habitat. Concerns related to water temperature were of particular importance to State Water Board staff due to the listing of the North Fork Feather River as a temperature-impaired segment under Section 303(d) of the CWA. In accordance with the CWA, the State Water Board has the responsibility and authority to impose conditions of approval necessary to ensure that the UNFFR Project will be protective of water quality.

The Draft EIS prepared by FERC analyzed the measures in the 2004 Settlement Agreement, but did not include an analysis of water temperature. In response to comments on the Draft EIS related to water temperature, the Final EIS examined potential measures that could be implemented to provide colder water to the North Fork Feather River during the summer. FERC provided an opportunity to comment on the Final EIS, and the State Water Board submitted comments. In its comment letters on the Draft and Final EISs, the State Water Board notified FERC that it was addressing the water temperature issues by preparing an EIR and considering measures for Basin Plan compliance. FERC cannot issue a new license unless the State Water Board issues a water quality certification, or waives its authority, pursuant to Section 401 of the CWA.

CEQA Guidelines Section 15221 states that when a project will require compliance with both CEQA and NEPA, state or local agencies should use the EIS or Finding of No Significant Impact (FONSI) rather than prepare an EIR or Negative Declaration if the EIS or FONSI complies with the necessary provisions of CEQA. Consistent with Section 15150, this RDEIR incorporates by reference certain sections of the FERC EIS to avoid repetition of information; however, the State Water Board determined that the EIS was not sufficient to fully satisfy CEQA requirements.

1.5 Other Hydroelectric Projects in the North Fork Feather River Basin

PG&E operates a series of hydroelectric projects in the North Fork Feather River basin (see Figure 1-2 for the locations of the projects), including the UNFFR Project. Figure 1-3 is a schematic diagram of these hydropower projects. The upstream-most project is the Hamilton Branch Hydroelectric Project, which generates power through a small powerhouse on the eastern shore of Lake Almanor from water diverted from Mountain Meadows reservoir upstream of Lake Almanor. The downstream projects include the Bucks Creek Hydroelectric Project (FERC Project No. 619), Rock Creek–Cresta Hydroelectric Project (FERC Project No. 1962), and Poe Hydroelectric Project (FERC Project No. 2107).

Hamilton Branch Hydroelectric Project

Because of its age (pre-1950), location (i.e., land ownership), and lack of navigable water, the Hamilton Branch Hydroelectric Project is exempt from FERC license requirements. This project consists of the Mountain Meadows reservoir, a diversion and canal system with pumping stations, and the 4.8-MW Hamilton Branch powerhouse on the eastern shore of Lake Almanor. Water from Mountain Meadows reservoir is released into the Hamilton Branch, and a pipeline conveys water to the Hamilton Branch powerhouse. The powerhouse can discharge up to 200 cubic feet per second (cfs), although mean monthly outflows are generally less than 100 cfs from August to December.

Bucks Creek Hydroelectric Project

The Bucks Creek Hydroelectric Project is operated by PG&E in cooperation with the City of Santa Clara and is located on Grizzly Creek, a tributary to the North Fork Feather River downstream of Yellow Creek. This project uses water tunneled from Three Lakes, Bucks Creek, Bucks diversion, and Grizzly forebay and conveys the flows to the North Fork Feather River upstream of Cresta reservoir and the Rock Creek powerhouse.

Rock Creek–Cresta Hydroelectric Project

The Rock Creek–Cresta Hydroelectric Project consists of the Rock Creek and Cresta reservoirs, dams, and powerhouses. Water released from Belden reservoir coupled with water conveyed through the Belden powerhouse enters Rock Creek reservoir, along with the natural flow of the East Branch North Fork Feather River. At Rock Creek reservoir, water is diverted through a tunnel to two parallel penstocks that serve the Rock Creek powerhouse. The combined flow from the Rock Creek and Bucks Creek facilities, along with the flow from several small tributaries along the North Fork Feather River, enter the Cresta reservoir. Water is diverted through a tunnel to two parallel penstocks that serve the Cresta powerhouse. Water released from the Cresta powerhouse enters the Cresta reach upstream of Poe reservoir.

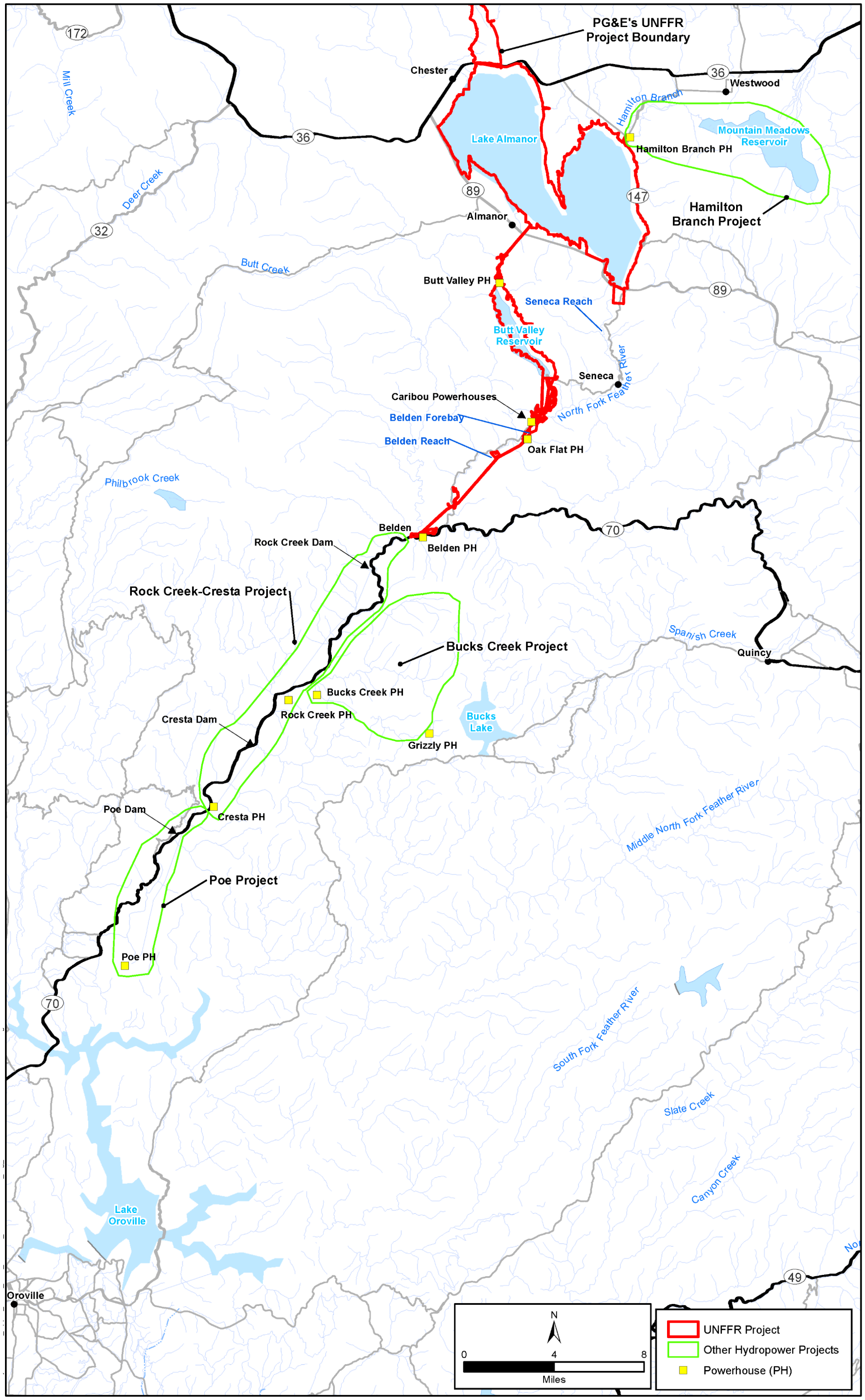

Figure 1-2 Hydroelectric Projects on North Fork Feather River

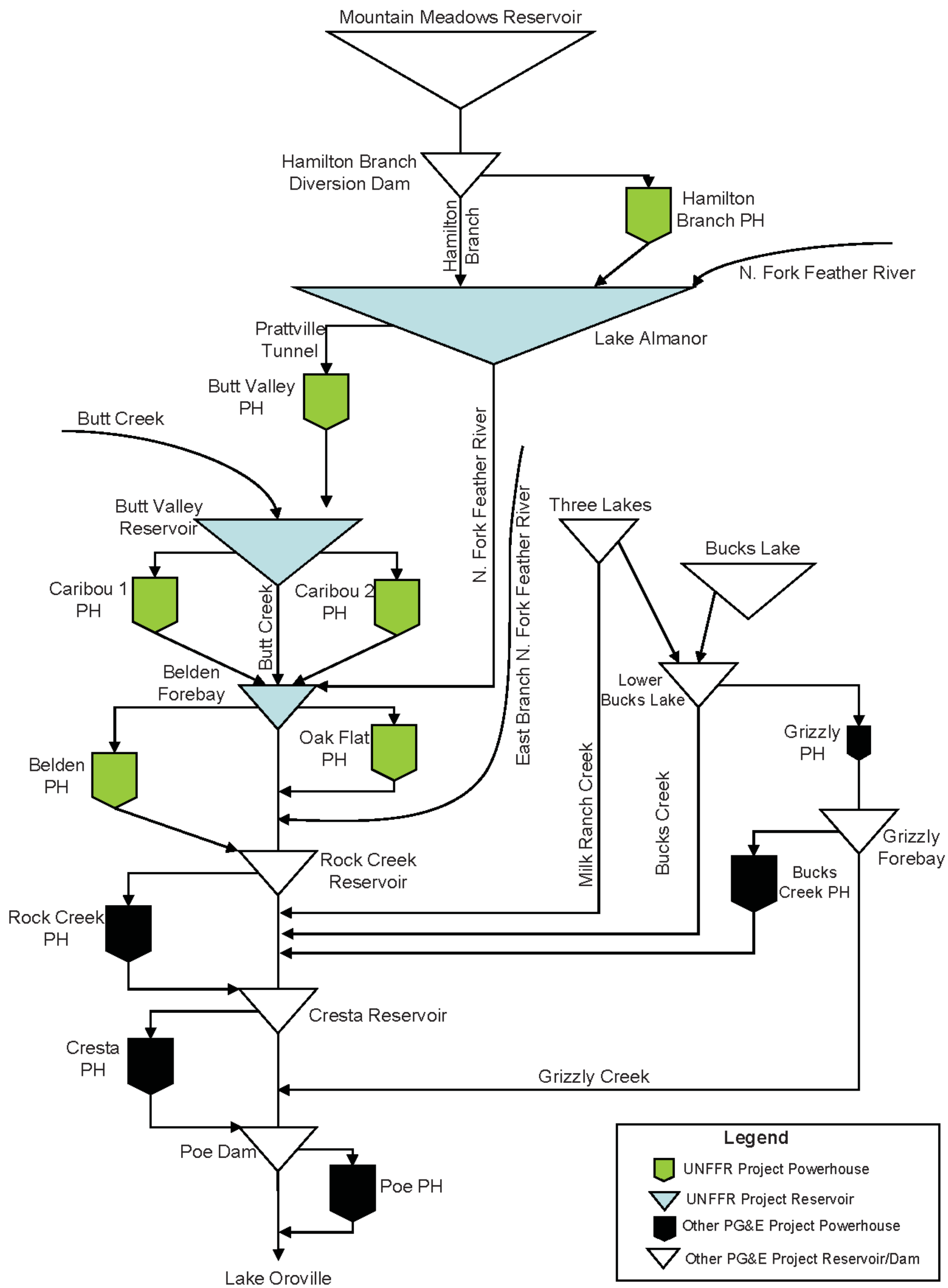

Figure 1-3 Schematic Diagram of Flow

Poe Hydroelectric Project

The Poe Hydroelectric Project includes the Poe diversion dam, the Poe reservoir, a reinforced concrete powerhouse, the Big Bend dam, and the Poe afterbay reservoir on the North Fork Feather River. Poe reservoir has a maximum surface area of approximately 53 acres. Flow from the Poe powerhouse is returned to the North Fork Feather River several miles upstream of Lake Oroville, a component of the California Department of Water Resources' (DWR) FERC-licensed project.

1.6 Agency Responsibilities

Several agencies have responsibility for issuing permits or approvals for the UNFFR Project or for resources that may be affected by the UNFFR Project. This section presents an overview of the various agency responsibilities; additional details on the necessary permits and approvals are provided in Chapter 4, Regulatory Framework.

State Water Board and Regional Water Boards

The State Water Board prepared this RDEIR. As described above, its discretionary action under CEQA is issuance or denial of a water quality certification under Section 401 of the CWA. Additional details on the State Water Board's responsibilities are provided in Chapter 2, State Water Board's Regulatory Responsibilities.

The Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) shares responsibility with the State Water Board for protecting the water quality and beneficial uses of the North Fork Feather River watershed. The Central Valley Regional Water Board adopted and the State Water Board and the USEPA approved the Basin Plan. The Basin Plan designates the beneficial uses of water to be protected along with the water quality objectives necessary to protect those uses. These beneficial uses and water quality objectives, along with state and federal anti-degradation requirements, constitute California's water quality standards under the CWA. The State Water Board must ensure consistency with these water quality standards in any water quality certification issued.

Resource Agencies

A number of federal, state, and local agencies have responsibility for managing the lands and resources in the UNFFR Project vicinity. Sections 4(e) and 18 of the Federal Power Act (FPA) authorize certain responsible and trustee agencies to submit mandatory measures to FERC during the relicensing process, and Section 10(j) authorizes the submission of non-mandatory recommendations. FERC will incorporate the mandatory measures, as well as conditions of the water quality certification, into the new license for the UNFFR Project and may incorporate the recommendations.

This section identifies agencies that have been active in the relicensing process for the UNFFR Project. Some of these agencies may also be requested to take discretionary actions related to various permits, approvals, and authorizations. The state and local agencies would be considered responsible agencies under CEQA (see section 15381 of the CEQA Guidelines). Anticipated permits and other environmental approvals are identified in Chapter 4, Regulatory Framework.

United States Department of Agriculture, Forest Service

The United States Department of Agriculture, Forest Service (USFS) is a federal land management agency responsible for the management, protection, and wise use of national forest system (NFS) lands throughout the United States Two national forests, Lassen and Plumas, manage NFS lands within or adjacent to the UNFFR Project boundary under their respective Land and Resource Management Plans (LRMPs); the lands they manage include a number of administrative and recreational facilities along the shores of Lake Almanor. Although the USFS was a party to the 2004 Settlement Agreement, it also exercised its authority to impose conditions on the UNFFR Project consistent with Section 4(e) of the FPA (letter dated November 4, 2004). These mandatory 4(e) conditions were incorporated into the Final EIS as part of the recommended alternative.

United States Department of Commerce, National Marine Fisheries Service

The United States Department of Commerce, National Marine Fisheries Service (NMFS) shares responsibility with the United States Department of Interior, United States Fish and Wildlife Service (USFWS) for implementing the federal Endangered Species Act (ESA). NMFS manages marine and anadromous species and is responsible for issuing incidental take permits for the species it manages. In the upper reaches of the North Fork Feather River watershed, NMFS has management authority over the Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) evolutionarily significant unit, Central Valley steelhead (*O. mykiss*) distinct population segment (DPS), and green sturgeon (*Acipenser medirostris*) southern DPS. As part of its review of PG&E’s application and the FERC EIS and pursuant to its authorities and responsibilities under Sections 10(a), 10(j), and 18 of the FPA, NMFS recommended several measures for inclusion in the new license for the UNFFR Project (letter dated March 28, 2006). On February 29, 2008, NMFS updated these recommendations and reserved its authority to prescribe fish passage at some point in the future.

United States Department of Interior, Fish and Wildlife Service

The USFWS shares responsibility with NMFS for administering the federal ESA. The USFWS manages terrestrial and freshwater species and is responsible for issuing incidental take permits for the species it manages. The USFWS has management authority over five sensitive species that may occur within the UNFFR Project boundary: the bald eagle (*Haliaeetus leucocephalus*); golden eagle (*Aquila chrysaetos*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*); California red-legged frog (*Rana aurora draytonii*); and slender Orcutt grass (*Orcuttia tenuis*). In January 2005, the USFWS submitted a Biological Opinion (BO) to FERC in response to a request for formal consultation on the bald eagle. The BO concluded that the new license for the UNFFR Project may affect the bald eagle, but is not likely to adversely affect the valley elderberry longhorn beetle or California red-legged frog and would have no effect on slender Orcutt grass. Since the opinion was issued, the bald eagle has been removed from the federal list of threatened and endangered species. Also as part of its review of the PG&E application and pursuant to its authorities and responsibilities under the Fish and Wildlife Coordination Act (FWCA), Sections 10(a), 10(j), and 18 of the FPA, and the ESA, the USFWS recommended several measures for incorporation into the new license (letter dated December 3, 2003).

United States Department of the Army, Corps of Engineers

The United States Department of the Army, Corps of Engineers (Corps) has jurisdiction over waters of the United States under the CWA and is responsible for issuing permits under Section 404 of the CWA for the discharge of dredged or fill material into waters of the United States, including wetlands. The North Fork Feather River, its tributaries, and the associated reservoirs are waters of the United States and are subject to the Corps' jurisdiction; therefore, a Section 404 CWA permit may be required for activities affecting these jurisdictional waters.

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW, formerly known as the California Department of Fish and Game) is responsible for maintaining native fish, wildlife, plants, and natural communities in California. CDFW is responsible for administering the California ESA and for issuance of incidental take permits; it is also responsible for issuing lake or streambed alteration agreements for activities that may affect fish or wildlife resources as a result of altering the natural flows of surface waters or other activities that affect rivers, streams, or lakes. As part of its review of the PG&E application and pursuant to its authority under Section 10(j) of the FPA, CDFW recommended several measures for incorporation into the new license (letter dated November 26, 2003).

Other Agencies

Plumas County (County) oversees development and other activities in the county and reviews projects for compliance with the Plumas County General Plan, the county zoning ordinance, and other local laws and regulations. The County was a signatory to the 2004 Settlement Agreement and submitted additional comments and recommended measures to FERC and the State Water Board during FERC's NEPA process, the CEQA scoping process, and more recently the 2014 Draft EIR. The Plumas County Public Works Department maintains public roads and bridges, including transportation infrastructure within and adjacent to the UNFFR Project boundary. Encroachment permits may be required for activities conducted within the right-of-way of a county road.

The California Department of Transportation (Caltrans) has the discretionary authority to issue special permits for the movement of vehicles and loads exceeding statutory limitations and to issue encroachment permits for the use of California state highways for other than normal transportation. Transportation permits are required for vehicles and loads exceeding the size, weight, and loading of vehicles described in Division 15 of the California Vehicle Code. Encroachment permits are required for activities conducted within the right-of-way of a state highway.

1.7 CEQA Process

Under CEQA, the State Water Board is the lead agency responsible for preparing an environmental document in connection with the State Water Board's consideration of

PG&E's application for a water quality certification for the UNFFR Project. This RDEIR was prepared in compliance with CEQA and the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et seq.). An overview of the CEQA process as it relates to this RDEIR is provided in this section.

The State Water Board initiated a public scoping period in August 2005 to solicit public, tribal, and agency input and comments on the proposed UNFFR Project and key issues that should be addressed in the Draft EIR, which was released in November 2014. A scoping meeting was held on September 27, 2005, to inform the public about PG&E's Proposed Project and the Draft EIR and to solicit comments. Key milestones in the public involvement and scoping processes completed to date are listed below.

August 30, 2005
The Notice of Preparation (NOP) and the Initial Study for the proposed UNFFR Project were sent to the State Clearinghouse, announcing a 30-day review period for state, regional, and local agencies. The NOP and Initial Study were also mailed to more than 200 other interested parties, including tribes and members of the public. The NOP included notice of a scoping meeting to be held in Chester, California, on September 27, 2005. Comments were originally due October 1, 2005.

September 14, 2005
The State Water Board sent a letter to agencies, tribes, and the public inviting participation at the scoping meeting and extending the deadline for submittal of scoping comments to October 17, 2005.

September 21, 2005
Notices of the scoping meeting were published in the following newspapers of general circulation: *Chester Progressive, Chico Enterprise Record, Feather River Bulletin, Indian Valley Record, Portola Reporter, Lassen County Times, Westwood Pinepress*, and *Sacramento Bee*.

September 27, 2005
The State Water Board held the scoping meeting at Chester Memorial Hall in Chester, California. The purpose of the meeting was to describe the proposed UNFFR Project and to solicit comments from members of the public and other interested parties. The meeting was facilitated by the State Water Board and its consultant, and was recorded and transcribed by a certified shorthand reporter (attachment to Appendix B). Questions were answered by representatives of the State Water Board and its consultant. Informational materials available at the meeting were provided by the State Water Board, PG&E, and the County.

November 26, 2014
A Notice of Completion was sent to the State Clearinghouse with the 2014 Draft EIR, which was released for review by the public and by local, state, and federal agencies for a period of 120 days. A public meeting on the 2014 Draft EIR was held at the Veteran's Memorial Hall in Chester, California, on February 11, 2015. At the conclusion of the public comment period, over 650 pieces of correspondence (letters and emails) had been received, and more than 1,400 comments were reviewed and catalogued.

April 2016
The State Water Board decided, based on the comments received on the 2014 Draft EIR, to prepare an RDEIR in order to provide an updated analysis of the baseline condition, the Proposed Project and Alternatives 1, 2, evaluate a new alternative (Alternative 3), provide updated resource information, and respond to concerns expressed during the comment period.

May 2020
A Notice of Completion and this RDEIR were released for a 45-day public review period.

1.8 Organization of RDEIR

This Draft EIR is organized into the following chapters:

- **Executive Summary**: Provides an overview of the UNFFR Project and the action alternatives, a summary of the environmental impacts and mitigation measures, and a discussion of areas of controversy and issues to be addressed.
- **Chapter 1, Introduction**: Provides background information about the UNFFR Project and the environmental review process. Also provides an overview of the regulatory environment and the responsibilities of various agencies with an interest in the UNFFR Project and the RDEIR. It also provides a summary of revisions to the 2014 Draft EIR.
- **Chapter 2, State Water Board's Regulatory Responsibilities**: Provides an overview of the State Water Board's responsibilities as they relate to issuance of the water quality certification and includes an overview of the Basin Plan.
- **Chapter 3, Proposed Project and Alternatives**: Provides background information on the existing operations; describes the proposed operation of the UNFFR Project under a new license as it was defined in PG&E's application to FERC; provides details on the 2004 Settlement Agreement; describes the screening process used by the State Water Board to identify and select the alternatives to the Proposed Project analyzed in this RDEIR and other potential alternatives that were previously evaluated and eliminated from further consideration; and describes alternatives to the proposed project analyzed in this RDEIR and the no-project alternative.
- **Chapter 4, Regulatory Framework**: Provides an overview of the laws, regulations, and policies that the UNFFR Project may be required to comply with during the term of a new FERC license.
- **Chapter 5, Environmental Setting and Environmental Impacts**: Describes the environmental setting for each resource topic and discusses the environmental impacts of the Proposed Project and the alternatives. Mitigation measures are identified for elements of The Proposed Project and the alternatives that may have significant impacts.
- **Chapter 6, Cumulative Impacts and Other CEQA Considerations**: Discusses other past, present, and reasonably foreseeable future projects in

the vicinity of the UNFFR Project and anticipated cumulative impacts of The Proposed Project and the alternatives; identifies any growth-inducing impacts; and summarizes any significant and unavoidable impacts identified in Chapter 5.

- **Chapter 7, Comparison of Alternatives:** Compares the potential environmental impacts associated with the Proposed Project and the alternatives, taking into account both potential environmental impacts and achievement of the objectives.
- **Chapter 8, References**: Lists all references cited in the RDEIR.
- **Chapter 9, Glossary**: Consists of a glossary of technical terms used in the RDEIR.
- **Chapter 10, List of Preparers**: Lists persons responsible for preparing the RDEIR.

1.9 Changes from 2014 Draft EIR

Following is a summary of the changes in this RDEIR from the 2014 Draft EIR:

1. The State Water Board's CEQA objectives were refocused to be consistent with the CEQA Guidelines and the Board's responsibility under the CWA. Commenters on the 2014 Draft EIR suggested that the objectives used to formulate the alternatives were not well defined. Chapter 1 of this RDEIR presents the objectives in a manner that tracks with the alternative's development process described in Chapter 3.
2. The RDEIR reflects a reorganization of the way the document is presented with respect to Proposed Project and the three alternatives. In the 2014 Draft EIR, Chapter 3 was a discussion of Proposed Project and Chapter 4 was a discussion of the two alternatives developed by the State Water Board. Chapter 3 of this RDEIR provides a comprehensive description of Proposed Project and Alternatives 1, 2, and 3.
3. This RDEIR includes revisions to Alternatives 1 and 2 as they were presented and analyzed in the 2014 Draft EIR. It also includes a new alternative (Alternative 3) that was formulated and incorporated into this RDEIR based on comments received on the 2014 Draft EIR.
4. In the 2014 Draft EIR, the Proposed Project incorporated the minimum flows from the 2004 Settlement Agreement, including pulse flows. Alternatives 1 and 2 described in Chapter 4 of the 2014 Draft EIR included modifications to minimum and pulse flow releases for non-summer months in the Settlement Agreement. In this RDEIR, the Proposed Project and Alternatives 1, 2 and 3 all include the minimum and pulse flows from the Settlement Agreement; however, minimum flows from Canyon dam under Alternatives 1 and 3 from mid-June to mid-September would be higher.
5. In recognition of the large number of actions associated with the Proposed Project, the descriptions of Alternatives 1, 2, and 3 all include the elements of

The Proposed Project. This change essentially expands the analysis area for all alternatives evaluated in this RDEIR.

6. The baseline conditions that existed when the NOP was issued in 2005 have changed for some resource topics due to changes in the natural, regulatory, and economic environment. The special-status species tables (plants and wildlife) that were included in the 2014 Draft EIR have been updated based on current information. In addition to updating these tables to include information provided by commenters and agencies concerning changes in the status of some species, these tables have also been revised to more accurately reflect the habitat for all special-status species.
7. The impacts analysis presented in Chapters 5 and 6 have been updated to reflect changes in the descriptions of the Proposed Project and the Alternatives, including the new Alternative 3.

Chapter 2 State Water Board's Regulatory Responsibilities

2.1 Role of State Water Board

Pacific Gas and Electric Company's (PG&E's) license for its Upper North Fork Feather River hydroelectric project (UNFFR Project) expired on October 31, 2004, and PG&E has applied to the Federal Energy Regulatory Commission (FERC) for renewal. PG&E must obtain a water quality certification for the UNFFR Project from the State Water Resources Control Board (State Water Board) before FERC can issue a new license.

Section 401 of the Clean Water Act (CWA) (33 U.S.C. § 1341) requires applicants for a federal license or permit that may result in a discharge into navigable waters to provide the federal licensing or permitting agency with certification that the activity to be licensed or permitted will comply with federal and state water quality standards. In California, the State Water Board is the state agency with regulatory authority to issue or deny water quality certifications for hydroelectric projects licensed by FERC. As part of the water quality certification process, the State Water Board reviews projects to ensure compliance with relevant water quality control plans, in this case the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) (Central Valley Regional Water Quality Control Board 2016).

The conditions of a water quality certification issued by the State Water Board would become mandatory conditions in the new FERC license.

2.1 Overview of Basin Plan

Section 303 of the CWA requires each state to adopt water quality standards applicable to all of its intrastate waters; the adopted water quality standards must be approved by the United States Environmental Protection Agency (U.S. EPA). In California, the state's water quality standards are identified in basin plans prepared by the nine Regional Water Quality Control Boards (Regional Water Boards) in compliance with the California Water Code (Wat. Code § 13240). The basin plans provide the basis for protecting water quality and include designations of beneficial uses to be protected and water quality objectives to protect those uses, as required under Section 303 of the CWA (33 U.S.C. § 1313) and Sections 13240 and 13241 of the California Water Code.

The North Fork Feather River is in the Sacramento River basin and is covered under the basin plan for the Sacramento and San Joaquin river basins, which encompass an area approximately one fourth the size of California. The current edition of the Basin Plan is the fifth edition, last revised in May 2018, (Central Valley Regional Water Quality Control Board 2018).

When establishing water quality objectives, the Regional Water Boards consider, among other things, the past, present, and future beneficial uses of the water bodies; their environmental characteristics; economics; and water quality conditions that could be reasonably achieved through coordinated control of the factors affecting water quality. When the State Water Board considers issuing a water quality certification for a project, it evaluates whether the project will comply with the applicable basin plan and whether the beneficial uses of the applicable water bodies will be protected.

Water Quality Standards

The beneficial uses together with the water quality objectives contained in the Basin Plan and state and federal anti-degradation requirements constitute California's water quality standards within the meaning of the CWA. These standards are intended to provide water quality adequate to protect beneficial uses, including the protection and propagation of fish and wildlife and recreation in and on the water. The water quality standards are also intended to address the use and value of public water supplies, such as for agricultural, industrial, and other purposes. Such standards serve the dual purposes of establishing the water quality goals for a specific water body and providing the regulatory basis for protecting these goals through the use of treatment controls and strategies.

Beneficial Uses

Beneficial uses are critical to water quality management in California. State law defines the beneficial uses of California's waters that may be protected against water quality degradation to include (and not be limited to) "domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves." (Wat. Code, § 13050(f).) The protection and enhancement of existing and potential beneficial uses are the primary goals of water quality planning.

The Basin Plan designates beneficial uses for two specific water bodies associated with the UNFFR Project: Lake Almanor and the North Fork Feather River. The designated beneficial uses for Lake Almanor and the North Fork Feather River are listed in Table 2-1. Collectively, these uses include water supply, power, recreation, warm and cold freshwater habitat, warm and cold spawning habitat, and wildlife habitat. These beneficial uses also apply to the North Fork Feather River's tributaries, including Butt Creek and Butt Valley reservoir.

Table 2-1 Beneficial Uses of Lake Almanor and North Fork Feather River

Beneficial Use	Description of Use from Basin Plan
Lake Almanor (Hydrologic Unit No. 518.41)	
Power (POW)	Uses of water for hydropower generation.
Recreation: Contact (REC-1)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Table 2-1 Beneficial Uses of Lake Almanor and North Fork Feather River

Beneficial Use	Description of Use from Basin Plan
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Cold Freshwater Habitat (COLD)	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Warm Spawning Habitat (SPWN)[1]	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
Wildlife Habitat (WILD)	Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
North Fork Feather River (Hydrologic Unit No. 518.4)	
Municipal and Domestic Supply (MUN)	Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Power (POW)	Uses of water for hydropower generation.
Recreation: Contact, Canoeing and Rafting (REC-1); Other Noncontact (REC-2)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. Contact uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs. Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. Noncontact uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Cold Freshwater Habitat (COLD)	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Table 2-1 Beneficial Uses of Lake Almanor and North Fork Feather River

Beneficial Use	Description of Use from Basin Plan
Cold Spawning Habitat (SPWN)[2]	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
Wildlife Habitat (WILD)	Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

1. Striped bass, sturgeon, and shad are listed in Basin Plan; these species do not occur in Lake Almanor.
2. Salmon and steelhead.

Water Quality Objectives

Each Regional Water Board is tasked with establishing water quality objectives to ensure the reasonable protection of beneficial uses pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). (Wat. Code, § 13241.) Because the State Water Board must certify compliance with water quality objectives pursuant to section 401 of the CWA, these objectives inform the CEQA project objectives described in section 1.3 of this RDEIR. The Porter-Cologne Act defines water quality objectives as "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area." (Wat. Code, § 13050, subd. (h).)

Water quality objectives may be in numerical or narrative form, and achievement of the objectives depends on applying them to controllable water quality factors. In cases where narrative objectives have been formulated to protect beneficial uses, the State Water Board and Regional Water Boards have the discretion to interpret the narrative objectives and the measures necessary to comply with the narrative objectives.

The Basin Plan defines the water quality objectives applicable to the beneficial uses of Lake Almanor and the North Fork Feather River. A summary of applicable objectives is set forth in Table 2-2. In determining whether and under what conditions to issue a water quality certification for the UNFFR Project, the State Water Board must ensure compliance with these objectives.

Table 2-2 Water Quality Objectives for Lake Almanor and North Fork Feather River

Beneficial Use[1]	Constituent	Water Quality Objective
Numerical Objectives		
Warm or Cold Freshwater Habitat (Only Cold Freshwater Habitat Applies to North Fork Feather River)	Temperature	Natural water temperatures shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration does not adversely affect beneficial uses. At no time or place shall the temperature be increased more than 5 degrees Fahrenheit (°F) above the natural receiving water temperature.
Warm or Cold Freshwater Habitat (Only Cold Freshwater Habitat Applies to North Fork Feather River) and Spawning	Dissolved Oxygen (DO)	The monthly median of the mean daily DO concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation. The DO concentrations shall not be reduced below the following minimum levels at any time: • Waters designated WARM 5.0 milligrams per liter (mg/l) • Waters designated COLD 7.0 mg/l • Waters designated SPWN 7.0 mg/l
All Uses	pH	The pH shall not be depressed below 6.5 nor raised above 8.5.
All Uses	Salinity	Electrical conductivity (at 25 degrees Celsius (°C)) shall not exceed 150 micromhos/centimeter (90 percentile) in well-mixed waters. Total dissolved solids shall not exceed 125 mg/l (90 percentile) in well-mixed waters
Contact Recreation	Bacteria	Based on a minimum of not less than five samples for any 30-day period, the fecal coliform concentration shall not exceed a geometric mean of 200/100 milliliter (ml), nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.

Table 2-2 Water Quality Objectives for Lake Almanor and North Fork Feather River

Beneficial Use[1]	Constituent	Water Quality Objective
Municipal and Domestic Supply (North Fork Feather River Only)	Chemical Constituents	At a minimum, water shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in Title 22 of the California Code of Regulations. At a minimum, water shall not contain lead in excess of 0.015 mg/l.
Municipal and Domestic Supply (North Fork Feather River Only)	Pesticides	Waters shall not contain concentrations of pesticides in excess of the MCLs set forth in California Code of Regulations, Title 22, Division 4, Chapter 15. Waters shall not contain concentrations of thiobencarb in excess of 1.0 micrograms per liter (µg/l).
All Uses	Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: • When natural turbidity is less than 1 Nephelometric Turbidity Unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2 NTUs. • When natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU. • When natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent. • When natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs. • When natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent. In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses will be fully protected.

Table 2-2 Water Quality Objectives for Lake Almanor and North Fork Feather River

Beneficial Use[1]	Constituent	Water Quality Objective
Municipal and Domestic Supply (North Fork Feather River Only)	Radioactivity	At a minimum, waters shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 64442 of Section 64442 and Table 64443 of Section 64443 of Title 22 of the California Code of Regulations.
Narrative Objectives		
All Uses	Biostimulatory Substances	Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.
All Uses	Coloration	Water shall be free of discoloration that causes nuisance or adversely affects beneficial uses.
All Uses	Floating Material	Water shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.
All Uses	Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.

Table 2-2 Water Quality Objectives for Lake Almanor and North Fork Feather River

Beneficial Use[1]	Constituent	Water Quality Objective
All Uses	Pesticide	No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. • Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses. • Total identifiable persistent chlorinated hydrocarbon pesticides shall not be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer • Pesticide concentrations shall not exceed those allowable by applicable antidegradation policies (see State Water Resources Control Board Resolution No. 68-16 and 40 C.F.R. Section 131.12.). • Pesticide concentrations shall not exceed the lowest levels technically and economically achievable.
All Uses	Radioactivity	Radionuclides shall not be present in concentrations that are harmful to human, plant, animal or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.
All Uses	Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
All Uses	Settleable Material	Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.

Table 2-2 Water Quality Objectives for Lake Almanor and North Fork Feather River

Beneficial Use[1]	Constituent	Water Quality Objective
All Uses	Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
All Uses	Taste or Odor	Water 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 affect beneficial uses.
All Uses	Toxicity	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.

1 The listed beneficial use applies to both Lake Almanor and the North Fork Feather River unless otherwise noted.

Controllable Factors

Achievement of the water quality objectives in the Basin Plan depends on the influences of controllable water quality factors on water quality and the extent to which these factors can be modified. The Basin Plan defines *controllable water quality factors* as "those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, that are subject to the authority of the State Water Board or the Regional Water Board, and that may be reasonably controlled." (Central Valley Regional Water Quality Control Board 2018.)

Controllable factors that alter flow regimes, such as dams and diversions, can negatively affect water quality and beneficial uses. In developing this RDEIR, the State Water Board evaluated temperature control measures that may be used to meet the water quality objectives and protect beneficial uses. In issuing a water quality certification, the State Water Board must determine what factors related to the UNFFR Project may be reasonably controlled and include appropriate conditions in the certification to control those factors to protect water quality standards.

Chapter 3 Proposed Project and Alternatives

3.1 Project History and Background

Great Western Power Company, acquired by PG&E in 1930, began construction and operation of dams and powerhouses along the North Fork Feather River in the early 1900s, coinciding with construction of the Western Pacific Railroad in the Feather River Canyon (Zemke 2006). Some of the early hydroelectric developments included the Big Bend powerhouse (1908) and Big Bend dam (1910), the Butt Creek powerhouse (dismantled in 1921) and the original Butt Valley dam (1912), the Big Meadows dam (now called Canyon dam) that created Lake Almanor (1914), and the Caribou powerhouse (1921). PG&E continued to construct and operate new hydroelectric projects in the North Fork Feather River watershed downstream of the UNFFR Project during the latter part of the 1900s.

The original license for the UNFFR Project (FERC Project No. 2105) was issued on January 24, 1955. This license consolidated two existing projects and two proposed projects. The existing projects were (1) Lake Almanor and Caribou powerhouse and (2) Butt Valley dam and reservoir. The proposed projects were (1) Caribou No. 2 powerhouse and (2) Belden forebay dam. The Caribou No. 2 powerhouse began operation in November 1958. Belden forebay dam was completed in the late 1950s. A more detailed description of the facilities that comprise the UNFFR Project is set forth in section 3.3, below. Since the 1960s, the UNFFR Project has provided power to PG&E customers throughout California and has played an integral role in power generation and transmission in California.

FERC Relicensing Process

PG&E's license to operate the UNFFR Project (FERC Project No. 2105) expired in October 2004. In accordance with the Federal Power Act (FPA) and FERC regulations, PG&E submitted an application to FERC for a new license on October 23, 2002 (Pacific Gas and Electric Company 2002). FERC has issued annual extensions since the license expired and will continue to issue extensions until a decision has been made on the new license.

In pursuing a new license to operate the UNFFR Project, PG&E followed FERC's Traditional Licensing Process (TLP). The TLP involves three basic stages: consultation; studies and draft application preparation; and application filing and acceptance by FERC. The TLP requires the licensee (PG&E) to work closely with federal, state, and local agencies; tribes; and the public to identify the environmental issues or concerns that may be addressed during the application process. These stakeholders have the opportunity to review and comment on the draft application. PG&E used a collaborative process to develop a settlement agreement that identifies measures that were evaluated by FERC in its Final Environmental Impact Statement (EIS) and may be incorporated into the new license. The pre-consultation for the UNFFR Project involved a 3-month review period in fall 2003, during which several agencies, a tribal group, and the public submitted comments on the relicensing application. Agency comment letters included recommendations for protection, mitigation, and enhancement (PM&E) measures to be included in the new license. Many of these measures were incorporated into the 2004 Settlement Agreement.

As part of its review of the PG&E application, FERC prepared an EIS under the National Environmental Policy Act (NEPA) to evaluate the environmental impacts of the UNFFR Project, including proposed measures from the 2004 Settlement Agreement, United States Department of Agriculture, Forest Service (USFS) 4e conditions, and additional measures recommended by FERC. Public scoping was completed in summer 2003, and a Draft EIS was completed in fall 2004. The Final EIS was completed in December 2005. FERC has not made a decision on the relicensing, pending resolution of several outstanding issues, including water quality. Under the FPA, FERC cannot issue a new license unless the State Water Board has issued or waived water quality certification.

Settlement Agreement Process

As part of the licensing application process, PG&E entered into a collaborative process with stakeholders and interested parties, known as the 2105 Collaborative, to resolve issues and develop PM&E measures to be included in the new license. Participants in the 2105 Collaborative included PG&E; USFS; United States Fish and Wildlife Service (USFWS); National Park Service; National Marine Fisheries Service (NMFS); California Department of Fish and Game (CDFG; now known as the California Department of Fish and Wildlife (CDFW)); Plumas County; a local 2105 Committee (composed of private citizens); American Whitewater; local recreation interests; California Sportfishing Protection Alliance; the Anglers Committee; Native American interest groups; and the California Hydropower Reform Coalition. State Water Board staff participated in the collaborative process in order to provide advice concerning the State Water Board’s regulatory process, but the State Water Board was not a party to the 2004 Settlement Agreement and is not a signatory to it.

The 2105 Collaborative had a goal of reaching agreement on mutually acceptable PM&E measures for inclusion in a new license for the UNFFR Project. The collaborative process resulted in the Settlement Agreement. The purpose of the agreement was to resolve “all lake level and streamflow issues for ecological purposes, river-based recreational uses, and other ‘resolved subjects’ in support of the USFS issuing its mandatory 4e conditions and FERC issuing a New Project License” (section 2.1 of the 2004 Settlement Agreement). While the 2004l Settlement Agreement included a wide range of measures, it did not resolve several fundamental issues, including water quality. On April 22, 2004, some of the stakeholders, including PG&E, signed the Settlement Agreement, which contained the PM&Es. The PM&Es were evaluated in the Final EIS prepared by FERC.

3.2 Project Location

The UNFFR Project is located in the upper reaches of the North Fork Feather River watershed, upstream of Lake Oroville, in Plumas County, California (Figure 1-1). The project area, as defined in the FERC EIS, encompasses more than 30,000 acres, including three reservoirs, part of a river, and part of a creek, in Plumas County, California. The three reservoirs are Lake Almanor, created by Canyon dam on the North Fork Feather River; Butt Valley reservoir, created by Butt Valley dam on Butt Creek; and Belden forebay, created by Belden dam on the North Fork Feather River downstream of its confluence with Butt Creek. The North Fork Feather River within the UNFFR Project boundary consists of two reaches, the Seneca reach (10.8 miles long) and the Belden reach (8.8 miles long). The Seneca reach extends from Canyon dam to Belden forebay, and the Belden reach extends from downstream of Belden dam to the tailrace of Belden powerhouse. The upper Butt Creek segment within the UNFFR Project boundary begins upstream of Butt Valley reservoir at the point where the bypass valve associated with the Butt Valley penstock discharges into Butt Creek and ends at Butt Valley reservoir. The flow in lower Butt Creek emerges as a series of perennial springs several hundred yards downstream of Butt Valley dam and enters the North Fork Feather River between Canyon dam and Belden forebay. Transmission lines, powerhouses, other energy facilities, maintenance facilities, roads, and recreation facilities occur along the shores of the reservoirs and the banks of upper Butt Creek and the North Fork Feather River, as well as on adjacent lands managed by the USFS and/or owned by PG&E.

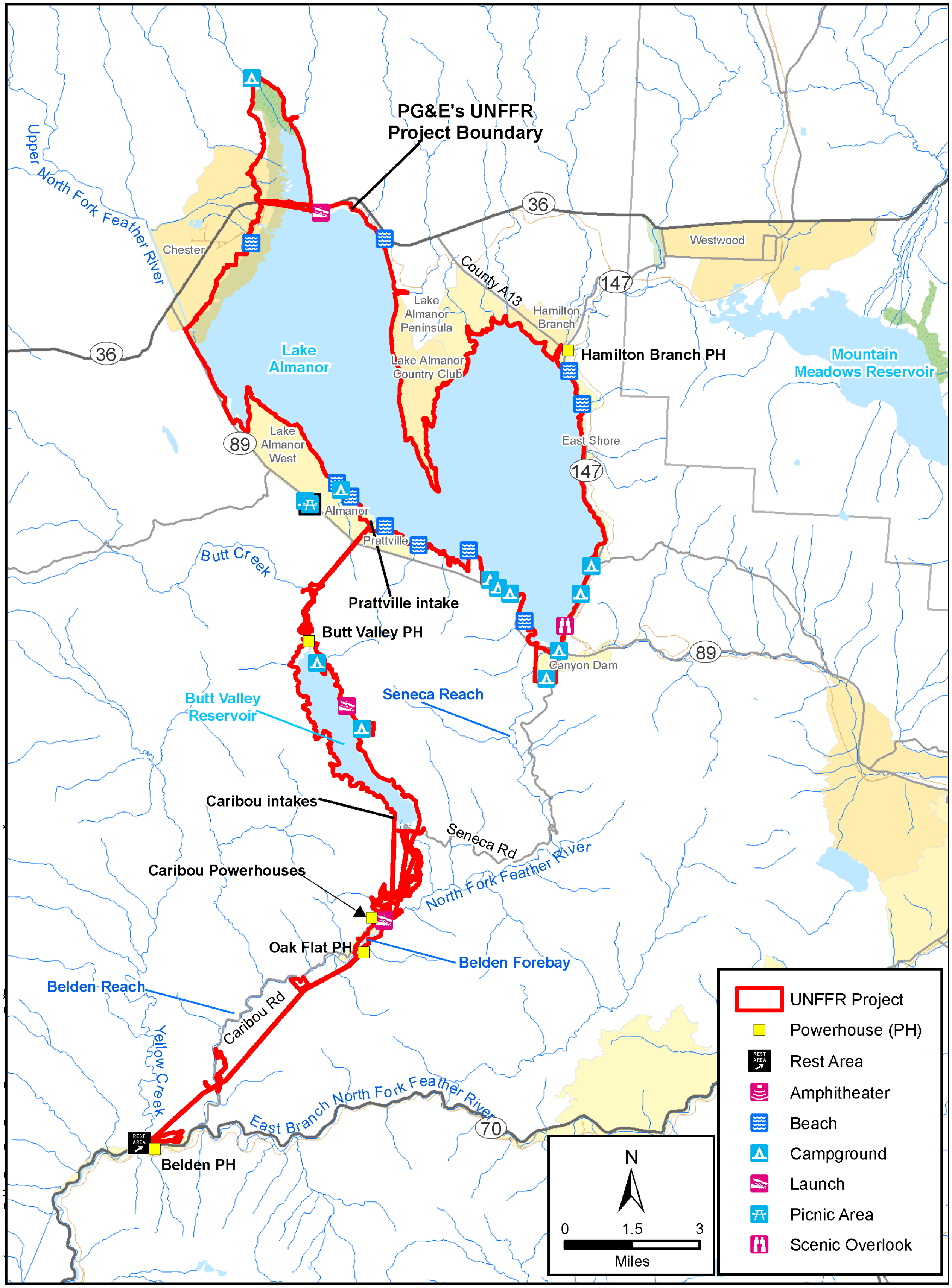

Figure 3-1 Upper North Fork Feather River Project

3.3 Overview of UNFFR Project

The UNFFR Project is one of the upstream-most projects in a series of water resource development and hydroelectric projects in the North Fork Feather River watershed. The UNFFR Project is a resource that is important to the operation of PG&E's Feather River hydroelectric system as a whole; it contributes to PG&E's energy production portfolio and plays a part in meeting the electrical generation capacity requirements of both PG&E and the state of California. The UNFFR Project consists of the following existing facilities within the FERC boundary:

- three dams that form Lake Almanor, Butt Valley reservoir, and Belden forebay;
- five powerhouses (Butt Valley, Caribou No. 1, Caribou No. 2, Oak Flat, and Belden);
- tunnels and penstocks connecting the reservoirs to the powerhouses; and
- transmission, recreation, operations and maintenance, and access facilities.

Existing Facilities

This section describes the existing UNFFR Project facilities and is primarily based on information that PG&E submitted to FERC in its License Application for the UNFFR Project (Pacific Gas and Electric Company 2002).

Reservoirs, Tunnels, and Penstocks

Three reservoirs, Lake Almanor, Butt Valley reservoir, and Belden forebay, provide regulated storage for controlled flow releases through the various powerhouses to generate electricity and support other uses, such as recreation.

Lake Almanor is the upstream-most reservoir on the North Fork Feather River within the UNFFR Project boundary and has the largest usable storage capacity (1,134,016 af). The maximum water surface area is 27,000 acres, and the maximum normal water surface elevation is 4,494 feet (PG&E elevation datum). Lake Almanor is impounded by Canyon dam, an earth-filled structure that is 135 feet high by 1,400 feet wide at its base and 1,250 feet long across its crest. Canyon dam has an outlet tower with multiple outlets that deliver water to a tunnel capable of releasing up to 2,100 cfs to the North Fork Feather River (Seneca reach) directly below the dam. In addition to the outlet structure, the dam has a concrete overflow spillway at an elevation of 4,500 feet (PG&E elevation datum). Water is also diverted from Lake Almanor through the Prattville intake, which conveys flow through the 10,899-foot-long Prattville tunnel No. 1A and the 5,568-foot-long Butt Valley penstock to the Butt Valley powerhouse. The combined operation of these intake structures allows PG&E to maintain the water surface elevations for Lake Almanor under the current license. In addition to providing the required flow releases to the Seneca reach of the North Fork Feather River, water can be released from the Canyon dam outlet tower in very wet years to control the level of Lake Almanor in order to avoid use of the spillway.

Butt Valley reservoir is south of Lake Almanor on Butt Creek, a tributary to the North Fork Feather River. In addition to inflow from the creek, Butt Valley reservoir receives flow from Lake Almanor through the Butt Valley powerhouse or, in some circumstances, via the bypass valve at the downstream portal of the Prattville tunnel, upstream of Butt Valley powerhouse. Butt Valley reservoir has a usable storage capacity of 49,897 af, a maximum water surface area of 1,600 acres, and a maximum normal water surface elevation of 4,132.1 feet (PG&E elevation datum). Butt Valley reservoir is impounded by Butt Valley dam, an earth-filled structure that is 74 feet high by 850 feet wide at its base and 1,350 feet long across its crest. The dam has no low-level outlet, but an ungated overflow spillway is capable of overflow releases at a crest elevation of 4,132.1 feet (PG&E elevation datum). This spillway has not been used since Butt Valley dam was substantially reconstructed in 1997. Water is diverted from the Butt Valley reservoir via the Caribou Nos. 1 and 2 intakes. Flow through the 9,776-foot-long tunnel No. 2 travels along the 2,222-foot-long Caribou No. 1 penstock to the Caribou No. 1 powerhouse. Flow through the 8,710-foot-long tunnel No. 2A travels along the 2,322-foot-long Caribou No. 2 penstock to the Caribou No. 2 powerhouse.

Belden forebay is on the North Fork Feather River, approximately 12 miles downstream of Lake Almanor and more than 1,150 feet in elevation below Butt Valley reservoir. In addition to flow from the Seneca reach of the river, it receives flow from the Caribou Nos. 1 and 2 powerhouses. Belden forebay has a usable storage capacity of 2,421 af, a maximum water surface area of 42 acres, and a maximum normal water surface elevation of 2,975.0 feet (PG&E elevation datum). Belden forebay is impounded by Belden forebay dam, a rock-filled structure that is 152 feet high by 603 feet wide at its base and 500 feet long across its crest. The dam has a spillway with four radial gates and a siphon that activates if the reservoir exceeds 2,975.5 feet (PG&E elevation datum). Water is released from Belden forebay into the North Fork Feather River via the Oak Flat powerhouse or flow is diverted to the Belden powerhouse through tunnels and a siphon. The first Belden tunnel is 23,637 feet long, the Belden siphon is 1,859 feet long and the second Belden tunnel is 9,649 feet long. Flow from the second tunnel enters the 924-foot-long Belden penstock and is delivered to the Belden powerhouse.

Powerhouses

The UNFFR Project includes five powerhouses, one at the upper end of Butt Valley reservoir (Butt Valley powerhouse), three in the immediate vicinity of Belden forebay (Oak Flat powerhouse and Caribou No. 1 and No. 2 powerhouses), and one at the downstream end of the Belden reach near the mouth of Yellow Creek and the confluence of the North Fork Feather River and East Branch North Fork Feather River (Belden powerhouse). The powerhouses include eight hydroelectric generating units with a total nameplate capacity of 342.6 megawatts (MW).

The Butt Valley powerhouse is immediately upstream of Butt Valley reservoir. The Butt Valley powerhouse consists of a single 55,000-horsepower vertical Francis turbine with a 13.8-kilovolt (kV) generator. It has a normal operating capacity of 41 MW. A 40,000-kilovolt-ampere (kVA) transformer bank steps up voltage from 13.8 kV to 115 kV for transmission.

Caribou Nos. 1 and 2 powerhouses are located adjacent to Belden forebay, immediately downstream of the Seneca reach. Caribou No. 1 includes three 30,000-horsepower double overhung impulse turbines with 11.5-kV generators. The total combined output of the generators is 75 MW. The generating units are connected to a 90,000-kVA transformer bank that steps up voltage from 11.5 kV to 115 kV for transmission, and the output can also be tied to the Caribou No. 2 development through a 56,000-kVA autobank. Caribou No. 2 has two 76,000-horsepower, 6-jet vertical shaft impulse turbines with 13.8-kV generators. The total combined output of the generators is 120 MW. 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.

The Oak Flat powerhouse, located at the base of Belden dam, has a single 1,837-horsepower horizontal shaft Francis turbine with a 1,628-kVA generator. The Oak Flat powerhouse generates power from the instream flow release to the Belden reach and has a maximum capacity of 1.3 MW. The generating unit is connected to a 2,001-kVA transformer bank, which connects to a distribution line.

The Belden powerhouse is located at the downstream end of the UNFFR Project near the confluence of Yellow Creek with the North Fork Feather River. It contains a single 158,000-horsepower vertical shaft Francis turbine with a 13.8-kV generator. The generator has a capacity of 125 MW. 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.

Transmission Facilities

Two transmission lines convey power generated by the five powerhouses to substations in the area. A 7.4-mile-long line from Butt Valley to the Caribou powerhouses has capacity for transmitting 230 kV, but it currently operates at 115 kV. A 12-kV tap line carries power from the Oak Flat powerhouse to a local distribution line.

Recreation Facilities

PG&E manages a number of recreation facilities associated with the UNFFR Project, including facilities on USFS lands, which are maintained by PG&E under a special use permit from the USFS. The USFS manages other recreation facilities in the vicinity of the UNFFR Project. PG&E-managed recreation facilities include:

Lake Almanor:

- Lake Almanor Campground – Loops 1, 2, and 3
- Camp Connery Group Camp
- Canyon Dam Day Use Area
- Almanor Scenic Overlook
- Eastshore Day Use Area
- Last Chance Campground and Group Camp
- Rocky Point Campground and Day Use Area

Butt Valley Reservoir:

- Ponderosa Flat Campground
- Alder Creek Day Use Area and Boat Launch
- Cool Springs Campground

Belden Forebay to Belden Powerhouse:

- North Fork Fishing Trail
- Belden Rest Stop on State Route 70

Existing Operations

The UNFFR Project is operated to maintain water levels in Lake Almanor and release flows for power generation at the UNFFR Project powerhouses and other downstream hydroelectric projects, including PG&E's Rock Creek-Cresta Hydroelectric Project and Poe Hydroelectric Project and DWR's Oroville Facilities. Water levels in Lake Almanor are maintained by releases through the Prattville intake, which conveys flows to the Butt Valley reservoir, and through the multi-level outlet structure at Canyon dam, which releases flows into the Seneca reach of the North Fork Feather River. Lake levels are regulated throughout the year by controlled releases during the summer and fall and reduced releases during winter and spring to allow the lake to refill. Currently, PG&E is managing the water level in Lake Almanor consistent with PM&E measure # 20 described in s3.4, and is attempting to manage daily drawdown rates to address environmental concerns (e.g., nesting waterfowl) during the summer months.

These releases are closely coordinated with the unregulated flows of the East Branch of the North Fork Feather River and downstream hydroelectric projects to avoid spilling water past the downstream powerhouses during high flows. Lake Almanor is usually at its highest level by early June, which coincides with the peak recreation period. Lake levels also fluctuate in response to increased (or decreased) energy demands and hydrologic conditions. Since 2004, under annual licenses, the minimum streamflow released from Canyon dam into the Seneca reach of the North Fork Feather River is 35 cfs year-round.

Downstream water storage impoundments—Butt Valley reservoir and Belden forebay—are operated to meet power system needs and manage water surface elevations on a daily basis. Butt Valley reservoir water levels typically fluctuate about 1 foot on a daily basis and 5 to 10 feet on a weekly basis. Spill at Butt Valley dam is rare due to the high hydraulic capacity of the Caribou powerhouses and has not occurred since the dam was reconstructed in 1997. Belden forebay can fluctuate 5 to 10 feet during a 24-hour period in response to fluctuating power demands and the need to maintain instream flow releases to the Belden reach. Under the current annual license, the minimum flow released from Belden dam through the Oak Flat powerhouse into the Belden reach is 140 cfs during the fishing season (last Saturday in April to Labor Day) and 60 cfs during the remainder of the year. Spill at Belden dam is infrequent due to PG&E's ability to regulate flows delivered to the Belden powerhouse.

The five powerhouses have automatic or semi-automatic controls operated from the Rock Creek switching center. The maximum regulated flow (i.e., hydraulic capacity) at each powerhouse is:

- 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

3.4 Proposed Project

PG&E developed its proposed project to ensure that it could meet its objectives for the UNFFR Project:

1. Continue generating electricity for the term of the new license to produce electric power from a renewable source for its customers.
2. Continue providing power to help meet both short- and long-term needs for power and ancillary services in PG&E's service area and within the California-Mexico Power Area.
3. Implement measures to conserve energy, mitigate damage to fish and wildlife (including related spawning grounds and habitat), provide recreational opportunities, and preserve other aspects of environmental quality.

Under the proposed project, UNFFR hydroelectric facilities will be operated and modified per PG&E's FERC application with additions from the Settlement Agreement, section 18 prescriptions, the 4(e) conditions, and FERC staff additions as summarized in the sections 0 and 0, below. The proposed project, along with three water temperature management alternatives, is evaluated in this Revised Draft Environmental Impact Report (RDEIR).

PG&E's FERC Application

On October 22, 2002, PG&E submitted an application to FERC for renewal of its license for the existing UNFFR Project. PG&E did not propose any large-scale capital improvements, construction, or operational changes to the UNFFR Project in its application, but it did identify numerous PM&E measures in response to correspondence with resource agencies, tribes, and other interested parties. Some of these measures were modified by FERC during its environmental review process (see the Final FERC EIS, Federal Energy Regulatory Commission 2005). Figure 3-1 illustrates the footprint of UNFFR Project.

PG&E's application included the following PM&E measures:

4. 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.
5. Continue to implement the road maintenance agreement between PG&E and Plumas National Forest.
6. Operate and maintain the existing gages to determine river stage and minimum streamflow below Canyon dam at the NF-2 stream gage (United States Geological Survey (USGS) gage No. 11399500) and Belden forebay dam at the NF-70 stream gage (USGS gage No.11401112) under the supervision of the USGS.
7. Prepare annual water quality report(s) that contains elements consistent with reporting requirements from the Water Quality Monitoring Program as outlined in the Settlement Agreement.
8. Develop an odor and metals monitoring program to evaluate the effectiveness of seasonal switching of the Canyon dam outlet tower gates used.

9. 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 UNFFR Project and potential solution(s) if they are UNFFR Project effects.
10. Develop a monitoring program to document long-term water quality conditions in Lake Almanor under altered UNFFR Project operations for the new license.
11. Develop a monitoring program to assess potential bioaccumulation of methylmercury, silver, and polychlorinated biphenyls (PCBs) in catchable-sized fish in the UNFFR project area.
12. Develop a bacteriological monitoring program, using a methodology appropriate to determine compliance with state water quality standards.
13. 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 Settlement Agreement. Minimum streamflows would commence within 60 days of issuance of the new license, unless facility modifications are required[1].
14. 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.
15. 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[2].
16. 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 resource agencies. 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.
17. Implement a ramping rate of 0.5 foot per hour, in all months, at Canyon dam, measured at gage NF-2, and at Belden dam, measured at gage NF-70, when the ramping rate can be controlled.

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[1] Tables 3-1 and 3-2 tables of this RDEIR are reproduced from Tables A-1 and A-2 of the Settlement Agreement.
[2] These pulse flows are shown in Table 3.3.

18. Block load[3] 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 Hydroelectric Project but less than 3,000 cfs.
19. Rehabilitate and maintain an existing streamflow gaging station on lower Butt Creek designated as NF-9 and read the gage four times a year.
20. 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 three to five years.
21. 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.
22. 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.
23. Maintain Lake Almanor water levels as follows (lake level is defined as the water surface elevation, expressed in PG&E datum, which is 10.2 feet lower than the USGS datum)[4]:
    - Wet and Normal Water Years—By May 31, the water surface elevation would be at or above 4,485.0 feet (908,000 af) and from June 1 through August 31, at or above 4,485.0 feet (908,000 af);
    - Dry Water Years—By May 31, the water surface elevation would be at or above 4,483.0 feet (859,000 af) and from June 1 through August 31, at or above 4,480.0 feet (787,000 af);
    - Critically Dry Water Years—By May 31, the water surface elevation would be at or above 4,482.0 feet (835,000 af) and from June 1 through August 31, the water surface elevation is at or above 4,480.0 feet (787,000 af); and
    - 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 the State Water Board, USFS, CDFG, and Plumas County of drought concerns. By May 1 of these same years consult with representatives from these agencies and other parties to discuss operational plans to manage the drought conditions.

[3] Block loading is a sub-component of the base load operation designed to respond to fluctuating seasonal demand. Block load operations commence when the maximum impoundment storage level is attained and ceases operation when the impoundment is drawn down to a certain level. When operating in block load, a facility is not attempting to maximize the revenue-generating aspects of hydropower.

[4] Figure 3-2 in FERC FEIS illustrates the range of Lake Almanor water surface elevations by water year for the period 1970-2003).

24. Take such reasonable actions as may be prudent to prevent the water surface elevation in Lake Almanor from exceeding an elevation of 4,494.0 feet unless a higher level is approved by FERC and DWR's Division of Safety of Dams.
25. Operate Butt Valley forebay so that the minimum water surface elevation from June 1 through September 30 is at or above 4,120.0 feet (32,000 af) and from October 1 through May 31 at or above 4,115.0 feet (24,500 af).
26. Continue to operate Belden reservoir so that the minimum water surface elevation is 2,905.0 feet (300 af), year-round.
27. Forecast the water year type on or about January 10; notify the resource agencies 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.
28. Remove the Gansner Bar fish barrier on the Belden reach[5].
29. Design a wildlife habitat enhancement plan, within one year of license issuance.
30. Develop an amphibian monitoring plan for USFS-sensitive species for the Seneca, Butt Creek, and Belden bypass reaches.
31. Continue to comply with measures protecting bald eagles according to existing nesting territory management plans.
32. Finalize and implement the UNFFR Project recreation resource management plan (RRMP) that includes the following elements:
    - a recreation facilities development program;
    - a recreation O&M program;
    - an interpretation and education 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.
33. Implement recreational facility enhancement measures (part of the recreation facilities development program) at Lake Almanor, Butt Valley reservoir, Belden

[5] In 2014, a FERC order was issued that amended paragraph (h) of article 26 of PG&E's license for the UNFFR Project (FERC 2014) and amended article 26 to delete the requirement to maintain and replace this barrier. PG&E implemented the Gansner Bar Fish Barrier Removal Project in 2015 to address public safety and aquatic connectivity issues raised during the relicensing process (PG&E 2016).

forebay, and the bypass reaches based on target completion dates and monitoring triggers (standards) in the RRMP.[6]

34. Provide the USFS with matching funds up to a maximum of $5,000,000 (2004 dollars) to construct recreation improvements at USFS-owned recreation facilities.[7]

35. Assume responsibility for operational maintenance and heavy maintenance of the following USFS 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 six months of completion of construction of the recreation improvements planned for the Almanor family campground and amphitheater, the Almanor group campground, and the Almanor beach, apply to FERC to incorporate these additional USFS facilities within the UNFFR Project boundary and include these facilities in the O&M program.[8,9]

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

37. 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 North Fork Feather River between its confluence with the East Branch of the North Fork Feather River and the Belden diversion dam; and (2) augment CDFG's existing Lake Almanor fisheries program.

38. Provide up to $25,000 (2004 dollars) to the USFS by March 1 of each year of the new UNFFR 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 UNFFR Project's bypass river reaches.

39. Coordinate with the USFS, Plumas County, and California Department of Transportation to develop a memorandum of understanding to produce a Belden interagency recreation river flow management plan.

40. Establish a recreation river flow technical review group within six months of issuance of a new license for the purpose of consulting with PG&E in the design

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[6] Additional details on this topic are incorporated by reference from FERC FEIS, Pages 3-200 to 3-240

[7] Page 10, Section 4.4.5 of the Settlement Agreement addresses escalation of costs: 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.

[8] PG&E has undertaken a number of recreational improvements since the Settlement Agreement was signed, including bike trails, boat ramps, and campground facilities.

[9] Additional details on this topic are incorporated by reference from FERC FEIS, pages 3-240 to 3-242.

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.

41. Implement the recreation flow implementation plan as described in the Settlement Agreement.
42. Implement the recreation river flow schedule and other provisions as presented in the Settlement Agreement.
43. Post, through a third party or other mechanism, an annual recreation flow calendar scheduling the initial recreation flow day per month.
44. 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.
45. 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.
46. 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 the number of boats encountered on the river.
47. Apply the basic ramping rates when implementing recreation river flows.
48. 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.
49. 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.
50. Modify the UNFFR 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.
51. Apply to FERC within one year of license issuance to adjust the UNFFR Project boundary to include all recreation improvements covered by the Settlement

Agreement at PG&E facilities as well as the following USFS 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.

52. Apply to FERC to adjust the UNFFR Project boundary as needed to incorporate the Almanor family campground and amphitheater, the Almanor group campground, and the Almanor beach, six months after the USFS has completed construction of all of the recreation improvements it has planned for each of these facilities.
53. Within one year of license issuance, file with FERC a USFS-approved road traffic survey plan for roads used for UNFFR Project purposes located on USFS lands. The traffic survey plan would include provisions for monitoring traffic every six years when monitoring recreation use in accordance with FERC Form 80 requirements.
54. Within two years of license issuance, implement aesthetic improvement measures and develop USFS-approved visual management plans.
55. Within 30 days of license issuance, implement the amended Lake Almanor shoreline management plan included in the final license application for the UNFFR Project.[10]
56. Conduct an annual meeting with the USFS, CDFG, and Plumas County to coordinate ongoing UNFFR Project-related land management activities.
57. Preserve the historic features and character of the clubhouse, houses, and grounds at Camp Caribou and consult with the USFS when planning maintenance and repair activities at this facility.
58. Finalize and implement the Historic Properties Management Plan (HPMP).

Modifications to PG&E's FERC Application

Settlement Agreement

The 2004 Settlement Agreement contains measures agreed to by the signatories of the agreement. A copy of the Settlement Agreement is attached as Appendix A. Although development of the Settlement Agreement involved a concerted effort of a broad-based group of resource agencies, public entities, and non-governmental organizations, some members of the 2105 Collaborative did not sign the agreement.

The following issues were considered resolved by the signatories to the 2004 Settlement Agreement:

1. Streamflows for PM&E of fish, wildlife, and other aquatic biota in UNFFR Project-affected stream reaches.
2. Streamflows for stream channel maintenance in UNFFR Project-affected stream reaches.

[10] PG&E Application, Appendix E-6-E (Draft Shoreline Management Plan)

3. Streamflows for whitewater boating and other river-based recreation on the Belden and Seneca reaches.
4. Water quality associated with UNFFR Project operations and facilities, excluding erosion and water temperature.
5. Streamflow fluctuations from UNFFR Project operations, including ramping rates.
6. Streamflow gaging for compliance monitoring.
7. Stream ecology monitoring.
8. Streamflow information for use by the public.
9. Facility modifications to implement the PM&E measures.
10. Administration of Settlement Agreement.
11. River sediment management.
12. UNFFR Project reservoir operation and lands management principles.
13. Recreation facilities development during the term of the new UNFFR Project license.

The 2004 Settlement Agreement resolved these issues by including measures pertaining to minimum streamflows, pulse flows, ramping rates, recreation flows, reservoir operations, water quality monitoring, wildlife habitat enhancement, fish stocking, recreation facilities development, maintenance and monitoring, adjustments to the UNFFR Project boundary, an interpretation and education program, and land management and visual resources. FERC considers the 2004 Settlement Agreement to represent additional PM&E measures proposed by PG&E and the other signatory parties to the agreement, sometimes replacing previous recommendations made by these entities (FERC EIS, p. 1-10). Since PG&E submitted its application to FERC, it has constructed the Marvin Alexander day use area[11] to increase public recreation opportunities at Lake Almanor in response to the current demand (letter dated July 12, 2005, to Magalie Roman Salas, FERC).

Proposed changes to the minimum streamflows in the Seneca and Belden reaches based on the 2004 Settlement Agreement are identified in Table 3-1 and Table 3-2.

Table 3-1 Proposed Minimum Streamflow Releases (in cfs) from Canyon Dam

Water Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project: 2004 Settlement Agreement[a]												
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

[11] Described on page 44 of Appendix A of the 2004 Settlement Agreement.

Baseline: Current Operations at Time of NOP under Existing License[b]												
All Years	35	35	35	35	35	35	35	35	35	35	35	35
Difference from Project and Baseline												
Critically Dry	40	40	55	55	55	45	40	25	25	25	25	35
Dry	55	65	75	75	75	75	45	35	25	25	25	40
Normal	55	65	90	90	90	90	55	45	25	25	25	40
Wet	55	65	90	115	115	115	60	45	25	25	25	40

a. Table A-1 2004 Settlement Agreement
b. Table B-1 (p B-16) Exhibit B, Final License Application Volume 1 of 8

Table 3-2 Proposed Minimum Streamflow Releases (in cfs) from Belden Dam

Water Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project: 2004 Settlement Agreement[a]												
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
Baseline: Current Operations at Time of NOP under Existing License[b]												
All Years	60	60	60	60	140[c]	140	140	140	60[c]	60	60	60
Difference from Project and Baseline												
Critically Dry	45	70	110	120	45	-50	-60	-65	15	15	25	30
Dry	75	80	115	135	55	20	-10	-30	40	40	50	55
Normal	80	80	115	165	85	85	35	0	80	60	60	60
Wet	80	80	120	175	95	85	35	0	80	60	60	60

a. Table A-2 2004 Settlement Agreement
b. Table B-1 (p B-16) Exhibit B, Final License Application Volume 1 of 8
c. 140 cfs begins last Saturday in April and ends Labor day

Participants in the 2105 Collaborative acknowledged that the Settlement Agreement flows are lower in some months and water year types (June through early September in Critically Dry years and July through early September in Dry years) than those that occurred prior to the UNFFR Project (i.e., natural hydrograph). One of the key criteria in developing the flow schedule in the Settlement Agreement was to provide a flow regime that incorporates attributes of a natural hydrograph using the available water resources while balancing the interests of the many relicensing participants. For each water body affected by the UNFFR Project, the 2105 Collaborative participants used Ecosystem and Management Attribute worksheets to identify flow regimes and reservoir elevations that could satisfy competing monthly resource needs. The flows shown in Table 3-1 and

Table 3-2 were developed using-existing data and resource conditions to address competing demands on these resources.

Table 3-3 summarizes pulse flow releases from Canyon dam and Belden Forebay dam in January, February, and March. To accommodate pulse flow releases, Outlet 1 at Canyon dam would be modified to enable a 600 cfs discharge.

Table 3-3 Pulse Flow Releases from Canyon Dam and Belden Forebay Dam in 2004 Settlement Agreement (cfs)

Water Year Type	January	February	March[a,b]
Critically Dry	--	--	--
Dry	--	--	--
Normal	675	1,000	1,000
Wet	675	1,200	1,200

a. No Pulse Flows would be required in March in the respective reach if two successive days of mean daily water temperature greater than 10 C° are measured at gages NF-2 (below Canyon Dam) or NF-70 (below Belden Forebay Dam), or if rainbow trout spawning in the respective reaches is observed and reported to the Licensee by CDFW or FS.

b. Initially, the typical schedule would be to increase flows at the Basic Ramping Rate to reach the peak streamflow, then hold the peak streamflow for 12 hours. In the Seneca Reach during March of Normal and Wet years, streamflow would then 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 3-1 above is reached. The 6-hour period of constant streamflow during the ramp down would occur between 9 AM and 3 PM of a weekend to allow recreational boating opportunities. In the Belden Reach, the peak streamflow would be reduced using the Basic Ramping Rate until the Minimum Streamflow specified in Table 3-2 above is reached, but no period of constant flow during the ramp down would be required in any month.

The Settlement Agreement provides for the establishment of a Recreation River Flow Technical Review Group (TRG) within 6 months of issuance of the new project license. Recreational flows would not be provided unless the TRG recommends that recreational flows be tested and the Forest Service, State Water Board, and FERC approve TRG's proposal. After a three-year test period, the TRG could recommend and the regulatory agencies could approve continuation of recreational flows based on an evaluation of the effects of the flows on ecological and social resources. The main purpose of the recreational flows is to provide water for kayakers, not to reduce water temperature. The recreational flows would not exceed the rate or frequency set forth in Table 3-4.

Table 3-4 Recreation Flow Release Schedule below Belden Forebay Dam (for the months of July through October)

Water Year Type	Flow Release (cfs)[1]	Initial Release Days (per Month)	Maximum Release Days (per Month)[2]
Critically Dry	650	1	1
Dry	650	1	2
Normal/Wet	750	1	2

a. During Normal and Wet water years, recreation river flow releases at Belden Dam and measured at NF-70 would be required 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 would be required between the hours of 10 AM and 1 PM for both release days.

b. During scheduled recreation river flow releases, PG&E would be required to count observed boater use in number of boats per day to determine whether recreation river flow release days should be added or subtracted the following year. All boats would be counted as 1 boat except for rafts 12’ or greater in length, which would be counted as 2 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 release day for a month exceeds 100 boats per day, one day of recreation river flow release would 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 would be subtracted from the recreation river flow release schedule for that month in the next year. Recreation river flow releases would not decrease below 1 day per month and would not exceed the maximum release days.

Section 18 of the Federal Power Act

In a letter dated November 26, 2003, NMFS provided a fishway prescription conditioned on the passage of anadromous fishes at one or more unspecified dams below the UNFFR Project area. In a letter dated March 14, 2005, NMFS provided a modified fishway prescription for the UNFFR Project conditioned on the implementation of a successful trap and transfer program for adult anadromous salmonids at DWR’s Oroville Facilities. Additionally, NMFS stated that it reserved its authority to prescribe fishways under Section 18 of the FPA. On February 29, 2008, NMFS amended its 2005 request for modified fishway prescriptions to reflect the terms of a Habitat Expansion Agreement that was part of a settlement agreement signed by NMFS, PG&E, and other parties [National Marine Fisheries Service 2008]. Consistent with its reservation of authority under Section 18 of the Federal Power Act, NMFS reserved its right to submit comments or recommended terms and conditions in the future.

Section 4(e) Conditions

Since the UNFFR Project occupies National Forest System (NFS) lands managed by the Lassen and Plumas National Forests, the USFS has the authority to impose mandatory conditions under Section 4(e) of the FPA. In a letter dated November 4, 2004, the USFS provided 47 final 4(e) conditions for the UNFFR Project.

USFS conditions 1 through 24 are standard conditions that require USFS approval on the final UNFFR Project design and any changes to the design, yearly consultation with the USFS to ensure the protection and development of natural resources, restrictions and protective measures that should be in place, and UNFFR Project operations and maintenance procedures that would enable continued UNFFR Project operations to be consistent with applicable provisions of the Lassen and Plumas National Forests' Land and Resource Management Plans. Conditions 31, 32, 33, 34, 42, and 43 relate to the development of plans for the use of NFS lands (including spoil pile, habitat, recreation, traffic, visual resources, and cultural resource management). Conditions 25, 27, 28, and 30 pertain to establishing and publicizing reservoir water levels and flow regimes in the UNFFR Project reaches. Conditions 41, 44, 45, 46, and 47 pertain to consultation with the USFS on USFS special-status species and invasive weeds. Conditions 26, 29, 31, 32, 35, 36, 37, 38, 39, and 40 concern the monitoring of water quality, water temperature, plants, fish, macroinvertebrates, wildlife, recreational use, and UNFFR Project lands and facilities to serve as a basis for adaptive management decisions and allow the USFS to take appropriate corrective actions. Many of these conditions are identical to terms that are specified in the 2004 Settlement Agreement. The complete USFS final 4(e) conditions are in Appendix B of FERC's Final EIS.

FERC Staff's Additions

After evaluating PG&E's proposal and the recommendations of the resource agencies and other interested parties, FERC staff considered what additional PM&E measures, if any, would be necessary or appropriate for the continued operation of the UNFFR Project. These additional measures are referred to as FERC staff's alternative. Note that the FERC Staff Alternative is not a separate alternative selected for analysis in this RDEIR. Rather, it is a modification of the Proposed Project analyzed in this RDEIR. In addition to, or in lieu of, PG&E's proposed measures, the FERC staff alternative would include the following environmental measures.

1. Develop a plan, including a 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 FERC 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 UNFFR Project operations.

5. Develop a bacteriological monitoring program for the first three 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 UNFFR Project to meet flow and lake level requirements of a new license, while being consistent with the Rock Creek-Cresta Hydroelectric Project Ecological Resources Committee and USFS determination for modifying the Prattville intake and implementing other temperature control measures.
7. Develop a plan to monitor dissolved oxygen concentrations in Lake Almanor and Butt Valley reservoir.
8. Revise the draft Shoreline Management Plan 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 [Recreation Resource Management Plan].
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, unless the water temperature exceeds 10°C for two consecutive days in March and a flow of this magnitude (700 cfs) was not measured in the preceding January or February at NF-4 (Seneca) and NF-7 (Belden).
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 Settlement Agreement. Initiate monitoring during years four and five of the new license. After this two 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 UNFFR 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 bypass reaches.
14. Delay implementation of recreational flow releases for a period of six 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 one 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 UNFFR 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 one year of license issuance.
21. Develop an interagency bald eagle management plan within one year of license issuance.
22. Develop a fire prevention and response plan within one year of license issuance.
23. Implement the measures outlined in the Programmatic Agreement[12] (PA).
24. Consult with the USFS, 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 [Historic Properties Management Plan].
25. Invite the USFS, Plumas County and the United States National Park Service 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 National Historical Preservation Act.
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 FERC, in consultation with the California State Historic Preservation Officer, 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.

3.5 Development of Alternatives to the Proposed Project

Section 15126.6, subdivision (a) of the CEQA Guidelines provides in relevant part:

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[12] As part of the relicensing process, PG&E has developed an agreement titled 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 License Issuance to Pacific Gas & Electric Company for the Continued Operation of the Upper North Fork Feather River Project (FERC Project No. 2105) in Plumas County, California.

> *An EIR shall describe a range of reasonable alternatives to the project . . . which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. An EIR is not required to consider alternatives which are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason.*

In this case, the project consists of the operation of the UNFFR Project under a new project license, in accordance with the PM&E measures included in PG&E's license renewal application to FERC, as modified by the Settlement Agreement and other new regulatory conditions summarized in section 0, above. As explained in section 0, the baseline for purposes of analyzing the potential environmental impacts of the proposed project and project alternatives is generally the environmental conditions existing when the Notice of Preparation was issued in 2005. Baseline conditions include the ongoing operation of the UNFFR Project under the conditions of the old project license. In general, the ongoing impacts of the UNFFR Project on water quality are included as part of the CEQA baseline. Relative to this baseline, renewal of PG&E's UNFFR Project license without any changes to the license conditions would not result in a physical change to the environment, except to the extent that ongoing UNFFR Project operations are contributing to the long-term deterioration of environmental conditions.

By contrast, issuance of a new project license, subject to the new PM&E's included as part of the proposed project, could result in environmental impacts relative to the CEQA baseline, even though the PM&E's are intended to satisfy present-day regulatory requirements and improve UNFFR Project operations and infrastructure for the benefit of the environment and the public. In particular, the construction activities associated with the recreational improvements around Lake Almanor and Butt Valley Reservoir that are described in the Settlement Agreement could have a variety of significant environmental impacts unless mitigation measures are implemented. PG&E and the other stakeholders who are signatories to the Settlement Agreement support implementation of those recreational improvements, however, and none of the stakeholders who have participated in the CEQA review process have suggested that the State Water Board consider an alternative that eliminates any of the PM&E's included as part of the proposed project in order to avoid or lessen any of the potential environmental impacts of the project. Accordingly, the State Water Board has not developed what would essentially be a "straw man" alternative that would avoid or lessen environmental impacts by eliminating one or more of the PM&E's included in the Settlement Agreement. Instead, the Board has focused on the development of alternatives that would address the issue of elevated temperatures in the North Fork Feather River that was left unresolved by the Settlement Agreement.

The alternatives described in this section were selected by the State Water Board based on their ability to achieve, or be consistent with, the objectives stated in section

1.3 of this RDEIR. This section introduces and describes the alternatives that are analyzed in Chapter 5 (Environmental Setting and Impacts) and Chapter 6 (Cumulative Impacts). Chapter 7 provides a comparison of The Proposed Project and these alternatives with the baseline condition associated with the UNFFR Project.

In determining what alternatives should be brought forward and considered in the RDEIR, the State Water Board has determined that its objectives, as described in section 1.3, could be met to varying degrees by each of the alternatives relative to the baseline condition. Consistent with the CEQA Guidelines, the alternatives were designed to inform the State Water Board's decision-making and public participation by evaluating the range of potential environmental impacts associated with different temperature control measures. The State Water Board has determined that the alternatives selected for analysis represent a reasonable range of potentially feasible alternatives, as required by CEQA.

Overview of the Alternatives Screening and Selection Process

Following the scoping process, the State Water Board used a three-level screening process to develop an array of project alternatives that could reduce water temperatures in the North Fork Feather River below Canyon dam and achieve other Project objectives. The process is briefly described below, and detailed information is provided in Appendices D, E, E1, E2, E3, and F.

Level 1. During Level 1, the State Water Board "cast a wide net" to capture all possible water quality measures and then subjected them to the following initial screening criteria:

- **Effectiveness and Reliability**—Is there a reasonable potential that the alternative can effectively and reliably achieve the preliminary temperature target of 20°C (consistent with temperature objectives identified in the Rock Creek–Cresta Relicensing Settlement Agreement), or are the effectiveness and reliability of the measure overly speculative?
- **Technological Feasibility and Constructability**—Can the alternative be implemented with currently available technology and construction methods?
- **Logistics**—Can the alternative be implemented considering current legal obligations, public safety needs, right-of-way and access needs, and other real-world logistical constraints?
- **Reasonableness**—Are there clearly superior or more reasonable alternatives available based on the three criteria listed above, or would implementation of the alternative be remote and speculative?
- **Fatal Flaws**—Does the alternative have any fatal flaws?

The set of alternatives remaining after the Level 1 screening process represented a reasonable range of potentially effective and feasible alternatives that were carried forward to Level 2.

Level 2. Level 2 screened out the alternatives that, after closer examination, would clearly be ineffective or infeasible or were inferior to the other alternatives. The alternatives were modified or refined based on the analysis, and preliminary engineering designs and cost estimates were developed. The following additional criteria were used to screen alternatives in Level 2:

- **Substantial Further Study**—Is there sufficient information currently available or can it be readily developed in order to evaluate the potential effectiveness and feasibility of the alternative, or is substantial further investigation or study required?
- **Environmental Challenges**—Are there obvious environmental consequences or problems associated with the alternative that would pose a major challenge to overcome?
- **Economic Feasibility**—Can the alternative be implemented at a reasonable cost, including capital, operations and maintenance, and energy replacement costs?

The alternatives that passed Level 2 screening represented the set of potentially effective and feasible project alternatives that were advanced to Level 3, the final phase in the screening process used for the 2014 Draft EIR.

Level 3. Sixteen discrete alternatives were advanced from Level 2, including those both within and outside the UNFFR Project boundary. The outcome of the Level 3 screening process was four possible modifications to UNFFR Project facilities or operations that were controllable by PG&E and within the jurisdiction of FERC, as follows:

- install a thermal curtain at the Prattville intake on Lake Almanor,
- install a thermal curtain near the Caribou No. 1 and No. 2 intakes on Butt Valley reservoir,
- modify the low-level outlets at Canyon dam and increase releases from the dam to up to 600 cubic feet per second (cfs), while decreasing releases to the Prattville intake, and/or
- use Caribou powerhouse No. 1 preferentially over Caribou powerhouse No. 2.

These alternatives were further evaluated by the State Water Board, resulting in the elimination from further consideration of the fourth alternative (preferential use of Caribou powerhouse No. 1).

Conclusion. The following alternatives resulted from the three-level screening process.

- Alternative 1 – Thermal curtains at Prattville intake and Caribou intakes with modifications to Canyon dam outlet structure and associated flows to the Seneca and Belden reaches.
- Alternative 2 – Thermal curtains at Prattville intake and Caribou intakes and associated flows to the Seneca and Belden reaches.

Alternatives 1 and 2 differ slightly from the combinations of water quality measures described in the Level 3 Report and evaluated in Appendix F in that they do not include excavation of submerged levees around the Prattville intake. At the time the Draft EIR was prepared, the State Water Board believed that these alternatives provided a reasonable range of alternatives that could be implemented. In response to public comments on the Draft EIR, a third alternative has been developed by the State Water Board for consideration in this RDEIR. These three alternatives are further described in 3.6 Selected Alternatives.

Additional Alternative Development

The Notice of Availability for the Draft EIR was issued on November 26, 2014. This notice included a preliminary recommendation by Water Board staff consisting of the following elements:

- implementation of The Proposed Project with the alternative minimum flows, as outlined in Chapter 4 of the Draft EIR;
- increased releases of up to 250 cfs for purposes of temperature control from the low level outlets at Canyon dam from June 16 to September 15;
- monitoring of the Upper North Fork Feather River and Lake Almanor to evaluate temperatures and fisheries effects resulting from implementation of The Proposed Project with increased Canyon dam flows; and
- adaptive management and a reservation of authority, whereby the State Water Board could later require installation of thermal curtains at Lake Almanor and Butt Valley reservoir based on monitoring results, if appropriate.

The State Water Board received a substantial number of comments regarding the preliminary staff recommendation, most of which focused on the fact that it appeared to be a separate alternative that was inconsistent with the 2004 Settlement Agreement and that was not fully described and analyzed in the Draft EIR.

Appendix E2 documents the analysis of various stand-alone scenarios for Canyon dam releases during the summertime. This analysis considered four release scenarios: 250 cfs, 350 cfs, 500 cfs, and 600 cfs. The selection of these scenarios was based on the on the relationship between increased Canyon Dam release and water temperature reduction benefit at Belden Reservoir for Alternative 4C developed in the Level 3 Study (See Appendix E, Table 2-4 and Figure 2-23a for a description of this alternative). To ensure that all alternatives were analyzed to the same level of detail as in Stetson's Level 3 Report, detailed model simulations were run to develop mean daily water temperature profiles and maximum weekly average water temperature (MWAT) profiles along the bypass reaches for the four stand-alone Canyon Dam release scenarios. Detailed model simulations were run to analyze the effects on cold freshwater habitat in Lake Almanor and Butt Valley reservoir. The outcome of this analysis provided the State Water Board with the information necessary to develop Alternative 3.

Alternatives Eliminated from Consideration

Several comments on the Draft EIR suggested that the State Water Board reconsider the Submerged Hooded Pipeline alternative, which was eliminated from further consideration in the Draft EIR. No new information has been provided to the State Water Board since the Draft EIR was issued to refute PG&E's analysis that the "hooded pipeline" alternative would not be as effective in reducing water temperatures as a thermal curtain at Prattville, and it therefore concluded that the hooded pipeline would not be a reasonable water temperature control measure (Pacific Gas and Electric Company 2005). This alternative was also eliminated from FERC's Final EIS because FERC made a determination that the required dredging of submerged levees would result in adverse resource effects (e.g., on cultural resources) and would not be feasible from a cost-benefit standpoint (Federal Energy Regulatory Commission 2005). The hooded pipeline alternative was therefore eliminated from further consideration in this RDEIR.

During the alternatives screening process for the 2014 Draft EIR, several alternatives and combinations of alternatives were evaluated but were eliminated from further consideration because they would not meet the project objectives as outlined in section 1.3 of this RDEIR. Detailed discussions of the rationale for excluding the alternatives that were eliminated from consideration in the Draft EIR were provided in the Level 1 and 2 and Level 3 Reports described in section 3.5.1. Through that process, alternatives that the State Water Board determined to be outside its jurisdiction under Section 401 of the Clean Water Act and not capable of influencing controllable factors on water quality in the North Fork Feather River downstream of Canyon dam were eliminated from consideration in the Draft EIR.

Comments submitted to the State Water Board on the Draft EIR by Plumas County and others requested reconsideration of an alternative that would include riparian restoration and riverine habitat improvement measures in the North Fork Feather River watershed[13]. This alternative was reconsidered during the preparation of this RDEIR. Lacking new information that would demonstrate the effectiveness of this alternative in meeting the State Water Board objectives outlined in section 1.3, this alternative was eliminated from consideration in this RDEIR consistent with the evaluation documented in Appendix D[14].

A number of commenters on the Draft EIR requested that the modification of the 2004 Settlement Agreement flow release schedules for the Seneca and Belden reaches (excluding summer releases from Canyon dam) under Alternatives 1 and 2 in the Draft EIR be reconsidered in the subsequent CEQA document. In response, the State Water Board decided to reconfigure Alternatives 1 and 2 to be consistent with the 2004 Settlement Agreement flows after determining that these flows would be consistent with the State Water Board's objectives.

A number of commenters on the Draft EIR requested that the State Water Board include an additional alternative consistent with the staff recommendation described in the

[13] Appendix D, Section 1.5 references this as the Plumas County Watershed and Improvement Alternative.

[14] The State Water Board may consider the merits of this or other off-site compensatory mitigation in the future if all reasonable on-site temperature reduction alternatives are found to be infeasible, ineffective, or unreasonable. However, in terms of quantifiable water temperature benefits in the North Fork Feather River, the Watershed Alternative provides no demonstration of effectiveness;therefore, it was not considered further in the Level 1 and 2 Report.

cover letter that accompanied distribution of the Draft EIR. In response to this request, the State Water Board developed a new alternative that focuses on increased releases from Canyon dam between June 16 and September 15 (see Table 3-4).

At the completion of the Level 3 process, State Water Board staff initiated an independent evaluation to further refine the alternatives using an electrical system-wide operational analysis, which can be found in Appendices J and J1. The analysis provides estimates of energy losses and the anticipated sources for replacing the lost energy.

The analysis in Appendix J indicates that alternatives requiring preferential operation of the Caribou No. 1 powerhouse or releases of 600 cfs from Canyon dam would likely eliminate the UNFFR Project’s ability to serve on-peak energy loads and provide ancillary services to the grid such as frequency correction. It is estimated that preserving this energy production and ancillary services with equivalent reserve characteristics would not meet lake level requirements and maintain sufficient turbine flows for ancillary services. This alternative was eliminated from further consideration in this RDEIR because of the inability to meet PG&E’s project energy generation objectives. Decreased flow to Butt Valley reservoir would increase temperatures and decrease cold water habitat in Butt Valley reservoir. Preferential flow through Canyon dam could further reduce cold water habitat in Lake Almanor. The additional loss of cold water habitat in Project reservoirs was another consideration in eliminating this alternative.

Appendix J also modeled releases from Canyon Dam of 250, 350, and 500 cfs. While increased flows continued to reduce temperatures in the Feather River below Canyon Dam, increased flows also reduced cold water habitat in Lake Almanor and as a result were not analyzed further in this RDEIR.

3.6 Selected Alternatives

Three alternatives were developed based on the process described in Section 3.5 which involve a combination of thermal curtains and increased summertime releases from Canyon Dam. Alternatives 1 and 2 include installation of thermal curtains at Prattville and Caribou intakes. Alternatives 1 and 3 include modification of the Canyon Dam low-level outlet and increased releases up to 250 cfs from June 16th to September 15th from Canyon Dam. Alternatives are summarized in Table 3-5.

Table 3-5 Summary of Alternatives

CEQA and Supplemental Modeling (Appendix E3)	Level 3 Report (Appendix E)	Thermal Curtains at Prattville and Caribou Intakes	Increase Canyon Dam release to 250 cfs June 16th to September 15th
Baseline	Present Day	No	No
Project		No	No
Alternative 1	3	Yes	Yes
Alternative 2	4a	Yes	No
Alternative 3	--	No	Yes

Alternative 1 - Thermal Curtains at Prattville Intake and Caribou Intakes with Canyon Dam Releases Up to 250 cfs

Alternative 1 includes installation of a thermal curtain at the Prattville intake on Lake Almanor, increased summertime releases up to 250 cfs, and installation of a thermal curtain at the Caribou intakes on Butt Valley reservoir. With the exception of summertime releases from Canyon dam to the Seneca reach, which would increase under this alternative to the extent necessary to control temperature, the flow release schedule, including pulse flows described for the Proposed Project is incorporated into this alternative. The footprint associated with Alternative 1 focuses on specific areas where activity would occur (Figure 3-2). This alternative also incorporates measures included in The Proposed Project (see section 3.4).

Prattville Intake Thermal Curtain

The Prattville intake thermal curtain would entail installation of a U-shaped thermal curtain around the Prattville intake structure on the west shore of Lake Almanor. The purpose of the thermal curtain would be to create a barrier that prevents the flow of warm surface water into the Prattville intake. Warm water would be retained above the curtain while cool water would be drawn into the intake from the lake bottom through the open area under the curtain. The curtain would not affect operation of the Prattville intake and would not require modifications to other components of the UNFFR Project.

To be effective, the curtain would be designed such that the velocities in the open area under the curtain would be relatively low—in the range of 0.10 to 0.25 feet per second. This objective would be achieved with a synthetic rubber curtain approximately 2,582 feet long by 50 feet deep that would extend about 900 feet offshore from the high shoreline (Figure 3-3). The curtain would be fixed in place using an anchor/buoy system. The lower lip of the curtain would be set about 5 feet above the bottom of Lake Almanor at an elevation of 4,455 feet (United States Geological Survey [USGS] datum) and would remain constant along the lake bottom as the lake level fluctuates. The curtain design and installation would ensure that the total open area under the curtain is maintained at 5,280 square feet, the area required to maintain adequate water velocities.

To ensure maximum efficiency under fluctuating lake levels, two galvanized steel bin-type walls would be constructed, and the curtain would be attached to a trolley on the walls to allow it to move up and down as lake levels fluctuate (Figure 3-4). The curtain would fold at the bottom as the lake level decreases. At full-pool elevation, the bin walls would extend out from the shoreline about 300 feet into Lake Almanor and serve as the anchor points on either end of the curtain (Figure 3-5). To prevent the need for excavation to install the bin walls, the foundation for these walls would consist of bi-axial strength geotechnical grid (such as Tensar S2) placed on the shoreline and lake bed and backfilled with 1 foot of local fill material from commercial sources. The bin wall would be constructed on top of this imported foundation, and additional fill material would be placed around the base of the bin walls at a 4:1 slope beginning 5 feet from both sides of the bin wall to provide lateral stability. The walls and fill around the base would require approximately 7,000 cubic yards of fill material, trucked from local commercial sources using state highways and county roads. Anticipated equipment required to construct this feature would include cranes, barges, excavators and dump trucks. Temporary coffer dams, including pumps and dewatering equipment, may also be required, depending on lake elevations and seasonal conditions.

Approximately 25 anchors would be used to maintain the lateral stability of the floating curtain. These anchors would be lowered into place via barges and backfilled with concrete once they are in position. Stabilization buoys would be installed on the water surface to hold the curtain in place. These buoys would be 6 feet in diameter by 8 feet long and would be located between the curtain and the shore. Cable break buoys would be installed as needed along the cables, extending from the anchors to the curtain, to provide notification if a cable is broken. Floatable tanks, spaced at appropriate intervals, would be installed along the top of the curtain to keep it afloat. Warning signs and navigation lights would be mounted on the stabilization buoys and/or floatable tanks to warn boaters of the curtain's location.

Based on preliminary design data developed by PG&E, it is anticipated that construction of the Prattville thermal curtain and related facilities would take six to eight months, probably over two construction seasons.

Modify Canyon Dam Low-Level Outlet and Increase Releases

The cool water discharge into the Seneca reach would be increased to as much as 250 cfs between June 16 and September 15, and the Canyon dam outlet may be modified to accommodate the increased flows. Modification of the outlet structure, which focuses on one of the low-level outlets near the bottom of the facility, would ensure that the UNFFR Project has the ability to release cool water from Lake Almanor as needed to reduce water temperatures in the North Fork Feather River downstream of Canyon dam during the summer months. To accommodate pulse flow releases in accordance with the 2004 Settlement Agreement, Outlet 1 would be modified to enable a 600 cfs discharge. In addition, the overall capacity of the Canyon dam system (outlet structure and tunnel) must be maintained to allow up to 2,000 cfs to be released in an emergency (PG&E 2002). Proposed changes to the minimum streamflows described for The Proposed Project in the Seneca reach under this alternative are identified in Table 3-6.

Table 3-6 Proposed Minimum Streamflow Releases (in cfs) from the Seneca Reach

Water Year Type	Jan	Feb	Mar	Apr	May	Jun[a]	Jul	Aug	Sep[b]	Oct	Nov	Dec
Critically Dry	75	75	90	90	90	80 ***250***	***250***	***250***	***250*** 60	60	60	70
Dry	90	100	110	110	110	110 ***250***	***250***	***250***	***250*** 60	60	60	75
Normal	90	100	125	125	125	125 ***250***	***250***	***250***	**250** 60	60	60	75
Wet	90	100	125	150	150	150 ***250***	***250***	***250***	***250*** 60	60	60	75

a. Increase in Canyon dam release on June 16th.
b. Revert to Settlement Agreement flows on September 15th.

The Canyon dam low-level outlet structure consists of a 115-foot-tall vertical tower connected to a 1,350-foot-long horseshoe-shaped tunnel that passes through the dam and discharges into the downstream river channel (Seneca reach). The upstream portion of the outlet tunnel (about 550 feet long) is steel lined, and the remaining portion consists of a 10-foot-diameter concrete conduit. The outlet tower has seven outlet gates. Outlets 6 and 7 are located at the highest elevation, 4,475 feet. There are three low-level outlet gates—Outlets1, 3, and 5—which are located at an elevation of 4,432 feet, or about 72 feet below the maximum lake level elevation of 4,504 feet (USGS datum). The remaining two outlet gates—Outlets 2 and 4— are located at an elevation of 4,410 feet. PG&E inspections have revealed that Outlets 2 and 4 are plugged with concrete and are buried under 20 feet of sediment making them permanently inoperable. As of 2016, Outlets 1, 3, and 5 are operable. Outlet 5 was repaired in 2005 and Outlet 1 was repaired in 2012.

Canyon Dam has been tested for emergency flows as well as flows down to the minimum flow of 60 cfs, so it is possible that modification will not be required for the release of the 250 cfs , but the modifications are analyzed because they may be necessary. Under this alternative, Outlet 5 would be modified by connecting a prefabricated steel bulkhead with built-in slide gates to the existing outlet to allow controllable releases of up to 250 cfs (Figure 3-6). The steel bulkhead would have different-sized valves that could be opened and closed to allow for releases of between 60 cfs and 250 cfs. The bulkhead would be fabricated offsite and then installed using a barge-mounted crane and either diving platforms or a floating walkway. The barge or barges are segmented in units that are 5 feet deep by 10 feet wide and come in 20, 30, or 40 foot lengths. The barges would be delivered to the job site by semi-truck. The work at this outlet structure will likely require a barge that has a working surface of about 60 feet by 60 feet, which would be adequate to hold a crane as well as support equipment for the diving operations and the construction activities. The barge or barges would be lifted by a crane into the water and then assembled as a unit. At the same time, all the equipment must be secured to the barges. PG&E estimates it would take approximately 3 days to unload and assemble the barges at the Canyon dam boat ramp. The crane would be used to lower the new bulkhead into the water, and divers would anchor it to the outlet tower below the water surface. The bulkhead would be constructed of plate steel and would be approximately 5 feet wide by 10 feet tall. If a walkway is used instead of diving platforms, it would extend from the dam to the outlet tower and would be temporarily anchored to the tower to provide a work area, which is similar to the procedure used for the earlier rehabilitation of outlet 5.

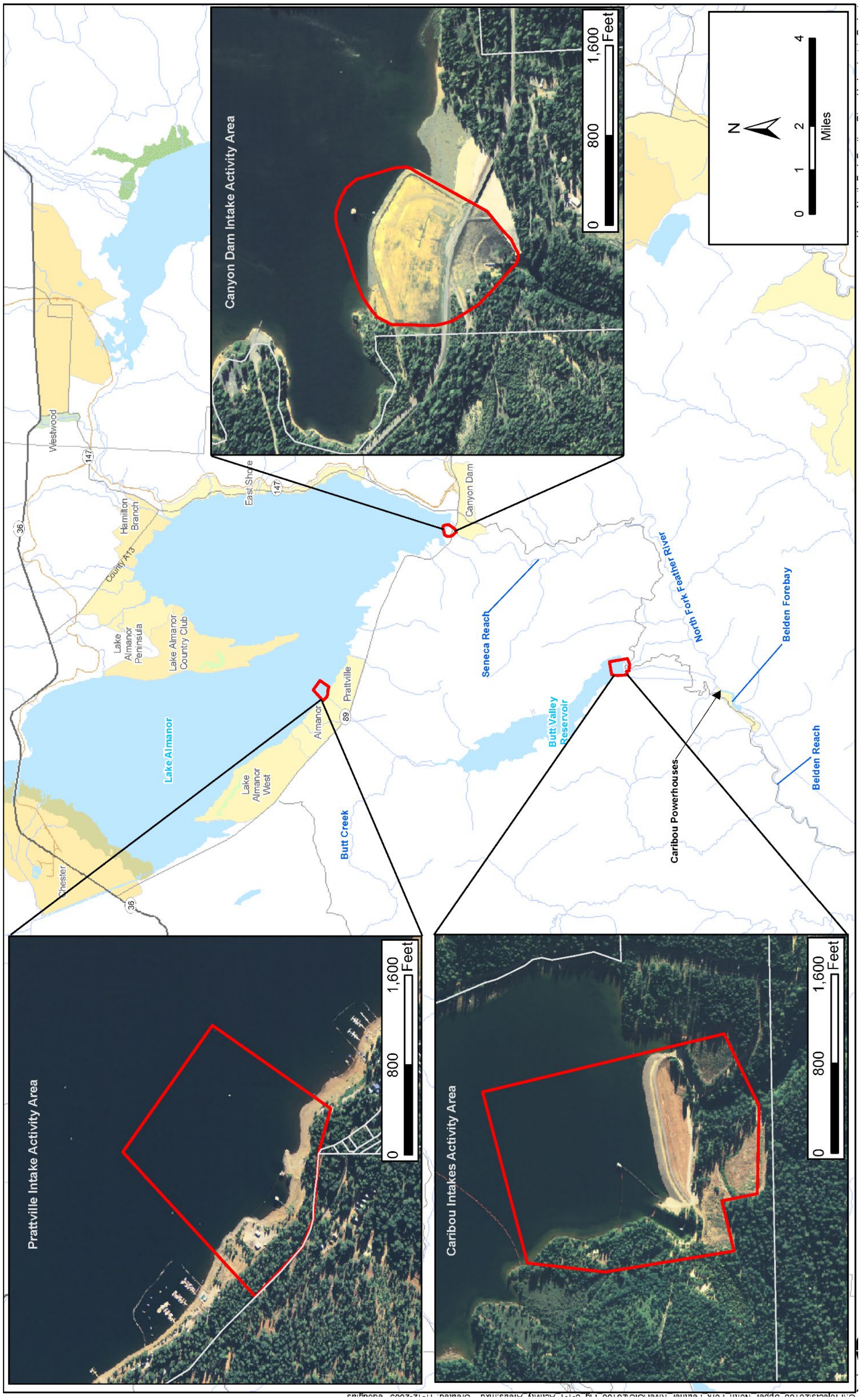

Figure 3-2 Project Activity Areas

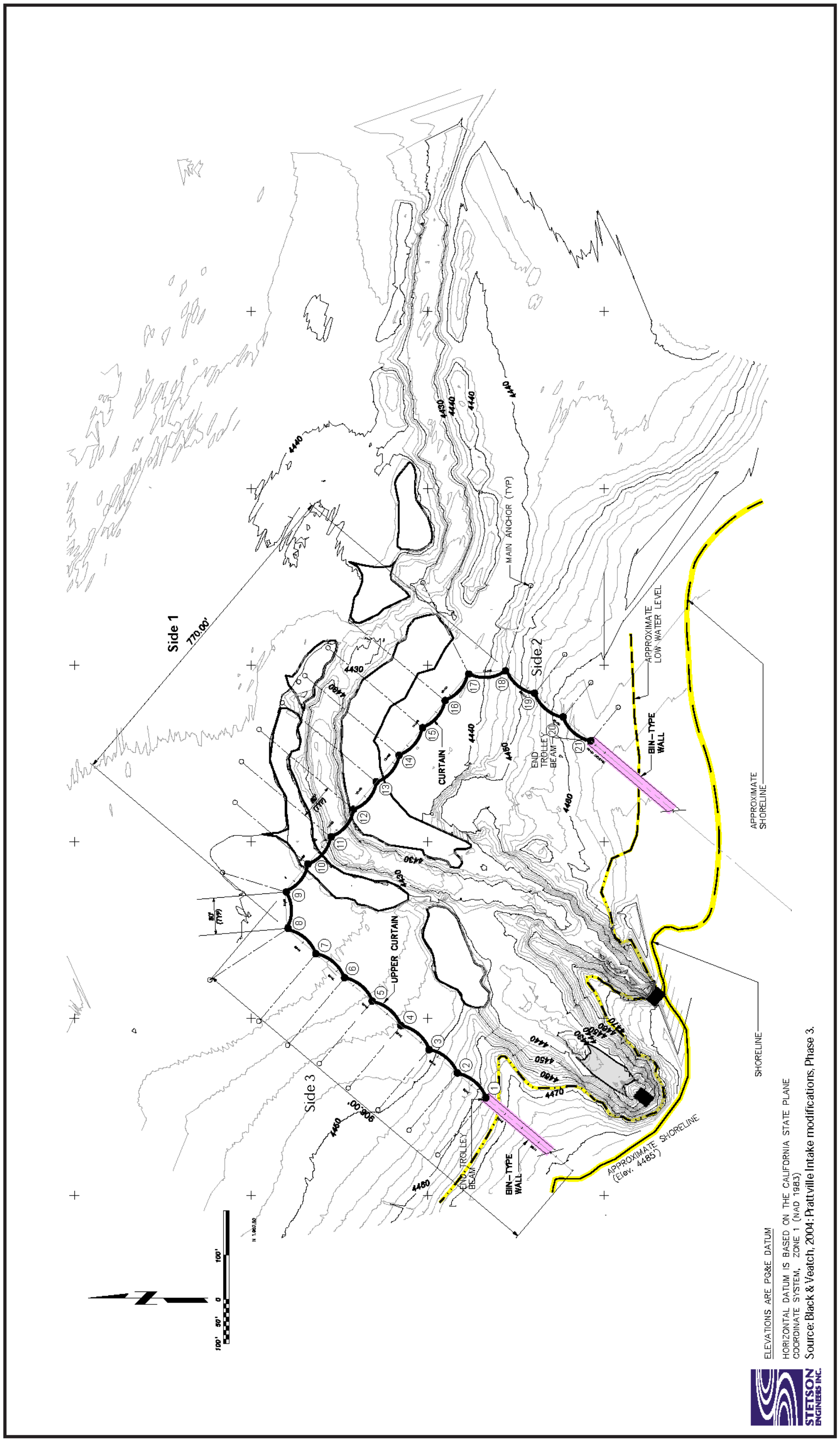

Figure 3-3 Plan View of Prattville Intake Thermal Curtain

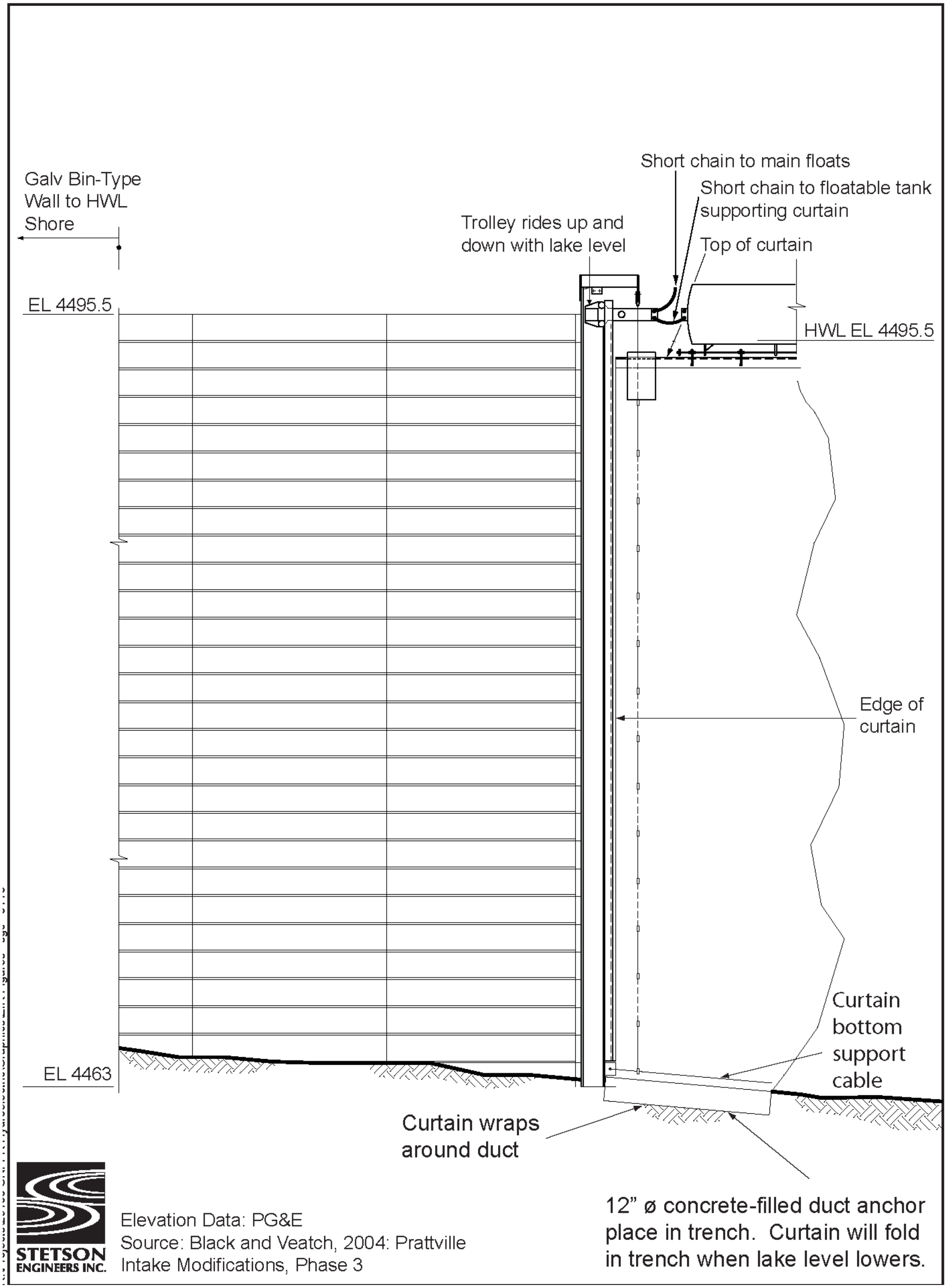

Figure 3-4 Thermal Curtain Trolley Detail

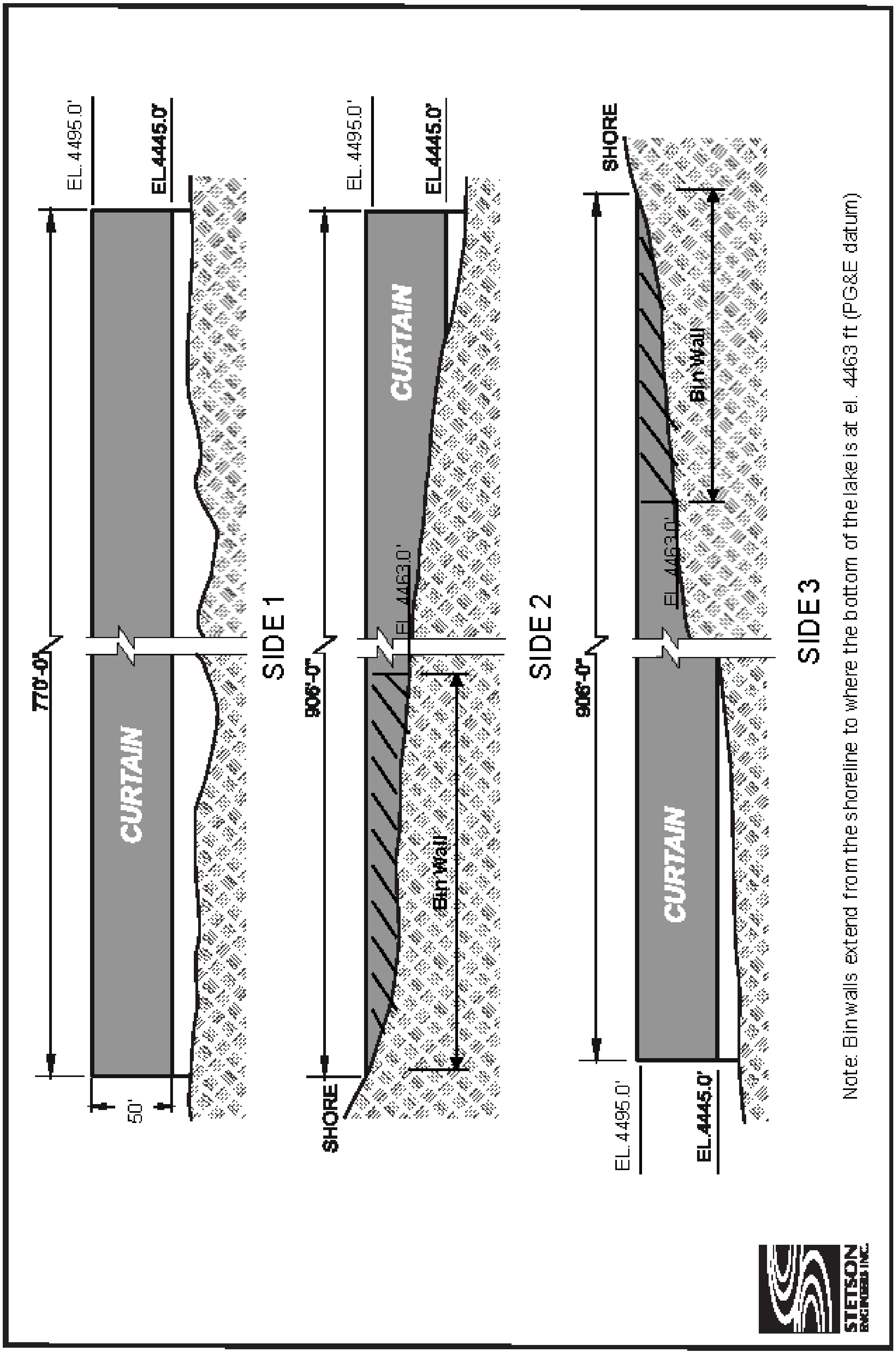

Figure 3-5 Elevation View of Prattville Intake Thermal Curtain

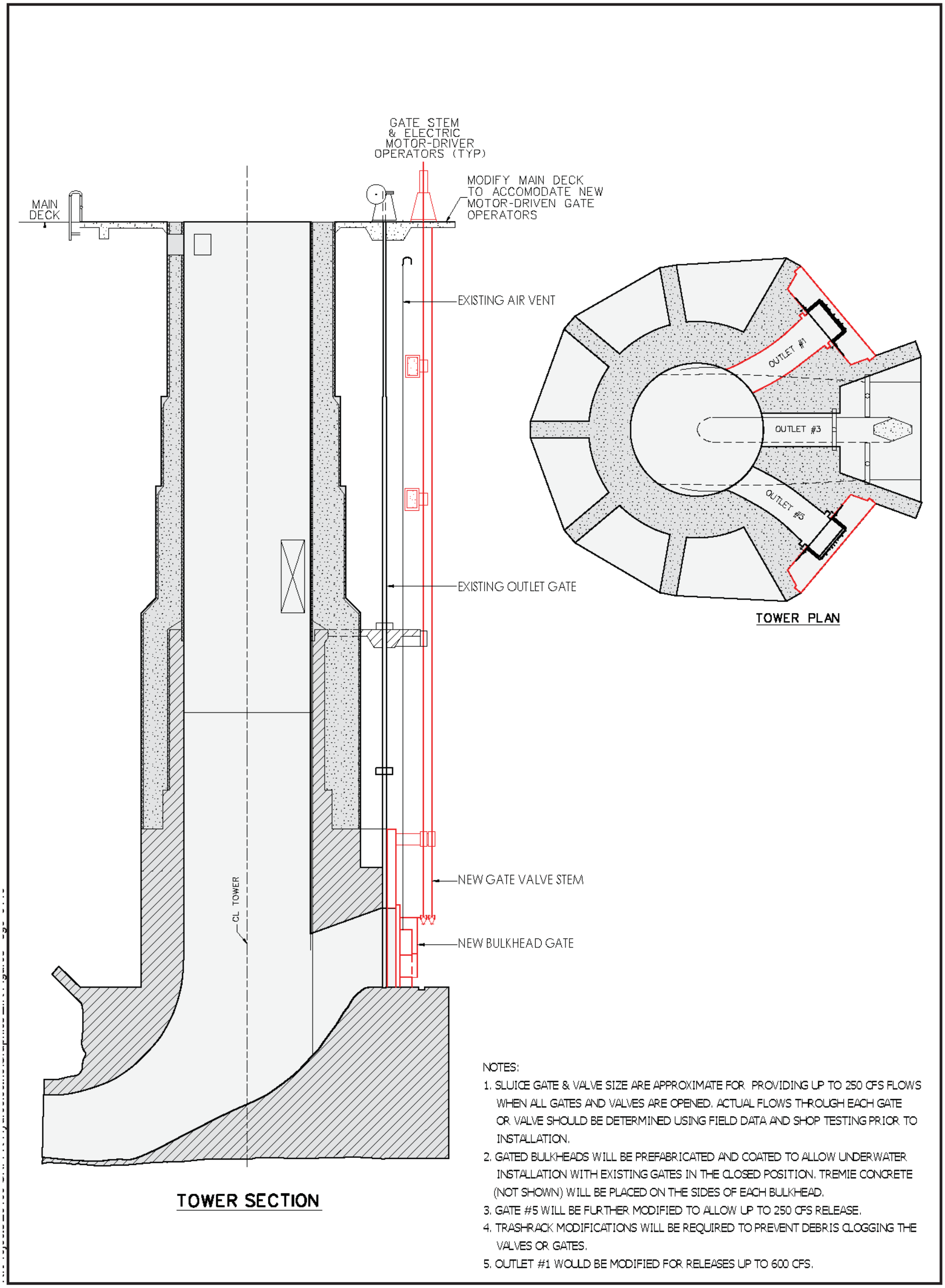

Figure 3-6 Canyon Dam Outlet Structure Modifications

The work area at the Canyon dam outlet will require approximately 200 feet of clear area away from the work platform. Once the platform is in place, restriction on public use will be limited to within the 200 foot clear area. Buoys or other markers will be placed to delineate the area around the outlet tower as off limits to recreational boats. All equipment on the platform will be equipped with secondary containment with a capacity equal to 150 percent of any potential spill amount.

The work at the boat ramp would be scheduled so that the boat ramp could be used outside of the hours of construction (e.g., ramp closed from 7 am to 5 pm for construction). Once the barges are assembled they can be moved to the site of the work and there will be no further impacts to the boat ramp until demobilization. The demobilization effort will take the same time and effort and have similar impacts to the boat ramp and access.

If the Canyon dam outlet tunnel needs to be temporarily closed during installation of the bulkhead, a pipeline and pump or siphon would be used to maintain existing minimum instream flows (35–60 cfs) in the Seneca reach. The pump or siphon would be used to divert flow from Lake Almanor over the spillway structure through an approximately 1,300-foot-long, 36-inch-diameter pipe, and discharge the flow down the spillway into the Seneca reach. A pump would be used to prime the siphon, and a vacuum pump would be used to prevent gases from accumulating at the high point of the pipeline. In order for the siphon to work properly, the lake level should be at least 4,500 feet (USGS datum). If the lake level is lower than 4,500 feet, two portable diesel-powered (700-horsepower) pumps would be used instead of a siphon. The duplex pumping system would maintain flows through the pipe for a short period of time, although at a lower rate, if one of the pumps were to fail. PG&E inspections would ensure that any pump failure would be identified and addressed within an 8-hour period. To prevent fish entrainment through the pump or siphon, fish screens of a compatible design and appropriate mesh-size to exclude small fish would be fitted to the pump or siphon. Figure 3-7 shows the proposed layout of the pumps on the shore just above the water level, with suction pipes reaching into the lake.

Based on preliminary design data developed by PG&E, it is anticipated that construction of the facilities necessary to modify the Canyon dam outlet structure would take 6 to 8 months, probably over two construction seasons.

Increases in the Canyon dam releases would require commensurate decreases in the Prattville intake flow to avoid lake level fluctuations or changes from the operating rules agreed to in the 2004 Settlement Agreement. The decrease in flows through the Butt Valley powerhouse would modify the volume and timing of water delivered to Butt Valley reservoir and subsequently made available to the Caribou intakes.

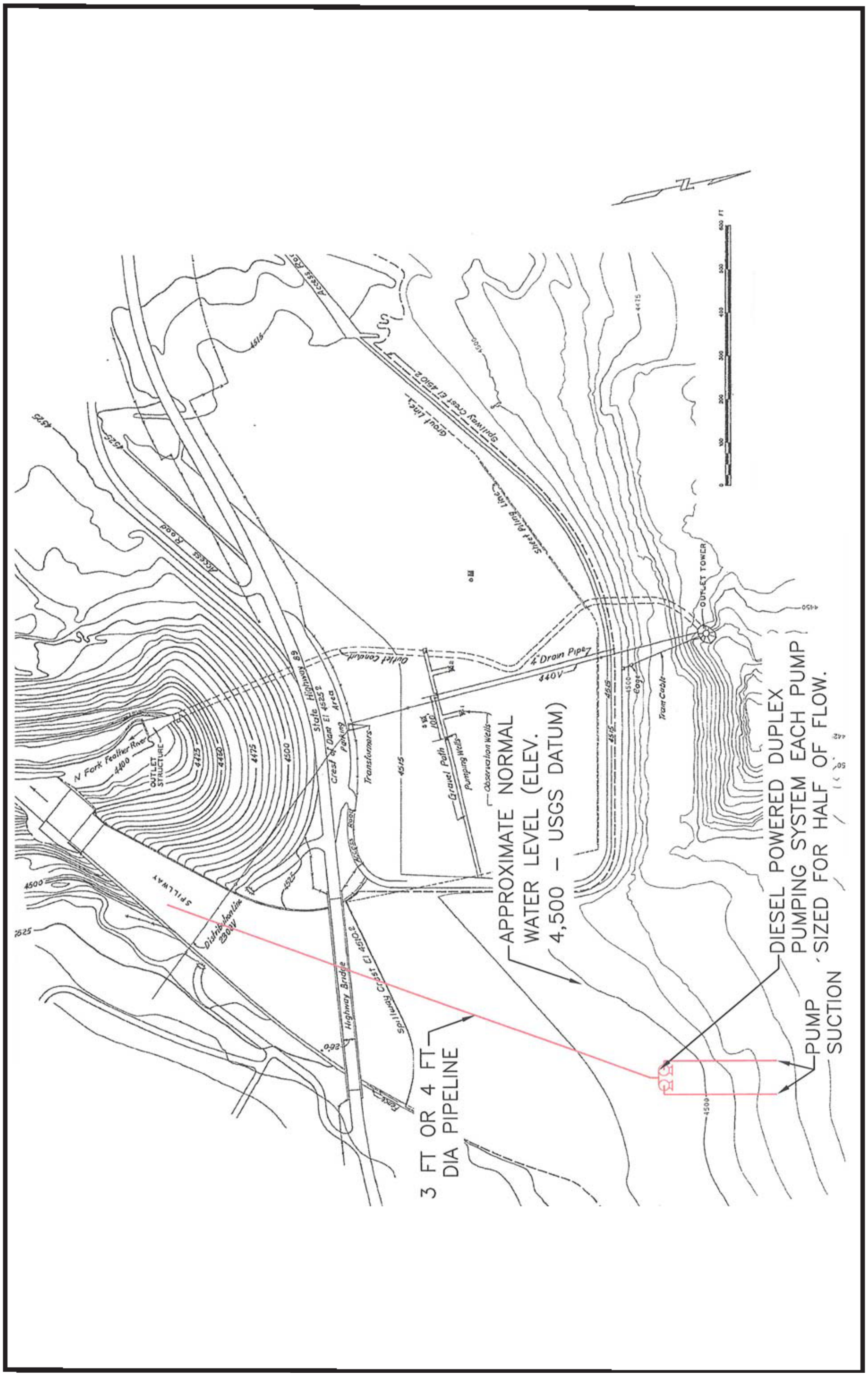

Figure 3-7 Canyon Dam Outlet Bypass Piping

Caribou Intakes Thermal Curtain

A fixed Γ-shaped thermal curtain would be installed near the Caribou No. 1 and No. 2 intakes at the downstream end of Butt Valley reservoir. The purpose of the thermal curtain would be to create a barrier that prevents the flow of warm surface water into either of the intakes. Warm water would be retained above the curtain while cool water would be drawn from the bottom of the reservoir into the intakes through the open area under the curtain. The Γ-shaped curtain would not affect flow to the spillway at Butt Valley dam in the event that the reservoir capacity is exceeded (which has never occurred). The installation and operation of the thermal curtain would not affect operation of the Caribou intakes and would not require modifications to other UNFFR Project operations.

Butt Valley reservoir serves as the afterbay to the Butt Valley powerhouse and the forebay for the Caribou No. 1 and No. 2 powerhouses. The reservoir receives the majority of its inflow from Lake Almanor via the Prattville intake and subsequent discharges from the Butt Valley powerhouse. Some contribution also comes from Butt Creek. In a typical year, the natural stream flow in Butt Creek peaks at about 350 cfs in the spring and decreases to a base flow of about 50-60 cfs in the summer. Water in Butt Valley reservoir is released to the two Caribou powerhouses through two separate intake structures. The Caribou No. 1 intake is located at an invert elevation of 4,077 feet and releases up to 1,100 cfs to the Caribou No. 1 powerhouse. The Caribou No. 1 intake structure is located in a small depression zone. The Caribou No. 2 intake is located in a shallow cove area with an invert elevation of 4,103 feet. The Caribou No. 2 intake normally releases up to 1,460 cfs to the Caribou No. 2 powerhouse. Both the Caribou No. 1 and No. 2 powerhouses discharge to Belden forebay on the North Fork Feather River. PG&E prefers to operate the Caribou No. 2 powerhouse because its turbine efficiency is about 15 percent higher than that of the Caribou No. 1 powerhouse.

The Caribou No. 1 intake draws mainly cooler, hypolimnion water while the Caribou No. 2 intake draws mainly warm surface water due to the placement of the intake at a higher elevation in the reservoir. The thermal curtain at the Caribou intakes would allow the Caribou No. 2 intake to draw cooler, hypolimnion water, thereby reducing water temperatures in Belden forebay where this intake discharges. To be effective, the curtain must be designed such that the velocities in the open area under the curtain are relatively low, in the range of 0.10 to 0.25 feet per second. This objective would be achieved with a synthetic rubber curtain approximately 1,960 feet long by 42 feet deep that extends about 980 feet offshore from the high shoreline (Figure 3-9). The curtain would be fixed in place. The lower lip of the curtain would be set about 10 feet above the reservoir bottom. The lower lip would remain constant along the reservoir bottom as the Butt Valley reservoir level fluctuates, which occurs on a daily basis during the summer and fall. This setting would ensure that the total open area under the curtain is maintained at 5,930 square feet, which is the area required to maintain adequate velocities.

Galvanized steel bin-type walls would extend about 200 feet offshore from the shoreline and Butt Valley dam and connect to the curtain endpoints. Similar to the Prattville curtain, the bin walls would be constructed on a foundation of imported material and would require about 1,400 cubic yards of backfill material obtained from local commercial sources. The walls would be constructed at the two ends of the curtain from the high water line to about 30 feet beyond the low water level to reduce localized damage to the curtain from water level fluctuations. Some modifications to Butt Valley dam would be needed to install the bin wall, but installation of anchors or other structures would not affect the structural integrity of the dam. A trolley system at the end of the bin walls would allow the top of the curtain to slide up and down as the water surface fluctuates, preventing the curtain from being exposed or buried by sediment. This design would eliminate the periodic maintenance that might be necessary to free the curtain if it became buried and would discourage the vandalism that could occur if it were exposed. Anchors, buoys, floatable tanks, and the geotechnical grid would be similar to those described for the Prattville intake thermal curtain. The walls and fill around the base would require approximately 7,000 cubic yards of fill material acquired from local commercial sources and transported in trucks using state highways, and county roads and Forest Service roads. Anticipated equipment required to construct this feature would include cranes, barges, excavators and dump trucks. Temporary coffer dams, including pumps and dewatering equipment may also be required dependent on lake elevations and seasonal conditions. To provide construction and maintenance access, construction of a new road along the west shore of Butt Valley reservoir would be required to provide long-term access between the dam and bin wall. The road would be approximately 30 feet wide and 1,200 feet long (Figure 3-9).

Based on preliminary design data developed by PG&E, it is anticipated that construction of the facilities necessary to install and operate the Caribou thermal curtains would take six to eight months, likely over two construction seasons.

PG&E investigated measures to minimize the warming of Butt Valley reservoir waters with the Prattville thermal curtain in place. PG&E considered two potential thermal curtain options for Butt Valley reservoir: (1) two thermal curtains, one installed up-reservoir near the Butt Valley powerhouse discharge and another installed down-reservoir near the Caribou No. 1 and No. 2 intakes; and (2) one thermal curtain installed at the up-reservoir location only. The function of the up-reservoir curtain would be to force the cooler discharge from the Butt Valley powerhouse to plunge to the bottom of Butt Valley reservoir. However, a special test in 2006 demonstrated that cool water naturally plunges to the bottom, making the up-reservoir curtain unnecessary. During the 2006 special test, a submerged channel that begins upstream of the boat ramp was identified along the west side of the Butt Valley reservoir. Measurements of water temperature stratification indicated that the cool water discharge from the Butt Valley powerhouse plunged and moved primarily through this channel with little entrainment or mixing with warm surface water as it moved toward the Caribou intakes. Figure 3-9 shows cross sections of the proposed Caribou intakes thermal curtain.

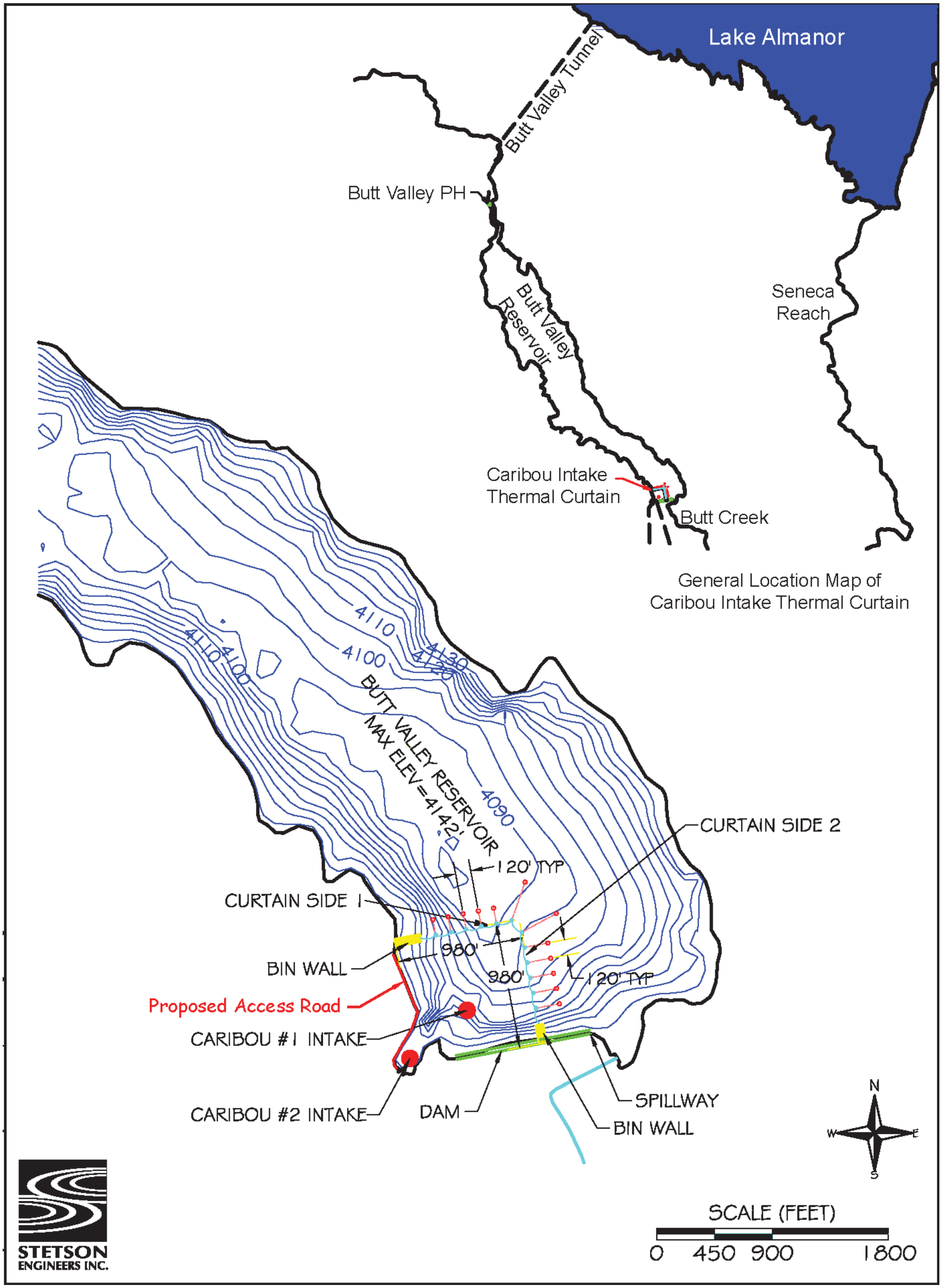

Figure 3-8 Plan View of Caribou Intakes Thermal Curtain

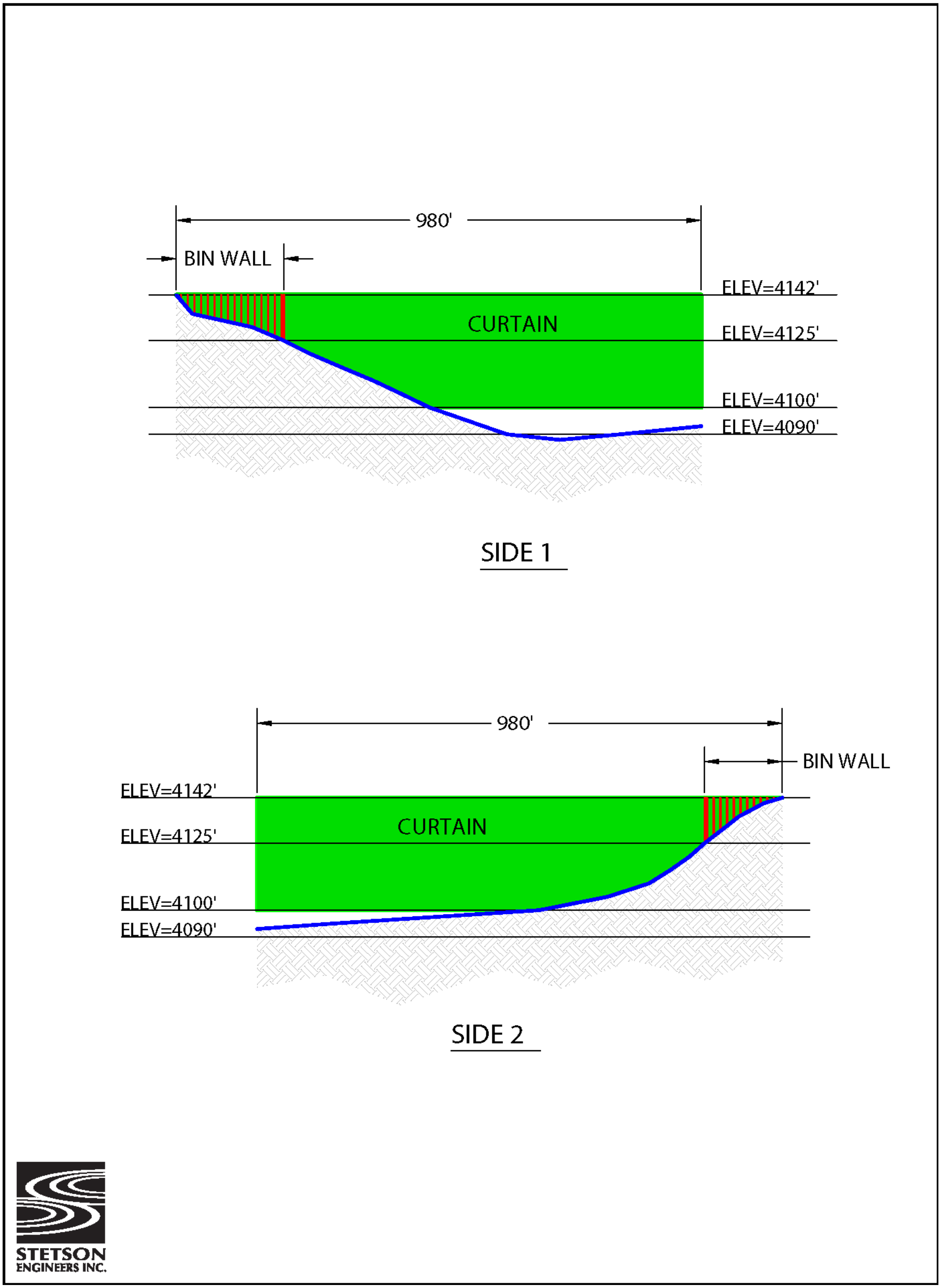

Figure 3-9 Cross Sections of Caribou Intakes Thermal Curtain

Alternative 2 – Thermal Curtains at Prattville Intake and Caribou Intakes

Alternative 2 consists of the installation of thermal curtains at the Prattville intake on Lake Almanor and at the Caribou intakes on Butt Valley reservoir as described for Alternative 1. The temperature benefits under Alternative 2 would not be as great as under Alternative 1. This alternative also includes the flow release schedule described for The Proposed Project and the measures included in the description of The Proposed Project (see section 3.4).

Prattville Intake Thermal Curtain

As described for Alternative 1, a thermal curtain would be installed at the Prattville intake to provide for increased delivery of cool water to Butt Valley reservoir.

Caribou Intakes Thermal Curtain

As described for Alternative 1, a thermal curtain would be installed at the Caribou intakes to provide for increased delivery of cool water to Belden forebay and the Belden reach of the North Fork Feather River.

Alternative 3 – Canyon Dam Releases Up to 250 cfs

Following the receipt and consideration of the public comments on the Draft EIR and feedback on the staff recommendation, the State Water Board made the decision to include an additional alternative consisting of the release of up to 250 cfs from Canyon dam between June 16 and September 15 to reduce water temperatures in the North Fork Feather River. This alternative is discussed as part of Alternative 1 (section 3.5.4). It is fully evaluated in Chapters 5 and 6 and compared with the other alternatives in Chapter 7.

Features Common to One or More Alternatives

The following features are common to one or more of the action alternatives, including The Proposed Project:

- Flow modifications per the 2004 Settlement Agreement, except for the modification of summer Canyon dam releases under Alternatives 1 and 3;
- construction practices and methods as described below; and
- transportation routes as described below.

Construction Practices and Methods Associated with Applicable Action Alternatives

As applicable, standard construction practices and environmental protection measures would be implemented during all construction activities. General construction measures are described below and resource-specific measures are identified in Chapter 5.

Schedule

- Installation of the Prattville intake thermal curtain is anticipated to require approximately two construction seasons and would take place while Lake Almanor is drawn down, which is typically from late summer into the fall months. This work could require one or more additional construction periods if environmental concerns (e.g., nesting raptors) are identified prior to completion.

- Modifications to the Canyon dam outlet would require approximately 3 months and could take place at any time of year.
- Installation of the Caribou intakes thermal curtain is anticipated to require approximately two construction seasons. This work could require one or more additional construction periods if environmental concerns (e.g., nesting raptors) are identified prior to completion.

Ground Disturbance

- Staging and construction areas associated with the Prattville intake thermal curtain would require approximately 15 acres of land above Lake Almanor and 45 acres of shoreline and lake surface/lake bed in the immediate vicinity of the Prattville intake.
- Staging and construction areas associated with the modifications to the Canyon dam outlet would require approximately 30 acres of land above Lake Almanor and 50 acres of shoreline and lake surface/lake bed in the immediate vicinity of Canyon dam.
- Staging and construction areas associated with the Caribou intakes thermal curtain would require approximately 40 acres of land above Butt Valley reservoir and 5 acres of shoreline and lake surface/lake bed in the immediate vicinity of the Caribou intakes and Butt Valley dam.
- All construction activities would occur on lands managed by the Forest Service or owned by PG&E.
- Where available, existing roads and previously disturbed areas would be used to access the areas used for staging and construction. A new road would be constructed from Butt Valley dam to the proposed location for the Caribou intakes thermal curtain on the west shore of Butt Valley reservoir.
- Vegetation removal would occur only as necessary. Ideally, this activity would be scheduled during the non-nesting season for avian species (after August 1 and before March 1); if this schedule is found not to be feasible, environmental protection measures, including pre-construction surveys and avoidance of nest sites, would be required.
- All areas disturbed by staging or construction would be restored to pre-disturbance conditions and revegetated consistent with the requirements of land managers and property owners.

In-Water Construction

- Construction equipment would remain on the shore or on the dams to the extent feasible; in-water construction would be consistent with federal, state and local requirements.
- Where in-water construction is necessary, divers would be used to the extent feasible.

- Barges would be used on the water for equipment and diver staging and construction. A crane on a barge at Canyon dam would be required to drop the bulkhead into the water for anchoring by divers to the existing outlet.
- Construction activities at the Canyon dam outlet may require access restrictions to the Canyon dam intake activity area and could require temporary closure of the Canyon Dam boat ramp. If temporary closure of the boat ramp is necessary, PG&E would be required to prepare a closure plan intended to minimize impacts on the boating public, as approved by the Forest Service. The plan may include measures to limit ramp closure during high public use periods and preparation of a public information program to inform boaters of alternate launch facilities.

Invasive Species Management

PG&E would develop and implement a plan to prevent the introduction of zebra and quagga mussels, invasive plants, and other invasive species to water bodies within the UNFFR Project boundary. The plan would cover all workers, vehicles, watercraft, and equipment (both land and aquatic) that would come into contact with Lake Almanor, Butt Valley reservoir, or other water bodies and associated riparian areas. Plan activities could include, but would not be limited to, the following:

- Pre-inspection and cleaning of all construction vehicles, watercraft, and equipment before being shipped to project areas.
- Reinspection of all construction vehicles, watercraft, and equipment on arrival at project areas.
- Inspection and cleaning of all personnel before work in project areas.

All inspections would be conducted by trained personnel and would include both visual and hands-on inspection methods for all vehicle and equipment surfaces, up to and including internal surfaces that have contacted raw water.

Approved cleaning methods would include a combination of the following:

- Precleaning – Draining, brushing, vacuuming, high-pressure water treatment, and thermal treatment.
- Cleaning – Freezing, desiccation, thermal treatment, high-pressure water treatment, and chemical treatment.

On-site cleaning would require capture, treatment, and/or disposal of any and all water needed to conduct cleaning activities.

Traffic Control/Detour

- PG&E could be required to implement short-term traffic control measures in conformance with the requirements of the appropriate jurisdictional authority for mobilization and demobilization of heavy equipment or wide-load vehicles, including seasonal or other limitations or restrictions, payment of excess size and weight fees, and posting of bonds conditioned upon repair of damage.

- Traffic control measures would be implemented along haul routes and in the vicinity of the staging and construction areas to alert travelers to any lane closures, temporary detours, slow-moving and exiting truck traffic, etc.

Air Pollution and Dust Control

- PG&E could be required to comply with applicable air pollution control rules, regulations, ordinances, and statutes. Measures that may be implemented include limiting dust by watering disturbed areas used by equipment and vehicles and minimizing emissions.

Water Pollution Prevention

- PG&E would be required to comply with applicable water quality standards, including implementation of water pollution control measures and the use of extreme care to prevent construction dirt, debris, stormwater runoff, and miscellaneous byproducts from entering any water body.
- PG&E would be required to exercise every reasonable precaution and best management practices to protect the North Fork Feather River and associated reservoirs from being polluted by fuels, oils, bitumen, calcium chloride, and other harmful materials and would be required to conduct and schedule operations to avoid or minimize muddying and silting of the water.
- Construction equipment would be inspected daily and maintained to ensure that fuel or lubricants do not contaminate the North Fork Feather River or associated reservoirs.
- Spill containment kits would be onsite at all times.
- Before starting any construction activities, PG&E would be required to prepare a Water Pollution Prevention Plan to effectively control water pollution during construction. The plan would provide details on all water pollution control measures to be implemented during construction. No construction activities would occur until the plan has been approved by the State Water Board.
- Oily or greasy substances originating from PG&E's operations would not be allowed to enter, or be placed where they will later enter, any water body.

Transportation Routes

State Routes 36, 70, 89, and 147 would serve as the primary transportation corridors to transport construction materials to the activity areas, as illustrated on Figure 3-1 and Figure 3-2. In addition, local roads managed by Lassen and Plumas counties, the Forest Service, and PG&E would be used for access during construction. With the exception of a short section of road necessary to access the Caribou Intakes activity area for construction and maintenance of the Caribou intakes thermal curtain, the existing road system would be used. Some construction activities may require temporary vehicular access within the activity areas below the full-pool elevation of Lake Almanor and Butt Valley reservoir when lake levels are down.

3.7 Alternative 4 - No Project

Under CEQA, an EIR must include an evaluation of a no project alternative. (Cal. Code Regs, tit. 14, § 15126.6, subd. (e).) "The purpose of describing and analyzing a no project alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project." (*Id*. § 15126.6, subd. (e)(1).) "The 'no project' analysis shall discuss the existing conditions at the time the notice of preparation is published . . . as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services." (*Id*., § 15126.6, subd. (e)(2).) Under the No Project Alternative in this RDEIR, the State Water Board would deny PG&E's application for water quality certification for the UNFFR Project pursuant to Section 401 of the Clean Water Act (CWA). (33 U.S.C. § 1341.) While the effects of denial are not certain, it can be reasonably assumed that the facilities associated with the UNFFR Project would eventually be removed or converted to another use(s), as discussed in Chapter 2.4 of FERC's Final EIS, which is incorporated herein by reference. Based on this assumption, the UNFFR Project would continue to operate under current conditions as described in section 3.3 over the short-term, pending a future FERC decision that would require compliance with NEPA,CEQA, and potentially a water quality certification. It is important to point out that the No Project Alternative is not synonymous with the environmental baseline, as defined in section 5.1.1.

Section 2.4 of FERC's Final EIS identified three alternatives that were eliminated from detailed study, including a scenario for potential retirement of the UNFFR Project (Federal Energy Regulatory Commission 2005). This scenario involved retiring the UNFFR Project with or without removing the dams and related facilities, including three project features eligible for consideration under the National Register of Historic Properties (NHRP): Canyon dam, Canyon dam intake tower, and Caribou No. 1 powerhouse. Either retirement option would involve denial of the relicensing application and surrender or termination of PG&E's existing license with appropriate conditions. At a minimum, retirement of the UNFFR Project would have the following effects: (1) the energy currently generated by the UNFFR Project (about 1,172 gigawatt-hours annually [GWH/YR]) would be lost; (2) generation at PG&E's downstream Rock Creek–Cresta Hydroelectric Project and Poe Hydroelectric Project would be substantially reduced; and (3) substantial effort would be necessary to retire the powerhouses and appurtenant facilities.

Retirement of the UNFFR Project while retaining Canyon, Butt Valley, and Belden dams would require a reconfiguration of two features eligible for listing on the NRHP—Canyon dam and the Canyon dam intake tower—to address storage and the release of water to avoid flooding. With the three dams in place, all UNFFR Project reservoirs could remain at full pool on a year-round basis, thereby influencing releases to the North Fork Feather River and lower Butt Creek.

If the UNFFR Project were decommissioned, PG&E would no longer require the UNFFR Project lands for UNFFR Project operations; thus, ownership of lands currently owned by PG&E could change. Depending on the subsequent landowner or land management agency, public access to some parts of the UNFFR Project area and recreational opportunities could change and/or be eliminated.

In addition to the retirement of the UNFFR Project, the PM&E measures described in the 2004 Settlement Agreement would not be implemented. Many of the PM&E's are designed to mitigate the effects of the UNFFR Project and could be unnecessary if the UNFFR Project were decommissioned. These PM&Es include modified minimum streamflow releases from Canyon dam and Belden dam, establishment of ramping rates and requirements for pulse flows and recreation river flows, biological and water quality monitoring, recreation improvements, and preparation of several plans to provide direction for future activities.

Future conditions without a FERC license would depend on the allowed uses and land ownership of the facilities and surrounding lands and could encompass a wide range of actions.

If retirement of the UNFFR Project involves removal of UNFFR Project facilities (i.e., Canyon dam, Butt Valley dam, intake facilities, etc.), the North Fork Feather River watershed would be substantially modified. Changes to the watershed during the first 5 to 10 years would include conversion of Lake Almanor and Butt Valley reservoir to a riverine environment. This conversion could cause substantial changes to the sediment and flow regimes in the North Fork Feather River downstream of Canyon dam, resulting in increased transport, delivery, and deposition of sediment in the reaches downstream. Modification of the flow regime, including the inability to regulate flow via the UNFFR Project, would substantially affect other FERC-licensed projects on the North Fork Feather River downstream. In addition to these changes, the sediment and flow regime of Butt Creek would be modified by eliminating facilities associated with Butt Valley reservoir.

Removal of Canyon, Butt Valley, and Belden dams and the related UNFFR hydropower facilities would result in the loss of the open-water habitat associated with Lake Almanor, Butt Valley reservoir, and Belden forebay and the associated beneficial uses defined in the Basin Plan. The habitat could convert to riparian and wetland or meadow habitats, similar to pre-dam conditions. The loss of open-water habitat could affect water birds, raptors, and other wildlife that rely on this type of habitat for foraging, resting, and other activities. Demolition activities could disturb special-status wildlife in the vicinity of the dams and other facilities while the facilities are being removed. The conversion of the reservoirs from lacustrine to riverine habitat could affect native aquatic organisms (e.g., fish, amphibians, macroinvertebrates) that prefer lake habitat and could indirectly affect wildlife, such as bald eagles, that forage on the fish. Removal of the dams would not benefit anadromous fish in the North Fork Feather River because hydroelectric facilities (e.g., Oroville dam) downstream would still impede their passage. Habitat that supports the warmwater recreational fisheries at Lake Almanor and Butt Valley reservoir would be substantially reduced, and flat-water recreational opportunities (e.g., boating) would be eliminated or substantially modified.

The loss of opportunities for flat-water recreation on Lake Almanor and Butt Valley reservoir could affect nearby communities as well as the larger Plumas County due to a reduction in visitation to the area. Public and private recreational features (e.g., campgrounds, beaches, boat docks) along the shoreline of Lake Almanor and Butt Valley reservoir would no longer be functional. Recreational facilities associated with the Seneca and Belden reaches would not be affected other than by changes in the sediment and flow regimes. Overall, recreational opportunities associated with the UNFFR Project would change to riverine activities, such as shore fishing and whitewater boating.

Retirement of the UNFFR Project without removal of UNFFR Project facilities would require the conversion of the existing features or facilities to non-hydropower uses, such as recreation or water supply, and a corresponding change to PG&E's water rights and its ability to regulate flows. Without the regulation of flows, the flood potential would increase, and dam modifications could be necessary to address public safety concerns. PG&E owns a majority of the lands encompassing the UNFFR Project, and these lands would likely be sold to other entities, resulting in land use modifications and possible use restrictions. If the dams were not removed, recreational opportunities would be similar to current conditions, and the open water habitat at the reservoirs would continue to support the warmwater fishery and wildlife; however, it is uncertain whether the existing trout fishery would be self-sustaining.

Chapter 4 Regulatory Framework

This chapter describes the federal, state, and local statutes, regulations, policies, and other authorities that apply to the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and to the alternatives described in Chapter 3.

4.1 Federal

The Federal Power Act and the Clean Water Act are the primary federal laws that govern operation of the UNFFR Project. Additional federal acts relevant to this project include: the National Forest Management Act, the Endangered Species Act, the Migratory Bird Act, the Bald and Golden Eagle Protection Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, and the Clean Air Act. Additional project federal guidance can be found in the Sierra Nevada Forest Plan Amendment and the Clean Power Plan.

Federal Power Act

The Project and associated facilities, operate in accordance with the articles, terms, and conditions of the FERC license issued pursuant to the Federal Power Act. The FERC license was issued January 24, 1955, pursuant to Sections 4(e) and 15 of the FPA (16 U.S.C. §§ 797(e) & 808) for the continued operation and maintenance of the Project.

Clean Water Act

The Clean Water Act (CWA) was originally known as the Federal Water Pollution Control Act of 1972. It protects the water quality of the nation's surface waters through enforcement of water quality standards and permits for the discharge of pollutants into navigable waters. Section 303 of the CWA (33 U.S.C. § 1313) requires each state to adopt water quality standards for the protection of designated beneficial water uses within the state. To comply with Section 303 of the CWA and the requirements of California's Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.), the Central Valley Regional Water Quality Control Board (Regional Water Board) developed the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan), which designates beneficial uses and establishes water quality objectives for surface and ground waters in the Central Valley, including the Feather River and Lake Almanor. The Basin Plan is described in more detail in Chapter 2, State Water Board's Regulatory Responsibilities, and under "State of California" below.

Section 401 of the CWA (33 U.S.C. § 1341) requires applicants for federal permits to obtain water quality certification from the state if the proposed activity could result in a discharge into a navigable water body. These and other sections of the CWA are intended to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. (33 U.S.C. § 1251.) Pursuant to Section 401 of the CWA, the State Water Resources Control Board (State Water Board) and the Regional Water Boards have regulatory authority for issuing water quality certifications in California. (Wat. Code, § 13160; Cal. Code of Regs., tit. 23, §§ 3830, 3855, 3859.) The State Water Board reviews and issues water quality certifications for projects that involve hydroelectric facilities licensed by the FERC.

Discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands, is regulated by the United States Army Corps of Engineers (Corps) under Section 404 of the CWA (33 U.S.C. § 1344). A series of Nationwide Permits has been approved for specific activities that would comply with the terms of the applicable permits and that would have a minimal impact on the environment. In California, the Corps may issue Letters of Permission to authorize certain fill activities that would have a minimal impact overall on the aquatic ecosystem, but that do not qualify for coverage under the adopted Nationwide Permits. For projects that do not meet the requirements of a Nationwide Permit or Letter of Permission, an Individual Permit is required. To comply with the Corps policy of no net loss of wetlands, discharges into wetlands must be avoided and minimized to the extent practicable. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland functions in a watershed. The alternatives described in Chapter 3, The Proposed Project and Alternatives, may require coverage under a CWA Section 404 permit for activities resulting in placement of fill material into a jurisdictional water (e.g., Lake Almanor and Butt Valley reservoir).

National Forest Management Act

The National Forest Management Act requires the U.S. Forest Service (USFS) to develop Land Resource Management Plans (LRMP) that "provide for a diversity of plant and animal communities" (16 U.S.C. 1604(g)(3)(B)) as part of its multiple use mandate. The USFS must develop plans that, among other things, provide for the maintenance of viable populations of existing native and desired non-native species in the planning area. (36 C.F.R. § 219.9.) The Sensitive Species program is designed to meet this mandate and to demonstrate the USFS' commitment to maintaining biodiversity on NFS lands. Activities on NFS lands must be designed to avoid or minimize adverse effects on USFS sensitive species.

USFS manages National Forest System (NFS) lands within the UNFFR Project boundary under the Plumas and Lassen National Forest LRMPs (U.S. Forest Service 1988, 1993). The LRMPs establish management goals and policies to direct management of NFS lands for a 10- to 15-year planning period and prescribe management practices for specific areas and schedules to achieve the goals and objectives. Applicable policies primarily emphasize resource conservation, provision of high-quality recreational opportunities, and protection of visual resources.

The 1988 Plumas National Forest LRMP applies to NFS lands around Butt Valley reservoir, along the North Fork Feather River between Canyon dam and Belden powerhouse, and along lower Butt Creek. NFS lands in the Plumas National Forest within the UNFFR Project boundary are in four management areas (MAs): North Fork (MA 19), Rich (MA 20), Butt Lake (MA 26), and Indian Valley (MA 27).

The 1993 Lassen National Forest LRMP applies to NFS lands managed along the southwest shore of Lake Almanor. These lands fall within one MA: Prattville (MA 38).

Specific land use policies for the MAs are provided in section 5.2, Land Use. Management of the visual character of the UNFFR Project lands in the Plumas and Lassen National Forests will need to be consistent with the LRMPs, and special use permits may be required for activities on NFS lands outside the boundary of the UNFFR Project established by the Federal Regulatory Energy Commission (FERC).

Sierra Nevada Forest Plan Amendment

The USFS prepared the Sierra Nevada Forest Plan Amendment to amend the Plumas and Lassen National Forest LRMPs and nine other LRMPs for national forests in the Sierra Nevada and on the Modoc Plateau in California and parts of Nevada. The Sierra Nevada Forest Plan Amendment provides management guidance for sustaining old forest ecosystems; protecting and restoring aquatic, riparian, and meadow ecosystems; improving fire and fuels management; combating noxious weeds; and sustaining lower westside hardwood ecosystems (U.S. Forest Service 2004). Within and adjacent to the UNFFR Project boundary, four distinct land allocations are identified in the Sierra Nevada Forest Plan Amendment: Riparian Conservation Areas; General Forest; Old Forest Emphasis; and Urban Wildland Intermix Threat Zone. As amended, the Plumas and Lassen LRMPs contain specific management goals, strategies, and standards and guidelines for each of the land allocations that are considered in the impact analyses in Chapter 5, Environmental Setting and Environmental Impacts.

Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, protects fish and wildlife species that have been listed as threatened or endangered and their habitat. Section 9 of the ESA (16 U.S.C. § 1538) prohibits "take" of listed fish and wildlife species, except when the take has been authorized under Sections 7 (16 U.S.C. § 1536) or 10 (16 U.S.C. § 1539). Take of a species is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." (16 U.S.C. § 1532(19).) Harm is defined as any act that actually kills or injures the species, including significant habitat modification that actually kills or injures the species by significantly impairing essential behavior patterns. (50 C.F.R. §§ 17.3, 222.102.) To a lesser degree than for fish and wildlife, Section 9 protects listed plants by making it illegal to collect or maliciously harm listed plants under federal jurisdiction or in non-federal areas in knowing violation of a state law. The National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) administer the ESA.

Sections 7 and 10(a) of the ESA provide methods for authorizing an otherwise lawful action that may result in take of a federally listed species. Federal agencies are required to consult with NMFS or USFWS under Section 7 to ensure that their actions do not jeopardize the continued existence of a listed species or affect designated critical habitat. For non-federal actions, Section 10(a) provides a pathway for incidental take authorization through preparation of a habitat conservation plan and issuance of an incidental take permit.

The USFWS issued a biological opinion for the UNFFR Project (letter dated January 25, 2005) in consultation with FERC on behalf of Pacific Gas and Electric Company (PG&E) to address potential take of the bald eagle and potential adverse effects on the valley elderberry longhorn beetle, the California red-legged frog, and slender Orcutt grass. The biological opinion stated that the proposed licensing of the UNFFR Project and the cumulative effects of the UNFFR Project along with other past, present, and reasonably foreseeable future projects in the North Fork Feather River watershed are not likely to jeopardize the continued existence of the bald eagle. Since the issuance of the biological opinion, the bald eagle has been removed from the federal list of threatened and endangered species. In its biological opinion, the USFWS also concluded that the UNFFR Project, including the 2004 Settlement Agreement flow schedule, is not likely to adversely affect the valley elderberry longhorn beetle or California red-legged frog and would have no effect on slender Orcutt grass.

As part of UNFFR Project operations under the new license, PG&E will implement an interagency bald eagle management plan[15], a vegetation monitoring plan that includes protection and management of valley elderberry longhorn beetle habitat, and an amphibian monitoring plan to further ensure that UNFFR Project operations and related activities will not adversely affect the eagle, federally listed valley elderberry longhorn beetle, or special-status amphibians. Further consultation under the ESA may be warranted if adverse impacts on federally listed species are anticipated as a result of the alternatives described in Chapter 3, The Proposed Project and Alternatives.

Because anadromous fish do not currently inhabit the UNFFR Project area, FERC concluded that consultation with NMFS was not warranted at the time it prepared its Final Environmental Impact Statement for the Upper North Fork Feather River Project (FERC 2005). In 2008, NMFS reaffirmed its reservation of authority regarding future fish passage at FERC-licensed facilities on the North Fork Feather River.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the United States Secretary of the Interior to protect and regulate the taking of migratory birds. The act establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs. The act makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in title 50, Code of Federal Regulations (CFR), Section 10.13, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR part 21). Mitigation measures may be required for construction activities associated with the UNFFR Project to avoid or reduce adverse impacts on nesting or breeding migratory birds.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act, originally passed in 1940, provides for the protection of the bald eagle and the golden eagle (as amended in 1962) by imposing criminal penalties on persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald

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[15] This plan may require inclusion of golden eagle based on best available information available at the time.

eagle. ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.… "Take" includes to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb." (16 U.S.C. § 668(a).) The USFWS recently established a new permit program under this act to improve the management of bald and golden eagles. Permits may be issued to protect public safety and to manage activities or projects that may disturb or otherwise incidentally "take" bald or golden eagles or their nests, while maintaining stable or increasing populations. UNFFR Project compliance with this act may require issuance by the USFWS of a permit for activities that could adversely affect bald or golden eagles.

National Historic Preservation Act

The National Historic Preservation Act of 1966, as amended, is the primary federal legislation that provides direction to federal agencies concerning management of historic properties. Section 106 (16 U.S.C. § 470(f)) requires federal agencies to identify and assess the effects of their actions on historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (NRHP). The criteria for National Register eligibility are outlined in 36 CFR Section 60.4. The responsible federal agency must consult with appropriate state and local officials, Indian tribes, the applicant, and members of the public if its actions would affect a historic property, and it must consider their views and concerns about historic preservation issues when making final project decisions. (36 C.F.R. §§ 800.2, 800.5.)

FERC's action to issue a new license for the UNFFR Project is considered an undertaking under Section 106. To meet the requirements of Section 106, FERC will execute a Programmatic Agreement for the protection of historic properties to minimize or avoid the effects of the continued operation of the UNFFR Project. The terms of the Programmatic Agreement would ensure that PG&E addresses and protects all historic properties identified within the UNFFR Project boundary in a historic properties management plan (HPMP). The HPMP would involve ongoing consultation as needed for the license term.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (NAGPRA) is a law that establishes the ownership of cultural items excavated or discovered on federal or tribal land after November 16, 1990. The provisions of NAGPRA do not apply to private lands. It states that Native American remains and associated funerary objects belong to lineal descendants. If lineal descendants cannot be identified, those remains and objects, along with associated funerary and sacred objects, and objects of cultural patrimony belong to the tribe on whose lands the remains were found or the tribe having the closest known relationship to them. The act divides the treatment of American Indian human remains, funerary objects, sacred objects, and objects of cultural patrimony into two basic categories. Under the inadvertent discovery and planned excavation component of the act and regulations, federal officials must consult with potential lineal descendants or American Indian tribal officials as part of their compliance responsibilities if they anticipate that activities on federal and tribal lands might have an effect on American Indian burials or if burials are discovered during such activities. For planned excavations, consultation must occur during the planning phase of the project. For inadvertent discoveries, the regulations delineate a set of short deadlines for initiating and completing consultation. The repatriation provision, unlike the ownership provision, applies to remains or objects discovered at any time, even before the effective date of the act, whether or not discovered on tribal or federal land. The act allows archaeological teams a short time for analysis before the remains must be returned. Once it is determined that human remains are American Indian, analysis can occur only through documented consultation (on federal lands) or consent (on tribal lands).

Clean Air Act

The federal Clean Air Act requires the establishment of standards to protect the general public from exposure to airborne pollutants that are known to be hazardous to human health. It requires the United States Environmental Protection Agency (U.S. EPA) to set national ambient air quality standards (NAAQS) to protect public health and welfare. NAAQS have been established for the following "criteria" air pollutants: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, suspended particulate matter (PM10 and PM2.5), and lead. The federal standards are identified in the discussion of the California Clean Air Act below for comparison with the state standards. Pursuant to the 1990 Clean Air Act amendments, the U.S. EPA has classified air basins (or portions thereof) as either in "attainment" or "non-attainment" for each criteria air pollutant, based on whether or not the NAAQS have been achieved. For areas that do not meet the NAAQS, the State, through its local air quality districts, is required to prepare air quality plans to attain the standards. Plumas County is in attainment or is unclassified for all national criteria pollutants.

Greenhouse Gas Regulation

To address climate change impacts, the United States has developed regulations and programs to expand research and identify actions to reduce greenhouse gas (GHG) emissions. The U.S. EPA proposed a Prevention of Significant Deterioration program and New Source Review rule changes to regulate GHGs. In December 2009, the U.S. EPA declared that GHG emissions threaten the public health and welfare of the American people (the endangerment finding), resulting in a new federal rule (40 C.F.R. § 98), effective December 29, 2009, that requires reporting of GHGs for certain GHG-emitting facilities.

The U.S. EPA then proposed the Clean Power Plan (CPP) August 3, 2015 which requires states to reduce GHG emissions from its fleet of existing power plants using one of several methods.[16] The U.S. EPA adopted the rule October 23, 2015, but the United States Supreme Court stayed implementation of the rule February 9, 2016. Given that the CPP is a regulatory initiative by the U.S. EPA and not a legislative

[16] U.S. EPA, "Clean Power Plan for Existing Power Plants" https://www.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants, retrieved December 15, 2016.

mandate, whether the CPP is formally implemented is uncertain with the change in presidential administrations.

4.2 State of California

Water Quality Control Plan for the Sacramento River and San Joaquin River Basins

The Regional Water Boards adopt and implement water quality control plans (basin plans) that recognize the unique characteristics of each region with regard to natural water quality; past, present, and reasonably foreseeable beneficial uses; and water quality problems. Basin plans are effective upon approval by the State Water Board. The Basin Plan that covers the Sacramento and San Joaquin river basins is designed to preserve and enhance water quality and protect the beneficial uses of all regional waters, encompassing an area approximately one-fourth the size of the state. Specifically, the Basin Plan (1) designates beneficial uses for surface water and groundwater; (2) sets narrative and numerical objectives that must be attained or maintained to protect beneficial uses; and (3) defines implementation programs that include specific prohibitions, action plans, and policies to achieve the water quality objectives.

The Basin Plan designates a variety of beneficial uses for Lake Almanor and the North Fork Feather River, including water supply, power, recreation, cold freshwater habitat, and wildlife habitat (see Chapter 2, State Water Board's Regulatory Responsibilities of this RDEIR and section 5.5, Water Quality, for additional details on the beneficial uses). As stated above, the Basin Plan also establishes the water quality objectives necessary to protect the designated beneficial uses.

California Endangered Species Act

Under the California Endangered Species Act (CESA), the California Department of Fish and Wildlife (CDFW; formerly known as the California Department of Fish and Game) is responsible for maintaining a list of endangered and threatened species. (Fish & G. Code, § 2070.) Pursuant to the requirements of CESA, any local or state agency reviewing a proposed project in its jurisdiction must determine whether any species that are state listed as endangered or threatened may be present in the project study area and determine whether the proposed project will have a potentially significant impact on any of these species.

CESA prohibits "take" of state-listed species. (Fish & G. Code, § 2080.) CESA protects native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, that are threatened with extinction or are experiencing a significant decline which, if not halted, would lead to a designation as threatened or endangered. Take is defined in Section 86 of the Fish and Game Code as to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Unlike the federal ESA, CESA does not include habitat modification as a form of take. CESA authorizes CDFW to issue incidental take permits for state-listed species if specific criteria are met. CESA emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate mitigation measures to offset project-related losses of protected species.

CDFW also maintains a list of "candidate species" and lists of "species of special concern." Candidate species are species that CDFW formally notices as being under review for addition to the list of endangered or threatened species, and the list of species of special concern constitutes a species "watch list." CDFW encourages informal consultation on any proposed project that may affect a candidate species.

Several state-listed species and state species of special concern have the potential to occur in the UNFFR Project vicinity; these species are discussed in section 5.7, Vegetation and Wildlife.

Fish and Game Code

The Fish and Game Code includes several provisions for the protection of waters of the State and the State's plant, fish, and wildlife resources as well as their habitat. An overview of applicable provisions is provided in this section.

Fully Protected Species

Fish and Game Code Sections 3505, 3511, 4700, 5050, and 5515 provide "fully protected" status to a number of birds, mammals, reptiles, amphibians, and fish, none of which can lawfully be "taken," even with an incidental take permit. Four fully protected avian species and one fully protected mammal are present in the project area. None of the 10 fully protected fish species is present in the North Fork Feather River or its tributaries.

Birds of Prey

Under Section 3503.5 of the Fish and Game Code, it is unlawful to take, possess, or destroy any birds in the orders of Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird, except as otherwise provided by the Fish and Game Code or any regulation adopted pursuant thereto.

Migratory Birds

Fish and Game Code Section 3513 states that it is unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird except as provided by rules and regulations adopted by the United States Secretary of the Interior under provisions of the Migratory Bird Treaty Act.

Food and Agricultural Code

The State legislature has declared that "the destructive impact of invasive and often poisonous noxious weeds is profound, affecting California's cropland, rangeland, forests, parks, and wildlands" and that "[t]hese pests cause enormous losses of private, state, and federal resources through decreased land productivity, degradation of wildlife habitat, and outright destruction of crops, livestock, wetlands, waterways, watersheds, and recreational areas." (Food & Agr. Code, § 7220.) Section 7271 designates the California Department of Food and Agriculture (CDFA) as the lead department for noxious weed management and designates funding for implementation of integrated weed management plans, research, and education on noxious weeds.

Streets and Highway Code (Scenic Highways)

Sections 260 to 284 of the Streets and Highway Code establish a system for designating state scenic highways and for managing the scenic highways for the protection and enhancement of California's natural scenic beauty. For designated scenic highways, a corridor protection program must be established and implemented by the local agency with jurisdiction over the roadway. The California Department of Transportation (Caltrans) oversees designation of scenic highways and implementation of the corridor protection program. Sections 263.1 through 263.8 of the Streets and Highway Code identify specific routes that make up the state scenic highway system (eligible and designated routes), which includes eligible segments of State Route (SR) 89 near the UNFFR Project. While eligible, segments of SR 89 near the UNFFR Project have not been formally designated, and Plumas County has not adopted a corridor protection program for it or other eligible scenic highways.

Streets and Highway Code (Encroachment Permit)

Caltrans requires an encroachment permit for trucks and other project-related traffic to use SR 70 and SR 89 under certain circumstances. (See Streets & Highway Code, § 670.) If construction activities are proposed in a Caltrans right-of-way, an encroachment permit may be required. In addition, if UNFFR Project-related traffic could affect visibility, traffic patterns, or the flow of traffic on SR 70 or SR 89 in a negative manner, an encroachment permit may be required.

California Clean Air Act

Similar to federal requirements, the 1988 California Clean Air Act specifies a program to attain the California ambient air quality standards (CAAQS). The California Air Resources Control Board (CARB), California's state air quality management agency, regulates mobile source emissions and oversees the activities of County Air Pollution Control Districts and regional Air Quality Management Districts. CARB regulates local air quality indirectly by establishing state ambient air quality standards and vehicle emission standards. The CAAQS are more stringent than the NAAQS for the criteria air pollutants. Table 4-1 summarizes the federal and state ambient standards.

Table 4-1 Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard (NAAQS)	State Standard (CAAQS)
Ozone	1-hour	—	0.09 ppm
	8-hour	0.075 ppm	0.070 ppm
Carbon monoxide	8-hour	9 ppm	9 ppm
	1-hour	35 ppm	20 ppm
Nitrogen dioxide	Annual arithmetic mean	0.053 ppm	0.030 ppm
	1-hour	—	0.18 ppm
Sulfur dioxide	Annual arithmetic mean	—	—
	24-hour	—	0.04 ppm
	1-hour	0.075 ppm	0.25 ppm
Fine particulate matter ($PM_{2.5}$)	24-hour	35 μg/m^3	—
	Annual arithmetic mean	15 μg/m^3	12 μg/m^3
Respirable particulate matter (PM_{10})	24-hour	150 μg/m^3	50 μg/m^3
	Annual arithmetic mean	—	20 μg/m^3
Lead	30-day average	—	1.5 μg/m^3
	Calendar quarter	1.5 μg/m^3	—

Toxic Air Contaminant Program

California established a Toxic Air Contaminant Program in the 1980s through the Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807 [Statutes 1983, Chapter 1047, Tanner]) to identify and control toxic air contaminants and reduce exposure. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Health & Saf. Code, § 44300 et seq.) supplemented the Toxic Air Contaminant Program and required a statewide air toxics inventory, notification to people exposed to a significant health risk, and facility plans to reduce these risks. CARB has identified specific measures to regulate certain activities that produce stationary and mobile toxic air contaminants (codified in the California Code of Regulations). CARB also established a list of toxic air contaminants and a threshold exposure level for some contaminants, which is the minimum level of exposure to avoid significant adverse health effects.

California Climate Change Mitigation Legislation and Regulations

Executive Order S-3-05 (Gov. Schwarzenegger, June 2005)

Executive Order S-3-05 was signed on June 1, 2005. The Order recognizes California's vulnerability to climate change, noting that increasing temperatures could potentially reduce snow pack in the Sierra Nevada, which is a primary source of the state's water supply. Additionally, according to this Order, climate change could influence human health, coastal habitats, microclimates, and agricultural yield. The Order set the GHG reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020 reduce GHG emissions to 1990 levels; and by 2050 reduce GHG emissions to 80 percent below 1990 levels.

California Global Warming Solutions Act of 2006 (AB 32)

Assembly Bill (AB) 32, the California Global Warming Solutions Act (Health and Safety Code Section 38500 et seq.), was signed in September 2006. The Act required the reduction of statewide GHG emissions to 1990 levels by the year 2020. This change, which was estimated to be a 25 to 35 percent reduction from 2006 emission levels, will be accomplished through an enforceable statewide cap on GHG emissions that were phased in starting in 2012. The Act also directs the CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources and address GHG emissions from vehicles. The CARB has stated that the regulatory requirements for stationary sources will be first applied to electricity power generation and utilities, petrochemical refining, cement manufacturing, and industrial/commercial combustion. The second group of target industries will include oil and gas production/distribution, transportation, landfills and other GHG-intensive industrial processes.

On December 11, 2008, the CARB adopted its Climate Change Scoping Plan (Scoping Plan), which functions as a roadmap of the CARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce GHG emissions, measured in carbon dioxide equivalent (CO_{2e}) emissions, by 174 million metric tons (MMT), or approximately 30 percent, from the state's projected 2020 emissions level of 596 MMT CO_{2e} under a "business-as-usual" scenario. The Scoping Plan also breaks down the amount of GHG emissions reductions the CARB recommends for each emissions sector of the State's GHG inventory. The Scoping Plan's recommended measures were developed to reduce GHG emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately affect low-income and minority communities. These measures also put the State on a path to meet the long-term goal of reducing California's GHG emissions by 2050 to 80 percent below 1990 levels.

AB 32 requires CARB to update the State's Scoping Plan for achieving the maximum technologically feasible and cost-effective reductions of GHG emissions at least once every five years. (Health & Saf. Code, § 38561, subd. (h).) The Proposed First Update to the Climate Change Scoping Plan (Proposed Update), released for public review on February 10, 2014, continued with the approach of the initial Scoping Plan by recommending a balanced mix of strategies to ensure that California remains on track to meet its long-term climate stabilization objectives.[17] The 2013 update highlighted

[17] See California Air Resources Board, "AB 32 Scoping Plan," website, https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm, retrieved December 20, 2016.

California's success to date in reducing GHG emissions and laid the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050, as required by Governor Schwarzenegger's Executive Order S-3-05 and Governor Brown's Executive Order B-16-2012. The 2050 objective is consistent with an Intergovernmental Panel on Climate Change (IPCC) analysis of the emissions trajectory that would stabilize atmospheric GHG concentrations at 450 parts per million CO_{2e} and reduce the likelihood of catastrophic climate change.

The key component of the ARB's AB 32 regulations that relate to changes in operations at the UNFFR Project is the Cap and Trade Program (CTP).[18] This program caps emissions for large stationary source emitters which exceed 25,000 tonnes annually, known as "covered entities," and sets an overall cap that declines at an average rate of 3.3 percent per year to 2020.[19] As a "load-serving entity" (LSE), PG&E is subject to this regulation, and its overall emissions must match the GHG allowances that it has been allocated and acquired. As a result, if PG&E's GHG emissions increase due to operational changes by one resource, e.g., the UNFFR Project, PG&E legally will have to offset those emissions by either reducing emissions a commensurate amount elsewhere (e.g., increased energy efficiency investment) or by acquiring more GHG allowances through the CTP Auction or via bilateral transactions.

Senate Bill 1368 (Chapter 598, Statutes of 2006)

Senate Bill (SB) 1368, signed in September 2006, required the California Public Utilities Commission (PUC) to establish a GHG emissions performance standard for "baseload" generation from investor-owned utilities by February 1, 2007. The California Energy Commission (CEC) was required to establish a similar standard for local publicly-owned utilities by June 30, 2007. The legislation further required that all electricity provided to California, including imported electricity, must be generated from plants that meet or exceed the standards set by the PUC and the CEC. In January 2007, the PUC adopted an interim performance standard for new long-term commitments (1,100 pounds of CO_2 per megawatt-hour), and in May 2007, the CEC approved regulations that match the PUC standard.

Senate Bill 97 (Chapter 185, Statutes of 2007)

Senate Bill (SB) 97, adopted August 2007, directed the Governor's Office of Planning and Research (OPR) to adopt amendments to the California Environmental Quality Act (CEQA) Guidelines to address GHG emissions. These amendments became effective in March 2010.

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[18] See California Air Resources Board, "Cap and Trade Program," website, https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm, retrieved December 20, 2016.

[19] California Air Resources Board, "Article 5: California Cap On Greenhouse Gas Emissions And Market-Based Compliance Mechanisms," Final Regulation, Section 95481, https://www.arb.ca.gov/cc/capandtrade/capandtrade/unofficial_ct_030116.pdf, retrieved December 20, 2016.

Senate Bill 350 (Clean Energy and Pollution Reduction Act of 2015)

Senate Bill 350 (SB 350) establishes renewable energy and energy efficiency targets, and creates new utility planning requirements to meet California Air Resources Board-established goals of reducing California's overall GHG emissions levels to 40 percent below 1990 levels by 2030. First, it increases California's Renewable Portfolio Standard (RPS) for electricity procurement from 33 percent by 2020 to 50 percent by 2030. It also requires the state to double energy efficiency savings from electricity and natural gas end uses by 2030. In order to ensure that the state meets these ambitious goals, the bill also requires large utilities to develop and submit Integrated Resource Plans (IRPs) that outline how they will meet GHG emissions targets and RPS requirements. Other provisions in the bill provide for transforming the California Independent System Operator to support a regional energy market that extends beyond California, authorizing utilities to implement transportation, electrification, and undertaking assessments of the barriers to low-income communities in adopting distributed generation technologies, energy efficiency and weatherization investments, and zero emission transportation options.

Senate Bill 32 (2016)

Senate Bill 32 follows up on the broad GHG emissions reduction targets established in AB 32, the California Global Warming Solutions Act of 2006. The original AB 32 required the State Air Resources Board to reduce statewide emissions of GHG to 1990 emissions levels by 2020. This Senate Bill goes further to require a reduction to 40 percent below the 1990 level by 2030. This codified the reduction set by Governor Brown in Executive Order B-30-15 issued April 29, 2015.[20] The California Air Resources Board is updating its Scoping Plan to select policies to achieve that reduction.[21]

4.3 Local

Plumas County General Plan

The Plumas County General Plan, as amended, presents goals and policies for managing private lands in the county and serves as a basis for all decisions regarding land use (Plumas County 2013). The plan elements most relevant to the UNFFR Project are 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 one of Plumas County's goals is to encourage the use of water for hydroelectric generation to meet the energy needs of Plumas County. Policies in the Plumas County General Plan are implemented through the Plumas County zoning ordinance, which regulates land use through the establishment of land use zones, parcel sizes, and placement of structures within Plumas County. The Plumas County Code, originally adopted in 1973, also provides

[20] See https://www.gov.ca.gov/news.php?id=18938.

[21] See California Air Resources Board, "AB 32 Scoping Plan," website, https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm, retrieved December 14, 2016.

policies to protect the environment in Plumas County for the safety and welfare of the public.

Northern Sierra Air Quality Management District Rules

The Northern Sierra Air Quality Management District has established specific rules and regulations to protect air quality and public health and safety in the area over which it has jurisdiction. These rules apply to open burning, construction and operations emissions associated with stationary sources, and toxic air contaminants. Use of large stationary equipment for UNFFR Project construction activities may require a permit from the Northern Sierra Air Quality Management District.

Chapter 5 Environmental Setting, Impacts, and Mitigation

5.1 Introduction

This chapter describes the environmental setting and analyzes the environmental impacts for resources that could be affected by the operation of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) under a new Federal Energy Regulatory Commission (FERC) license and a water quality certification issued by the State Water Resources Control Board (State Water Board).

The following resource topics are evaluated in this chapter:

- Land Use and Mineral Resources
- Geology, Geomorphology, and Soils
- Water Resources
- Water Quality
- Fisheries
- Vegetation, Wildlife, and Sensitive Biological Resources
- Recreation
- Aesthetics
- Public Services, Utilities, and Energy
- Hazards and Hazardous Materials
- Cultural Resources
- Transportation and Traffic
- Air Quality
- Noise
- Greenhouse Gas Emissions
- Energy

For each of the above resource topics, this chapter describes the baseline conditions for the analysis and analyzes the potential environmental impacts associated with implementation of The Proposed Project and the alternatives described in Chapter 3, The Proposed Project and Alternatives. Chapter 4, Regulatory Framework, contains descriptions of applicable federal, state, and local laws, regulations, and policies that guide the analysis in this chapter. The no project alternative is evaluated in Chapter 3, Proposed Project and Alternatives.

Environmental Baseline in This Revised Draft EIR

The environmental setting for each resource topic evaluated in this chapter serves as the environmental baseline for the impact analysis. The baseline represents the resource conditions and best available information at the time each resource topic was evaluated for this RDEIR. Because it has been more than 10 years since the Notice of Preparation of the Draft EIR (NOP) was published on August 30, 2005, both the available information and the condition of the resource—and therefore the environmental baseline—have changed for some resource topics.

In the case of hydrologic conditions, the modeling conducted to support the alternatives development process (see Chapter 3, Proposed Project and Alternatives) provided the baseline conditions based on water years that represent the range of flows in the North Fork Feather River over different seasons and water year types. Water quality information that has become available since the NOP was issued in 2005, including data provided by commenters on the 2014 Draft EIR, has been incorporated into both the environmental setting and impacts sections of this RDEIR. Conditions for other physical resources, such as geology and soils, do not change over a short period of time; therefore, the baseline for these topics is generally consistent with the baseline in the 2014 Draft EIR. For biological resources, the 2005 baseline used in the 2014 Draft EIR incorporated field studies conducted in support of Pacific Gas & Electric Company's (PG&E's) application to FERC for a new license, as well as the latest special-status species lists and recorded species occurrences in the California Natural Diversity Database (California Department of Fish and Game, 2019). In this RDEIR, the biological sections have been updated to reflect new biological information obtained from PG&E from ongoing, FERC-required monitoring efforts. Similarly, for cultural resources, surveys and research conducted in support of the PG&E application provide the baseline. Although there were comments on the 2014 Draft EIR related to cultural resources, the baseline conditions have not changed since the 2005 Notice of Preparation was issued.

The description of the setting, or baseline, for the various resource topics varies depending on the type and location of activities described under The Proposed Project and the alternatives. In some cases, a regional overview is presented that covers the UNFFR Project vicinity. Although the size of the local setting for the resource topics varies, each local setting encompasses, at a minimum, the activity areas associated with the Proposed Project and the alternatives.

Overview of the Analysis

The State Water Board prepared a CEQA initial study for the UNFFR Project and distributed it in August 2005 along with the NOP as part of the scoping process. The NOP described several potential alternatives to address water quality in the North Fork Feather River and contained an initial analysis of the continued operation of the UNFFR Project as proposed by PG&E in its application to FERC and the 2004 Settlement Agreement.

The scoping process was used to formulate and refine the alternatives described in Chapter 3, the Proposed Project and Alternatives, and to focus the analysis on resource topics and issues of concern to the public and other agencies. Appendix B provides additional information on the scoping process.

The resource sections in this chapter focus on issues that are applicable to the activities or activity areas associated with Proposed Project and the alternatives presented in Chapter 3. In addition, each resource section identifies topics that are not discussed and the reason for their exclusion (CEQA Guidelines Section 15128).

The impact analysis in each resource section includes a discussion of the methodology used to evaluate impacts, a list of significance thresholds, descriptions of impacts, and, as appropriate, descriptions of mitigation measures. The impact analysis covers the Proposed Project and the alternatives at an equal level of detail but focuses on the differences between the alternatives. Conclusions concerning the level of significance of each impact are provided at the end of the discussion of impacts. The organization of a typical impact analysis section is shown below.

Methodology

The methodology subsection describes the methods and key assumptions used for the analysis. It also indicates whether impacts were evaluated quantitatively or qualitatively; for most resource topics, impacts are discussed qualitatively. For some resources, supporting technical information may be found in one of the appendices.

Thresholds of Significance

Thresholds of significance are identified using the CEQA Guidelines; agency standards; legislative or regulatory requirements, as applicable; and professional judgment. The thresholds provide a means to identify the level at which an impact becomes significant. Most thresholds are qualitative, but quantitative thresholds are provided for some resource topics.

Impacts and Mitigation Measures

The impact statements and final (after mitigation, if appropriate) levels of significance are summarized in tabular format at the beginning of the Impacts and Mitigation Measures subsection for each resource topic. The remainder of the subsection discusses each impact, with conclusions concerning the level of significance before and after mitigation measures, as appropriate. Mitigation measures are identified for each potentially significant impact. In order to minimize redundancy, discussions of the impacts of the Proposed Project and the alternatives that are the same are not repeated. The differences between the impacts of the alternatives are emphasized in the discussions.

For each impact, an impact statement is presented that summarizes the impact, and the analysis of impacts is presented under each statement. In some cases, the discussion is presented separately for one or more alternatives, and, in other cases, the discussion is combined because the similarity of impacts of the alternatives. The impact statements are labeled according to the resource topic using an abbreviation of the resource and a number to correspond to the sequential number of the impact within the section. If mitigation measures are identified, the mitigation measure is presented with the same labeling and numbering as the impact and identifies the alternative(s) it applies to.

5.2 Land Use and Mineral Resources

This section describes land uses and mineral resources in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would conflict with nearby land uses or applicable land use plans, policies, or regulations or result in the loss of availability of mineral resources. The following related topics are not discussed in this Revised Draft Environmental Impact Report (RDEIR) for the reasons noted:

- **Agriculture and Forestry Resources:** The UNFFR Project area (project area) does not contain farmland or land used for agricultural purposes. A portion of the Caribou intakes activity area[22] is in Plumas County's (County's) Timberland Production Zone (TMZ), but none of the alternatives would affect the ability to grow and harvest timber in this zone.
- **Habitat Conservation Plan/Natural Community Conservation Plan Consistency:** No habitat conservation plans or natural community conservation plans have been adopted for land in the UNFFR Project area.
- **Physical Division of an Established Community:** The UNFFR Project area does not contain any established communities, and none of the alternatives would physically divide nearby communities.
- **Displacement of People or Housing:** None of the alternatives would displace people or housing.

The potential impacts of Pacific Gas and Electric Company's proposed project (described in section 3.4) were evaluated in the Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project issued by FERC. As allowed for under Section 15150 of the CEQA Guidelines, this RDEIR incorporates by reference sections of the FERC EIS that analyze the impacts of PG&E's proposed project on land use and mineral resources. Since the FERC EIS did not analyze Alternatives 1, 2, and 3 in the EIS, they are discussed in this section of the RDEIR with respect to land use and mineral resources.

Environmental Setting

Land Ownership and Management

The UNFFR Project area encompasses approximately 30,920 acres, including a 19.6-mile reach of the North Fork Feather River and a 4-mile reach of Butt Creek. The North Fork Feather River in this reach is divided into the Seneca reach, which is 10.8 miles long, and the Belden reach, which is 8.8 miles long.

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[22] Activity areas encompass areas surrounding and in Lake Almanor, Butt Valley reservoir, Belden forebay, the North Fork Feather River, and Butt Creek where construction and ground-disturbing activities associated with Alternatives 1, 2, and 3 have the potential to occur.

Federal lands in the UNFFR Project area are managed by the United States Department of the Interior, Bureau of Land Management (BLM), and the United States Department of Agriculture, Forest Service (USFS). Lassen National Forest manages approximately 370 acres, and Plumas National Forest manages approximately 515 acres. Public lands managed by BLM total approximately 38 acres. Most of the remaining 30,000 acres are owned by PG&E. Lands in the UNFFR Project vicinity include roads and rights-of-way maintained by the County and the California Department of Transportation (Caltrans), other private lands, and lands in the Lassen and Plumas National Forests.

Lands in the three activity areas associated with Alternatives 1, 2, and 3 are owned by PG&E; PG&E also owns some of the land adjacent to the activity areas. Plumas National Forest manages land adjacent to the Canyon dam intake and Caribou intakes activity areas, and Lassen National Forest manages the land just southwest of the Prattville intake activity area.

Under its current annual license, PG&E oversees facilities and activities associated with its operation and maintenance of hydroelectric facilities, administrative sites (including offices and residences), and recreational sites on lands it owns or on lands subject to USFS special use permits. The USFS is responsible for authorization and management of activities on its lands, including issuance of permits for certain activities and maintaining or improving facilities not maintained by PG&E or others. The County is responsible for ensuring that private lands are managed consistent with the Plumas County General Plan (General Plan). The County is also responsible for the security and protection of private lands in the UNFFR Project vicinity and maintaining or improving County roads. Caltrans maintains State Routes (SRs) 36, 70, 89, and 147.

Regional Planning Strategies and Policies

This section of the RDEIR discusses two types of planning processes: federal resource management plans that apply to the management of USFS and BLM lands and a general plan that applies to private lands in Plumas County.

BLM's Eagle Lake Field Office Resource Management Plan

The Eagle Lake Field Office Resource Management Plan provides management direction and standards and guidelines for two parcels of land managed by the BLM in the UNFFR Project area. These parcels are located on the northwest side of Lake Almanor. Because none of the activity areas are near these parcels, the management plan is not discussed further in this RDEIR.

Lassen National Forest Land and Resource Management Plan

The Land and Resource Management Plan (LRMP) for the Lassen National Forest identifies management prescriptions based on the desired use of the land and provides management direction and standards and guidelines for each management area (MA) within the national forest (USDA Forest Service 1993). Parts of the UNFFR Project area are within the Prattville MA, specifically land around the western and northern shores of Lake Almanor, which is administered by the Almanor Ranger District. The Prattville intake activity area is just northeast of the Prattville MA. Applicable management prescriptions for the Prattville MA include developed recreation, late successional forest, timber, and view/timber. Management direction and standards and guidelines applicable to the UNFFR Project include:

- maintaining a near-natural setting along the shoreline at Lake Almanor,
- protecting sensitive plants and their habitat,
- maintaining visual quality commensurate with other resource needs,
- meeting visual quality objectives,
- assisting in recovery efforts for threatened and endangered species,
- maintaining or increasing species diversity,
- managing habitat for sensitive wildlife species,
- maintaining habitat for nesting ospreys and Canada geese within 1/2 mile of Lake Almanor and near small wetlands, and
- protecting and enhancing nesting habitat capability for bald eagles at the Rocky Point and Prattville territories.

Plumas National Forest Land and Resource Management Plan

The Plumas National Forest LRMP provides management direction and standards and guidelines for each MA in the national forest (USDA Forest Service 1988). Parts of the UNFFR Project area within the North Fork, Rich, Butt Lake, and Indian Valley MAs, specifically around Butt Valley reservoir, the North Fork Feather River, and the southern shore of Lake Almanor, are administered by the Greenville and Quincy Ranger Districts. The Canyon dam outlet structure and Caribou intakes activity areas are adjacent to the Plumas National Forest boundary. Management direction and standards and guidelines applicable to the UNFFR Project include:

- maintaining pleasing visual corridors,
- protecting water quality,
- providing for recreational gold panning and digging, and
- maintaining or enhancing bald eagle habitat suitability at Canyon dam.

Sierra Nevada Forest Plan Amendment

The Sierra Nevada Forest Plan Amendment (Forest Plan Amendment) describes desired conditions, provides management direction, and identifies objectives for allocated uses within the Plumas and Lassen National Forests; the Forest Plan Amendment amended the LRMPs for both forests (USDA Forest Service 2004). This broad-scale amendment places particular emphasis on protecting, increasing, and perpetuating desired conditions of old forest ecosystems; maintaining the structure and function of general forest; protecting and restoring desired conditions of aquatic, riparian, and meadow ecosystems; reducing the threat of wildland fires and improving defensibility from wildland fires along the urban interface; maintaining Protected Activity Centers for the California spotted owl so that the forests continue to provide habitat conditions that support successful reproduction of the owls; and reducing the spread of invasive exotic plant species, containing existing weed populations, and eradicating them where possible.

Allocated uses established under this amendment include old forest emphasis areas; general forest with wildland-urban interface threat and defense zones; aquatic, riparian, and meadow habitat; and California spotted owl Protected Activity Centers overlaid in some areas.

Plumas County General Plan and Zoning Ordinances

The use of non-federal land in Plumas County is guided by the Plumas County General Plan (General Plan). The General Plan is a comprehensive, long-range plan that provides guidance for the physical development of land within the County. The General Plan land use map was adopted in 1983, and the most recent update was adopted in December 2013 (Plumas County 2013). The County is in the process of finalizing the 2035 General Plan Update.

The General Plan land use map establishes resource areas and development areas within the County. The General Plan designates the land in the three activity areas as Lake and as Resort and Recreation. Allowed uses in these areas are defined in the zoning code, as discussed further below.

The General Plan contains goals, objectives, and land use management strategies relating to the protection and use of resources, development consistent with service levels, and constraints to development based on localized situations. Goals and management strategies applicable to the UNFFR Project include:

- identifying and protecting commercially viable resource production areas with safeguards for the surrounding land and environment;
- encouraging use of water for hydroelectric generation;
- managing stormwater runoff and controlling erosion;
- protecting important wildlife habitat, migration routes, and wetlands;
- preserving the basic visual aspects of the environment that maintain the rural character of the County; and
- protecting and preserving historic and prehistoric sites, structures, and objects.

The County zoning ordinances implement the General Plan by providing a precise delineation of permitted land uses, precluding land use conflicts, and establishing general site development standards (Plumas County 1973). The designated zoning and allowed uses for the three activity areas are presented below.

Prattville Intake Activity Area

In the Prattville intake activity area, Lake Almanor is zoned Lake (L) and the adjacent upland area is zoned Recreation 1 (Rec-1). The purpose of the L zone is to provide for the use and management of water resources. Hydroelectric generation, water impoundments, and docks are allowed uses within the L zone. In addition, boat ramps, marinas, and recreation facilities are permitted subject to the issuance of a special use permit.

The Rec 1 zone provides for multiple uses of prime recreation sites in a manner supportive of recreational uses. Allowed uses within this zone include recreation facilities, campgrounds, boat ramps and services, and several other uses described in the County zoning ordinances. Public utility facilities are permitted subject to the issuance of a special use permit. Public utility facilities are defined as uses necessary for the provision, distribution, or conveyance of utilities to the public.

Canyon Dam Intake[23] Activity Area

In the Canyon dam intake activity area, Lake Almanor is zoned L and the adjacent upland area is zoned Rec-3. The L zone and portions of the Rec-3 zone within this activity area also have Special Plan (SP) Combining zones to protect the scenic quality of lake views from SR 89, Canyon dam, and the shoreline of Lake Almanor. These SP zones include an SP Combining Scenic Road (SP-ScR) zone along SR 89 and an SP Combining Scenic Area (SP-ScA) zone north of SR 89, including Lake Almanor. No physical aspect of a private parcel subject to an SP zone may be altered without review and approval by the County. Lake Almanor is also included in the Flood Plain (FP) Combining zone. The purpose of the FP Combining zone is to regulate development to achieve reasonable safety from flood hazards.

Caribou Intake Activity Area

In the Caribou intakes activity area, Butt Valley reservoir is zoned L with an FP Combining zone and the adjacent upland area is subject to both the TPZ and Rural (R-10) zone. The purpose of the TPZ is to encourage protection of immature trees and restrict the use of timberland to the production of timber products and compatible uses. Allowed uses in the TPZ include management for the use of other natural resources where less than 3 acres of land is converted to non-timberland use; hydroelectric generation within the TPZ is subject to site development review and approval by the County. The purpose of the R-10 zone is to provide for dwelling units at a ratio of 10 to 20 acres per dwelling unit, with provisions for compatible uses. Public utility facilities, recreation facilities, and limited electrical generation are permitted subject to the issuance of a special use permit by the County.

Land Uses

Land uses in the vicinity of the UNFFR Project include open space with scattered rural residences; small communities, such as Chester, Seneca, Belden, and Lake Almanor West; occasional recreational facilities; and industrial developments associated with the hydroelectric facilities. Much of the open space is forested lands consisting of conifer and mixed-conifer forests in upland areas and riparian woodlands along the water bodies. Higher density residential uses occur in Chester and around portions of Lake Almanor, with lower density residential uses in established communities along the North Fork Feather River. Recreational facilities occur primarily at Lake Almanor, with additional facilities scattered along the North Fork Feather River and the eastern shore of Butt Valley reservoir. Hydroelectric facilities occur along the major water bodies in the region and on adjacent lands. Mineral extraction is another use associated with both the Seneca and Belden reaches as well as mineralized zones throughout the North Fork Feather River watershed. A variety of individuals and organizations throughout the watershed have mineral rights associated with either mining claims or private lands.

Lake Almanor

In addition to providing a storage reservoir for the UNFFR Project, Lake Almanor is used for a variety of recreational uses and provides scenic views for residents and visitors. A number of designated and dispersed campgrounds, boat launch sites, and

[23] Canyon dam “intake” and Canyon dam “outlet” are synonymous.

day use areas are available around the lake (see section 5.8, Recreation, for additional details). Boating, swimming, fishing, hiking, and wildlife viewing are common recreational activities associated with Lake Almanor.

Residential and commercial uses also exist around the lake in established communities or at scattered locations adjacent to shoreline of the lake. SRs 36, 89, and 147 provide primary highway access to Lake Almanor and associated developments.

The Prattville intake at the Prattville intake activity area is located several hundred yards off the western shore of Lake Almanor near the Marvin Alexander Beach day use area and an adjacent PG&E maintenance yard. Nearby land uses include commercial marinas along the shoreline and residential uses to the south. The Canyon dam intake structure at the Canyon dam intake activity area is located several hundred feet from the southern shore of Lake Almanor in the general vicinity of several recreational facilities: Canyon dam boat launch facility, Rocky Point campground (formerly Lake Almanor campground), Camp Conery group campground, Canyon dam day use area, Almanor scenic overlook, and the Eastshore picnic area. PG&E administrative facilities are located just west of SR 89 and Canyon dam.

Seneca Reach of North Fork Feather River

The Seneca reach of the North Fork Feather River flows through a steep narrow canyon, primarily on lands managed by the Plumas National Forest. There is little development along this reach due to minimal access either by road or trail. The community of Seneca lies along the North Fork Feather River several miles downstream of Canyon dam, and there are some residences in the surrounding area.

Recreational uses are not as common along this reach as at Lake Almanor, but fishing, boating, and kayaking do occur seasonally. Currently, the USFS reports that there are 19 mining claims in the general vicinity of the Seneca reach; several of these are currently authorized by the USFS under approved operating plans. In 2014, Plumas County approved a mining permit for a surface placer mine on the Seneca reach. This permit included a minimum 30-foot setback from the North Fork Feather River.

The Seneca reach has limited access along Seneca Road and unpaved spur roads. Parking is available at pullouts along Seneca Road, and river access is by foot trails in most areas. The Seneca reach terminates at the upstream limit of the Belden forebay.

Butt Valley Reservoir

Butt Valley reservoir is an UNFFR Project facility located on land owned by PG&E. Most of the surrounding lands are managed by the Plumas National Forest. PG&E operates two designated campgrounds, Ponderosa Flat and Cool Springs, and one day-use area, Alder Creek, along the east shore of Butt Valley reservoir. Most of the reservoir is accessible for day -use recreation, such as boating, fishing, and wildlife viewing; however, boats are excluded from the southern end of Butt Valley reservoir near the Caribou intakes for safety reasons. No residential uses exist around the reservoir because most of the land is managed by the Plumas National Forest. Prattville-Butt Valley Reservoir Road provides the primary access from Lake Almanor to the north and from Seneca Road to the south.

The Caribou intakes in the Caribou intakes activity area are in the southwest portion of the reservoir just north of Butt Valley dam. Nearby uses include open space (National Forest lands), the dam, and the reservoir.

Upper Butt Creek flows into Butt Valley reservoir near the Butt Valley powerhouse. Butt Valley reservoir does not release flows into the historic channel of lower Butt Creek; instead, flow in lower Butt Creek comes from a series of springs downstream of the reservoir. Lower Butt Creek is a perennial stream that flows into the Seneca reach above Belden forebay.

Belden Reach of the North Fork Feather River

The Belden reach of the North Fork Feather River is downstream (south) of the Caribou powerhouses. The Belden reach provides limited recreational opportunities with scattered residential uses in the vicinity. There are no designated communities along the Belden reach. Three designated campgrounds—Queen Lily, North Fork, and Gansner Bar—are at the southern end of the Belden reach. A number of undeveloped trails provide access to undeveloped day use areas along the river. Caribou Road, a paved road, provides primary access along the Belden reach.

State Route 70 and 89 Corridors

The state highways in the general vicinity of the UNFFR Project provide access for the various uses in the area and offer parking areas and access to designated campgrounds and day use areas along the highway corridors. Several communities exist along these highways, and the Bucks Lake Wilderness area, part of the Plumas National Forest, is on the south side of SR 70 near Belden.

Mines and Mineral Resources

The North Fork Feather River and its tributaries have been subject to gold mining since the mid-1800s. There are 19 states, including California, where a mining claim may be made on federally-administered lands. The USFS manages surface claims on USFS land and the BLM manages surface claims on other public lands and subsurface claims on both USFS land and all other public lands. The USFS grants claims for a period of three to five years. In-water work will also require a 404 Permit from the ACOE. Lode claims include rock-in-place bearing veins, or lodes, of valuable minerals having well-defined boundaries). Placer claims generally consist of unconsolidated materials, such as sand and gravel containing free gold or other minerals, and are limited to 20 acres in size. Most of the mining claims along the North Fork Feather River are placer claims. A few lode mines are also located on USFS and adjacent private lands in the Seneca area. In addition to mining claims, there are also a number of private parcels that are known to have historic or ongoing mining operations. Many of these parcels were conveyed to private parties through patents issued by the federal government.

The USFS has documented four active placer claims in the Seneca Reach below Canyon Dam and one adjacent lode claim (Edlund, 2019), which are included in Table 5.2-1. None of the claims represent a sole source of income for the claimant.

Table 5.2-1 Summary of USFS Active Claims in the Seneca Reach

Claim	Description
Sunset Consolidated (China Bar)	Long-running placer claim expires 2024. Plan includes a river ford, but site has option to mine and camp without crossing the river and was crossable during flows up to 1200 cfs.[a]
Dahlen's Placer	Placer claim expires in 2023. Claim has had multiple operators over many years. Project includes river ford, during high flows uses excavator to cross river.[b]
B&P Placer	Placer claim with same claimant as Dahlen's Placer. Excavation near river.
Lucky Chance Lode	Load claim operated alongside B&P Placer Claim with excavation near river.
Partner Place	Project uses a derrick and winch system to mine within the channel. Project does not include a river ford. Plan was approved by the USFS in 2018. Expires in 2021.

a. R. Johns, personal communication. February 7, 2020.
b. R. Dahlens, personal communication. February 4, 2020

At least one placer gold mine is currently permitted by Plumas County on the Seneca reach. The county does not have any areas designated as mineral resource zones by the California State Geologist under the Surface Mining and Reclamation Act, although there is a wide array of current and historic mining areas throughout the County

Environmental Impacts and Mitigation Measures

Methodology

The Proposed Project and each alternative were compared with the applicable General Plan land use designations, goals, and management strategies; the county zoning designations; and the management direction and standards and guidelines of the Plumas and Lassen National Forest LRMPs, as amended, to analyze consistency with applicable land use plans, policies, and zoning regulations. The results of the analyses in other sections of this RDEIR were used to evaluate overall land use compatibility. Active mining claims and private mining operations along the North Fork Feather River were qualitatively evaluated to determine whether The Proposed Project or the alternatives would inhibit the ability to prospect or mine gold and other locatable minerals.

Thresholds of Significance

Impacts on land uses or mineral resources would be significant if The Proposed Project or an action alternative would:

- result in major conflicts with nearby land uses;
- cause a significant environmental impact due to a conflict with any land use plans, policies, ordinances, or regulations that were adopted for the purpose of avoiding or mitigating an environmental effect; or
- result in the loss of availability of an important mineral resource.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of the Proposed Project and the alternatives on land uses and mineral resources and, if applicable, identifies mitigation measures for significant impacts. Table 5.2-2 compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.2-2 Summary of Land Use (LU) and Mineral Resources Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact LU-1: Construction activities associated with The Proposed Project or the alternatives could disrupt other land uses in or near activity areas.	Less than significant	Less than significant	Less than significant	Less than significant
Impact LU-2: Implementation of The Proposed Project or the alternatives could conflict with adjacent land uses.	Less than significant	Less than significant	Less than significant	Less than significant
Impact LU-3: The Proposed Project or the alternatives could cause a significant environmental impact due to a conflict with the goals, policies, and objectives of the Plumas County General Plan, County Zoning Ordinances, or the Lassen and Plumas National Forests LRMPs.	Less than significant	Less than significant	Less than significant	Less than significant

Table 5.2-2 Summary of Land Use (LU) and Mineral Resources Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact LU-4: Implementation of The Proposed Project or the alternatives could disrupt authorized locatable mining activities in the Seneca and Belden reaches of the North Fork Feather River.	Less than significant	Less than significant	Less than significant	Less than significant

Impact LU-1: Construction activities associated with The Proposed Project or alternatives could disrupt other land uses in or near activity areas.

Proposed Project and Alternatives 1, 2, and 3

Construction activities associated with the Proposed Project and the alternatives would involve ground disturbance, periodic construction traffic, and use of large equipment and trucks that would generate fugitive dust, tailpipe emissions, and noise that would periodically and temporarily affect land use at multiple locations within the boundary of the UNFFR Project. To varying degrees with respect to timing, scale, and intensity, these activities could impair the peaceful enjoyment of nearby residential, commercial, and recreational land uses, including nearby campgrounds, day use areas, and marinas, at Lake Almanor and Butt Valley reservoir. Modifications to the Canyon dam outlet structure under Alternatives 1 and 3 would not require any changes to the part of the structure above the surface of Lake Almanor.

Short-term construction activities in the vicinity of the Canyon dam boat ramp would be consistent with Zones L and Rec-1 under the County's General Plan. Disruption of recreational land uses resulting from construction at Lake Almanor and Butt Valley reservoir would be especially pronounced during the recreation season (see section 6.8, Recreation, for additional discussions of recreation impacts within the FERC boundary). The temporary disturbances associated with Alternatives 1, 2 and 3 during construction could discourage uses near the three activity areas , but other recreational areas (e.g., at other locations around Lake Almanor and along the Belden reach) would continue to be available and the public would be informed about the construction schedule and anticipated disturbances in advance by PG&E and/or other agencies and organizations. The temporary construction associated with Proposed Project (within the FERC boundary) and the alternatives (within the three activity areas) would not substantially disrupt nearby land uses; therefore, the impacts would be **less than significant**.

Impact LU-2: Implementation of Proposed Project or alternatives could conflict with adjacent land uses.

Proposed Project

Implementation of Proposed Project would not conflict with adjacent land uses associated with Lake Almanor or Butt Valley reservoir. Implementation of the flow regime incorporated into Proposed Project and the alternatives would increase the minimum flow release in the Seneca reach from 35 cubic feet per second (cfs) to the flow schedule shown in Table 3-1. In the Belden reach, the current FERC license requires the release of 140 cfs during the trout fishing season (last Saturday in April to Labor Day) and the release of 60 cfs for the remainder of the year. These flows would increase in most months, as shown in Table 3-2. These flow increases in the Seneca and Belden reaches could have an effect on pedestrian and/or vehicular access along and across these channels for various authorized land use activities such as mining. Recreational boating opportunities would be increased as a result of the increases in flows.

Increased flows in the Seneca reach as part Proposed Project would have an effect on the ability to ford the river during these higher flows. Mining claims are specifically addressed under Impact LU-4, and the ability to ford the river would not significantly impact other land uses. As a result, the Project impact to surrounding land uses would be **less than significant**.

Alternatives 1 and 2: Thermal Curtains

Under Alternatives 1 and 2, installation of a thermal curtain around the Prattville intake at Lake Almanor would reduce the amount of lake area available for recreational uses on the water by about 16 acres. It would not conflict with the nearby residential and commercial uses, but is adjacent to the Marvin Alexander day use area. The curtain would be entirely under water, with bin walls connecting it to the shore and buoys and floatable tanks with signs and safety lights visible. The location of the curtain and associated structures would disrupt current activities along the shoreline within a small portion of this activity area, and access to the adjacent Marvin Alexander day use area[24] may be subject to short restrictions.

Contact and non-contact water recreational activities would be excluded from the area immediately surrounding the thermal curtain and related facilities, which would be signed and marked to prevent accidents. The area excluded from recreational use by the thermal curtain would be approximately 16 acres or 0.6 percent of the total lake surface. Also, the thermal curtain is not expected to substantially impair the use of the commercial marinas near the Prattville intake because boaters using these facilities would have adequate lake surface area to safely use the facilities under variable climatic conditions (e.g., wind direction and lake levels).

[24] This day use area was constructed by PG&E as a condition of the 2004 Settlement Agreement after the Notice of Preparation for this CEQA process was submitted to the State Clearing House on August 30, 2005.

The thermal curtain around the Caribou intakes would not affect land uses at Butt Valley reservoir or from the adjacent shoreline in the vicinity of Butt Valley dam. Boating access is currently limited near the intakes and the dam, and there is minimal recreational use in the vicinity of the dam. The primary use in the upland portion of this activity area is open space.

Although construction of a thermal curtain at the Prattville intake may require temporary restrictions and/or seasonal closure of the Marvin Alexander day use area, the timing and nature of these impacts on land use would be **less than significant**.

Alternatives 1 and 3: Increased flow on the Seneca Reach

Alternatives 1 and 3 include increased flows from Canyon dam up to 250 cfs from June 16th to September 15th. Modifications to Canyon Dam to allow for the increased flows would be entirely under water and would not involve new or expanded permanent facilities on the land or near existing recreational uses in the vicinity of Canyon dam. Periodic, temporary closures of the Canyon dam boat ramp and adjacent shoreline access would occur, but construction schedules will be developed to ensure that alternative launch and access locations are available for recreational users.

Alternatives 1 and 3 would result in flow up to 250 cfs, which is higher than the proposed project's 150 cfs. Access to mining claims is specifically addressed in this section under impact LU-4. Other surrounding land uses - agriculture, forestry, and habitat conservation - would not be impacted by the increased flows or other activities under Alternatives 1 and 3, and therefore the impact to adjacent land use would be **less than significant**.

Impact LU-3: Proposed Project or the alternatives could cause a significant environmental impact due to a conflict with the goals, policies, and objectives of the Plumas County General Plan, County Zoning Ordinances, and the Lassen and Plumas National Forest LRMPs.

Proposed Project

The UNFFR Project area falls within the jurisdiction of Plumas County and both the Lassen and Plumas National Forests and is subject to their respective plans. The analysis of this impact as it relates to the proposed project is discussed in detail under Land Management Plans in section 3.3.6.1 of the Final FERC EIS and is hereby incorporated by reference. As discussed under Impact LU-2, Proposed Project would result in changes to the flow release schedule for both the Seneca and Belden reaches. These changes are not inconsistent with the General Plan or the two LRMPs; in fact, both the County and the USFS were signatories to the 2004 Settlement Agreement. Compliance with these plans will ensure that any impacts to adjacent land uses would be **less than significant**.

Alternatives 1 and 2

A thermal curtain at the Prattville intake would change the use of about 20 acres of Lake Almanor available for recreational uses. Around the Prattville intake, the lake is zoned L and the adjacent upland area is zoned Rec-1. The purpose of the L zone is to provide for the use and management of water resources. Hydroelectric generation is an allowed use within the L zone. Public utility facilities are permitted in the Rec-1 zone subject to the issuance of a special use permit from the County. A thermal curtain would be consistent with the land use and zoning designations. FERC could require PG&E to obtain a special use permit from the County for facilities such as the bin walls in the Rec-1 zone on the shore.

Modifications to the Canyon dam intake structure under Alternative 1 would not require any changes to the portion of the structure above the water surface or the use of the dam or result in permanent changes to surrounding land uses. The function and character of the intake structure would remain consistent with the goals, policies, and objectives of the General Plan and County zoning ordinances. Short-term construction activities in the vicinity of the Canyon dam boat ramp would be consistent with zones L and Rec-1. Changes in flow releases to the Seneca and Belden reaches under either Alternative 1 or 2 would be consistent with the General Plan and the Lassen and Plumas National Forests' LRMPs.

No activities would occur at Canyon dam under Alternative 2.

Around the Caribou intakes, Butt Valley reservoir is zoned L with an FP Combining zone, and the adjacent upland area is zoned TPZ and R-10. Hydroelectric generation is an allowed use within the L zone. A thermal curtain would not conflict with the purpose of the FP Combining zone of regulating development to achieve reasonable safety from flood hazards. No changes in land use would occur within the TPZ other than construction of about 1,200 feet of access road necessary to install and maintain a thermal curtain. Within the R-10 zone, public utility facilities and limited electrical generation are permitted subject to the issuance of a special use permit. A thermal curtain would be consistent with the land use and zoning designations, but FERC could require PG&E to obtain a special use permit from the County for facilities such as bin walls in the R-10 zone on the shore.

Both Alternatives 1 and 2 would result in a **less-than-significant** impact related to consistency with the goals, policies, and objectives of the General Plan, County Zoning Ordinances, and the Lassen and Plumas National Forests' LRMPs.

Alternative 3

Alternative 3 consists of the same modifications as Alternative 1 to the Canyon dam outlet structure and subsequent release of 250 cfs from June 16 through September 15. This alternative would result in a **less-than-significant impact** related to consistency with the goals, policies, and objectives of the General Plan, County Zoning Ordinances, and the Lassen and Plumas National Forests' LRMPs.

Impact LU-4: Implementation of Proposed Project or the alternatives could disrupt authorized locatable mining activities in the Seneca and Belden reaches of the North Fork Feather River.

Proposed Project and Alternatives 1, 2, and 3

Proposed Project and the alternatives would result in increased releases into the Seneca and Belden reaches, as described under Impact LU-2. Alternatives 1 and 3 would include additional releases of up to 250 cfs through Canyon dam into the Seneca reach from June 16 to September 15. Increased flows would raise water levels in the Seneca and Belden reaches during certain periods of the year and could disrupt placer mining activities in the Seneca reach that have USFS-approved operating plans, or mining operations on private lands have been approved by Plumas County. Higher water levels and increased velocities in the Seneca reach and to a lesser extent the Belden reach could impair the ability of some miners to access and mine these sites along the reaches. Some miners may need to adjust their mining schedules to avoid the periods of increased releases. However, increases in flows may result in beneficial conditions for certain types of placer mining activities.

On October 13, 2016, USFS and State Water Board staff conducted a site visit to look at locations used by miners to access and develop their claims throughout the Seneca reach. Two claimants were contacted in 2020 to discuss access to their claims. One claimant confirmed that he could still ford the river in the spring of 2019 when flows were up to 1200 cfs. The Geomorphic Study (Appendix E3.1-12 of the FLA) supports this finding as several cross sections had depths less than 2 feet at measured flows of 700 cfs.

Typically, mining activity is limited along this reach and occurs primarily between about May and October, but current USFS and Plumas County authorizations do not have seasonal restrictions. Occasional disruption of mining along the Seneca and Belden reaches would not result in the loss of availability of an important mineral resource because very few active mining properties would be negatively affected, the disruptions would be short term, and the mineral resource would still be available during lower flow periods. Under The Proposed Project and Alternatives 1, 2, and 3, the impact on the availability of locatable mineral resources would be **less than significant**.

5.3 Geology, Geomorphology, and Soils

This section describes the geology, fluvial geomorphology, geologic hazards, and soils in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts related to these resources.

The potential impacts of the Proposed Project were evaluated in the *Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project* issued by FERC (FERC 2005). As allowed under Section 15150 of the CEQA Guidelines, this Revised Draft Environmental Impact Report (RDEIR) incorporates by reference sections of the Final FERC EIS that analyze the impacts of UNFFR Project operations on geology, geomorphology, and soils. Since Alternatives 1, 2, and 3 were not analyzed in the FERC EIS, they are discussed in this section of the RDEIR with respect to geology, fluvial geomorphology, and soils.

Environmental Setting

Geology Setting

The North Fork Feather River watershed is commonly referenced as the boundary between two geomorphic provinces: the Cascade Range Province and the Sierra Nevada Province. The Cascade Range Province to the north is characterized by volcanoes, while the Sierra Nevada Province to the south is known for large granitic intrusive bodies surrounded by metamorphic rocks of marine origin (Earthworks Restoration Inc. and CH2M Hill 2007). The mountain ranges within these two provinces form a nearly continuous barrier between the Great Basin and the Central Valley of California. In the North Fork Feather River canyon, rocks of the southern Cascade Range overlay the much older rocks of the Sierra Nevada. This geologic contact is exposed at a number of locations, including along the Belden reach, downstream of Oak Flat powerhouse.

The history of volcanic activity in the southern Cascade Range dates back to the Miocene epoch (26 million years ago) and continues into the Holocene epoch (recent years). Mount Lassen, the southern termination of the Cascade Range, is situated approximately 25 miles northwest of Lake Almanor. Mount Lassen’s most recent eruptive period began in 1914 and lasted several years; the largest eruption was in 1915, when Mount Lassen exploded, sending pumice and rock fragments down its northeastern slope and raining ash as far as 200 miles to the east. This eruption created the larger and deeper of the two craters seen today near the volcano’s summit.

Rocks in the southern Cascade Range are Pliocene to Holocene in age (less than 6 million years old) and represent episodic volcanic activity, including basalt flows, volcaniclastic sediment deposits (e.g., tuff, breccia, volcanic ash), and localized cinder and hydrothermal deposits (California Division of Mines and Geology 1966). Sedimentary (e.g., glacially derived tills and moraines), lakebed, and floodplain deposits are also evident throughout the southern Cascade Range.

The Sierra Nevada was formed by the intrusion of granitic plutons into older Paleozoic and Mesozoic metavolcanic and metasedimentary rocks approximately 77 to 225 million years ago (California Division of Mines and Geology 1966). In a plate tectonic setting, the older Paleozoic and Mesozoic formations represent a series of oceanic volcanic arcs similar to what is today found in the South Pacific (Dickinson 2008, Ernst et al. 2008, Day and Bickford 2004). Over geologic time, these volcanic arcs moved by plate tectonics until they individually accreted to (glued to) the proto-North America continent Laurentia. These rocks are found in the North Fork Feather River watershed and are called the Feather River terrane. (A terrane is a geological body that has formations and complexes that are geologically similar.) The Feather River terrane is thought to be a tectonic fossil of these volcanic arcs.

This tectonic evidence is similar to what is found in the eastern Klamath terrane, specifically within the Trinity subterrane. In the past decade, additional evidence substantiates a correlation between the Sierra Nevada and the Klamath Mountains Provinces (Snoke and Barnes 2006), and the Feather River terrane is thought to be an extension of the Trinity subterrane located within the eastern Klamath terrane to the northwest near Redding. The Feather River terrane continues southwards, ending about 90 miles south (Hacker and Peacock 1990).

The intrusive process resulted in the local uplift and deformation of the overlying older rock, exposing the underlying granitic rocks. Continued uplift and erosion, accompanied by localized volcanic activity and extensive alpine glaciation during the Pleistocene (3.6 million years ago), created the present pattern of deep-walled valleys that characterize the Sierra Nevada. Massive Mesozoic granitic outcrops form the core of these mountains and are widely recognized for their dramatic relief and erosive nature.

Most of the rocks in the Sierra Nevada are much older than those found in the southern Cascade Range immediately to the north. Over time, the topography of the Sierra Nevada has been heavily influenced by multiple episodes of alpine glaciation, whereas the southern Cascade Range displays less evidence of alpine glaciation. The erosive nature and age of the Sierra Nevada rocks have resulted in locally extensive sedimentary deposits, including large deposits of glacial outwash and lakebed sediments associated with periodic episodes of glacial advance and retreat. In some locations, the boundary between the two mountain ranges is covered by deep volcanic deposits, and in other areas it is overlain by extensive glacial deposits (California Geological Survey 2002).

The landscape and geomorphic features evident in the general vicinity of the UNFFR Project are predominantly the result of volcanic activity, with some glacial influences. Downstream of Belden forebay, large outcrops of granitic rocks are exposed along the North Fork Feather River canyon. The rock formations around the northern, western, and southwestern sides of Lake Almanor consist of more recent Tertiary and Quaternary volcanic flows with minor amounts of volcanic ash and other materials formed by volcanic activity (e.g., pyroclastic flows or rock). On the northeastern, eastern, and southern shores, Paleozoic metasedimentary rocks are exposed, with minor amounts of metavolcanics (California Public Utilities Commission 2000). Alluvial deposits, including floodplain and lakebed sediments, overlay metamorphic rocks along the northwestern, southern, and eastern shores of Lake Almanor. Butt Valley reservoir and the surrounding area are underlain by Mesozoic metamorphic rocks of marine origin. These rocks are also exposed in the vicinity of the Caribou facilities and the Belden powerhouse near the confluence of Yellow Creek with the North Fork Feather River.

Geomorphology

The terrain in the North Fork Feather River watershed is as complex as the underlying geology. While the gentle slopes in the vicinity of Lake Almanor are controlled by the underlying volcanic terrain and deep soils of the southern Cascade Range, the steep, highly dissected terrain found along the Seneca and Belden reaches is indicative of metamorphic rocks of the Sierra Nevada. The Butt Creek watershed upstream of Butt Valley dam is representative of the southern Cascade Range; however, a noticeable change in slope and exposed rock is evident along lower Butt Creek below the dam.

Similar to the topographic distinctions observable in the uplands, river and stream channels in the general vicinity of the UNFFR Project exhibit characteristics representative of the two geomorphic provinces. Compared to channels in the Sierra Nevada, southern Cascade Range channels typically have lower stream gradients, smaller substrate sizes, higher base flows, and lower peak flows. They tend to rely more on spring flow than surface runoff due to the porosity of volcanic rocks. The role of large woody material also varies between channels in these two geomorphic provinces.

Fluvial erosion and mass wasting in the North Fork Feather River canyon (e.g., landslides, rockslides) are the main geomorphic processes below the Canyon and Butt Valley dams (USDA Forest Service 1997). Surface water runoff is rapid and flows primarily into the North Fork Feather River or its tributaries. Historically, streams flowing through Big Meadows (inundated by Lake Almanor) and Butt Valley followed shallow meandering channels through broad floodplains covered with riparian vegetation. Floodwaters would quickly overtop the banks of these channels and deposit sediment on the valley floor. Under present conditions, however, land use changes, including the conversion of valleys to reservoirs, have not only inundated large reaches of the North Fork Feather River and tributaries such as Butt Creek, but have changed the form and function of the North Fork Feather River in the Seneca and Belden reaches as well as downstream of the UNFFR Project.

Geomorphic Classification

Pacific Gas and Electric Company (PG&E) classified the North Fork Feather River and lower Butt Creek using the Level II classification process of the Rosgen Channel Classification System (Rosgen 1996). The Rosgen system uses five primary channel parameters to characterize the form and function of streams and rivers:

- Entrenchment describes the degree of vertical containment of a channel within its valley. This attribute is used to describe how a channel may enlarge its width during high flow events.
- Width-depth ratio is an index of the shape of the channel cross-section and is computed as the ratio of the bankfull width to mean bankfull depth. The

channel shape affects the distribution of energy (e.g., velocity) within the channel and influences the efficiency of the channel in transporting sediment.

- Sinuosity characterizes the planform (how the channel is represented on a map) and is calculated as channel length to valley length.
- Water surface slope typically is expressed as channel gradient. It is determined along the longitudinal profile of the channel by measuring the differences in water surface elevation over a length of channel. To varying degrees, the gradient of a channel represents the energy available to the channel and is directly related to channel hydraulics.
- Bed particle size influences the planform, cross-section shape, and longitudinal profile of the channel. It also affects the rate of sediment transport and the overall stability of the channel in response to changes in flow or sediment regimes.

In support of the UNFFR Project license application, a Level II geomorphic classification study was conducted for the North Fork Feather River and lower Butt Creek (Pacific Gas and Electric Company 2002). Fourteen study sites were assessed in the field: seven sites in the Seneca reach, five sites in the Belden reach, and two sites on lower Butt Creek. One Level II study site was selected to represent the channel geomorphic conditions for each probable channel type in the Seneca, Belden, and lower Butt Creek reaches. The resulting classifications are shown on Figure 5.3-1 at the end of this section. The geomorphic characteristics of each study site are presented in Table 5.3-1 through Table 5.3-3.

Hydraulic Characterization

Hydraulic conditions at six sites along the North Fork Feather River were evaluated in conjunction with the geomorphic characterization. The locations of these sites are shown on Figure 5.3-1 (Sites B1–B3 and S1–S3). Due to the short reach of lower Butt Creek, the study did not evaluate sites on lower Butt Creek.

The hydraulic study focused on estimating the magnitude of flows required to mobilize bed material and to transport sediments delivered to the North Fork Feather River channel. In part, this study was intended to evaluate the range of flows required to modify the amount and location of riparian vegetation that occurs within and adjacent to the channel. This study integrated Rosgen Level II classification data, hydraulic modeling, and values from empirically based sediment transport equations. The study included site identification, field data collection, observation during controlled releases of up to 700 cubic feet per second (cfs) (concurrent with aquatic habitat studies) during 2001, development and calibration of a hydraulic model and model runs of a range of flows to estimate hydraulic conditions, and, ultimately, comparison of modeled hydraulics with calculated requirements to mobilize the observed bed material. The hydraulic study also considered the results of tracer gravel and Belden forebay sedimentation studies.

Within the Seneca and Belden reaches, the range of hydraulic conditions represented by each of the study sites is highly variable. As a general approximation, the outcome of the hydraulic study indicates that 1,600 to 3,000 cfs is the range of flows necessary to mobilize the median-size bed material from the representative sites within the Seneca and Belden reaches (Table 5.3-4). Tracer gravel studies within these reaches suggest that small to moderate size gravels (as large as 50 mm) were generally mobilized at representative locations during the 700 cfs test releases. The study results also indicate that while gravel-sized material may be mobilized frequently (every other year) in the Belden reach, the gaps in the hydrologic record for the Seneca reach inhibit the ability to determine the frequency of gravel transport and mobility for that reach. The study also concluded that cobble-sized material (90 mm to 226 mm) may be mobilized and transported within the Seneca and Belden reaches with flows of approximately 2,300 cfs.

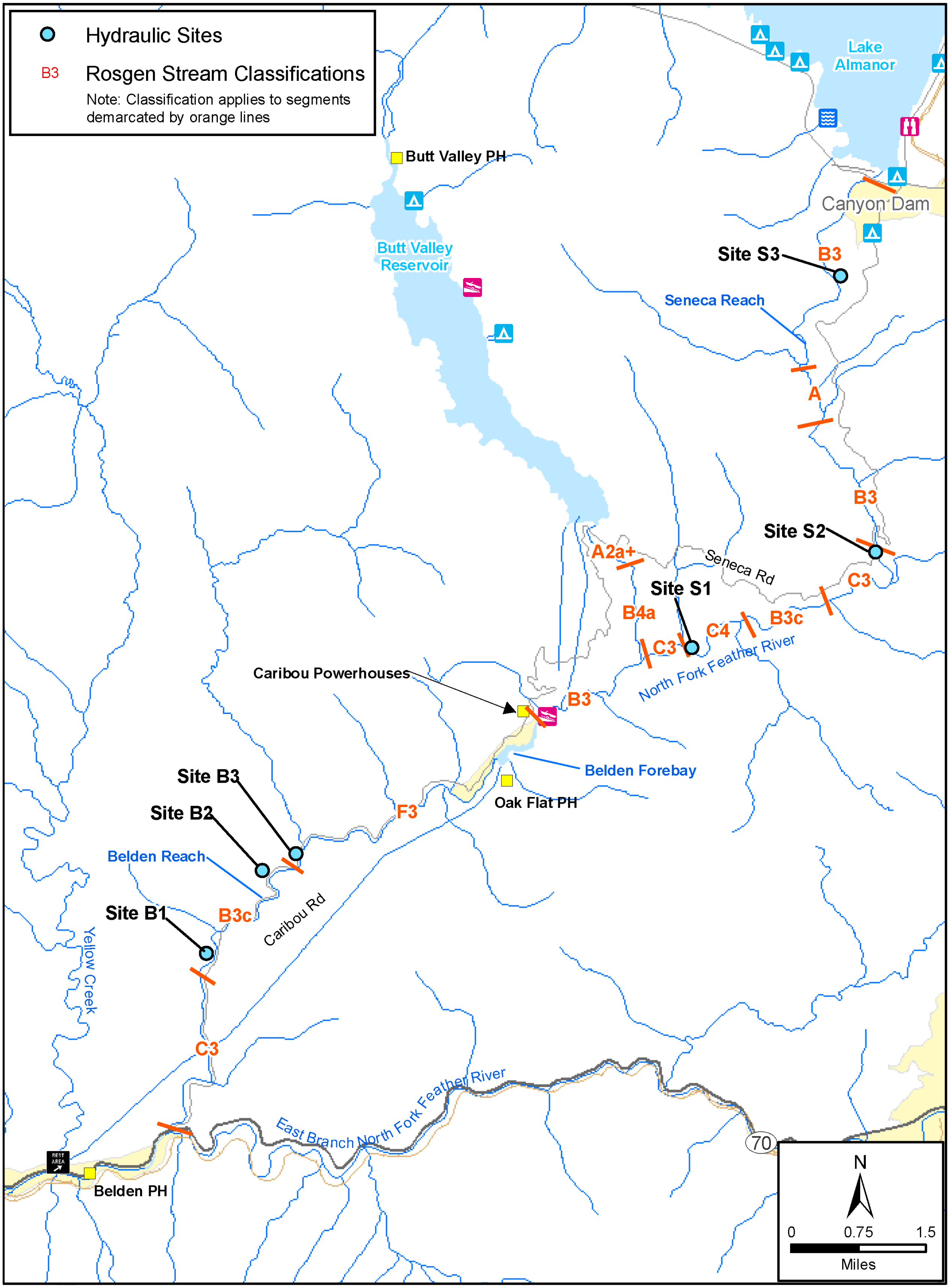

Figure 5.3-1 Geomorphic Classifications and Hydraulic Sites

Table 5.3-1 Modern Geomorphic Parameters at Sampling Sites in the Seneca Reach

Location	Upstream of Caribou Power-house	China Bar	China Bar	Up-stream of Muggins Creek	Seneca Resort	Seneca Resort	Down-stream of Salmon Falls	Up-stream of Large Talus Slope	Skinner Flat	Skinner Flat	Skinner Flat
River Distance (1000's of feet)	**49.3**	**56.5**	**57**	**62.3**	**75.4**	**75.5**	**84.5**	**94.3**	**96.93**	**96.97**	**97**
Rosgen Level II Type	B3	C3	C4	B3c	C3	C3	B3	B3	B3	B3	B3
Bankfull Width (ft)	57	55	119	68	116	98	42	67	108	84	97
Mean Bankfull Depth (ft)	1.8	2.4	1.60	2.2	1.7	1.00	1.9	2.20	3.00	2.10	2.40
Bankfull Area (ft^2)	101	133	191	147	195	101	81	149	325	180	230
Width/Depth Ratio (BW/BD)	32	23	74	31	68	98	22	31	36	40	40
Slope (%)	2.0	1.50	1.50	1.50	1.10	1.10	3.50	3.00	3.90	3.90	3.90
D50 (mm)	120	**	22	64	85	92	160	175	220	**	**
D50 (class)	Small Cobble	Coarse Gravel **	Coarse Gravel	Small Cobble	Small Cobble	Small Cobble	Large Cobble	Large Cobble	Large Cobble	Large Cobble **	Large Cobble **

Source: Pacific Gas and Electric Company 2002

*River stations measured in an upstream direction from the confluence of the North Fork Feather River with the East Branch of the North Fork Feather River.

**No particles were sampled in the field. Particle class based upon visual estimates.

Table 5.3-2 Modern Geomorphic Parameters at Sampling Sites in the Belden Reach

Location	Upstream of Siphon Crossing (9,200 ft*)	North Fork Camp-ground (13,300 ft)	Queen Lily Camp-ground (21,500 ft)	Queen Lily Camp-ground (21,600 ft)	Down-stream of Mosquito Creek (24,140 ft)	Down-stream of Mosquito Creek (24,200 ft)	Down-stream of Caribou Power-house (36,500 ft)
Rosgen Level II Type	C3	B3c	B3c	B3c	F3	F3	F3
Bankfull Width (ft)	60	70	45	49	74	76	92
Flood Prone Width (ft)	182	136	94	86	90	88	102
Mean Bankfull Depth (ft)	2.9	2.90	2.2	2.10	1.00	.70	1.30
Bankfull Area (ft^2)	172	203	101	102	71	56	116
Width/Depth Ratio (BW/BD)	21	24	21	23	74	108	70
Slope (%)	1.00	0.70	0.70	0.70	1.50	1.50	1.70
D50 (mm)	75	71	155	93	90	74**	140
D50 (class)	Small Cobble	Small Cobble	Large Cobble	Small Cobble	Small Cobble	Small Cobble	Large Cobble

Source: Pacific Gas and Electric Company 2002

FPd = flood prone width BW = bankfull width BD = bankfull depth

*River stations measured in an upstream direction from the confluence with the North Fork Feather River and the East Branch of the North Fork Feather River.

**Composite D50 pebble count result from left side (55mm) and right side (90mm).

Table 5.3-3 Modern Geomorphic Parameters at Sampling Sites in Lower Butt Creek

Location	Upstream of Confluence with the North Fork Feather River (Site 800)	Downstream of Butt Valley Dam (Site 10,000)
Rosgen Level II Type	B4	A2a+
Bankfull Width (ft)	25	29
Flood Prone Width (ft)	54	43
Mean Bankfull Depth (ft)	1.1	1.2
Bankfull Area (ft^2)	27	34.5
Width/Depth Ratio (BW/BD)	22.7	24.2
Slope (%)	3.5	12.7
D50 (mm)	45	12
D50 (class)	Very Coarse Gravel	Medium Gravel

Source: Pacific Gas and Electric Company 2002

Table 5.3-4 Discharge Predicted to Initiate Motion of the Median Bed Particles

Site	Cross Section	D50 (mm)	Shields Curve[1]	Andrews Equation[2]	Rosgen	M-PM
B1	1	256[d]	—[c]	n.d.	—[c]	n.d.
	2	72[a]	1,600	n.d.	2,600	n.d.
	3	72	2,700	2,300	4,200	—[c]
	3	48[a]	500/1,400	700	2,400	—[c]
	4	128[d]	6,000[b]	n.d.	—[c]	n.d.
B2	1	256[d]	—[c]	n.d.	—[c]	n.d.
	2	160[a]	6,000[b]	n.d.	—[c]	n.d.
	3	60	600	1,500	1,000	3,400
	3	94[a]	1,700	3,500	2,900	—[c]
	4	90[d]	1,600	n.d.	2,300	n.d.
B3	1	256[d]	4,800	n.d.	—[c]	n.d.
	2	48	250	250	450	600
	2	56[a]	400	400	600	650
	2	90[a]	800	700	1,700	2,600
	3	91	6,000[b]	2,500	—[c]	—[c]
	3	55[a]	2,900	1,400	6,000	—[c]
	4	32[d]	700	n.d.	800	n.d.
S1	1	92	2,300	n.d.	1,900	n.d.
	2	78	—[c]	—[c]	3,000[b]	n.d.
	3	64[d]	—	n.d.	2,100	n.d.
	4	78	3,500[b]	700	2,600[b]	—[c]
	4	22[a]	400	100	200	—[c]

Table 5.3-4 Discharge Predicted to Initiate Motion of the Median Bed Particles

Site	Cross Section	D50 (mm)	Shields Curve[1]	Andrews Equation[2]	Rosgen	M-PM
S2	1	150	—[c]	n.d.	—[c]	—[c]
	1	120[a]	—[c]	n.d.	—[c]	—[c]
	1	84[a]	—[c]	n.d.	—[c]	—c
	2	128[d]	2,000	1,300	1,500	n.d.
	3	80	1,600	1,400	1,300	—c
S3	1	362[d]	2,400[b]	n.d.	—[c]	n.d.
	2	220[a]	2,300[b]	n.d.	3,000[b]	n.d.
	3	362[d]	2,600[b]	n.d.	—[c]	n.d.
	4	362[d]	1,700	n.d.	2,500	n.d.

Source: Pacific Gas and Electric Company 2002

Notes: Discharges in cfs.

n.d. = No data available for calculation of initiation motion with this method

B = Belden; S = Seneca

[1] Value of 0.47 is commonly used for bed-load transport equation.

[2] Value of 0.03 used as indicator of incipient motion for gravel and cobble bed streams.

[a] D50 determined from pebble count. All other median particle sizes are based on bulk sampling of surface material.

[b] Estimated based on extrapolation of the Shields curve.

[c] Discharge needed to initiate motion is significantly greater than highest flow modeled and could not be extrapolated.

[d] D50 estimated from visual observations during cross-section surveys and photographs.

Geologic Hazards

Geologic hazards in the UNFFR Project vicinity are typically associated with seismic or volcanic activity. Hazards associated with geologic processes include liquefaction, seiches, and erosion. This section provides an overview of geologic hazards that may occur in the UNFFR Project vicinity.

Seismic Activity

No significant earthquake faults have been documented in the UNFFR Project vicinity. The closest historic fault (200 years or less in age) is approximately 55 air miles south of Lake Almanor (measured in Google Earth). This historic fault is the Cleveland Hill fault in the Foothills Fault System. Approximately 90 air miles to the east (measured in Google Earth) is the historic Amadee fault zone on Honey Lake. Historic refers to the fault being active due to historically recorded seismic events. Known faults within the general vicinity of the UNFFR Project are provided in Table 5.3-5 below.

Table 5.3-5 UNFFR Project Area Faults

Fault Name	Fault Zone	Age	Location
Unnamed	Unnamed	Quaternary (age undifferentiated last 1.6 million years)	Warner Valley in the headwaters area
Unnamed	Unnamed	Quaternary (age undifferentiated last 1.6 million years)	Headwaters area southwest of Kelly Mountain
Stover Mountain Fault	Butt Creek Fault Zone	Late Quaternary (last 700,000 years)	Headwaters area
Unnamed	Unnamed	Quaternary (age undifferentiated last 1.6 million years)	Headwaters area near Ice Cave Mountain
Unnamed	Butt Creek Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Headwaters area near North Stover Mountain
Stover Mountain Fault	Butt Creek Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Headwaters area near Stover Mountain
Unnamed	Lake Almanor Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Headwaters area near Chester
Unnamed	Lake Almanor Fault Zone	Late Quaternary (last 700,000 years)	Headwaters area near Chester
Unnamed	Butt Creek Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Lake Almanor west shore
Rock Lake Fault	Butt Creek Fault Zone	Late Quaternary (last 700,000 years)	Lake Almanor west shore
Almanor Fault	Almanor Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Almanor peninsula
Keddie Ridge Fault	Keddie Ridge Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Lake Almanor northeast shore

Table 5.3-5 UNFFR Project Area Faults

Fault Name	Fault Zone	Age	Location
East Shore Fault	Almanor Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Lake Almanor east shore
Mule Shoe Mine Fault	Butt Creek Fault Zone	Late Quaternary (last 700,000 years	Lake Almanor west shore and south
Indian Valley Fault	Mohawk Valley Fault Zone	Holocene (last 11,700 years)	Indian Valley south from Lake Almanor
Crablouse Ravine Fault	Crablouse Ravine Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Near Belden
Haskins Valley Fault	Haskins Valley Fault Zone	Quaternary (age undifferentiated last 1.6 million years)	Bucks Lake south shore
Camel Peak Fault	Camel Peak Fault Zone	Pre-Quaternary	Camel Peak
Big Bend Fault	Big Bend Fault Zone	Pre-Quaternary	Big Bend Mountain
North Table Mountain Fault	North Table Mountain Fault Zone	Pre-Quaternary	Lake Oroville west shore

Source: **http://maps.conservation.ca.gov/cgs/fam/**

The UNFFR Project area is bounded on the northeast in and near Lake Almanor by the western extension of the Walker Lane component of the Basin and Range Physiographic Province and to the southwest in the Lake Oroville area by the Foothills fault zone. Both areas are seismically active with the most recent event occurring in 1975 on the Cleveland Hill Fault in the Foothills fault zone. A late Holocene event occurred within the last 200 years occurred on the Amadee Fault in Honey Lake. Both of these late Holocene faults lie outside the UNFFR Project area, approximately 55 air miles to the southwest from Lake Almanor for the Cleveland Hill Fault and approximately 90 air miles to the east for the Amadee Fault.

Indian Valley Fault is located just south of Lake Almanor and lies within the UNFFR Project area. The last movement occurred here sometime during the last 11,700 years; it therefore is not considered to be a historic fault. This tectonic feature is part of the Mohawk Valley fault zone, the western-most extension of Walker Lane in the Basin and Range Physiographic Province (Moores et al. 2006). Although Indian Valley is located well within the Sierra Nevada

Physiographic Province, it exhibits Basin and Range tectonics. Ninety miles east of Lake Almanor, within the Basin and Range Physiographic Province, are the late Holocene Honey Lake faults (e.g., Amadee Fault), which have a slip rate of 1.1 to 2.6 millimeters per year (0.04 to 0.10 inches per year). The northwest trend of these fault zones (i.e., Mohawk and Amadee fault zones) is also exhibited by the Quaternary Almanor fault zone and late Quaternary Butt Creek fault zone that define the basin in which Lake Almanor sits. Collectively, these northwest-trending Quaternary to late Holocene (200 years or less) fault zones are within the Northern California Shear Zone that extends northward into Mounts Lassen and Shasta of the Cascades Physiographic Province (Wesnousky 2005).

Although located outside of the UNFFR Project Area, Lake Oroville captures flow from the North Fork Feather River watershed. Lake Oroville lies within the Foothills fault zone. In 1975, a magnitude 5.7 seismic event occurred on the Cleveland Hills Fault in this fault zone. Previously three historic seismic events of magnitude 5.0 to 5.9 have occurred near Lake Oroville: two in 1909 60 kilometers (km) (38 miles) east of Lake Oroville and the other in 1940 60 km north of Lake Oroville. All three seismic events occurred outside of the UNFFR Project area. The Foothills fault zone is geologically old comprising an assortment of tectonic remnants from the Mesozoic Era when micro-plates were attached to the North American Plate. Therefore, it is not common to have seismic events of any consequence occurring in this fault zone. This has led to an interesting hypothesis testing of dam-reservoir weight-causing seismic events; reservoir water weight appears to contribute to seismic events (Toppozada and Morrison 1982).

Volcanic Activity

The UNFFR Project area and the surrounding vicinity are considered to be volcanically active; the last volcanic eruption was in 1915 when Mount Lassen erupted (Earthworks Restoration Inc. and CH2M Hill 2007). Active geothermal features associated with the greater Lassen hydrothermal system are found in the upper reaches of the North Fork Feather River watershed, and signs of potential volcanic activity continue to be exhibited in Lassen Volcanic National Park in the form of steam vents, hot springs, and bubbling pools of mud. An eruption of Mount Lassen could trigger landslides, release toxic gases, and produce pyroclastic flows that could quickly envelop areas miles from the actual volcano. The Chester/Lake Almanor region could be subject to lahars (landslides or mudflows of volcanic debris) and secondary flooding associated with volcanic activity (United States Geological Survey 2005).

Liquefaction

Liquefaction is a process whereby water-saturated granular soils are transformed to a liquid state during ground shaking. Loose to medium dense sands, gravels, and silts occurring below the water table are prone to liquefaction. The soils bordering Lake Almanor, including those within the three activity areas, are predominantly alluvial; lakebed deposits occur on the bottom of the lakes. These soils have the potential to undergo liquefaction; however, a detailed analysis of the potential for liquefaction was not conducted because the activities under consideration in these areas are not expected to affect the potential for liquefaction or be affected by liquefaction if it were to occur.

Seiches

A seiche is an oscillation or standing wave in a body of water confined in a basin. Seiches commonly arise from a sudden local change in atmospheric pressure accompanied by wind and occasionally tidal currents. They can also occur as a result of ground shaking caused by earthquakes or by the force of large landslides or debris flows entering a water body. Water bodies in the UNFFR Project capable of experiencing a large-scale seiche include Lake Almanor and Butt Valley reservoir. The hazards associated with a seiche would involve the overtopping or possible failure of Canyon and Butt Valley dams, with resulting modifications to the flow regime (i.e., flooding) of the Seneca and Belden reaches and potentially the North Fork Feather River downstream of the UNFFR Project. However, the likelihood of such an event is considered small.

Erosion

Shoreline erosion is evident along the southeastern shore of Lake Almanor near Canyon dam and along the western shore of the Almanor peninsula (Federal Energy Regulatory Commission 2005). A shoreline erosion study conducted by PG&E in 2000 found that approximately 7 percent of the reservoir's shoreline has undergone substantial erosion, as evidenced by slope scars on the shoreline and sloughing of material into the water. Rip-rap has been installed in some areas to reduce the effects of erosion.

Wind-generated waves and boat wakes have eroded steeper parts of the shoreline along the 4,500 foot contour (Lake Almanor's normal maximum water level is at 4,494 feet elevation (PG&E elevation datum), which could degrade water quality through turbidity and sedimentation as well as jeopardize cultural, recreational, and other sites along the shoreline. Fluctuating lake levels also contribute to shoreline erosion. Operation of off-highway vehicles along the exposed shoreline of Lake Almanor contributes to ongoing localized erosion in some areas. Since about 2006, PG&E has been managing the reservoir levels consistent with its FERC application as described in section 3.4 of this RDEIR

Stetson Engineers inspected the Lake Almanor shoreline by boat on June 28, 2007 (Stetson Engineers 2010). The purpose of the field inspection was to evaluate shoreline conditions related to erosion activity from fluctuating lake levels. The field inspection focused on areas that demonstrated significant erosion, as documented during previous field inspections by PG&E. Locations of active shoreline erosion were consistent with those previously documented by PG&E. Based on the 2007 inspection, shoreline erosion has not changed, which is likely because of PG&E's consistent management of lake levels since the 2002 license application was submitted to FERC.

Highly weathered or decomposed granite, which is erodible and prone to landslides, is found along portions of the North Fork Feather River canyon (California Department of Water Resources 2007). Landslides and slumping have occurred in the UNFFR Project vicinity, specifically along the steeper slopes of the canyon downstream of the Seneca reach. During periods of heavy precipitation, the potential for pipes, penstocks and tunnels, and other UNFFR Project facilities to be affected by surface erosion, landslides, or slumping increases. In 1984, heavy precipitation triggered a large rock slide that resulted in significant damage to the Caribou No. 2 switchyard and to the Caribou No. 1 penstock. In 1997, the slope traversed by the Caribou No. 2 penstock suffered noticeable and potentially disastrous erosion.

Improvements have since been made to stabilize the area, and slope movement is monitored (California Public Utilities Commission 2000). The Belden 2 tunnel is known to have a crack, which is monitored regularly and repaired as needed (Pacific Gas and Electric Company 1999).

Some of the UNFFR Project features and facilities occupy National Forest System lands managed by the Lassen and the Plumas National Forests. The Land and Resource Management Plans for these forests acknowledge the geologic instability of the region. Therefore, United States Forest Service (USFS) roads, structures, and other management facilities and activities are designed to avoid unstable areas and prevent accelerated failure (USDA Forest Service 1988, 1992).

Soils

Most of the soils that underlie UNFFR Project facilities in the North Fork Feather River watershed are in the Skalan-Holland-Deadwood soil association, with some areas in the Skalan-Deadwood-Kistirn complex, Tahand-Baileycreek complex, or Kinkel-Deadwood complex. The soil types in the three activity areas[25] include the Skalan family and the Skalan-Holland association near the Prattville intake; the Holland family and the Tahand-Baileycreek complex near Canyon dam; and the Kinkel-Deadwood complex, Holland soils, and Basic-Skalan-Kinkel complex near Butt Valley reservoir. The dominant soils along the North Fork Feather River between Canyon dam and the Belden powerhouse include the Skalan-Holland-Deadwood association, Kinkel-Deadwood families, Skalan-Deadwood-Kistirn families, and rock outcrop-Dubakella family. Soils along the river channel are primarily associated with glacial, alluvial, and lacustrine environments.

The Skalan-Holland-Deadwood soil association occurs on gently sloping to very steeply sloping topography (USDA Forest Service 1994). The Skalan family of soils consists of deep, well to somewhat excessively drained soils on mountain side slopes, gently sloping hills, and undulating flats. Skalan soils are formed from weathered andesite and basalt flows and are typically composed of gravelly sandy loams. Depth to bedrock ranges between 34 and 60 inches, depending on slope and family association. On steeper slopes, the erosion hazard is moderate to high, but remains low on slopes of less than 35 percent. Skalan soils occur in the vicinity of the Prattville intake and Butt Valley dam on generally flat areas, as well as at other locations in the general vicinity of the UNFFR Project.

The Holland soils family consists of moderately deep to deep well-drained soils formed by weathered andesite and basalt flows (USDA Forest Service 1994). In a few small areas, Holland soils are formed from metasediments and diatomaceous earth. Holland soils are found on volcanic flats, ridges, and mountain side slopes. In the general vicinity of the UNFFR Project, Holland soils occur in association with the Skalan family and are limited to 0 to 35 percent slopes. The erosion hazard of these soils is low, and the depth to bedrock is typically greater than 60 inches. Holland soils occur in the vicinity of the Prattville intake, Canyon dam, and Butt Valley dam, as well as in other locations in the UNFFR Project vicinity.

[25] Activity areas encompass areas surrounding and portions of Lake Almanor and Butt Valley reservoir where construction and ground-disturbing activities have the potential to occur.

The UNFFR Project facilities occupy landscape positions that are underlain by soils of the Skalan-Deadwood association. Soils of the Deadwood family consist of about 30 percent of the association (USDA Forest Service 1994). Deadwood soils are found on some of the steeper slopes in the general vicinity of the UNFFR Project. These soils are shallow and well to somewhat excessively drained. Formed from weathered metasediments, Deadwood soils in the UNFFR Project are found on escarpments, mountain side slopes, and ridges. In the general vicinity of the UNFFR Project, Deadwood soils have a moderate erosion potential. The Kinkel-Deadwood association is found in the vicinity of Butt Valley dam.

The Tahand-Baileycreek complex soils are derived from volcanic rock or ash and occur on 5 to 30 percent slopes (Natural Resources Conservation Service 2009). They are well drained, with bedrock between 20 and 60 inches below the surface. The soils have a moderate erosion potential. The Tahand-Baileycreek complex occurs in the vicinity of the Canyon dam activity area.

Environmental Impacts and Mitigation Measures

Methodology

The analysis of geologic, geomorphic, geologic hazards, and soils impacts is based on a review of existing literature and data and reconnaissance-level assessments of the local geologic and geomorphic conditions in the UNFFR Project vicinity. The impact analysis addresses the potential for the Proposed Project and the alternatives to expose the public or structures to geologic or geomorphic hazards, disturb soil, or result in indirect soil-related effects from erosion or other disturbance.

Thresholds of Significance

Impacts associated with geology, geomorphology, or soils would be significant if Proposed Project or an alternative would:

- result in substantial erosion or loss of topsoil;
- expose people, structures, or critical facilities to major geologic hazards (including seismicity, landslides, or liquefaction); or
- expose people or structures to unstable or expansive soil conditions.

Impacts and Mitigation Measures

This section discusses the anticipated impacts related to geology, geomorphology, and soils associated with Proposed Project and the alternatives and identifies mitigation measures for significant impacts. Table 5.3-6 compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.3-6 Summary of Geologic, Geomorphic, and Soils (GGS) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact GGS-1: Construction activities associated with Proposed Project or the alternatives would cause erosion in disturbed areas, resulting in increased sedimentation in the North Fork Feather River and reservoirs.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact GGS-2: Implementation of Proposed Project or the alternatives could increase exposure of people and structures to geologic hazards, such as erosion, landslides, or rockslides.	Less than significant	Less than significant	Less than significant	Less than significant
Impact GGS-3: Implementation of Proposed Project or the alternatives could modify the channel morphology of the North Fork Feather River as a result of changes in flow.	Less than significant	Less than significant	Less than significant	Less than significant
Impact GGS-4: Implementation of the Proposed Project or the alternatives could affect the location and severity of shoreline erosion along Lake Almanor.	Less than significant	Less than significant	Less than significant	Less than significant

Impact GGS-1: Construction activities associated with Proposed Project or the alternatives could cause erosion in disturbed areas, resulting in increased sedimentation in the North Fork Feather River and reservoirs.

Proposed Project and Alternatives 1, 2, and 3

Pages 3-222 to 3-239 of section 3.3.5 of the Final FERC EIS contain descriptions of the 30 recreational facilities and improvements to be implemented under the Proposed Project. These descriptions, without FERC's environmental effects analysis, are hereby incorporated into this EIR by reference. The 30 recreational facilities and improvements make up the majority of the construction activities associated with Proposed Project and Alternatives 1, 2 and 3. The construction activities associated with these recreational facilities and improvements will be located near Lake Almanor, Butt Valley reservoir, and various reaches of the North Fork Feather River

Access to the Prattville intake and Canyon dam activity areas would be along existing roads, and staging areas would be located in previously disturbed areas, requiring little vegetation removal. However, the construction of thermal curtains at the Caribou intakes would require a new road to access the west shore of Butt Valley reservoir.

Construction activities associated with the Proposed Project and the alternatives have the potential to disturb soils and lakebed deposits to varying degrees. Under Proposed Project, the construction and/or improvement of recreational facilities, some of which would be in or adjacent to a water body, have the potential to cause erosion that could result in some increase in sedimentation to the receiving water. Under Alternatives 1 and 2, construction of thermal curtains and a new road along the west shore of Butt Valley reservoir would have the potential to cause erosion that could result in an increase in sedimentation to Lake Almanor and Butt Valley reservoir. Under Alternatives 1 and 3, construction associated with modifications to the Canyon dam outlet structure could cause erosion of lakebed or shoreline areas that could result in an increase in sedimentation to Lake Almanor and the Seneca reach.

Due to the location and nature and timing of each construction activity, the potential for The Proposed Project to cause erosion that could result in increased sedimentation in the rivers and reservoirs is **significant** without mitigation.

Mitigation Measures

Mitigation Measure GGS-1: Approval of Construction Activities by the State Water Board (Turbidity and Total Suspended Solids)

Prior to construction, PG&E shall submit detailed plans outlining all construction activities to the State Water Board for review and written approval. Each plan will contain a detailed description of the proposed activities, activity boundaries, potential environmental impacts, pollutants of concern, and selection of appropriate best management practices (BMPs) that will be implemented. The following measures, or their equivalent, shall be required for construction activities:

- Preservation of existing vegetation will be implemented, where appropriate, to minimize the amount of exposed erodible soil and to reduce the need for soil stabilization practices.
- Areas that will be disturbed as a result of construction activities will be stabilized with soil stabilization BMPs. Soil stabilization is a source control measure that is designed to keep soil particles from detaching and becoming transported in runoff. Stabilization practices may include both soft surface protection systems and hard surface protection systems. Soil stabilization BMPs implemented in the activity areas may consist of hydro-seeding, vegetation planting, mulch, geotextiles, plastic covers, erosion control blankets, and soil binders. Effective soil cover shall be provided for inactive areas and all finished slopes, open space, and backfill. Inactive

areas of construction are areas of construction activity that have been disturbed and are not scheduled to be redisturbed for at least 14 days.

- Sediment controls are structural measures that are intended to complement and enhance soil stabilization BMPs and reduce sediment discharges from construction activity. The sediment controls that will be considered for the construction activities associated with the UNFFR Project will be designed to intercept and filter out soil particles that may become detached and transported in runoff as a result of construction activities. Sediment control BMPs such as silt fences, fiber rolls, temporary flow conveyance systems, sediment basins, and check dams shall be considered. Effective perimeter controls will be required. All construction entrances and exits will be stabilized.
- Wind has the potential to transport erodible soil particles that are not stabilized or controlled with sediment control or soil stabilization practices. Standard dust control practices will be implemented during construction. Stockpile management BMPs such as plastic covers and perimeter controls (silt fences and/or fiber rolls) will be implemented to protect stockpiles that have the potential to erode as a result of wind.
- Construction activities that meet the conditions of the General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit; Water Quality Order 2009-0009-DWQ and NPDES No. CAS000002, as amended by Order No. 2010-0014-DWQ and 2012-0006-DWQ) will be required to comply with the permit.
- Construction activities will not cause increases in turbidity downstream of the construction area greater than those identified in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan). Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed background levels (natural turbidity measured in Nephelometric Turbidity Units [NTUs] prior to the start of and construction activities) by more than Basin Plan thresholds outlined below or as amended thereto:

Background Level or Natural Turbidity	Downstream Turbidity (After Starting Construction)
Less than 1 NTU	Total turbidity shall not exceed 2 NTU
Between 1 and 5 NTU	Increases shall not exceed 1 NTU
Between 5 and 50 NTU	Increases shall not exceed 20 percent
Between 50 and 100 NTU	Increases shall not exceed 10 NTUs
Greater than 100 NTU	Increases shall not exceed 10 percent

- The location and frequency of monitoring shall be determined in consultation with the State Water Board prior to the commencement of construction activities. If monitoring shows that turbidity has exceeded the water quality objective, construction will cease and the violation will be reported immediately to the State Water Board's Deputy Director for Water Rights and the Executive Officer for the Central Valley Regional Water Board. Construction may not re-commence without the permission of the Deputy Director.

As part of its review, the State Water Board will require additional mitigation measures, as necessary, to prevent impacts to water quality objectives or designated beneficial uses.

Significance after Mitigation

Implementation of Mitigation Measure GGS-1 would reduce the impact to a **less-than-significant** level.

Impact GGS-2: Implementation of Proposed Project or the alternatives could increase exposure of people and structures to geologic hazards, such as erosion, landslides, or rockslides.

Proposed Project and Alternatives 1, 2, and 3

Neither Proposed Project nor the alternatives would increase the potential for geologic hazards or increase exposure of people or structures to these hazards. Existing hazards in the area from volcanic and seismic activity would continue to pose hazards to the public, UNFFR Project facilities, and the environment, but the potential for damage to the existing or proposed UNFFR Project facilities from these hazards is considered low.

The Prattville and Caribou intakes thermal curtains, which would be part of both Alternatives 1 and 2, would be anchored to the nearly level lake bottoms and would move with the fluctuating lake levels to minimize the potential for damage to the curtains. The thermal curtains would not affect the geology of the area or geomorphology of Lake Almanor, Butt Valley reservoir, or the North Fork Feather River. The Caribou intakes thermal curtain would not affect Belden forebay or the downstream Belden reach because the volume of flow released into Belden forebay would be similar to current conditions. These measures would not increase the exposure of the public to geologic hazards.

Flow volumes in the Seneca and Belden reaches would be modified under Proposed Project and Alternatives 1, 2, and 3 based on the flow schedule described in Chapter 3. Under Alternatives 1 and 3, modification to the Canyon dam intake structure would allow an increase in flow of up to 250 cfs released through the dam into the Seneca reach during the summer months. Some channel scouring could occur during initial high-flow releases or during pulse flow releases, which could result in localized erosion within or adjacent to the bed and banks of the North Fork Feather River along the Seneca and Belden reaches. The hydraulic study conducted by PG&E (Table 5.3-4) indicates that 1,600 to 3,000 cfs flows are necessary to mobilize the median-sized bed material, while gravel-sized material was mobilized during 700 cfs test flows.

Landslides and rockslides occur periodically in the North Fork Feather River canyon under current conditions, posing a safety hazard to anglers, rafters, and others. These hazards tend to be isolated events that are attributable to a combination of environmental factors and would not necessarily be increased by the proposed flow modifications in the Seneca or Belden reaches. PG&E provides warnings to the public when high volumes of flow are released through the dams and powerhouses.

In conclusion, neither Proposed Project nor the alternatives would expose people or structures to geologic hazards or substantially increase the potential for these hazards; therefore, impacts related to geologic hazards would be **less than significant**.

Impact GS-3: Implementation of Proposed Project or the alternatives could modify the channel morphology of the North Fork Feather River as a result of changes in flow.

Proposed Project and Alternatives 1, 2, and 3

Under Proposed Project and the alternatives, the flow schedule for the Seneca and Belden reaches would be modified, with a goal of increasing the minimum flow.

Under Proposed Project and the alternatives, pulse flows are required in January, February, and March if the water year type for the month indicates that the water year is anticipated to be either normal or wet. Additionally, per the FERC Staff Alternative in the Final FERC EIS, pulse flows may be required in March of dry years if a flow of high enough magnitude has not occurred in the preceding January or February to ensure that some geomorphic and sedimentological processes occur in the bypass reaches during all water year types. The magnitudes of all pulse flows depend on the water year type and month and have the potential to mobilize gravels in the Seneca and Belden reaches.

Implementation of a gravel monitoring plan will include an evaluation of gravel movement during pulse flows in the Seneca and Belden reaches. The gravel monitoring plan will be implemented as specified in the 2004 Settlement Agreement. Emphasis will be placed on monitoring the movement and recruitment of spawning-sized gravel in the Belden and Seneca reaches. If data from the gravel monitoring indicate that the pulse flow regime could be improved to enhance the availability and distribution of spawning gravel or enhance riparian function, the pulse flows can be revised as set forth in the 2004 Settlement Agreement. Although flows would increase in the Seneca and Belden reaches, changes in the river morphology would be similar to the current variable conditions, and pulse flows would be implemented in a way that benefits the geomorphic processes along the North Fork Feather River. Impacts would be **less than significant**.

Under Alternatives 1 and 3, up to 250 cfs of flow would be released into the Seneca reach through Canyon dam during the summer months; this additional flow would not be released under Alternative 2. Although a 250 cfs release would be substantially higher than the current flow discharged from Canyon dam, it is well below the flows required to mobilize gravels and cobbles in the Seneca and Belden reaches (see Table 5.3-4). A 250 cfs release is also well below the thresholds required to influence the size or configuration of gravel bar and floodplain features in either reach.

Overall, flow releases to the Seneca and Belden reaches would be similar to the current pattern; however, increased water would flow through these reaches during the typically dry summer months. The flows could transport sediment and woody debris along the channel and deposit these materials downstream in the Belden forebay or other reservoirs. Channel size would not likely be affected in the Seneca reach where the canyon is steep and has less potential for erosion. The channel size in the Belden reach could change in areas where the floodplain is broader, but such changes would be similar to current changes as the river flows increase and decrease. Although flows would increase in the Seneca and Belden reaches, changes in the North Fork Feather River morphology would be similar to current variable conditions. The impacts would be **less than significant**.

Impact GGS-4: Implementation of Proposed Project or the alternatives could affect the location and severity of shoreline erosion along Lake Almanor.

Section 3.3.1.2 of the Final FERC EIS, pages 3-83 to 3-86, analyzes the effects of Proposed Project on the location and severity of shoreline erosion along Lake Almanor. These effects are similar to those that would be experienced under the alternatives described in section 3.5. Installation of thermal curtains at the Prattville and Caribou intakes would not require changes in operation of the intake facilities, Lake Almanor, or Butt Valley reservoir and would not increase the potential for shoreline erosion from wave action or fluctuating lake levels. Section 3.3.1.2 of the Final FERC EIS, pages 3-83 to 3-86, is incorporated into this RDEIR by reference.

Shoreline erosion has been, and will continue to be, an ongoing concern at Lake Almanor, specifically in the vicinity of Canyon dam and the Almanor peninsula, because fluctuating lake levels and wave action will continue. The magnitude and patterns of erosion would not be different than those currently occurring at the lake; neither Proposed Project nor the alternatives would modify lake operations in a way that would increase erosion.

Water levels and the timing of the withdrawal of water from the lake under the alternatives would be similar to existing reservoir management practices (Stetson Engineers 2010). Measure #52 of PG&E’s 2002 license application requires implementation of a shoreline management plan and is incorporated into Proposed Project and the alternatives. Specifically, this measure requires that PG&E update the Shoreline Management Plan (SMP) for Lake Almanor in consultation with the State Water Board, USFS, California Department of Fish and Wildlife (CDFW), Plumas County, and the Maidu community. A final SMP will then be submitted to the State Water Board for approval. The SMP must include a comprehensive shoreline monitoring program. The results of the shoreline monitoring surveys would allow impacts to be evaluated and would indicate the need for further erosion control measures. If monitoring indicates the need for further erosion control measures, PG&E will again update the SMP in consultation with the State Water Board, USFS, CDFW, Plumas County, and the Maidu Community. An amended SMP will be submitted to the State Water Board for approval and will be implemented by PG&E upon receiving all required approvals.

In conclusion, with the implementation of the approved SMP, neither Proposed Project nor the alternatives would result in levels of shoreline erosion in excess of the levels occurring under baseline conditions. The State Water Board believes that the effects of Proposed Project and the alternatives on the location and/or severity of shoreline erosion will be **less than significant**.

5.4 Water Resources

This section describes the surface water resources in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and analyzes the impacts on hydrology of the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license. The following topics are not discussed in this section for the reasons noted:

- **Groundwater Recharge:** Neither Proposed Project nor the alternatives would modify groundwater recharge in the area.

Environmental Setting

North Fork Feather River Watershed

The North Fork Feather River watershed encompasses approximately 3,500 square miles in the northern Sierra Nevada (Ecosystems Sciences Foundation 2005). The elevation range of the watershed is from 2,250 feet above mean sea level above Lake Oroville to more than 10,000 feet at Mount Lassen. Precipitation is the primary source of water in the watershed, with groundwater contributing only a small percentage of flow through springs. Annual precipitation levels range from more than 90 inches at higher elevations in the Sierra Nevada and Cascade Range to less than 11 inches at lower elevations in the Sierra Valley. Flow from the North Fork Feather River watershed is captured in Lake Oroville, which is part of the State Water Project and is managed by the California Department of Water Resources under FERC License #2105.

The watershed contains 24 subwatersheds and four main river branches—North Fork, South Fork, Middle Fork, and West Branch of the Feather River (Ecosystems Sciences Foundation 2005). The North Fork Feather River is divided into 17 subwatersheds, which encompass an area of 1.38 million acres or almost 60 percent of the entire watershed (Figure 5.4-1). The North Fork Feather River subwatersheds contribute approximately 60 percent, or 3,228 cubic feet per second (cfs, average daily flow), of the inflow to Lake Oroville. The other subwatersheds contribute approximately 2,110 cfs (average daily flow). The combined total average daily inflow to Lake Oroville is estimated at 5,338 cfs.

A series of hydroelectric projects heavily regulate flows along the North Fork Feather River above Oroville dam. One of the upstream-most projects is the UNFFR Project, which consists of Lake Almanor, Butt Valley reservoir, Belden forebay, the Upper North Fork Feather River, Butt Creek, and associated hydroelectric facilities (**Error! Reference source not found.**). As part of the UNFFR Project, constant instream flow releases are made at Canyon dam and Belden forebay dam, and operational releases flow through the dams, reservoirs, outlets, and powerhouses. The water bodies associated with the UNFFR Project are described below.

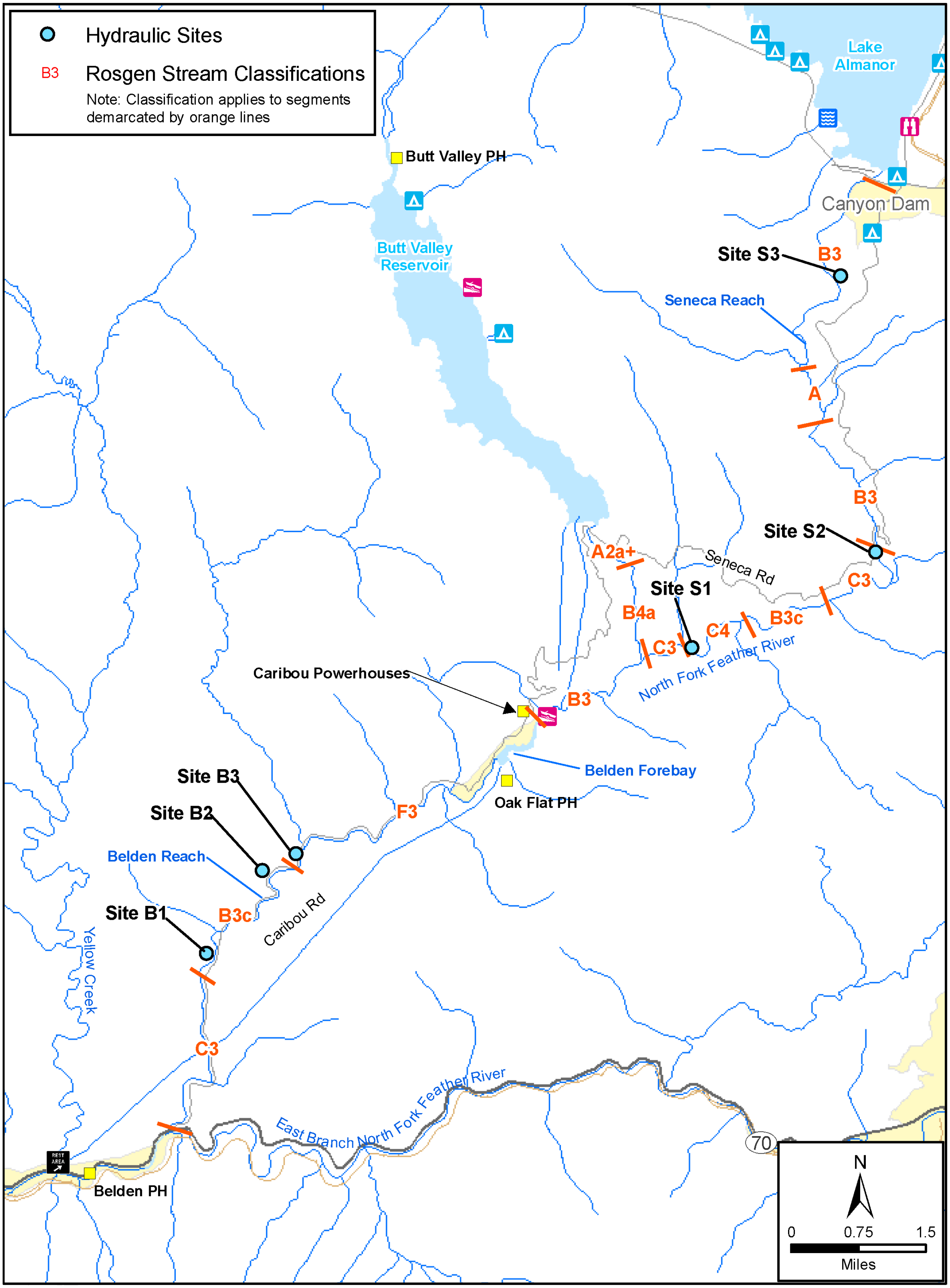

Figure 5.4-1 Geomorphic Classifications and Hydraulic Sites

UNFFR Project Reservoirs

Lake Almanor

Lake Almanor is a man-made reservoir created in 1914 by Great Western Power Company (now Pacific Gas and Electric Company [PG&E]). The reservoir receives natural flow from the North Fork Feather River and other tributaries, diverted water from Mountain Meadows reservoir, and spring flow from submerged springs (Earthworks Restoration, Inc., and CH2M Hill 2007). The lake receives flow from an area of approximately 200,000 acres, encompassing Mount Lassen and the western slopes of the Sierra Nevada. The North Fork Feather River contributes approximately half of the annual surface inflow to Lake Almanor, and the Hamilton Branch diversion from Mountain Meadows reservoir contributes approximately one quarter of the inflow. Lake Almanor provides some flood control benefit during periods of high inflow (wet years or flood events) because of its large surface area.

Lake Almanor has a usable storage capacity of 1.134 million acre-feet (af) at its normal maximum water level of 4,494 feet (PG&E datum) (Pacific Gas and Electric Company 2002). The reservoir is managed to store water during the winter and spring and release it to generate hydropower during the summer and fall.

PG&E regulates Lake Almanor water levels at or below the maximum water level through releases into the North Fork Feather River through Canyon dam and diversions to Butt Valley reservoir via the Prattville intake. Lake levels are closely regulated to prevent flooding and overtopping of Canyon dam. Releases through the Canyon dam's low-level outlet to maintain water levels below the maximum level are rare and typically occur only during wet years.

Up to 2,100 cfs of water from Lake Almanor is diverted through the Prattville intake to Butt Valley powerhouse and Butt Valley reservoir for power generation and storage. Water is released into the North Fork Feather River at Canyon dam to maintain flows in Seneca Reach. Releases through Canyon dam into the North Fork Feather River are discussed below in the section titled "Seneca Reach of the North Fork Feather River."

Butt Valley Reservoir

Butt Valley reservoir was created by damming a segment of Butt Creek in 1912 to store 64 acre-feet of water for hydropower generation (Zemke 2006). It was expanded in 1921 by a larger dam, which was enlarged again in 1924 and modified in 1997 to its current configuration. The reservoir receives natural flow from Butt Creek and diverted flow from Lake Almanor via the Prattville intake. Butt Creek contributes approximately 95 cfs mean annual flow to the reservoir, and flow from Lake Almanor varies substantially depending on the water year and demand (Federal Energy Regulatory Commission 2005). PG&E diverts the reservoir inflow to Caribou Nos. 1 and 2 powerhouses. Flow is not released into lower Butt Creek downstream of the reservoir.

Butt Valley reservoir has a usable storage capacity of 49,897 acre-feet at its maximum normal water surface elevation of 4,132.1 feet (PG&E datum) (Pacific Gas and Electric Company 2002). PG&E diverts water from Butt Valley reservoir through the Caribou Nos. 1 and 2 powerhouses into Belden forebay. Approximately 280 and 650 cfs, respectively, are diverted on average through each powerhouse, with the Caribou No. 2 powerhouse being operated more frequently for power production. The releases from Butt Valley reservoir are heavily regulated by PG&E to operate the powerhouses; therefore, inflow to the powerhouses varies daily, with higher flows during peak demand periods. For example, during peak operations, each powerhouse may experience a change in flow of more than 1,000 cfs within a few minutes. Butt Valley reservoir has a very low potential to overtop because of the regulated nature of the inflow to the reservoir and PG&E's ability to regulate outflow through the Caribou intakes.

Belden Forebay

Belden forebay was created in the late 1950s as the last and smallest impoundment in the UNFFR Project (Pacific Gas and Electric Company 2002). It receives inflow from two discrete intakes at the downstream end of Butt Valley reservoir via the Caribou Nos. 1 and 2 powerhouses, lower Butt Creek, and the Seneca reach of the North Fork Feather River. Inflow is heavily regulated by releases from both the Prattville intake and Canyon dam, Lake Almanor, and Belden forebay's surface water elevation typically fluctuates by 5 to 10 feet on a daily basis. Belden forebay has a usable storage capacity of 2,421 acre-feet at its normal maximum water elevation of 2,975 feet (PG&E datum). Water is either diverted from the forebay via tunnels and penstocks through the Belden powerhouse, or it is released into the Belden reach of the North Fork Feather River via the Oak Flat powerhouse. The highly regulated inflow to Belden forebay reduces the likelihood of flooding, and spills over the Belden dam are rare.

North Fork Feather River Upstream of Belden Powerhouse

Upper North Fork Feather River (above Lake Almanor)

The upper North Fork Feather River has its headwaters on the slopes of Mt. Lassen and Mt. Conrad. It flows south-southeast through alluvial valleys and empties into Lake Almanor in the reach that historically flowed through Big Meadows. Average daily flow in the North Fork Feather River upstream of Lake Almanor ranges from approximately 200 cfs to less than 700 cfs throughout the year, with higher flows between January and July, the peak snowmelt period (Federal Energy Regulatory Commission 2005).

Hamilton Branch

The Hamilton Branch of the North Fork Feather River was impounded by Indian Ole dam to form Mountain Meadows reservoir in 1927 as part of a project to provide water and power to logging camps in the area. PG&E acquired this project in 1945 and continues to operate it under a FERC exemption. Water is diverted from the reservoir to Lake Almanor via the Hamilton Branch powerhouse. The channel of Hamilton Branch also conveys flow from the reservoir to Lake Almanor. Average daily flow through the powerhouse ranges from approximately 60 to 130 cfs, with slightly lower flows on the order of 50 to 120 cfs in the bypass reach of the Hamilton Branch (Federal Energy Regulatory Commission 2005). Flow fluctuates throughout the year with peaks between March and May.

Seneca Reach of North Fork Feather River

The Seneca reach of the North Fork Feather River begins below Canyon dam at Lake Almanor and flows into Belden forebay. The Seneca reach flows through a steep canyon with a well-defined river channel. Per PG&E's current license, a minimum flow of 35 cfs is released from Lake Almanor via Canyon dam into the Seneca reach (Federal Energy Regulatory

Commission 2005). The Seneca reach also receives inflow from various small tributaries. The Seneca reach conveys flow to Belden forebay, contributing a mean annual flow of approximately 125 cfs, where it converges with lower Butt Creek. Pulse flows and additional recreational flows are not currently released into the Seneca reach.

Butt Creek

The headwaters of Butt Creek originate in the Cascade Range north of Butt Valley reservoir, and the creek flows east into Butt Valley reservoir. Inflow to the reservoir from the creek is estimated at 95 cfs mean annual flow (Federal Energy Regulatory Commission 2005). Lower Butt Creek flows for a short distance downstream of the reservoir and converges with the Seneca reach of the North Fork Feather River before emptying into Belden forebay. Between 1970 and 1984, mean annual flow in lower Butt Creek near Caribou was estimated to be 29 cfs (Federal Energy Regulatory Commission 2005). Flow in lower Butt Creek below Butt Valley reservoir emerges from springs along the waterway.

Belden Reach of North Fork Feather River

The Belden reach of the North Fork Feather River begins at Belden dam and continues downstream to Belden powerhouse at the downstream end of the UNFFR Project. Downstream of Belden forebay, the North Fork Feather River flows through a steep canyon and receives flow from the forebay, Mosquito Creek, and the East Branch of the North Fork Feather River. Under the current license, PG&E operates Belden dam to maintain a minimum of 140 cfs in the Belden Reach during the fishing season (last Saturday in April through Labor Day) and 60 cfs the rest of the year (Federal Energy Regulatory Commission 2005). Mosquito Creek contributes between 2 and 10 cfs, with an average of 5 to 6 cfs during the summer. The East Branch is a major tributary of the North Fork Feather River and has median monthly flows greater than 1,500 cfs during March and April, with substantially lower flows between July and November (100 to 200 cfs). Pulse flows and additional recreational flows are not currently released into the Belden reach from Belden forebay.

North Fork Feather River Downstream of Belden Powerhouse

The North Fork Feather River continues downstream of Belden powerhouse to Lake Oroville. PG&E operates two other hydroelectric projects along the river, the Rock Creek–Cresta Hydroelectric Project [FERC Project No. 1962] and the Poe project [FERC Project No. 2107], and one on a tributary (the Bucks Creek project [FERC Project No. 619]). These projects divert substantial flow for power generation and influence the quantity of flow in the North Fork Feather River. Downstream of the confluence of the North Fork Feather River with the East Branch of the North Fork Feather River, water enters Rock Creek reservoir and is diverted through a tunnel to the Rock Creek powerhouse. The diverted flow enters Cresta reservoir with flow from the North Fork Feather River and several tributaries downstream of Rock Creek reservoir. From Cresta reservoir, flow is diverted to the Cresta powerhouse or released into the North Fork Feather River to flow into Poe reservoir with flow from Grizzly Creek. From Poe dam, water is diverted to the Poe powerhouse or released into the North Fork Feather River to flow into Lake Oroville.

Water Rights and Use

PG&E holds water rights to divert, store, and use water from the North Fork Feather River and its tributaries primarily for its hydroelectric projects, although some of PG&E's water rights authorize the use of water for consumptive purposes. PG&E holds licensed rights to divert water from French Creek for domestic use, industrial use, and fire protection at Caribou camp and from Oak Creek for domestic use and fire protection at Howells patrol station. PG&E also stores water in Lake Almanor and Butt Valley reservoir and releases the water for irrigation in the Sacramento Valley under claimed pre-1914 appropriative rights. The Western Canal Water District uses water under these consumptive water rights pursuant to a 1986 contract, which provides that PG&E must release 145,000 acre-feet from storage in its reservoirs between March 1 and October 31 of each year for irrigation downstream of Lake Oroville.

The primary use of water diverted from the North Fork Feather River is power generation, although other agencies, companies, and the public also use the river for fire protection and domestic, industrial, and irrigation supply. The water bodies associated with the UNFFR Project contribute to the water supply provided by Lake Oroville for the State Water Project. A summary of water rights held by PG&E for storage is included in Table 5.4-1 and diversion is included in Table 5.4-2.

Table 5.4-1 PG&E Storage Water Rights in Project[a]

Application	Type	Permit or License	Priority Date	Source	Storage (Acre-feet)	Use	Season
S000922	Pre-1914	--	1902	North Fork Feather	1,308,000[b]	Lake Almanor storage for power	Year-round
A030257	Appropriative	Permit 021151	May 20, 1993	North Fork Feather	500,000	Lake Almanor storage for power	Oct 1 to Jun 30
S000923	Pre-1914	--	1902	Butt Valley Creek	49,897	Butt Valley Reservoir storage for power	Year-round

a. Based on PG&E owned water rights with a point of diversion in the project area (as recorded in the State Water Board eWRIMS)
b. PG&E delivers water to Western Canal Water District for purposes of irrigation between March 1 and October 31 pursuant to a 1986 contract.

Table 5.4-2 PG&E Diversion Water Rights in Project Area[a]

Application	Type	Permit or License	Priority Date	Source	Diversion[b]	Use	Season
S000933	Pre-1914	--	1913	North Fork Feather	2,000 cfs	Butt Valley PH	Year-round
A030258	Appropriative	Permit 021152	May 20, 1993	North Fork Feather	1,000 cfs	Butt Valley PH and Caribou No. 2 PH	Nov 1 to Jun 30
A030415	Appropriative	Permit 021153	December 8, 1994	North Fork Feather	1,400 cfs	Butt Valley and Caribou No. 2 PH	Year-round
S000931	Pre-1914	--	1902	Butt Valley Creek	1,000 cfs	Caribou No. 2 PH	Year-round
S000932	Riparian	--	1958	Butt Valley Creek	1,350 cfs	Caribou No. 1 PH	Year-round
S011477	Riparian	--	1969	Butt Valley Creek	2,410 cfs	Belden PH	Year-round
A009800	Appropriative	License 009871	January 1, 1940	North Fork Feather	2,465 cfs 2,896 cfs 3,500 cfs 3,500 cfs	Belden PH Rock Creek PH Cresta PH Poe PH	Year-round
A026780	Appropriative	Permit 020864	April 7, 1981	North Fork Feather	135 cfs 604 cfs 600 cfs 800 cfs	Beldon PH Rock Creek PH Cresta PH Poe PH	Year-round
A027570	Appropriative	License 013663	November 2, 1982	North Fork Feather	152.4 cfs	Oak Flat PH	Year-round

Table 5.4-2 PG&E Diversion Water Rights in Project Area[a]

A003794	Appropriative	License 000637	January 10, 1924	French Creek	0.5 cfs	domestic, industrial, and fire protection	Year-round
A003795	Appropriative	License 000809	January 10, 1924	Oak Creek	600 gpd	domestic and fire protection	Year-round
S000924	Pre-1914	--	1890	Butt Creek	10 cfs	Irrigation	Jun 1 to Oct 31

a. Based on PG&E owned water rights with a point of diversion in the Project (as recorded in the State Water Board eWRIMS)
b. cfs = cubic feet per second
gpd = gallons per day
PH = power house

Environmental Impacts and Mitigation Measures

Methodology

The water resources impact analysis is based on the description of the surface water hydrology of the North Fork Feather River in the Environmental Setting section and includes a qualitative discussion of changes in flow and UNFFR Project operations associated with Proposed Project and the alternatives. Information for the environmental setting section is based on a watershed assessment (Earthworks Restoration, Inc., and CH2M Hill 2007), management plan (Ecosystems Sciences Foundation 2005), modeling of the Feather River, and information from PG&E's relicensing application (Pacific Gas and Electric Company 2002). The impact analysis addresses the effects of Proposed Project and the alternatives on hydrology, flood potential or hazards, and downstream water supply.

Thresholds of Significance

Impacts on water resources would be significant if Proposed Project or the alternatives would:

- substantially alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site;
- expose people or structures to a significant risk of loss, injury, or death involving flooding; or
- reduce water supplies in a manner that would substantially affect existing users.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of Proposed Project and the alternatives on water resources and identifies mitigation measures for significant impacts. Table 5.4-1 compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.4-3 Summary of Water Resources (WR) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact WR-1: Construction activities associated with Proposed Project or the alternatives could require use of water from Lake Almanor or Butt Valley reservoir.	Less than significant	Less than significant	Less than significant	Less than significant
Impact WR-2: Implementation of Proposed Project or the alternatives could increase the potential for flooding along the Seneca and Belden reaches as a result of modified flows in the North Fork Feather River.	Less than significant	Less than significant	Less than significant	Less than significant
Impact WR-3: Implementation of Proposed Project or the alternatives could modify water deliveries from Lake Almanor, affecting existing water uses downstream.	No impact	No impact	No impact	No impact

Impact WR-1: Construction activities associated with Proposed Project or the alternatives could require use of water from Lake Almanor or Butt Valley reservoir

Proposed Project and Alternatives 1, 2 and 3

Construction activities could require a temporary water supply for dust suppression (watering the construction area) or other construction uses. PG&E's permitted rights authorize the use of water stored in Lake Almanor and Butt Valley reservoir for power production; they do not authorize industrial use. PG&E could change the purpose of use under its claimed pre-1914 consumptive-use rights to allow for water use during construction activities, provided that no third-party water right holders would be injured by the change and the amount of water would not exceed that of the claimed pre-1914 consumptive use amount. Alternatively, PG&E could apply for a temporary water right permit, or identify an alternative water supply, such as from the local communities. If the water supply from the local communities is used, PG&E would need to coordinate with the local utility company to ensure that an adequate supply is available and identify a method for withdrawing water from the supply. The temporary water supply to support construction is unlikely to require construction of a new water supply system or establishment of permanent new water rights because of the temporary nature of the use. All water used to support construction will come from a valid water right. Adverse environmental effects are not anticipated as a result of the need for a water supply during construction; therefore, impacts would be **less than significant**.

Impact WR-2: Implementation of Proposed Project or the alternatives could increase the potential for flooding along the Seneca and Belden reaches as a result of modified flows in the North Fork Feather River.

Implementation of Proposed Project and the alternatives would entail modifications to flows released from Canyon dam and Belden dam. The effects of these changes on flood potential and related hazards along the North Fork Feather River are described in this section. The effects of flow modifications on water quality and aquatic habitat in the North Fork Feather River are described in section 6.5, Water Quality, and section 6.6, Fisheries, respectively.

Proposed Project

Proposed Project would involve the implementation of the minimum instream flows outlined in the 2004 Settlement Agreement. The North Fork Feather River below Canyon Dam would experience an initial increase in flows but these flows would become fairly steady, with increases or decreases as required by the 2004 Settlement Agreement.

The Seneca reach would experience an increase in minimum flows from 35 cfs to between 60 and 150 cfs under the 2004 Settlement Agreement, depending on the water year type and month. (See Chapter 3, Table 3-1.) The North Fork Feather River below Canyon Dam would experience an initial increase in flows as the minimum flow through Canyon Dam is increased, but the flow would become fairly steady, with monthly increases or decreases as required. The short-term changes could result in flooding along the canyon in areas that have not been frequently inundated and could expose recreationists using this reach to flood hazards. PG&E would follow safety protocols and properly inform the public of the increased releases prior to making any changes in the releases. The longer-term flood potential along this reach would be similar to current conditions and would be minimal as a result of the highly regulated nature of the inflow from Lake Almanor.

The Belden reach would experience an increase in minimum flows from 60 cfs to between 110 and 210 cfs between Labor Day (September) and March, depending on the water year type and month. During the fishing season (April to Labor Day), minimum flows would increase from 140 cfs to a high of 235 cfs during April and May in wet years (see Table 3-2.) These changes in flows would result in effects similar to those described above for the Seneca reach and could result in localized flooding during the initial increase in releases. The fluctuating releases through Belden Dam would be similar to current releases, with peak flows during the fishing season and lower flows during the rest of the year. Recreationists along the Belden reach would be exposed to flood hazards from fluctuating water levels similar to those under current conditions.

The 2004 Settlement Agreement requires pulse flow releases from both Canyon Dam and Belden Forebay 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 normal or wet. The peak streamflow is variable and depends on month and water year type. The pulse flow events are limited to a total of 1,800 acre-feet per event and must follow the protocol outlined in the 2004 Settlement Agreement. The short-term changes could expose recreationists using this reach to flood hazards; however, PG&E would follow safety protocols and properly inform the public of the increased releases prior to making any changes in the releases.

In summary, the Seneca and Belden reaches would experience changes in their flow regimes, but the potential for flooding would be minimal and similar to current conditions. With the minimal seasonal flow changes, impacts on other resources along the North Fork Feather River, such as riparian vegetation, wildlife, soils, and river morphology, would also be minimal. Hydrologic impacts associated with the changes in flow under the Proposed UNFFR Project would be **less than significant**.

Alternatives 1 and 3

Operation of the thermal curtains in Lake Almanor and Butt Valley reservoir would not modify releases into the North Fork Feather River or increase the potential for flooding. However, under Alternatives 1 and 3, modifications to the Canyon dam outlet structure would increase flows up to 250 cfs in the Seneca reach from June 16 through September 15 to increase the amount of cool water in the reach.

During other months, the Seneca reach would experience an increase in minimum flows from 35 cfs to between 60 and 150 cfs under the 2004 Settlement Agreement, (see Chapter 3, Proposed Project and Alternatives, Table 3-1), depending on the water year type and month.

The effects of the increased minimum flows in the Seneca reach would be similar to those outlined above for Proposed Project. The maximum release of 250 cfs could periodically increase the water surface elevation in the river channel between Canyon dam and Belden forebay and pose a hazard to recreationists along this reach. PG&E would follow proper safety protocols to inform the public of any scheduled increase of releases at Canyon Dam prior to implementation The longer term flood potential along this reach would be similar to current conditions and would be minimal as a result of the highly regulated nature of the inflow from Lake Almanor. Flooding below Belden forebay is not expected due to the regulated nature of the flows.

The Belden reach would experience an increase in minimum flows from 60 cfs to between 110 and 210 cfs between Labor Day (September) and March under the 2004 Settlement Agreement (see Chapter 3, Proposed Project and Alternatives, Table 3-2), depending on the water year type and month. During the fishing season (April to Labor Day), minimum flows would increase from 140 cfs to a high of 235 cfs during April and May in wet years. These changes in flows would result in effects similar to those described above for the Seneca reach and could result in localized increases in water surface elevation during the release periods. The fluctuating releases through Belden dam would be similar to current releases, with peak flows during the fishing season and lower flows during the rest of the year. Recreationists along the Belden reach would be exposed to hazards from fluctuating water levels similar to those under current conditions.

In summary, under Alternatives 1 and 3, the Seneca and Belden reaches would experience changes in their flow regimes, but the potential for flooding would be minimal and similar to current conditions. With the minimal seasonal flow changes, impacts on other resources along the North Fork Feather River, such as riparian vegetation, wildlife, soils, and river morphology, would also be minimal. Hydrologic impacts associated with the changes in flow under Alternative 1 would be **less than significant**.

Alternative 2

Under Alternative 2, implementation of the thermal curtains at Prattville intake and Caribou intakes would not increase the potential for flooding in the North Fork Feather River because the volume of discharges through the intakes would not be modified as a result of curtain installation. Water levels on Lake Almanor and Butt Valley reservoir would also not be affected by the thermal curtains, and flood hazards would not be increased at the reservoirs. Changes in minimum flows in the Seneca and Belden reaches (Chapter 3, Table 3-1and Table 3-2, respectively) would result in the same impacts described under Alternatives 1 and 3, with the exception of Canyon dam. Under Alternative 2, Canyon dam releases would not be increased up to 250 cfs from June 16 through September 15. Hydrologic impacts would be **less than significant**.

Impact WR-3: Implementation of Proposed Project and alternatives could modify water deliveries from Lake Almanor, affecting existing water rights and uses downstream.

Proposed Project and Alternatives 1, 2, and 3

Although Proposed Project and the alternatives would result in a change in flows in the North Fork Feather River below Canyon dam due to modifications in releases through the dam, PG&E would still be capable of meeting its water delivery obligations to downstream users. Flow releases would be maintained or increased to improve aquatic habitat. Existing water rights would still apply. Neither Proposed Project nor the alternatives would affect downstream users. **No impacts** would occur.

5.5 Water Quality

This section describes the relevant aspects of water quality in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether the operation of Proposed Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts on water quality conditions in Lake Almanor, Butt Valley reservoir, Butt Creek, and the North Fork Feather River.

The following topics are not discussed in this Revised Draft Environmental Impact Report (RDEIR) for the reasons noted:

- **Groundwater Quality:** Neither Proposed Project nor the alternatives would affect groundwater quality in the area.
- **Water Visibility:** Since 2009, reports concerning water quality in Lake Almanor have been prepared annually (except for 2015) for the Plumas County Flood Control and Water Conservation District and Almanor Basin Watershed Advisory (Johnston and McMurtry 2010, 2011, 2012, 2013, 2014; Johnston and McReynolds 2016). These reports have consistently concluded that reported Secchi depth visibility has been in agreement with historic values in a database maintained by the California Department of Water Resources. This conclusion is consistent with the information provided by PG&E in its 2002 License Application for the UNFFR Project (Pacific Gas and Electric Company 2002) as well that contained in the 1975 Lake Almanor Limnologic Investigation (California Department of Water Resources 1975). These reports suggest that climatic conditions, reservoir levels, and input from tributaries are key factors that contribute to water visibility in Lake Almanor. Neither Proposed Project nor the alternatives would change these key factors and the visibility of the water in Lake Almanor relative to baseline conditions would remain the same.
- **Nutrients:** Neither Proposed Project nor the alternatives would cause a detrimental change in the overall concentrations of nutrients in Lake Almanor. A slight reduction in total phosphorus loading in Lake Almanor could occur through hypolimnetic[26] releases of phosphorus solubilized from the lake bed sediments by anoxic conditions in the hypolimnion in the late summer (Cooke et al. 1993). The reduction in phosphorus loading would not increase algal productivity or otherwise decrease water quality in the reservoir because phosphorus is already considered the limiting nutrient for algal growth in Lake Almanor (Earthworks Restoration and CH2M Hill 2007). An associated slight decrease in phosphate concentration could occur immediately below Canyon Dam during hypolimnetic releases late in the summer and would rapidly decline to baseline when phosphorus binds to riverbed sediments as the water reoxygenates below Canyon Dam.
- **Coliform Bacteria:** Neither Proposed Project nor the alternatives would cause a change in the occurrence of coliform bacteria in Lake Almanor, Butt Valley reservoir, or the North Fork Feather River because seasonal reservoir storage and discharge

[26] The layer of water in a thermally stratified lake that lies below the thermocline, is noncirculating, and remains perpetually cold

volumes would not be affected. Sporadic, localized high concentrations of coliform bacteria have been reported at Lake Almanor (Pacific Gas and Electric Company 2002). Coliform bacteria concentrations above the water quality objective in the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (Basin Plan) of a geometric mean concentration of 200 coliform bacteria per 100 milliliters have been reported in the southern extent of Lake Almanor near Canyon Dam during May, August, and October (Federal Energy Regulatory Commission 2005). The source of these relatively high coliform concentrations is uncertain (CH2M Hill 2006).

- Proposed Project and alternatives described in Chapter 3 would not differ with respect to overall storage or lake levels in Lake Almanor.

The potential impacts of Proposed Project were evaluated in the Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project issued by the FERC. As allowed for under Section 15150 of the California Environmental Quality Act (CEQA) Guidelines, the State Water Resources Control Board (State Water Board) incorporates, by reference, applicable sections of FERC's EIS that analyze the impacts of Proposed Project on water quality. Since FERC's EIS did not analyze Alternatives 1, 2, or 3 (described in section 3.5 of this RDEIR), they are discussed in this section with respect to water quality.

The potential impacts of Proposed Project on the quality of water that supports cold water habitat and the recreational fishery of Lake Almanor and Butt Valley reservoir were raised as primary concerns during the public scoping process for the Draft Environmental Impact Report (Draft EIR) (Appendix B). Accordingly, water temperature and dissolved oxygen (DO), the key water quality parameters associated with the cold freshwater habitat beneficial use in the UNFFR Project water bodies, are the focus of the water quality analysis presented in this section of the Revised Draft Environmental Impact Report (RDEIR).

Environmental Setting

The North Fork Feather River lies within the Sacramento River basin. The river and its tributaries are therefore subject to the water quality objectives set forth in the Basin Plan.

The beneficial uses identified in the Basin Plan are shown in Table 2-1, State Water Board's Regulatory Responsibilities. The numerical and narrative objectives applicable to the beneficial uses of Lake Almanor and the North Fork Feather River are listed in Table 2-2.

Over the past 100 years, the hydrology of the North Fork Feather River watershed has been modified by numerous hydroelectric projects on the river and its tributaries (see Figure 1-2). Other land uses, including the construction and operation of railroads and highways, timber harvest and management, mining, livestock grazing, recreation, and residential development, have also affected the watershed. These projects and activities have influenced the water quality of the North Fork Feather River and its tributaries.

Extensive hydroelectric development on the North Fork Feather River has greatly altered the river's physical character and flow regime. The North Fork Feather River contains three FERC-licensed hydroelectric projects consisting of five diversion dams located on the mainstem of the North Fork Feather River: the UNFFR Project, Rock Creek–Cresta Hydroelectric Project (FERC Project No. 1962), and the Poe Hydroelectric Project (FERC

Project No. 2107). The North Fork Feather River also contains the Hamilton Branch Project, which PG&E operates under an exemption from FERC. As a result of the hydroelectric projects, much of the river's flow from Lake Almanor to Lake Oroville is diverted through tunnels and penstocks. The current operations, project features, and relationships among the projects result in a limited ability to control dam releases for water temperature management in the North Fork Feather River (Pacific Gas & Electric Company 1979, 2000, 2005; Woodward-Clyde Consultants 1987; California Department of Fish and Game 1988; Federal Energy Regulatory Commission 2005).

As described in Chapter 2, the Basin Plan identifies two hydrologic units (i.e., water bodies) within the UNFFR Project boundary: Lake Almanor (Hydrologic Unit No. 518.41) and the North Fork Feather River downstream of Canyon Dam (Hydrologic Unit No. 518.4). The entire Butt Creek watershed, including Butt Valley reservoir, is a tributary to the North Fork Feather River and is included in Hydrologic Unit No. 518.4.

Beneficial uses designated for Lake Almanor are hydropower generation, water contact recreation, warm and cold freshwater habitat, warm spawning habitat, and wildlife habitat. Beneficial uses designated for the North Fork Feather River below Canyon Dam are municipal and domestic supply, hydropower generation, water contact recreation, non-water contact recreation, cold freshwater habitat, cold spawning habitat, and wildlife habitat. The State Water Board is required by law to establish water quality objectives that ensure the reasonable protection of designated beneficial uses, and it must consider and balance all competing uses of a body of water in its decision making. In instances where both warm and cold water beneficial use designations occur within a single water body, such as Lake Almanor, the cold water uses are usually the most limiting, and water quality objectives to protect cold water habitat receive special consideration.

In 2006, the North Fork Feather River below Lake Almanor to Lake Oroville, was listed by the United States Environmental Protection Agency (U.S. EPA) under Section 303(d) of the Clean Water Act for non-compliance with the Basin Plan's water quality objectives for the river. The listing was based on water quality limitations caused by occurrences of high summertime water temperatures and elevated polychlorinated biphenyls (PCBs) concentrations. Though the source of the impairment is listed as "unknown" because a source analysis has not been performed, the primary causes of water temperature impairment in the North Fork Feather River may be attributed to hydromodification and flow regulation/modification. As of the October 3, 2017 Staff Report for listed Water Bodies (State Water Board, 2017), the North Fork Feather River in the project area is still listed for noncompliance with the Basin Plan's water quality objectives for temperature and PCB's.

Water Quality Conditions

This RDEIR focuses on potential modifications to the existing UNFFR Project that may be implemented to better protect the overall beneficial uses of the North Fork Feather River, while limiting water quality impacts to the beneficial uses of Lake Almanor. The following sections describe aspects of key water quality conditions and the relevant water quality objectives as they pertain to the specific beneficial uses (see Table 2-1) that occur in Lake Almanor and the

North Fork Feather River and that are subject to the influence of controllable factors[27] associated with the UNFFR Project.

During the FERC relicensing process for the UNFFR Project, PG&E performed numerous technical studies to improve the understanding of the current resource conditions and beneficial uses of Lake Almanor and the North Fork Feather River, including its tributaries. The Draft and Final FERC EIS provided additional information on this topic, much of which is incorporated by reference in this RDEIR. Since the Final FERC EIS was prepared in 2005, PG&E and the Plumas County Flood Control and Water Conservation District, the Lake Almanor Watershed Group, and the Sierra Institute for Community and Environment have contributed to a body of information on various water quality conditions, including water temperature and DO, through ongoing monitoring efforts and watershed planning documents (CH2M Hill 2006; Earthworks Restoration and CH2M Hill 2007; Johnston and McMurtry 2010, 2011, 2012, 2013, 2014; Johnston and McReynolds 2016; and Sierra Institute 2012). In 2006, PG&E conducted a series of special tests to provide data for the analysis presented in this RDEIR as part of the ongoing CEQA planning (Stetson Engineers and Pacific Gas and Electric Company 2007a).

The following section, organized by water body, briefly describes the relevant water quality conditions of concern with respect to the Basin Plan's water quality objectives and beneficial uses.

Reservoirs

Lake Almanor

Lake Almanor is one of the largest reservoirs in California, with a normal storage capacity of 1.13 million acre-feet. The reservoir receives inflow from the upper North Fork Feather River, the Hamilton Branch, and a number of smaller streams and springs (see Figure 3-1). Lake Almanor has an average hydraulic residence time, or flow-through rate, of between 0.75 and 1 year (Federal Energy Regulatory Commission 2005, Earthworks Restoration and CH2M Hill 2007).

The discussion of Lake Almanor water quality is derived from several sources, including PG&E's FERC license application (Pacific Gas & Electric Company 2002), historic limnology and fisheries studies (California Department of Water Resources 1975, California Department of Fish and Game 1974), watershed condition and water quality assessments for the Lake Almanor basin (CH2M Hill 2006, Earthworks Restoration and CH2M Hill 2007), the Final FERC EIS (Federal Energy Regulatory Commission 2005), and recent water quality monitoring by the Plumas County Flood Control and Water Conservation District, the Lake Almanor Watershed

[27] Protection and attainment of beneficial uses designated in the Basin Plan require the State Water Board and Regional Water Quality Control Boards (collectively, Water Boards) to apply the water quality objectives to reasonably controllable water quality factors in issuing Clean Water Act Section 401 water quality certifications. "Controllable water quality factors" are the actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State that are subject to the authority of the Water Boards and may be reasonably controlled, p 4-22 Central Valley Regional Water Quality Control Board (2018).

Group, and the Sierra Institute for Community and Environment (Johnston and McMurtry 2010, 2011, 2009-2012, 2013, 2014; Johnston and McReynolds 2016). These sources indicate that Lake Almanor generally meets water quality objectives supportive of currently designated beneficial uses[28], as defined in the Basin Plan, and shows predictable seasonal patterns.

Historic annual patterns of temperature and oxygen in Lake Almanor have been similar since records began (Johnston and McReynolds 2016). Recent reports and assessments have suggested new trends in Lake Almanor water quality, potentially as a result of climatic conditions. Data reported by Sierra Institute (2012) suggest average yearly temperatures in Lake Almanor from 1990 to 2010 have trended upward, from 50.38 ºF in 1990 to 56.95 ºF in 2010. In addition, Schneider et al. (2009) found that the nighttime lake surface temperature appears to have been warming at about 0.15 ± 0.03°C per year since 1992.

Data on Secchi disk transparency, nutrient concentrations, and algal biomass for Lake Almanor reflect a moderate level of productivity, a lake characteristic known as being “mesotrophic” (California Department of Water Resources 1975; Cooke et al. 1993, as cited by Earthworks Restoration and CH2M Hill 2007; Johnston and McMurtry 2009, 2010, 2011, 2012, 2013, 2014; Johnston and McReynolds 2016). As would be expected in a mesotrophic lake, current conditions include some seasonal oxygen depletion in the deepest areas of the lake below the thermocline, as described in more detail below. However, this seasonal occurrence does not appear to indicate a water quality impairment of the designated cold freshwater habitat beneficial use because the temporal and spatial extent of the seasonal oxygen depletion is limited (CH2M Hill 2006).

The overall water quality of Lake Almanor may be influenced by such factors as water depth, season, climatic conditions, and the timing and volume of stream and spring inflows, overland runoff, erosion and sediment influx, and septic system leachate and treated wastewater effluent discharges to the lake (California Department of Water Resources 1975; California Department of Fish and Game 1974; Earthworks Restoration and CH2M Hill 2007; Johnston and McMurtry 2009, 2010, 2011, 2012, 2013, 2014; Johnston and McReynolds 2016). The size and depth of the lake, coupled with the seasonal climatic variability, cause the lake to thermally stratify during the late-spring/early-summer period. Thermal stratification refers to the physical process in a water body when warming of the surface water creates a sufficient gradient in the relative densities between the surface and deeper waters because of the differences in temperature, which ultimately limits the depth to which wind can mix the warm surface with the deeper colder water. This stratification process results in the formation of a distinctive warm upper layer (known as the epilimnion) and cooler bottom layer (known as the hypolimnion). The transitional zone between the two layers that exhibits the greatest rate of temperature change is referred to as the thermocline or metalimnion.

[28] Historical water temperature and DO data indicate that the volume of suitable cold freshwater habitat (i.e., volume of water that equals or is less than 20°C and has DO of 5 mg/L or greater) in Lake Almanor is severely limited in the summer during critically dry water years. However, the absence of observed historical fish kills, even in critically dry water years, suggests that the water quality in Lake Almanor generally supports its currently designated beneficial uses.

A thermocline typically develops in Lake Almanor around late May and begins to dissipate by late September (Pacific Gas and Electric Company 2002, 2008, 2009, 2010, 2011; Johnston and McMurtry 2009, 2010, 2011, 2012; Johnston and McReynolds 2013, 2014). The depth of the thermocline varies over the season and is primarily affected by variations in annual climatic conditions, solar radiation, day length, and prevailing wind direction and strength. In 2015, after four consecutive warm, dry years, physical data showed higher water temperatures and less dissolved oxygen in the epilimnion than in the previous 5 years (Johnston and McReynolds 2016). In the same year, dissolved oxygen in the metalimnion dropped to zero, and thermal stratification began to break down in October (Johnston and McReynolds 2016).

The timing and degree of thermal stratification in Lake Almanor varies annually as does the maximum surface water temperature (Pacific Gas and Electric Company 2008, 2009; Johnston and McMurtry 2009, 2010, 2011, 2012, 2013, 2014; Johnston and McReynolds 2016). As air temperatures fall and the days shorten in September, the epilimnion cools and, consequently, the difference in the water densities of the epilimnion and hypolimnion becomes smaller and the layers ultimately mix, which dissipates the thermocline. By October, the thermocline is gone and Lake Almanor becomes well mixed in terms of temperature throughout its depths.

At the height of summer, the epilimnion of Lake Almanor typically occurs from the surface down to a depth of 30 to 40 feet, with average daily water temperatures ranging from 20°C to 24°C. The corresponding hypolimnion occurs below depths of approximately 50 feet, with water temperatures ranging from 7°C to 14°C (Pacific Gas and Electric Company 2002, 2005b, 2008, 2009, 2010, 2011; Johnston and McMurtry 2009, 2010, 2011, 2012, 2013, 2014; Johnston and McReynolds 2016).

DO concentrations have been periodically monitored in Lake Almanor for more than 35 years. DO concentrations were initially monitored by the California Department of Water Resources in the 1970s and 1980s (California Department of Water Resources 1975, California Department of Fish and Game 1974). Since 2000, PG&E has monitored DO concentrations to support the UNFFR Project relicensing process and to comply with the Rock Creek–Cresta Settlement Agreement and FERC license conditions (Pacific Gas & Electric Company 2002, 2005, 2008, 2009, 2010, 2011). More recently, DO monitoring has been done by the Plumas County Flood Control and Water Conservation District (Johnston and McMurtry 2009, 2010, 2011, 2012, 2013, 2014; Johnston and McReynolds 2016). DO concentrations in Lake Almanor follow typical seasonal and spatial patterns generally associated with large thermally stratified reservoirs (Federal Energy Regulatory Commission 2005). Within the epilimnion, atmospheric conditions (e.g., wind mixing, air temperature, water temperature) and algal blooms, through oxygen production by photosynthesis, primarily affect DO concentrations and maintain relatively high DO levels. Below the thermocline, oxygen consumption by fish, invertebrates, and bacterial decomposition of organic material is the dominant process affecting DO concentrations, with little mixing of surface waters to maintain DO levels. As a result of this oxygen consumption in the hypolimnion, DO concentrations generally decline rapidly with depth below the thermocline. DO levels can vary widely throughout Lake Almanor, both with respect to depth and geographic location as a result of localized conditions, such as proximity to spring and stream inflows, algal blooms, and surface exposure to prevailing winds. Prevailing winds on Lake Almanor can generate large waves that may increase surface mixing and DO concentrations, even down to the depth of the thermocline and into the upper hypolimnion, under certain conditions (Federal Energy Regulatory Commission 2005).

The deepest portion of the reservoir near Canyon Dam experiences DO below 1 mg/L during the heat of the summer. Subsequent equalization of DO throughout the vertical profile occurs with mixing of the water column when the thermocline dissipates with cooling of the surface water during the shorter days and cooler nights in the early fall.

PG&E sampled for 12 trace metals (arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, silver, and zinc) in 2000 during the months of April, June, July, August, September, and November. Unfortunately, method detection limits for cadmium, lead, mercury, and silver were too high to ensure compliance with applicable standards. PG&E could only estimate dissolved fractions for arsenic, cadmium, copper, lead, mercury, silver, and zinc using EPA-acceptable protocols.

Between July and November 2001, PG&E modified its monitoring program to focus on obtaining information appropriate for further evaluation of selected trace metals (iron, manganese, and silver) with lower detection limits. In 2002 and 2003, PG&E developed a supplemental monitoring program using trace metal clean methodology, which could test for lower detection limits of cadmium, lead, mercury, and silver.

Trace metal concentrations for Lake Almanor generally fell within applicable criteria with the exception of dissolved cadmium and iron concentrations. A July 2003 surface sample had a cadmium concentration of 0.15 micrograms per liter (µg/l). Applicable EPA criteria dictated that cadmium concentrations may not exceed a national 4-day average of 0.13 µg/l[29]. Although the July 2003 surface sample may be noteworthy, it is impossible to determine if EPA criteria were exceeded based on a single sample rather than a 4-day average.

From September to mid-October 2001, dissolved iron concentrations of more than the allowable instantaneous maximum of 1.0 milligram per liter (mg/l) were reported near the bottom of the Canyon Dam outlet tower in Lake Almanor. During the same sampling period, a mineral spring located adjacent to the Canyon Dam outlet structure also exceeded the allowable instantaneous maximum concentration, suggesting a possible natural source.

Butt Valley Reservoir

On average, more than 90 percent of the inflow to Butt Valley reservoir comes from Lake Almanor via the Prattville intake. Therefore, the water quality of Butt Valley reservoir is highly influenced by conditions in Lake Almanor. Some inflow from upper Butt Creek, an unregulated tributary, also influences water quality in Butt Valley reservoir, though to a lesser degree.

Summer water temperature at Butt Valley reservoir is predominantly influenced by the operation of the Prattville intake, discharges from the Butt Valley powerhouse, and operation of the Caribou powerhouses. The operation of UNFFR Project facilities affects water temperatures throughout Butt Valley reservoir and results in a moderate thermal gradient from the Butt Valley powerhouse (cooler water) to the Caribou intakes (warmer water) during late spring and early summer, with a less-defined gradient during the rest of the year. Due to its size, the reservoir geometry, and the relatively short hydraulic residence time during the summer, a well-developed thermocline does not occur at Butt Valley reservoir (Stetson Engineers 2009).

[29] This is a hardness-dependent criterion. The listed criterion is for a hardness of 50 mg/l.

Average daily water temperatures during July and August below the Butt Valley powerhouse ranged from 15.7°C to 21.3°C between 2000 and 2007, averaging 18.9°C (Pacific Gas and Electric Company 2002, 2008). At the Caribou intakes near Butt Valley dam, water temperatures averaged 21.6°C near the surface and 16.5°C near the bottom during the summer over the course of an 8-year monitoring period (Pacific Gas and Electric Company 2002, 2008). The water temperature data in the dry year (2009) also showed the similar magnitudes[30]. Because of the relatively short retention time of water in the reservoir during the summer and the relatively shallow depth, the water in Butt Valley reservoir tends to remain fairly well mixed and develops only weak thermal stratification, if any.

Use of the Caribou No. 1 powerhouse draws water through the Caribou No. 1 intake from a lower elevation in the reservoir than does the Caribou No. 2 intake and thus can rapidly deplete the reservoir of any cold water storage (Stetson Engineers 2009). Figure 5.5-1 and Figure 5.5-2 illustrate the seasonal pattern of water temperatures in Butt Valley reservoir. The observed temperatures indicate that (1) the temperature of Caribou No. 2 powerhouse discharge water was generally close to the temperature of the Butt Valley reservoir epilimnion, indicating that the Caribou No. 2 intake mainly withdrew epilimnion water; (2) the temperature of Caribou No.1 powerhouse discharge water was generally close to the Butt Valley powerhouse discharge water, and both Caribou No. 1 powerhouse and Butt Valley powerhouse discharge waters had an increasing trend in temperature during the summer; and (3) the temperature of Caribou No. 1 powerhouse discharge water was lower than Caribou No. 2 powerhouse discharge water by about 3°C to 4°C in July, with the difference reduced to less than 2°C in August. In late August and September, there was little difference. The data suggest that replenishment of the relatively cold water from the Butt Valley powerhouse, the cold water plunge into the reservoir hypolimnion, and the cold water movement along the hypolimnion of Butt Valley reservoir are important factors affecting the reservoir thermal stratification and Caribou No. 1 powerhouse discharge temperatures.

DO concentrations measured during the June to August timeframes at the Butt Valley powerhouse in 2000 and 2002 ranged from 6.3 to 10.2 mg/l. These levels are similar to those measured in Lake Almanor in the epilimnion near the Prattville intake during the same sampling periods (Pacific Gas and Electric Company 2002). DO measurements taken near the Caribou intakes in Butt Valley reservoir in 2000 ranged from 0.4 to 10.6 mg/l. DO levels at the surface ranged from 6.0 to 10.6 mg/l and near the bottom of Butt Valley reservoir ranged from 0.4 to 10.3 mg/l. Hypoxic conditions (DO<2.0 mg/l) occurred in June and July of 2000 near the bottom and anoxic conditions (DO = 0 mg/L) occurred in August 2000 (Pacific Gas and Electric Company 2002).

[30] Average daily water temperatures during July and August of 2009 below the Butt Valley powerhouse ranged from 16.9°C to 21.4°C, averaging 19.8°C. At the Caribou intakes near Butt Valley dam, water temperatures averaged 21.0°C near the surface and 16.6°C near the bottom during the summer of 2009.

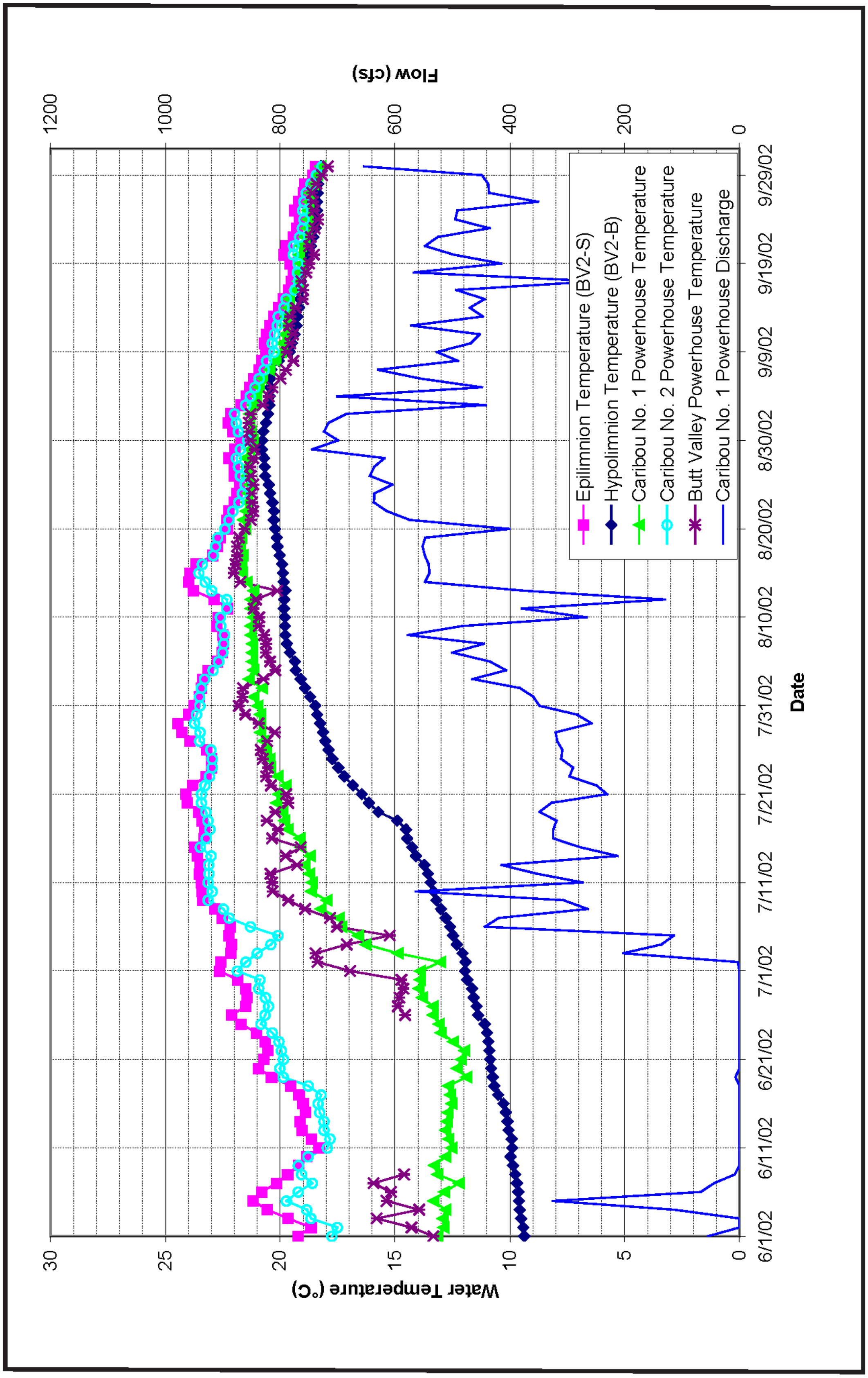

Figure 5.5-1 Measured Mean Daily Water Temperatures in Butt Valley Reservoir in 2002 (Dry)

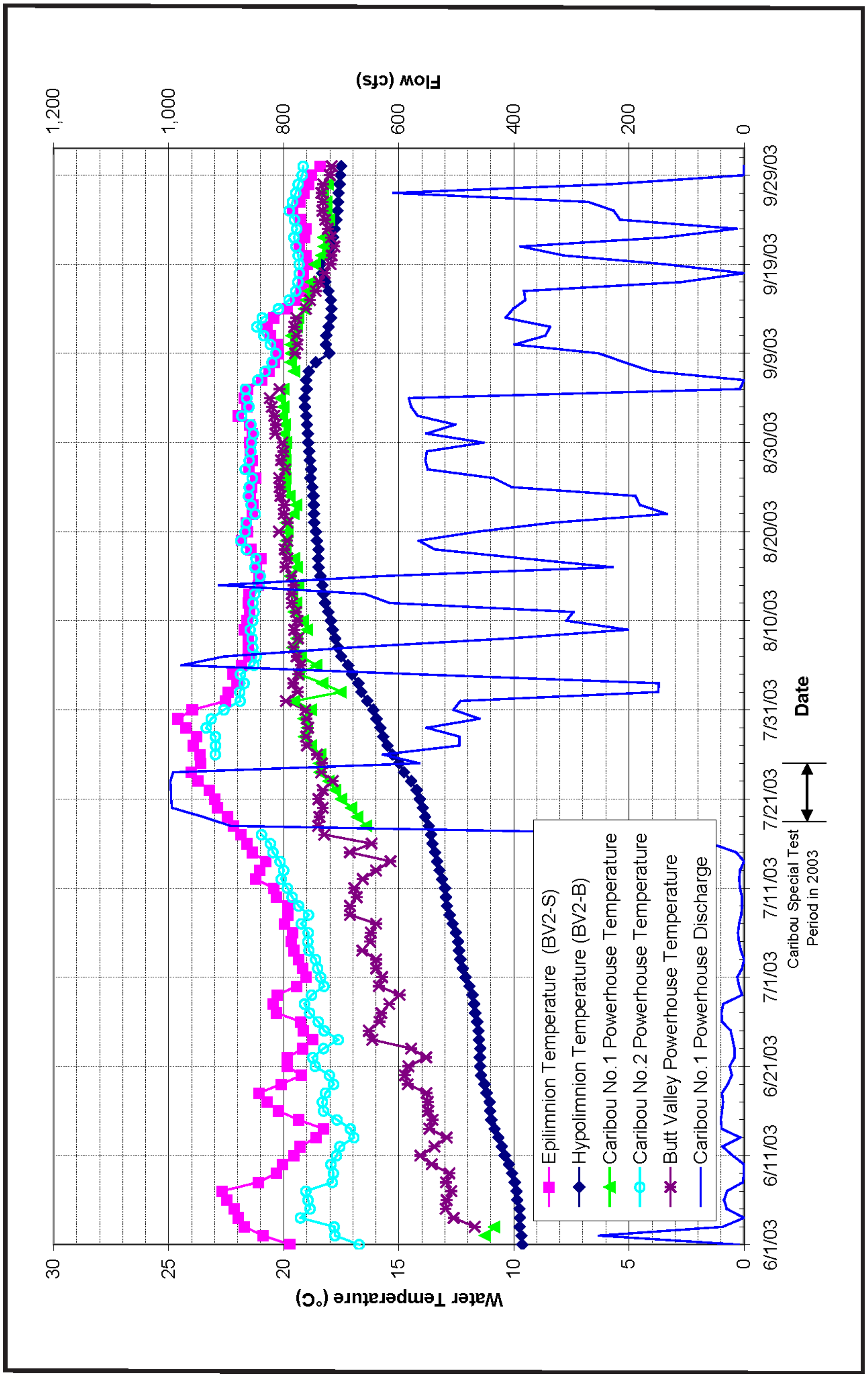

Figure 5.5-2 Measured Mean Daily Water Temperatures in Butt Valley Reservoir in 2003 (Normal)

Trace metal concentrations in Butt Valley reservoir generally fall within acceptable criteria. Similar to Lake Almanor, a July 2003 sample taken from the Butt Valley powerhouse tailrace had a dissolved cadmium concentration of 0.8 µg/l.

In addition to the 2000 through 2003 trace metals monitoring programs, PG&E evaluated the bioaccumulation of mercury, silver, and polychlorinated biphenyls (PCBs) in fish and crayfish during 2001, 2002, and 2003. PG&E modified this program in 2002 to analyze fillets of fish species that would represent fish caught by sport fishermen in Butt Valley reservoir. These samples were tested only for total mercury concentrations on the assumption that the majority of the accumulated mercury would be in the methylated form.

Total mercury concentrations from these fish fillets ranged from 60 to 200 micrograms per kilogram (µg/kg), with larger fish tending to accumulate the most mercury. Allowable mercury concentrations vary widely between agencies; the United States Food and Drug Administration (FDA) developed an action level of 1,000 µg/kg whereas the California Office of Environmental Health Hazard Assessment (OEHHA) established a fish contaminant goal of 220 µg/kg. In either case, mercury accumulation in fish caught within Butt Valley reservoir fall below these limits.

Belden Forebay

The water quality of Belden forebay is affected by inflow from the Seneca reach, lower Butt Creek, and Butt Valley reservoir diversions through the Caribou intakes. Water quality is generally good in the forebay, though exceedances of Basin Plan objectives have occurred for water temperature, DO, specific conductance, mercury, and PCB concentrations in fish tissues (Pacific Gas and Electric Company 2002, State Water Resources Control Board 2010). In Belden forebay, some trace metals, minerals, and total dissolved solids have exhibited elevated levels relative to EPA's California Toxics Rule (40 CFR Part 131.36) criteria (Federal Energy Regulatory Commission 2005). Concentrations of PCBs in fish tissues collected from Belden forebay during one sampling season exceeded the OEHHA's fish contaminant goal of 3.6 nanograms per gram of fish flesh, which was established to protect human health (see State Water Resources Control Board 2010). In 1984, a rockslide damaged the Caribou No. 2 powerhouse, resulting in a discharge of PCBs that contaminated soil, slide debris, and sediments stored in Belden forebay. While PG&E has taken measures to remediate the materials contaminated with PCBs by dredging Belden forebay and placing the dredged material downstream near Oak Flat at a contained upland location, ongoing monitoring has detected that some residual contamination remains in the aquatic food chain (Federal Energy Regulatory Commission 2005, State Water Resources Control Board 2010).

Water temperatures in Belden forebay are similar to those in Butt Valley reservoir, with little thermal stratification (Federal Energy Regulatory Commission 2005; Stetson Engineers 2007b, 2009). During the summer, inflow to Belden forebay comes predominantly from the Caribou powerhouses, with less influence from the Seneca reach and lower Butt Creek. On average, the Seneca reach contributes less than 5 percent of the flow through the forebay during the July through September period (Stetson Engineers 2007b, 2009). The average daily water temperature of discharges from the Caribou powerhouses ranged from 13.3°C to 21.9°C for Caribou No. 1 and 17.4°C to 23.4°C for Caribou No. 2 during the summer months (June through September) over a variety of water years from 2000 to 2004 (Pacific Gas and Electric Company 2002; Stetson Engineers 2007b, 2009). Due to the differences in the elevation and operation of the Caribou intakes, the water temperature can vary substantially, depending on which intake is used. The Caribou No. 1 intake draws water from a lower elevation (deeper) in Butt Valley reservoir, which likely explains the lower temperature of its discharges. Daily summer water temperatures in Belden forebay near its dam ranged from 15.8°C to 22.8°C, with no more than a 3°C vertical temperature stratification, during 2000 to 2004 (Pacific Gas and Electric Company 2002; Stetson Engineers 2007b, 2009). PG&E monitoring during the months of June through September reported that average daily water temperatures exceeded 20°C for 35 percent of days monitored at the Caribou No. 1 powerhouse discharge (mostly during August) and 65 percent of days monitored at the Caribou No. 2 powerhouse discharge (mostly during July through September). As a result, water temperatures exceeding 20°C in Belden forebay mostly occurred in July and August.

The relatively uniform temperatures along the length and throughout the depths of Belden forebay are likely a result of the forebay’s small size, inflow dominated by the discharges of the Caribou powerhouses, short retention time (less than one day), instream flow releases to the Belden reach, diversions to the Belden powerhouse, and wide daily stage fluctuations in the forebay related to PG&E operation and maintenance activities (Stetson Engineers and Pacific Gas and Electric Company 2007; Stetson Engineers 2007b, 2009).

DO concentrations tend to fall below 7.0 mg/l near the bottom of Belden forebay in June and July and near the discharge points of the Caribou powerhouses in September (Pacific Gas and Electric Company 2002).

PG&E’s 2000 through 2003 trace metals monitoring program identified dissolved copper and total recoverable manganese as exceeding, or having the potential to exceed, acceptable criteria. In July 2000, the dissolved copper concentration at the Caribou No. 1 powerhouse tailrace was estimated to be 0.00605 mg/l. This exceeds the California Toxic Rule, Freshwater Aquatic Life Protection hardness-dependent 4-day criterion of 0.0049 mg/l. However, a 4-day average cannot be determined by a single sample and all other samples fell well below the hardness-dependent criterion.

During the 2000 monitoring program, manganese concentrations at the Caribou No. 1 and No. 2 powerhouse tailraces exceeded the Title 22 secondary maximum contaminate level (MCL) of 0.05 mg/l. During the 2001 modified monitoring program, dissolved manganese concentrations remained within acceptable limits.

Bioaccumulation of silver in samples taken from Belden forebay ranged from 2 µg/kg in smallmouth bass to 23 µg/kg in a composite crayfish sample. Bioaccumulation of mercury was also considered low, with a range of 33.3 µg/kg in the composite crayfish sample and 114.0 µg/kg in smallmouth bass. There is no FDA action level for silver. The FDA action level for mercury in fish is 1 mg/kg, or 1,000 µg/kg.

Between 2001 and 2002, levels of PCBs ranged from 0.80 µg/kg in a composite crayfish sample to 14.90 µg/kg in a smallmouth bass sample. Screening values for total PCBs levels vary widely between state and federal agencies. FDA tolerance levels for PCBs prohibit interstate commerce of fish flesh containing 2,000 parts per billion (ppb) while the EPA uses a screening value of 10 ppb. Several of the samples collected from Belden forebay exceeded the EPA PCB screening value (Pacific Gas and Electric Company 2002).

North Fork Feather River

Seneca Reach

The majority of inflow to the 10.8-mile-long Seneca reach is from Lake Almanor via discharges from the Canyon Dam outlet structure (see **Error! Reference source not found.**). As a result, the water quality in the Seneca reach is similar to the water quality in Lake Almanor near the Canyon Dam outlet structure.

The lower gates of the outlet structure have typically been used by PG&E to release flows to the Seneca reach. These gates, with an invert elevation of 4,422 feet above mean sea level, draw water from the hypolimnion during the summer, which is colder than the surface of the lake and contains lower amounts of DO. DO concentrations in the water released into the Seneca reach rapidly increases due to aeration of the water upon discharge from the lake (Pacific Gas and Electric Company 2002). Seasonal measurements for DO concentrations along the Seneca reach, including lower Butt Creek, have been consistently greater than 7.0 mg/l (Pacific Gas and Electric Company 2002).

Average daily water temperatures in the Seneca reach during the summer months (June through September) from 1999 to 2004 ranged from 9.8°C to 14.1°C near Canyon Dam and 11.8°C to 16.8°C upstream of the Caribou powerhouses with the exception of 2004, which had observed average daily water temperatures up to 22.5°C near Canyon Dam and up to 18.1°C upstream of the Caribou powerhouses. The warmer temperatures observed in 2004 occurred during a test of the upper-level gates of the Canyon Dam outlet structure (Pacific Gas and Electric Company 2002, 2005a; Federal Energy Regulatory Commission 2005; Stetson Engineers 2007b, 2009). Under the existing baseline condition and typical operations, average daily water temperatures during summer months in the Seneca reach, rarely exceed 13.5°C near Canyon Dam and 17.5°C upstream of the Caribou powerhouses (Pacific Gas and Electric Company 2005b; Stetson Engineers 2007b, 2009). Water temperatures along the Seneca reach tend to increase between Canyon Dam and the Butt Creek confluence (9.6 miles downstream), then decrease somewhat below the confluence. This is due to the cool inflow from lower Butt Creek, which had average daily temperatures between 10.2°C and 13.1°C during 2000 to 2004 (Pacific Gas and Electric Company 2002; Stetson Engineers 2007b, 2009). The accretion flows from lower Butt Creek to the Seneca reach mainly originate from springs and surface runoff emanating downstream of Butt Valley dam because all of the upper Butt Creek flow is impounded in Butt Valley reservoir behind the dam and diverted through the Caribou intakes and there is little seepage through the Butt Valley dam (approximately 0.07 cfs).

Detectable levels of dissolved iron, manganese, and sulfide in the Seneca reach near Canyon Dam were documented by PG&E during water quality monitoring of a 35 cfs test release through the lower gate of the outlet structure in 2001. The salt solubility of these metals and minerals is greater in the low-oxygen environment of the hypolimnion of lakes, which occurs in Lake Almanor during the late summer and early fall at depths near the level of the lower gate on the Canyon Dam outlet structure. The concentrations of dissolved iron, manganese, and sulfide in the Canyon Dam discharge decreased when the upper-level gates were used during the 2001 tests (Federal Energy Regulatory Commission 2005). Dissolved iron, manganese, and sulfide, along with specific conductance and DO in the lower-level releases from Canyon Dam, varied throughout the 2001 monitoring period and occasionally exceeded water quality objectives established in the Basin Plan, especially from late August to October; however, concentrations of these water quality constituents substantially decreased below exceedance thresholds within a short distance downstream of Canyon Dam, where the water rapidly reoxygenates (Pacific Gas and Electric Company 2002). Odors, specifically due to hydrogen sulfide, have also been reported to occasionally exceed drinking water standard thresholds, mostly during fall months in the Seneca reach immediately downstream of Canyon Dam; however, this condition rapidly dissipates within 0.6 mile of Canyon Dam (Pacific Gas and Electric Company 2002).

Belden Reach

Inflow to the 8.8-mile-long Belden reach is from Belden forebay via discharge at the Oak Flat powerhouse and subsequent additions from smaller tributaries downstream of Belden dam and from the East Branch of the North Fork Feather River (see Figure 1-2). The water quality of the Belden reach near Belden dam is similar to the water quality in Belden forebay. About 7.2 miles downstream of Belden dam, the contribution of the East Branch influences the Belden reach in terms of total discharge and water chemistry. As with Belden forebay, the Belden reach has exceeded Basin Plan objectives for water temperature (mostly in July and August), specific conductance, mercury, and PCB concentrations in fish tissues (Pacific Gas and Electric Company 2002, State Water Resources Control Board 2010).

The water temperature of the Belden reach is primarily driven by the water temperature in Belden forebay, which in turn is controlled by the Lake Almanor and Butt Valley reservoir outflow temperatures (Pacific Gas and Electric Company 2005b, Stetson Engineers 2009). Reservoir outflow temperatures for Lake Almanor and Butt Valley reservoir are affected by many factors, including meteorology, inflow hydrology, regulated outflows, reservoir water levels, and the timing of these factors. However, there is no straightforward relationship between hydrological year type or meteorology and reservoir outflow temperature. For example, a dry hydrological year and warm meteorological year would not necessarily result in reservoir outflow temperatures that are warmer than a normal hydrological year and a normal meteorological year (Stetson Engineers 2009).

In addition to UNFFR Project operations, there are a number of influences on water temperature in the Belden reach. The most notable are the contributions of the East Branch of the North Fork Feather River and Yellow Creek; the confluence of the East Branch with the North Fork Feather River is about 1.6 miles upstream of the Belden powerhouse, and the confluence of Yellow Creek with the river is at the lower end of the Belden reach. The East Branch is considerably warmer than the North Fork Feather River during the summer while Yellow Creek tends to be cooler than the river. The North Fork Feather River's physical characteristics, such as vegetative cover and topographic shading, and meteorological conditions associated with lower elevations in the watershed also influence water temperature throughout the Belden reach (Pacific Gas and Electric Company 2002).

For a given water temperature of Belden forebay discharge, temperatures in the North Fork Feather River downstream have a relatively straightforward relationship with meteorological (i.e., climate) and hydrological (i.e., flow) conditions. For example, the water temperatures in the Belden reach are warmer when air temperatures are warm and flows are reduced (Stetson Engineers 2009). Average daily water temperatures in the Belden reach in the summer months during the 1999 to 2004 period ranged from 13.9°C to 22.9°C from Belden dam to immediately upstream of the Belden powerhouse. Water temperatures tend to be coolest near the reach's confluence with Mosquito Creek and increase downstream of the East Branch of the North Fork Feather River confluence, partially as a result of the warm inflows from the East Branch. Average daily water temperatures in the Belden reach upstream of the East Branch exceeded 20°C for 20 to 29 percent of the days in July and August during 1999 to 2004 compared to downstream of the East Branch, where 51 percent of the days in June through September during 1999 to 2004 exceeded 20°C (Pacific Gas and Electric Company 2002, 2005b; Federal Energy Regulatory Commission 2005). The Belden reach above East Branch during the 2002 to 2004 experienced a maximum instantaneous diel temperature of 24°C with average fluctuations of 4.8°C for June and July and 4.1°C for August and September (Stetson Engineers 2009).

All DO concentrations reported for the Belden reach by PG&E (2002) were greater than 7 mg/L and generally exceeded 80 percent of air saturation. Although the Belden dam release is from the bottom of Belden forebay where DO concentrations tend to fall below 7.0 mg/l in June and July, the aeration that occurs when water is released would increase DO rapidly below Belden dam.

The 1984 rockslide that occurred upslope of Belden forebay resulted in deposition of contaminated sediment in Belden forebay. Subsequent remediation efforts by PG&E resulted in placement of material dredged from the forebay onto the floodplain of the North Fork Feather River downstream of Belden dam. PG&E relicensing studies included efforts to sample nine specimens of various aquatic organisms for PCBs downstream of this dredge disposal pile: four Sacramento suckers, four rainbow trout, and one crayfish. All nine samples had PCB levels lower than the EPA screening level of 10 ppb and well below the FDA action level of 2,000 ppb (PG&E 2002).

Downstream of Belden Powerhouse

Water quality in the North Fork Feather River downstream of the UNFFR Project, specifically water temperature in the Rock Creek and Cresta reaches (downstream of Belden powerhouse to Cresta powerhouse), is influenced by streamflow releases and powerhouse discharges from the UNFFR Project, inflow from the unregulated East Branch of the North Fork Feather River and other tributaries, and the Bucks Creek Project, which discharges into the Rock Creek reach. Warm inflow, mainly from the Belden powerhouse to the Rock Creek reservoir, along with high ambient air temperatures and solar radiation during the summer months (June through September) leads to warm water temperatures in the North Fork Feather River downstream of the UNFFR Project boundary all the way to Lake Oroville (Pacific Gas and Electric Company 2005b, Stetson Engineers 2009). Average daily temperatures commonly exceed 20.0ºC in all downstream reaches and powerhouse discharges associated with the Rock Creek, Cresta, and Poe projects from June to September (Federal Energy Regulatory Commission 2005). Average daily temperatures up to 22.9°C in the Rock Creek reach and up to 22.7°C in the Cresta reach have been recorded during some water years (Pacific Gas and Electric Company 2005b, Stetson Engineers 2007b). A maximum instantaneous diel temperature of 24°C was reported during the 2002 to 2004 monitoring of the Rock Creek reach above Bucks Creek and the Cresta reach above Cresta powerhouse (Stetson Engineers 2009). The average water temperature fluctuation ranged between a daily minimum and maximum temperature for the Rock Creek and Cresta reaches of 3.6°C and 2.9°C, respectively, in June; 3.1°C and 2.8°C, respectively, in July; 2.7°C and 2.5°C, respectively, in August; and 2.5°C and 2.0°C, respectively, in September (Stetson Engineers 2009).

Water temperature patterns for the Poe reach (downstream of Cresta powerhouse to Poe powerhouse) are similar to those of the upstream reaches, though the Poe reach tends to be the warmest when compared to the rest of the North Fork Feather River, with a recorded average daily temperature up to 24.7ºC during the summer months (Stetson Engineers 2007b). From 2002 to 2004, a maximum instantaneous diel temperature of 26.6°C was reported for the Poe reach. The average fluctuation between the daily minimum and maximum temperatures was 3.2°C in June, 3.1°C in July, 2.7°C in August, and 2.4°C in September (Stetson Engineers 2009).

DO concentrations are reported to remain at or near air saturation in the Rock Creek, Cresta, and Poe reaches, though these reaches exhibit periodic increases in turbidity, iron, aluminum, and specific conductance during high precipitation and runoff events (Federal Energy Regulatory Commission 2006).

Environmental Impacts and Mitigation Measures

Methodology

A combination of recent and historic water quality monitoring data and various modeling tools were used to evaluate the potential impacts of Proposed Project and the alternatives on the water quality and the resulting impacts on the beneficial uses of the North Fork Feather River, including Lake Almanor. The spatial limits of the analysis encompass the activity areas and their immediate vicinity with respect to construction impacts and the North Fork Feather River system from Lake Almanor to the Poe reach with respect to operational impacts.

The Level 3 Report presents a broad range of modeled river and reservoir conditions resulting from various feasible alternatives for the UNFFR PG&E project (see Appendix D). The three alternatives that are evaluated in this RDEIR represent a subset of the range of reasonable measures analyzed in the Level 3 Report. Subsequent modeling (Stetson Engineers 2016a, 2016b, and 2016c) evaluated the alternatives in this document and the results are included in Appendices E1 to E3. The analysis of environmental impacts evaluates the potential changes in water temperatures and DO in Lake Almanor, Butt Valley Reservoir, and the North Fork Feather River resulting from the Proposed Project and the alternatives. Two separate analyses were completed: 1) an analysis of temperature in the North Fork Feather River downstream of Lake Almanor and Belden Forebay and 2) an analysis of the temperature and DO in Lake Almanor and Butt Valley Reservoir. The focus of these analyses is on changes in temperature and DO from June to September when water temperatures are the highest and incremental increases in temperatures would have the largest impact on the cold water fishery.

Lake Habitat

During summertime, Lake Almanor is stratified. Warm water stays on the surface, the epilimnion, and does not mix with cooler deeper water that becomes depleted of oxygen, the hypolimnion. When stratification occurs, suitable cold water habitat becomes limited to a middle layer where temperatures are cool enough and DO is high enough. The criteria used for this analysis was temperature less than or equal to 20°C and DO greater than 5 mg/L[31].

Increased withdrawal of cold water from the hypolimnion of the Lake would reduce the volume of cold water, but also induce mixing with higher dissolved oxygen in the epilimnion, potentially creating more habitat of cool water with sufficient DO. The interaction was analyzed in both Lake Almanor and Butt Valley Reservoir with a CE-QUAL-W2, a 2-D hydrodynamic model developed by the US Army Corp of Engineers and run by Stetson Engineers (Appendix E). Temperature and DO samples were taken during 2000 and 2001 and were used to calibrate the model. Then daily metrological data was compiled for three years: 2000 "normal", 2001 "dry", 2009 "critical". Historic hourly metrological data and daily flow and temperature data were used as model inputs and described further in the Level 3 Report (Appendix E). Individual days, approximately two weeks apart, were analyzed to calculate the suitable habitat volume, the resulting volumes are summarized for Lake Almanor during critical periods form July to September in Table 5.5-1. Each calculated habitat volume was then multiplied by the number of days until the next analyzed day and summed to get a cumulative available seasonal habitat in acre-feet-days, shown in Table-5.5-2.

The 20°C threshold is used in the Rock Creek – Cresta Relicensing Settlement Agreement and is not the upper incipient lethal temperature (UILT), defined at the temperature at which 50 percent of a population can survive for 7-days. Rainbow trout can survive excursions above the 20°C threshold without being lethal for periods over a week, however, there may be impacts to physiological performance such as reduced growth and weakened disease resistance. It should be noted that the Lake Almanor CE-QUAL-W2 model may not be able to capture the potentially small, isolated "pockets" of suitable cold water habitat that may occur in some local areas, and as a result may underestimate the total available habitat in Lake Almanor.

[31] Use of 5 mg/L DO concentration for the purpose of defining a lower criterion for the thermal refuge habitat index at Lake Almanor is not to be construed as a departure from the Basin Plan DO objective of 7 mg/L for cold, freshwater habitat because the natural process of thermal stratification in lakes results in a declining relationship of DO saturation levels with depth in thermally stratified lakes during the summer. This results in DO levels below 7 mg/L at depths with the colder temperatures that are preferred by cold water fish. DO may be near air saturation levels in shallower, warmer water above the thermocline (see Appendix F for a detailed rationale). In addition, as shown in Figure 6.5-2b, the entire lake had a DO level below 7 mg/L in September and November of 2011. Applying the Basin Plan DO objective of 7 mg/L as the lower criterion for the thermal refuge habitat index would indicate an absence of suitable cold freshwater habitat in the Lake Almanor, which is not the case since there have been no observed fish kills.

Table 5.5-1 Suitable Cold Water Volume in Lake Almanor

Suitable Cold Water Habitat (acre-feet)					
Normal	*July 7*	*Jul 20*	*Aug 7*	*Aug 17*	*Sep 7*
Baseline	216,200	145,600	65,000	44,400	636,600
Project	214,940	143,790	63,690	40,910	639,480
Alt 1	228,120	148,900	61,440	34,130	689,080
Alt 2	227,740	148,400	61,150	35,030	683,250
Alt 3	215,150	145,050	63,640	40,340	648,070
Dry	*July 7*	*Jul 20*	*Aug 7*	*Aug 17*	*Sep 7*
Baseline	149,970	69,790	16,770	3,050	40,280
Project	149,200	69,420	16,200	2,650	38,140
Alt 1	153,960	70,040	13,160	410	13,790
Alt 2	153,430	70,370	13,080	420	17,990
Alt 3	150,730	69,270	12,960	410	30,840
Critical Dry	*July 10*	*Jul 20*	*Aug 9*	*Aug 17*	*Sep 12*
Baseline	85,420	40,870	360	0	490,230
Project	82,720	39,070	0	0	493,040
Alt 1	83,760	36,410	0	0	429,290
Alt 2	82,900	37,090	0	0	463,000
Alt 3	83,010	38,480	0	0	483,230
Suitable Cold Water Habitat Change from Baseline (acre-feet)					
Normal	*July 7*	*Jul 20*	*Aug 7*	*Aug 17*	*Sep 7*
Project	-1,260	-1,810	-1,310	-3,490	2,880
Alt 1	11,920	3,300	-3,560	-10,270	52,480
Alt 2	11,540	2,800	-3,850	-9,370	46,650
Alt 3	-1,050	-550	-1,360	-4,060	11,470
Dry	*July 7*	*Jul 20*	*Aug 7*	*Aug 17*	*Sep 7*
Project	-770	-370	-570	-400	-2,140
Alt 1	3,990	250	-3,610	-2,640	-26,490
Alt 2	3,460	580	-3,690	-2,630	-22,290
Alt 3	760	-520	-3,810	-2,640	-9,440
Critical Dry	*July 10*	*Jul 20*	*Aug 9*	*Aug 17*	*Sep 12*
Project	-2,700	-1,800	-360	0	2,810
Alt 1	-1,660	-4,460	-360	0	-60,940
Alt 2	-2,520	-3,780	-360	0	-27,230
Alt 3	-2,410	-2,390	-360	0	-7,000

Table 5.5-1 Suitable Cold Water Volume in Lake Almanor

Percent Change in Suitable Cold Water Habitat					
Normal	*July 7*	*Jul 20*	*Aug 7*	*Aug 17*	*Sep 7*
Project	-1%	-1%	-2%	-8%	0%
Alt 1	6%	2%	-5%	-23%	8%
Alt 2	5%	2%	-6%	-21%	7%
Alt 3	0%	0%	-2%	-9%	2%
Dry	*July 7*	*Jul 20*	*Aug 7*	*Aug 17*	*Sep 7*
Project	-1%	-1%	-3%	-13%	-5%
Alt 1	3%	0%	-22%	-87%	-66%
Alt 2	2%	1%	-22%	-86%	-55%
Alt 3	1%	-1%	-23%	-87%	-23%
Critical Dry	*July 10*	*Jul 20*	*Aug 9*	*Aug 17*	*Sep 12*
Project	-3%	-4%	-100%	0%	1%
Alt 1	-2%	-11%	-100%	0%	-12%
Alt 2	-3%	-9%	-100%	0%	-6%
Alt 3	-3%	-6%	-100%	0%	-1%

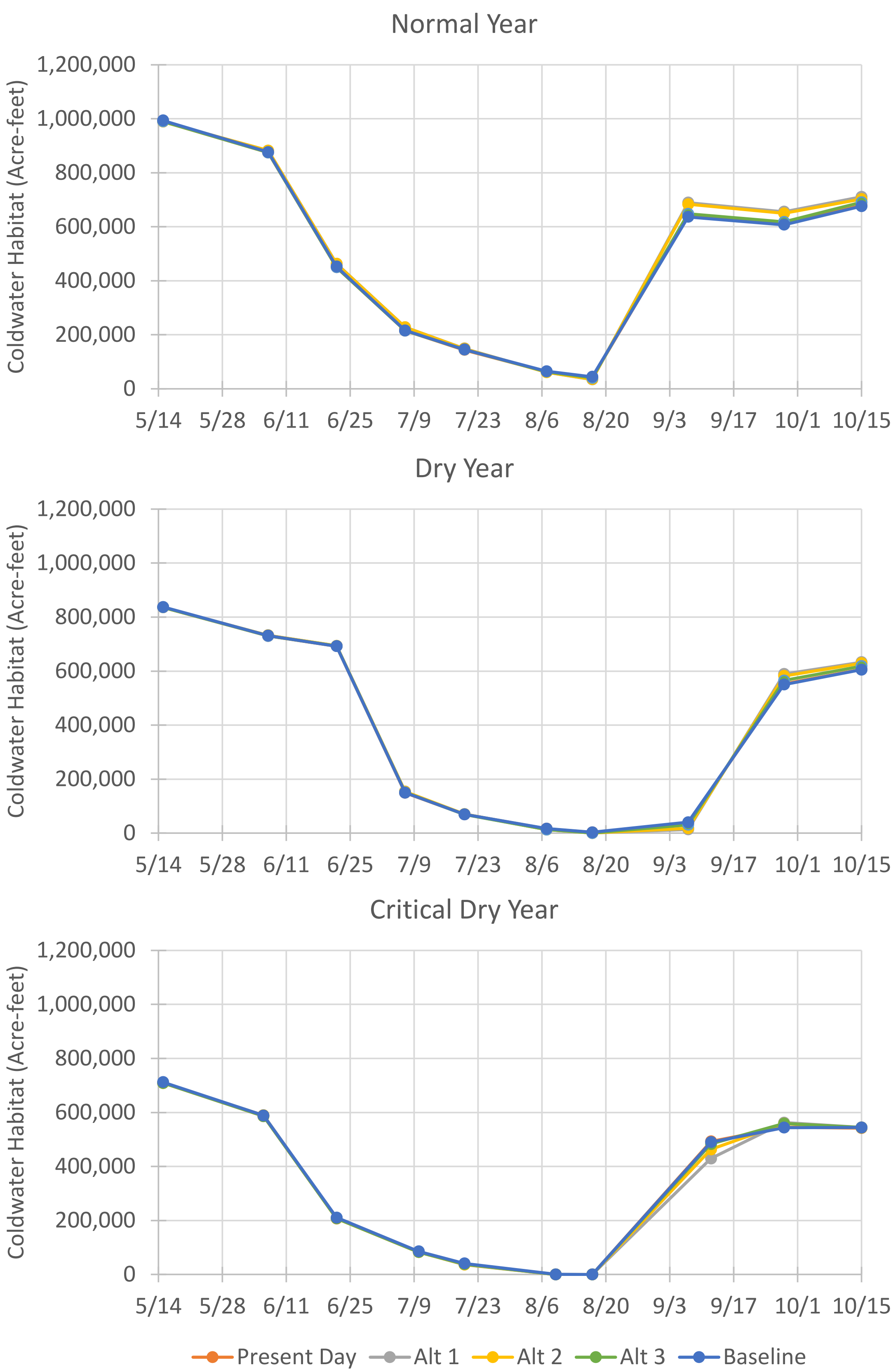

Figure 5.5-3 Lake Almanor Cold Water Habitat Volume (<20°C and >5 mg/l DO)

Table-5.5-2 Seasonal[a] Available Habitat in Lake Almanor and Butt Valley Reservoir

Alternative[c]	Available Habitat (Thousand Acre-feet-day)[b]			Percent Change from Baseline		
	Normal, 2000	Dry, 2001	Critical Dry, 2009	Normal, 2000	Dry, 2001	Critical Dry, 2009
Lake Almanor						
Baseline	84,090	63,920	57,110	--	--	--
Proposed Project	83,960	63,860	56,920	-0.2%	-0.1%	-0.3%
Alternative 1	86,820	64,520	55,980	3.2%	0.9%	-2.0%
Alternative 2	86,460	64,410	56,560	2.8%	0.8%	-1.0%
Alternative 3	84,500	64,080	56,970	0.5%	0.2%	-0.2%
Butt Valley Reservoir						
Baseline	3,880	3,990	2,260	--	--	--
Proposed Project	3,730	3,710	1,800	-3.7%	-7.1%	0.0%
Alternative 1	3,790	3,980	2,180	-2.2%	-0.3%	1.1%
Alternative 2	3,900	4,030	2,510	0.6%	0.9%	7.4%
Alternative 3	3,650	3,470	2,130	-5.7%	-13.1%	0.5%
Combined						
Baseline	87,970	67,910	59,370	--	--	--
Proposed Project	87,690	67,570	58,720	-0.3%	-0.5%	-0.3%
Alternative 1	90,610	68,500	58,160	3.0%	0.9%	-1.9%
Alternative 2	90,360	68,440	59,070	2.7%	0.8%	-0.7%
Alternative 3	88,150	67,550	59,100	0.2%	-0.5%	-0.2%

a. Model dates address worst-case summer season May 15 to end of September to 15
b. Available habitat defined as less than 20°C and greater 5 mg/L DO
c. Proposed Project = listed as “present day” in Appendix E.
Alternative 1 = Thermal Curtain + 250 cfs at Canyon Dam
Alternative 2 = Thermal Curtain
Alternative 3 = 250 cfs at Canyon Dam

All modeled alternatives showed an annual combined cold water habitat (acre-feet-days) of Lake Almanor and Butt Valley Reservoir increasing from 3.0 percent to a loss of 1.9 percent compared to baseline. Alternative 1, thermal curtains and 250 cfs at Canyon Dam, shows the largest gain in habitat during *normal years* (3.0%), but also the largest loss of habitat in critical *dry years* (-1.9%). Alternative 3, 250 cfs at Canyon Dam, resulted in the smallest habitat gain during *normal years*, but also the smallest loss during *critical dry years*. The percentage of cold water habitat may vary more widely on a day-to-day basis, particularly in August when the total cold water habitat is significantly reduced. Table 5.5-1 shows Lake Almanor with no *critical dry* *year* habitat for all alternatives. During the first half of August, the baseline maintains a small amount of suitable habitat (360 acre-feet or 0.1% of the lake volume). Temperatures above 20°C are not lethal for short periods of time and the model may underestimate the total volume of cold water habitat due to local cold water pockets around the springs.

River Temperature

The river temperature below Belden Reservoir was modeled for a representative day each month from June to September for the various alternatives and a range of meteorological and hydrologic conditions. Lake temperatures were calculated using a 19-year meteorological record with inflows based on a synthesized data set of a single year of inflows coupled with temperatures and outflows to match the specific alternative operations for the corresponding hydrologic scenario. Lake temperature results were sorted to create an "exceedance level" for each summer month and for each alternative. Six different combinations of meteorological and hydrologic scenarios were compiled and summarized in Table 5.2-2. Each combination was then run through a series or river temperature and mixing models to calculate the river temperatures from Belden to Poe for a representative day each summer month.

Table-5.5-3 Data inputs for River Temperature Modeling

Scenario	Reservoir Temperature[a]	Meteorological Condition[b]	Stream Accretion	Dam Release Schedule[c]
Maximum	Maximum	Normal + 1.3 standard deviations	Monthly average accretion for 2001	Extreme Dry
Critical Dry	10% exceedance	Normal + 1.3 standard deviations	Monthly average accretion for 2002	Critical Dry
Dry	25% exceedance	Normal + 1.3 standard deviations	Monthly average accretion for 2002	Dry
normal	50% exceedance	Normal (monthly mean)	Monthly average accretion for 2000, 2003, 2004	Normal
Wet	75% exceedance	Normal - 1.3 standard deviations	Monthly average accretion for 2006	Wet
Very Wet	90% exceedance	Normal - 1.3 standard deviations	Monthly average accretion for 2006	Wet

a. Exceedances are calculated monthly based on 19-year daily output of Lake Almanor MITEMP and Butt Valley Reservoir CE-QUAL-W2 models.
b. 19 year (1984 – 2002) daily data from four metrological stations: Prattville Intake, Chester, Canyon Dam, and McArthur.
c. Dam Release Schedule based on 2004 Settlement and reoperation per specific alternative (250 cfs at Canyon Dam).

The results of the river temperature analysis from Belden to Poe are included in the Level 3 Report (Appendix E) in Tables 2-3a and 2-3b. Table 5.5-4, below, shows the Proposed Project and each of the three alternatives compared to baseline by creating a single metric of a daily average degree-day-kilometer (degree-d-km), which is the difference of the river temperature above the threshold of 20°C, multiplied by the river length, multiplied by the days of the month, and then averaged for all summer months. Changing the threshold to 22°C does not change the relative ranking of the alternatives with Alternative 1 (thermal curtains and 250 cfs at Canyon Dam) showing the greatest temperature reduction and Alternative 3 (250 cfs at Canyon Dam) with the least temperature reduction.

Table 5.5-4 Belden to Poe Summertime Habitat over 20°C Threshold

Scenario	Wet	Normal	Dry	Critical Dry
Average Summertime River Temperature above threshold (Degree-d-km)				
Baseline	3.9	24	71	93
Proposed Project	3.0	20	65	87
Alt 1	0.5	4.1	19	31
Alt 2	0.9	5.4	28	45
Alt 3	1.9	8.8	43	57
Decrease from Baseline (Degree-d-km)				
Proposed Project	0.8	3.1	5.8	5.8
Alt 1	3.4	20	52	62
Alt 2	3.0	18	44	48
Alt 3	2.0	15	28	36
Percent Decrease from Baseline				
Proposed Project	-20%	-13%	-8%	-6%
Alt 1	-86%	-83%	-73%	-67%
Alt 2	-78%	-77%	-61%	-52%
Alt 3	-52%	-63%	-39%	-39%

Under baseline and Proposed Project operations during *normal years*, the entire 48 mile stretch of the Upper North Fork of the Feather River remains below 20°C in June and only the last three miles are predicted to exceed 20°C in September. However, even during a *normal year*, the entire reach below Seneca, except for Cresta Reservoir (approximately 0.9 miles long above Rock Creek Powerhouse) is above 20°C resulting in a daily average of 24 degree-day-kilometers (degree-d-km) for *normal years* for the baseline. In June of *dry years*, both the Proposed Project and baseline exceed a mean daily temperature of 20°C in June after the East Branch at river mile 18.8 to 47.9, where mean daily temperatures reach 23.5°C. During July and August of *dry years*, the mean daily temperature for most of the river is around 22°C until water reaches the lower Poe reach where temperatures climb above 24°C above the Poe Powerhouse. *Dry year* temperature conditions under the Baseline and Proposed Project result in a daily average of 71 and 65 degree-d-km, respectively. For *critical dry years* the Proposed Project and baseline exceed 20°C for all reaches below Belden all summer with peaks in July above the Poe Powerhouse of over 25.5°C, resulting in a daily average of 87 and 91 degree-d-km for the baseline and Proposed Project, respectively.

All alternatives result in decreases in river temperatures, with Alternative 1 predicted to have the largest reduction in river temperatures followed by Alternative 2, then Alternative 3. The temperature differences are largest at the start of Belden and converge as the water flows downstream. During *dry years* in July, the head of the Belden reach would have temperatures of 21.7°C, 21.5°C, 20.4°C, 19.1°C, and 18.5 °C for baseline, Proposed Project, Alternative 3, Alternative 2, and Alternative 1, respectively. Temperatures drop slightly passing through the reservoirs but, a warming trend exists through the system with the relative order remaining the same. During *dry years* in July, flows at the Poe powerhouse are 25.0°C, 25.0°C 24.6°C, 24.1°C, and 23.9°C for baseline, Proposed Project, Alternative 3, Alternative 2, and Alternative 1, respectively. The difference in the project flows and baseline become negligible. The difference under Alternative 3 of 3.2°C at Belden is reduced to a difference of 1.1°C at the Poe Powerhouse. Similar patterns exist in other year types and months and are summarized in Table 5.5-4. The metric of average degree-d-km shows that during *critical dry years*, Alternative 1 decreases the average degree-d-km 67 percent compared to the Proposed Project reduction of 6 percent. While Alternative 3 would result in the smallest average seasonal river temperature reduction among the alternatives with a 39 percent reduction during *critical dry years*, the Alternative 3 reduction is significantly greater than the Proposed Project's 6 percent reduction.

Thresholds of Significance

The significance thresholds used for assessing potential impacts on water quality were developed based on guidance provided by the CEQA Guidelines. These threshold criteria were applied to the qualitative assessment and quantitative modeling results and used to determine the significance of impacts on water quality and associated beneficial uses of the affected water bodies. The analysis of water quality impacts and benefits focused on temperature, DO, taste and odors, turbidity, and the potential for discharge of hazardous materials for the Proposed Project and the alternatives.

Impacts on water quality would be significant if the Proposed Project or an alternative would:

- violate existing water quality standards or otherwise substantially degrade water quality
- result in substantial water quality changes that would adversely affect beneficial uses
- result in undesirable impacts on public health or environmental receptors.

Impacts and Mitigation Measures

This section discusses the anticipated impacts related to water quality associated with the Proposed Project and the alternatives and, if applicable, identifies mitigation measures for significant impacts. Table 5.5-5 compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.5-5 Summary of Water Quality (WQ) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact WQ-1: Implementation of Proposed Project or the alternatives could affect water temperature in Lake Almanor.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact WQ-2: Implementation of Proposed Project or the alternatives could affect water temperature in Butt Valley reservoir.	Less than significant	Less than significant	Less than significant	Less than significant
Impact WQ-3: Implementation of Proposed Project or the alternatives could affect water temperatures in the North Fork Feather River below Canyon Dam and Belden dam.	No impact (Beneficial)	No impact (Beneficial)	No impact (Beneficial)	No impact (Beneficial)
Impact WQ-4: Implementation of Proposed Project or the alternatives could affect DO levels in water discharged from Canyon Dam and Butt Valley powerhouse.	Less than significant	Less than significant	Less than significant	Less than significant
Impact WQ-5: Implementation Proposed Project or the alternatives could cause water released from Canyon Dam to have an undesirable taste or odor.	Less than significant	Less than significant	Less than significant	Less than significant
Impact WQ-6: Implementation of Proposed Project or the alternatives could cause a change in the character or quantity of dissolved metal concentrations or other contaminants in Lake Almanor or the North Fork Feather River.	Less than significant	Less than significant	Less than significant	Less than significant

Table 5.5-5 Summary of Water Quality (WQ) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact WQ-7: Construction activities associated with Proposed Project or the alternatives could result in temporary increases in turbidity and total suspended solids in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact WQ-8: Hazardous materials spills during construction activities associated with Proposed Project or the alternatives could cause contamination of Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation

Impact WQ-1: Implementation of Proposed Project or the alternatives could affect water temperature in Lake Almanor.

Proposed Project

Implementation of the Proposed Project would result in increased releases from Canyon Dam, with equivalent decreases from the Prattville intake diversion, as outlined in the 2004 Settlement Agreement. The increased releases could affect the distribution of water temperatures in Lake Almanor during periods of summer thermal stratification. The effects on thermal stratification as a result of the increased withdrawal of hypolimnetic water from the Canyon Dam lower gate outlet structure are described by Stetson Engineers (2009, 2012, 2016) (Appendices E, E1, E2, and E3). Increased withdrawal of hypolimnetic water could reduce the volume of cold water in the hypolimnion and induce a small amount of movement of the hypolimnetic water. As a result, some mixing would be expected at the interface of the hypolimnion and the metalimnion water layers.

Under all water year types, the Proposed Project's suitable cold water habitat in Lake Almanor (i.e., water equal to or less than 20ºC with DO of 5 mg/L or greater) would be within 0.5 percent of baseline conditions on the seasonal average, see Table-5.5-2. In general, Lake Almanor has the smallest volume of suitable cold water habitat in August under both baseline conditions and Proposed Project. As a result of the smaller total habitat volume in August, the model predicts the largest relative changes of -8, -13, and -100 percent reduction in cold water habitat on days with the least cold water habitat in for *normal, dry*, and *critical dry years*, respectively. During *critical dry years*, the model also predicts no suitable cold water habitat in the last two weeks of August for both baseline and the Proposed Project. Due to the limited amount of suitable cold water habitat, the predicted loss of habitat in both absolute volume and duration would be potentially **significant without mitigation**.

Alternatives 1, 2, and 3

Either separately or combined, the operation of a thermal curtain at the Prattville intake and increased water releases of up to 250 cfs from mid-June to mid-September through the Canyon Dam low-level outlet structure, with a corresponding decrease in the Prattville intake diversion, would affect the suitable cold water habitat in Lake Almanor during periods of summer thermal stratification. The effects on thermal stratification as a result of the withdrawal of hypolimnetic water, both from the Prattville intake with use of a thermal curtain and from the Canyon Dam outlet structure, were described by Stetson Engineers (2009, 2016a, 2016b) (Appendices E, E2, and E3) and presented in Table 5.5-1 and Figure 5.5-1. Habitat volume was calculated for ten individual days throughout the summer for each water year type. Data is summarized in Table-5.5-2 by multiplying the habitat volume (volume of water less than 20°C and greater than 5 mg/l DO) with the number of days represented by each habitat volume calculation and summing the results to obtain a seasonal habitat volume calculated in acre-feet-days for each water year type. Suitable habitat in August is very limited. Calculated suitable habitat volumes for baseline, Proposed Project, and all the alternatives are less than 6 percent of total lake volume in *normal years*, less than 1 percent in *dry years*, and no habitat in *critical dry years*.

All the alternatives resulted in an increase in seasonal suitable cold water habitat compared to baseline and the Proposed Project during *normal years*, but alternatives with thermal curtains (Alternatives 1 and 2) resulted in reductions in seasonal suitable cold water habitat in *critical dry years* when compared to baseline. Alternative 1 has the largest seasonal benefit (+ 3.2 percent) in the volume of suitable cold water habitat in Lake Almanor during *normal water years* and the largest seasonal loss (-2.0%) in *critical dry years*, as shown in Table-5.5-2. Alternative 3 results in the smallest increase in habitat compared to baseline during normal years (0.5%), but also the smallest loss of habitat in critical dry years (-0.2%) when compared to baseline.

The percentage of available habitat lost is largest for all alternatives in late August ranging from 23 percent in *normal years* to a 100 percent loss in *critical dry years*. The loss of suitable cold water habitat during critical dry years can be misleading because even the baseline results show a complete loss of suitable cold water habitat, and the total acre-feet of cold water habitat loss is limited to less than 0.06 percent of the total lake volume.

Nonetheless, due to the limited volume of suitable cold water habitat in Lake Almanor during *critical dry years*, any loss of habitat volume would be potentially **significant without mitigation**.

Mitigation Measure WQ-1 (Proposed Project, Alternatives 1, 2, and 3): Implement Water Quality and Fish Monitoring, Augment Stocking of Cold Water Fishery in Lake Almanor, and Adaptively Manage Canyon Dam Releases

Under this mitigation measure, PG&E would be required to develop and implement a water quality monitoring program to collect water temperature and DO depth profiles throughout Lake Almanor and develop and implement a Lake Almanor fish monitoring program. PG&E would also be required to evaluate the monitoring data annually to determine, in consultation with applicable resource agencies, whether CDFW's Lake Almanor fish stocking program should be augmented to ensure the Project's operations do not adversely affect Lake Almanor's fishery. Supplemental fish stocking would be consistent with CDFW's current program of stocking catchable trout.

Additionally, PG&E would be required to adaptively manage the Canyon Dam releases in consultation with applicable resource agencies and as required by the State Water Board. Data collected as part of the water quality monitoring program and Lake Almanor fish monitoring program will be used to monitor and assess potential impacts to the suitable habitat in Lake Almanor, which may result in a determination that releases from Canyon Dam for purposes of meeting minimum instream flows or temperature control should be modified or suspended. The goal of adaptive management of the Canyon Dam releases would be to mitigate or avoid impacts to suitable habitat in Lake Almanor while affording reasonable protection to habitat in the North Fork Feather River.

Significance after Mitigation

Mitigation Measure WQ-1 would (1) reduce the uncertainty associated with summer cold water habitat estimates for Lake Almanor by increasing the base of monitoring information to improve the understanding of cold water habitat conditions,(2) improve the ability of the cold water fishery to recover if adverse impacts occur, and (3) avoid impacts to the extent feasible through the adaptive management of Canyon Dam releases. Implementation of this mitigation measure would reduce the impact to a **less-than-significant** level.

Impact WQ-2: Implementation of Proposed Project or one of the alternatives could affect water temperature in Butt Valley Reservoir.

Proposed Project

As outlined in the 2004 Settlement Agreement, the Proposed Project contains operational changes that may reduce the inflows and outflows of Butt Valley reservoir by a small amount. The reduced inflows and outflows would occur as a result of transfer of some of the inflow from the Prattville intake to releases from Canyon Dam to increase flows in the Seneca reach. The hydrodynamics of Butt Valley reservoir would vary only slightly from the baseline condition because of the small change in inflows and outflows.

In general, water temperatures in Butt Valley reservoir under the Proposed Project would be similar to the baseline condition with less than 10 percent loss in suitable cold water habitat (temperature less than 20°C and DO greater than 5.0 mg/L) on a seasonal basis for all water year types. No seasonal loss of cold water habitat would occur in *critically dry years*.

When considering individual days rather the cumulative seasonal suitable cold water habitat for the Proposed Project, *dry years* would have the largest volumetric loss of cold water habitat (7,440 acre-feet or over 20 percent of the lake volume) in September as less water is diverted into Butt Valley Reservoir compared to baseline operations. However, during periods when suitable habitat volumes are severely limited, such as August for *dry and critical dry years*, the Proposed Project results in minimal loss of suitable habitat compared to baseline. Suitable habitat loss in August during *dry years* is calculated to be only 10 acre-feet or 0.03 percent of lake volume and during *critical dry years* both the proposed project and baseline have no suitable habitat (shown in Appendix E3 – Table 22 and Figure 24). As a result, the impact of the Proposed Project on water temperature in Butt Valley reservoir would be **less than significant.**

Alternatives 1, 2, and 3

Alternatives with thermal curtains (Alternative 1 and 2) would improve seasonal cold water habitat in Butt Valley Reservoir over the Proposed Project. Alternative 2 (thermal curtain without increased flow through Canyon Dam) would have the largest increase in cold water habitat in Butt Valley Reservoir over baseline conditions for all year types.

Under Alternative 3 (increased Canyon Dam releases of up to 250 cfs without thermal curtains at the Prattville and Caribou intakes), effects to Butt Valley reservoir water temperatures would be similar to that of the Proposed Project, except for a slightly slower recovery of suitable cold water habitat in September of *dry water years* (see E3 – Tables 22, 25, 28 and Figures 24, 27, 30). The change in the recovery rate of suitable cold water habitat would not have a significant, adverse effect on the cold water fishery because of the continued availability of suitable cold water habitat and the short duration of the change.

The impact of all alternatives on water temperatures in Butt Valley reservoir would therefore be **less than significant**.

Impact WQ-3: Implementation of the Proposed Project or one of the alternatives could affect water temperatures in the North Fork Feather River below Canyon Dam and Belden dam.

Proposed Project

The proposed minimum instream flow schedule for the Seneca and Belden reaches incorporated into Proposed Project would reduce water temperature in North Fork Feather River reaches downstream to the Poe Hydroelectric Project.

In the *very wet years,* releases in June from Canyon Dam are below 10°C. Habitat below 10°C is less than the optimum for trout as shown in Figure 5.6-1. The length of river below 10°C extends less than 1 mile beyond the length of the of baseline compared to the Proposed Project. Due to the limited duration and length of this change the impact is **less than significant**

The Proposed Project results in a difference between 0.6°C and 0°C maximum daily temperature during dry and *critical dry years* with the largest differences in the Belden reach and temperatures converging in the Poe reach (Appendix E3). The average degree-d-km over 20°C is reduced from the baseline by 8 percent in *dry years* and 6 percent in *critical dry years* over the entire reach for the entire summer (see Table 5.5-4). Water temperatures would continue to exceed the optimal temperatures for rainbow trout in summer months, a condition that led the EPA to list the North Fork Feather River upstream of Lake Oroville under Section 303(d) of the Clean Water Act (CWA) as water quality limited for temperature. Relative to the baseline, however, temperatures would not increase. Therefore, the Proposed Project is considered to have **no impact (Beneficial)**.

Alternatives 1, 2, 3

All three alternatives reduce temperatures in the Seneca reach through to the Poe reach. The alternatives result in the greatest water temperature reduction in the Belden reach and the difference from baseline decreases as the water flows downstream and temperatures converge.

In the *very wet years*, releases from Canyon Dam in June are below 10°C. Habitat below 10°C is less than the optimum for trout as shown in Figure 5.6-1. For each of the alternatives, the length of river below 10°C extends less than 1 mile beyond the length of the of the baseline scenario. Due to the limited duration and length of this change the impact is **less than significant**.

Temperature remains relatively constant for each alternative from the Belden reach through the Cresta Reach, however temperature increases significantly under each alternative in the Poe Reach. The model results for July in a *dry year* show the water entering the Belden Reach at 18.5°C, 19.1°C, and 20.4°C for Alternatives 1, 2, and 3, respectively, resulting in a 3.1°C, 2.6°C, and 1.3°C temperature reduction from baseline. When the water reaches the Poe powerhouse, after having increased in temperature most significantly in the Poe reach, the differences between baseline are reduced to 1.1°C, 0.9°C, and 0.4°C, for Alternatives 1, 2, and 3, respectively (with temperatures heating to 23.9°C, 24.1°C, and 24.6°C, respectively). Based on the June through September average daily temperature exceedance (calculated as degree-d-km), Alternative 1 has the largest reduction, followed by Alternative 2, then Alternative 3. Alternative 3 reduces the average degree-d-km by 63 percent in *normal years* and 39 percent in *dry and critical dry years* (Table 5.5-4 and Appendix E3 Figures 2 through 11). Therefore, Alternatives 1, 2, and 3 are considered to have **no impact (beneficial).**

Impact WQ-4: Implementation of Proposed Project or one of the alternatives could affect DO concentration in water discharged from Canyon Dam and Butt Valley powerhouse.

Proposed Project

Under the Proposed Project, discharges from Canyon Dam and the Butt Valley powerhouse would have DO levels similar to baseline conditions. The increased Canyon Dam releases from the low-elevation outlet as specified in the 2004 Settlement Agreement, with an equivalent reduction in the discharge through the Prattville intake to maintain lake levels in Lake Almanor, would release more hypolimnetic water with low DO to the Seneca reach during the summer than under the current operation. Although the increased flows are between two and four times greater than the current minimum flow release of 35 cfs from Canyon Dam, it is expected that the DO concentration would be 6 mg/L at the point of discharge and would increase to more than 7 mg/L within a distance of less than 0.3 mile from the dam.

Seasonal measurements for DO concentrations below the dam under current conditions have been consistently greater than 7.0 mg/L (PG&E 2002). Theoretically, the aeration efficiency is related to both the Froude number and the Reynolds number (i.e., indices of turbulence) of the flow jet at the discharge outlet. Analysis by Stetson Engineers showed that the aeration efficiency would be reduced from the current 63 percent to about 55 percent when the release rate is increased from 35 cfs to 90 cfs. At the estimated aeration efficiency of 55 percent, the DO concentration would be greater than 6 mg/L at the discharge outlet. Using the Streeter–Phelps DO model (H.W. Streeter and E. B. Phelps 1925), Stetson Engineers estimated that the DO concentration would increase to greater than 7 mg/L within a distance of less than 0.3 mile from the discharge outlet.

The Proposed Project does not call for the implementation of any measures that would modify the Prattville intake. Therefore, discharges from the Butt Valley powerhouse would contain DO levels similar to baseline conditions. The impact of the proposed PG&E project on DO concentration in water discharged from Canyon Dam and Butt Valley powerhouse would be **less than significant.**

Alternatives 1, 2, and 3

With the Prattville thermal curtain in place under Alternatives 1 and 2, discharge through the Butt Valley powerhouse into Butt Valley reservoir would contain lower DO levels during certain periods of the summer. It is estimated that the hypolimnetic water coming from Lake Almanor would have DO levels of 2 to 4 mg/L compared to existing conditions of 6 to 7 mg/L. However, the aeration that occurs at the Butt Valley powerhouse discharge would increase the DO levels from that 2 to 4 mg/L range. Aeration under existing conditions would not be expected to be as high as Alternatives 1 and 2 because the Prattville intake mainly withdraws epilimnion water that has relatively high concentrations of DO. However, if a thermal curtain near the Prattville intake is used to cause withdrawal of cold water from the hypolimnion (with low DO), aeration under this condition would be greater. This condition was evidenced during the 2006 summertime special test (Stetson Engineers and Pacific Gas and Electric Company 2007a). During the special test, the Butt Valley powerhouse discharge was reduced to about 500 cfs to cause selective withdrawal of hypolimnion cold water at the Prattville intake (i.e., water was taken from a lower level). Measurements of water temperature and DO in the discharge channel about 180 feet downstream from the Butt Valley powerhouse (Table 5.5-4) demonstrated that aeration at the powerhouse discharge outlet would increase the DO to near air saturation. Therefore, the impact of Alternatives 1 and 2 on DO concentration in water discharged from Butt Valley powerhouse would be **less than significant**.

Table 5.5-4. Measured Water Temperature and Dissolved Oxygen in the Discharge Channel about 180 Feet from the Butt Valley Powerhouse during the 2006 Summertime Special Test

Measurement Time	Estimated DO at Prattville Intake[a] (mg/L)	Measured Water Temperature in the Discharge Channel (°C)	Measured DO in the Discharge Channel (mg/L)
8/1/2006, 7:00am	4.5	14.0	8.7
8/2/2006, 7:45am	4.5	12.2	8.4
8/3/2006, 7:45am	4.5	12.4	8.4
8/4/2006, 8:31am	4.5	13.2	8.2
8/5/2006, 8:00am	4.5	12.3	8.8

[a] The DO concentration at the Prattville intake was estimated based on the measured discharge water temperature and the measured vertical profiles of water temperature and DO at the Prattville intake.

Under Alternatives 1 and 3, the increased Canyon Dam release of up to 250 cfs from June 16 through September 15 from the low-elevation outlet with an equivalent reduction in the discharge through the Prattville intake to maintain lake levels in Lake Almanor would result in more water with low DO concentrations released to the Seneca reach during the summer than under the Proposed Project or baseline operations. Although a Canyon Dam release of 250 cfs would be seven times greater than the current (baseline) minimum flow release of 35 cfs, it is expected that the DO concentration would be more than 5.5 mg/L at the point of discharge and would increase to more than 7 mg/L within a distance of less than 1.0 mile from the dam[32]. Under Alternative 2, the releases from Canyon Dam would be the same as for Proposed Project. The effects on DO would also be the same. Therefore, the effects of all alternatives on the DO concentration in the water discharged from Canyon Dam would be **less than significant.**

Impact WQ-5: Implementation of Proposed Project or one of the alternatives could cause water released from Canyon Dam to have an undesirable taste or odor.

Proposed Project

The increased releases from the Canyon Dam low-level outlet, as outlined in the 2004 Settlement Agreement, could cause an increase in noticeable hydrogen sulfide odors in the immediate vicinity of the dam discharge to the Seneca reach of the North Fork Feather River during certain times in late summer, depending on annual hydrologic conditions and Lake Almanor water storage levels. While a sulfide odor may be noticeable during the increased late-summer releases of 60 cfs, it is unlikely that the degree of change in its duration relative to the current (baseline) condition (35 cfs) would be noticeable. This impact would be **less than significant**.

[32] Seasonal measurements for DO concentrations below Canyon Dam under current conditions have been consistently greater than 7.0 mg/L (Pacific Gas and Electric Company 2002). Stetson Engineers estimated the aeration efficiency at the Canyon Dam discharge point to be about 63 percent. Theoretically, the aeration efficiency is related to both the Froude number and the Reynolds number (i.e., indices of turbulence) of the flow jet at the discharge point. Analysis by Stetson Engineers showed that the aeration efficiency could be reduced from the current 63 percent to about 45 percent when the release rate is increased from 35 cfs to 250 cfs. At the estimated aeration efficiency of 45 percent, the DO concentration would be greater than 5.5 mg/L at the discharge outlet. Using the Streeter–Phelps DO model (H.W. Streeter and E.B. Phelps 1925), Stetson Engineers estimates that the DO concentration would increase to more than 7 mg/L within a distance of less than 1.0 mile from the discharge outlet.

Alternatives 1 and 3

The modification of the Canyon Dam low-level outlet to release up to 250 cfs from mid-June to mid-September could cause an increase in noticeable hydrogen sulfide odors in the immediate vicinity of the dam discharge to the Seneca reach of the North Fork Feather River during certain times in late summer, depending on annual hydrologic conditions and Lake Almanor water storage levels. The increased Canyon Dam releases of up to 250 cfs would occur when Lake Almanor is thermally stratified and during a portion of the period when hydrogen sulfide is produced in the hypolimnion, which is usually during the late summer to early fall season and with high lake surface elevations (Pacific Gas and Electric Company 2002, Federal Energy Regulatory Commission 2005). However, the highest concentrations of hydrogen sulfide, iron, and manganese, which are all soluble under the anoxic chemical-reducing conditions at the interface of the lake bed and the hypolimnion, are reported by PG&E to occur from mid-September to October (Federal Energy Regulatory Commission 2005). The temperature control discharges of up to 250 cfs from the Canyon Dam low-elevation outlet would not be required after mid-September, when the occurrence of hydrogen sulfide odors typically has been most noticeable.

The 250 cfs release from Canyon Dam would draw more water from the deep hypolimnion compared to the baseline 35 cfs release or the releases under the proposed PG&E project. It is anticipated that the withdrawal zone for the outlet gate for a 250 cfs release will be larger than the current 9-foot-depth band surrounding the gate currently used for the 35 cfs release (Pacific Gas and Electric 2002). The increased withdrawal zone above and below the outlet gate would result in considerable mixing and dilution of the sulfide-containing deep hypolimnetic water with water from higher in the water column that contains little to no hydrogen sulfide. In addition, water quality monitoring downstream of Canyon Dam suggests that rapid aeration of water as it passes through the Canyon Dam discharge tunnel and is released to the Seneca reach returns sulfide concentrations to near non-detectable levels within a short distance (1,250 feet) below the dam (Federal Energy Regulatory Commission 2005). While a sulfide odor may be noticeable during late-summer releases of up to 250 cfs at Canyon Dam, it is unlikely that it would be more noticeable than under current conditions. This impact would therefore be **less than significant**.

Alternative 2

Under Alternative 2, Canyon Dam releases would occur in accordance with the alternative minimum instream flow conditions for the Seneca reach shown in Figure 3-1. These releases would be greater than the current (baseline) 35 cfs, but less than the releases under Alternatives 1 and 3 (250 cfs) during the summer months. Therefore, this impact would be **less than significant**.

Impact WQ-6: Implementation of Proposed Project or one of the alternatives could cause a change in the character or quantity of dissolved metal

concentrations or other contaminants in Lake Almanor or the North Fork Feather River.

Proposed Project

As described above, releases from the Canyon Dam low-elevation outlet structure could contain lower DO concentrations. 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 sediments under anoxic conditions with pH levels of 7.5 units or less.

Iron and manganese were found to have exceeded water quality objectives in the Seneca reach only during *dry water years*; however, concentrations of these water quality constituents substantially decreased to below exceedance thresholds within a short distance downstream of Canyon Dam, where the water rapidly re-oxygenates (Pacific Gas and Electric Company 2002). All other water quality objectives at the Canyon Dam outlet near the bottom of Lake Almanor were satisfied, and changes to dissolved metal concentrations would not adversely affect conditions within the Seneca reach.

Increased withdrawal of hypolimnetic water under Proposed Project compared to withdrawal under the baseline condition could reduce the volume of cold water in the hypolimnion of Lake Almanor. In addition, increasing cold water withdrawal also would induce a small amount of movement of the hypolimnetic water, resulting in some mixing at the interface of the hypolimnion and the metalimnion water layers. This mixing could result in either no increase or a small increase in the DO concentration in the upper hypolimnion. The DO concentration in the lower hypolimnion at the water-sediment interface would be expected to remain unchanged. Therefore, dissolved metal concentrations within Lake Almanor would be expected to remain unchanged relative to baseline conditions. Because dissolved metal concentrations within Lake Almanor will remain unchanged, releases to water bodies via the Prattville intake or Canyon Dam would have no adverse effects related to dissolved metal concentrations in Lake Almanor, the Seneca reach, and Butt Valley reservoir. No operational changes would occur that would influence metal concentrations in Belden forebay. Although flows will increase in the Belden reach, the PCB levels would be expected to remain stable or potentially decrease over time. Impacts under the proposed PG&E project would be **less than significant.**

Alternatives 1 and 3

The 250 cfs release from Canyon Dam under Alternatives 1 and 3 from June 16 to September 15 would draw more water from the hypolimnion than occurs under the current (baseline) 35 cfs release or under the releases from Proposed Project. It would be expected that the withdrawal zone of the intake gate for a 250 cfs release would be larger than the 9-foot-depth band surrounding the outlet gate associated with the current 35 cfs release (Pacific Gas and Electric 2002). The increased withdrawal zone above and below the outlet gate would cause considerable mixing and dilution of the hypolimnetic water with water from lower elevations in the reservoir. The mixing and dilution could result in lower metal concentrations in the release water compared to baseline conditions. In addition, concentrations of these metals would be substantially decreased to below exceedance thresholds within a short distance downstream of Canyon Dam, where the water would rapidly re-oxygenate, causing the metals to precipitate to the channel bed.

Thermal curtains installed at the Prattville intake together with the increased Canyon Dam release of up to 250 cfs would reduce the volume of cold water in the hypolimnion of Lake Almanor and induce movement of the hypolimnetic water, resulting in mixing at the interface of the hypolimnion and the metalimnion water layers. This mixing would result in an increase in the DO concentration in the upper hypolimnion and, possibly, in the lower hypolimnion at the water-sediment interface. Increased DO at the water-sediment interface would reduce the release of metals from the lakebed sediments and thereby decrease dissolved metal concentrations in Lake Almanor. Decreased concentrations of dissolved metals in Lake Almanor would result in decreased concentrations in Butt Valley reservoir.

In summary, no adverse effects concerning dissolved metal concentrations in Lake Almanor or other water bodies within the boundary of the UNFFR Project are expected. The impacts under Alternatives 1 and 3 would be **less than significant**.

Alternative 2

Under Alternative 2, releases from the Canyon Dam outlet structure would increase from the current (baseline) minimum of 35 cfs (year round) to between 60 and 150 cfs, depending on month and water year type (see releases from Canyon Dam for Proposed Project (Table 3-1in 2004 Settlement Agreement.) Increases in minimum flow releases will likely encourage some degree of mixing and dilution of the hypolimnion of Lake Almanor and promote downstream aeration within the Seneca reach. These factors are expected to contribute to a decrease in dissolved metal concentrations that have historically exceeded water quality objectives (e.g., iron and manganese). Similar to Alternatives 1 and 3, no adverse effects on dissolved metal concentrations in Lake Almanor or other water bodies within the boundary of the UNFFR Project are expected under Alternative 2. The impacts under Alternative 2 would be **less than significant**.

Impact WQ-7: Construction activities associated with Proposed Project or the alternatives could result in temporary increases in turbidity and total suspended solids in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.

Proposed Project

Pages 3-222 to 3-239 of Section 3.3.5 of FERC's Final EIS contain descriptions of the 30 recreational facilities and improvements to be implemented under Proposed Project. These descriptions, but not FERC's environmental effects analysis, are hereby incorporated into this RDEIR by reference.

The recreational facilities and improvements make up the majority of the construction activities associated Proposed Project. The construction activities associated with these recreational facilities and improvements will be located near Lake Almanor, Butt Valley reservoir, and various reaches of the North Fork Feather River. The amount of detail provided in FERC's Final EIS for each of these proposed recreational facilities and improvements is not sufficient for a detailed examination of the potential water quality impacts. In reviewing these proposed facilities and improvements, the State Water Board must be conservative in making its determination concerning whether to certify compliance with the Basin Plan to ensure the continued protection of designated beneficial uses and compliance with water quality objectives.

In addition to these planned recreational facilities and improvements, the Proposed Project initially included removal of the Gansner Bar fish barrier. This element of Proposed Project was implemented in 2015.

The NF-9 gage weir is located in lower Butt Creek between Butt Valley dam and its confluence with the North Fork Feather River. A monitoring plan will be developed, in consultation with the California Department of Fish and Wildlife, the State Water Board, the Forest Service, and the U.S. Fish and Wildlife Service, to determine if the NF-9 gage weir is an obstacle to upstream fish passage. If monitoring data confirms that the NF-9 gage weir is preventing or limiting upstream fish passage, PG&E has agreed to remove or modify it to provide upstream passage for fish. The general nature of instream construction projects may result in a potential impact to water quality. As previously stated, the State Water Board must be conservative when reviewing these facilities and improvements to ensure the continued protection of designated beneficial uses and compliance with water quality objectives.

Due to the proximity of the various facility development and improvement projects to Lake Almanor and the other water bodies within the boundary of the UNFFR Project and the potential for surface-disturbing activities, the construction impacts on turbidity and total suspended solids within these water bodies is considered **significant without mitigation**.

Alternative 1, 2, and 3

Construction activities under Alternative 1 and 2 would involve installation of a thermal curtain around both the Prattville and Caribou intakes and modifications to the Canyon Dam low-level outlet gates, while Alternatives 1 and 3 would involve modifications to the Canyon Dam low-level outlet gates only. Ground disturbance and placement of fill along the lake bed and shore at both Lake Almanor and Butt Valley reservoir would temporarily increase turbidity and total suspended solids in these water bodies. The use of geotechnical fabrics under the foundations of bin walls and the use of divers during installation of the thermal curtains and modifications to the Canyon Dam outlet structure would minimize disturbance of the sediments along the bottom of the water bodies, but installation of the bin walls for the thermal curtains would require discharge of backfill material into the water bodies and along the shore. Vehicle access and launching of the barges could disturb soil along the shore of the water bodies and discharge sediment into them.

Fine sediments, such as silts and clays, from the fill material or shore disturbance could become suspended in the water bodies around the activity areas, increasing turbidity and total suspended solids for short periods of time. Larger-sized sediments, such as coarse sand and gravel, would fall to the bottom. Some sediments may be dispersed around the water bodies or be discharged from one of the release structures (Prattville intake, Caribou intakes, Canyon Dam outlet) into the water body immediately downstream. These sediments could affect turbidity and total suspended solids beyond the activity area, but the effects would be reduced further away from the disturbance area. The temporary increase in turbidity and total suspended solids could affect beneficial uses of the receiving or downstream water bodies, including freshwater and spawning habitat and recreational uses.

As described in Chapter 3, PG&E would be required to comply with water quality standards and implement appropriate water pollution control measures to minimize construction-related impacts on water quality. With implementation of these measures and compliance with the water quality certification, construction impacts associated with installation of the thermal curtains and modifications to the Canyon Dam outlet structure on turbidity and total suspended solids in Lake Almanor, Butt Valley reservoir, and downstream water bodies would be **less than significant** and would not adversely affect beneficial uses.

Alternatives 1, 2 and 3 include the construction of facilities and improvements described in detail in Chapter 3. Considering Alternatives 1 and 3 in their entirety (i.e., Canyon Dam outlet structure modifications, thermal curtains, proposed PG&E project elements), potential impacts on turbidity and total suspended solids in Lake Almanor and the other water bodies within the UNFFR Project boundary are considered **significant without mitigation**.

Mitigation Measures

Mitigation Measures GGS-1: Approval of construction activities by the State Water Board (Turbidity and Total Suspended Solids)

See sections 0 for mitigation measures associated with construction activities related to the Proposed Project and alternatives.

Significance after Mitigation

Implementation of Mitigation Measure GGS-1 would reduce the impact to a **less-than-significant** level.

Impact WQ-8: Hazardous materials spills during construction activities associated with Proposed Project or the alternatives could cause contamination of Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.

Proposed Project

As previously stated, the proposed project includes various construction activities in the vicinity of Lake Almanor, Butt Valley reservoir, and the North Fork Feather River. Due to the proximity of the construction sites to UNFFR Project waters (Lake Almanor, Butt Valley reservoir, and the North Fork Feather River), a spill of hazardous materials (e.g., oil, grease, gasoline, or solvents) during construction activities could cause contamination of the adjacent water bodies A spill could degrade water quality and have deleterious effects on fish and other aquatic organisms near the construction areas, resulting in adverse effects on beneficial uses. (See section 5.6, Fisheries, for more information on fishery impacts.)

As described in Chapter 3, PG&E would be required to implement appropriate water pollution control measures to minimize construction-related impacts on water quality. PG&E also has a Spill Prevention Control, and Countermeasure Plan and a Hazardous Materials Business Plan for the Upper North Fork Feather area. These plans include control BMPs and response plans that will reduce the threat of hazardous material to the adjacent water bodies, but not eliminate the risk. As a result, the impact of hazardous material spills during construction is **significant without mitigation**.

Alternatives 1, 2, and 3

Construction activities under Alternatives 1, 2, and 3 would require the use of barges in the water and/or vehicles and equipment along the shores of Lake Almanor and Butt Valley reservoir. Activities in the water or along the shore could result in a spill of hazardous materials (e.g., oil, grease, gasoline, or solvents) into the lake or reservoir, which could be transported downstream into the North Fork Feather River. Such spills could degrade water quality and have deleterious effects on fish and other aquatic organisms near the activity areas, resulting in adverse effects on beneficial uses (see section 5.6, Fisheries, for more information on fishery impacts).

As described above and in Chapter 3, PG&E would be required to implement appropriate water pollution control measures to minimize construction-related impacts on water quality. With implementation of these measures and compliance with the water quality certification the conditions of approval of detailed construction plans, construction impacts on water quality from hazardous materials associated with all three alternatives is considered **significant without mitigation.**

Mitigation Measure

Mitigation Measure WQ-8: Approval of Construction Activities by the State Water Board (Hazardous Materials)

Prior to construction, PG&E will submit detailed plans outlining all construction activities associated with the work to be completed to the State Water Board for review and written approval. Each plan will contain a detailed description of the proposed activities, activity boundaries, potential environmental impacts, pollutants of concern, and appropriate best management practices (BMPs) that will be implemented. The following measures or the equivalent will be included in the water quality certification and incorporated into each construction plan:

- Construction material, debris, spoils, soil, silt, sand, bark, slash, sawdust, rubbish, steel, other organic or earthen material, or any other substances that could be hazardous to aquatic life resulting from UNFFR Project–related activities shall be prevented from entering surface waters.
- All wash water shall be contained and disposed of in compliance with state and local laws, ordinances, and regulations.
- No unset cement, concrete, grout, damaged concrete, concrete spoils, or wash water used to clean concrete surfaces shall contact or enter surface waters.
- All equipment must be washed prior to transport to the UNFFR Project site and must be free of sediment, debris, and foreign matter.
- Any maintenance or refueling of vehicles or equipment occurring on site will be done in a designated area with secondary containment, located away from drainage courses to prevent the runoff of stormwater and spills. All equipment using gas, oil, hydraulic fluid, or other petroleum products shall be inspected for leaks prior to use and shall be monitored for leakage. Stationary equipment (motors, pumps, generators, etc.) and vehicles not in use shall be positioned over drip pans or other types of containment. Spill and containment equipment (oil spill booms, sorbent pads, etc.) shall be maintained onsite at all locations where such equipment is used or staged.
- All imported riprap, rocks, and gravels used for construction shall be pre-washed.

- No leachate from truck or grout mixer cleaning stations shall percolate into UNFFR Project area soils. Cleaning of concrete trucks or grout mixers shall be performed in designated washout areas of sufficient size to completely contain all liquid and waste concrete or grout generated during washout procedures. Hardened concrete or grout shall be disposed of at an authorized landfill, in compliance with state and local laws, ordinances, and regulations.
- All construction debris and trash shall be contained and regularly removed from the work area to the staging area during construction activities. Upon completion, all UNFFR Project–generated debris, building materials, excess material, waste, and trash shall be removed from all the UNFFR Project sites for disposal at an authorized landfill or other disposal site in compliance with state and local laws, ordinances, and regulations.
- Onsite containment for storage of chemicals classified as hazardous shall include secondary containment and appropriate management as specified in California Code of Regulations, title 27, Section 20320.
- If at any time an unauthorized discharge to surface waters (including rivers or streams) occurs or monitoring indicates that the UNFFR Project has or could soon be in violation with water quality objectives, the associated project activities shall cease immediately and the Deputy Director for Water Rights (Deputy Director) and the Central Valley Regional Water Quality Control Board Executive Officer shall be notified. Associated activities may not resume without approval from the Deputy Director.

The State Water Board will modify the UNFFR Project or require additional mitigation measures, as necessary, in order to prevent impacts to water quality objectives or designated beneficial uses.

Significance after Mitigation

Implementation of Mitigation Measure WQ-8 would reduce the impact to a **less-than-significant** level.

5.6 Fisheries

This section describes the warm water and cold water fisheries in the waters associated with the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and analyzes the effects of the operation of Proposed Project under a new Federal Energy Regulatory Commission (FERC) license on native, game, and special-status fish and their habitats. The environmental setting section of this chapter is largely excerpted from FERC's Final Environmental Impact Statement (EIS) for the UNFFR Project that was completed in 2005, with additional information summarized from the Evaluation of the Biological Performance of Potential Alternatives to Improve Compliance with Temperature Objectives of the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Stetson Engineers 2009), which was prepared to support this Revised Draft Environmental Impact Report (RDEIR) and is included as Appendix F.

The following topic is not discussed in this section for the reason noted:

- **Local Plans or Policies for Fisheries:** No watershed-specific habitat conservation plans or fishery management plans have been adopted for fisheries in the UNFFR Project vicinity.

Environmental Setting

Overview of Aquatic Habitat and Fisheries in the Watershed

Aquatic Habitat

The main waters associated with the UNFFR Project include Lake Almanor, Butt Valley Reservoir, Belden forebay, North Fork Feather River, and Butt Creek.

The UNFFR Project waters support warm water and cold water fisheries, with Lake Almanor supporting both types of fisheries and the other UNFFR Project waters supporting primarily cold water fisheries. The North Fork Feather River historically was dominated by cold water fishes, including Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*), which is listed under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA); Central Valley steelhead (*O. mykiss irideus*, the anadromous form of rainbow trout), which is listed under the federal ESA; and Central Valley fall-run Chinook salmon, which is a federal ESA species of concern. Man-made alterations to the North Fork Feather River, however, have created barriers to both upstream and downstream migration of anadromous fish (Yoshiyama et al. 2001). Therefore, anadromous fish no longer inhabit the North Fork Feather River.

The first human influences on fish habitat, including fish migration barriers in the Feather River basin, were likely associated with mining operations. Hydraulic mining altered the river's geomorphic and hydrologic processes, resulting in dewatered river beds, increased sediment loading, and physical alteration of gravel and cobble streambeds, all of which likely affected salmonid populations. The construction of Big Bend dam in 1910 upstream of present-day Lake Oroville probably blocked most migratory fish from accessing the North Fork Feather River and its tributaries. Additional migratory barriers in the upper Feather River were created by the construction of Canyon dam in 1914, a second dam that replaced it in 1927, Rock Creek dam in 1950, Cresta dam in 1950, Poe dam in 1958, and Oroville dam in 1963.

The alterations in physical habitat caused by the construction and operation of the hydropower diversion dams, inundation of the river channel behind the dams, and alteration of streamflows, including effects on the river's water temperature regime, have long been identified as important factors limiting the cold water fishery of the North Fork Feather River (Pacific Gas and Electric Company 1979, Moyle et al. 1983, Wixom 1989.) Changes in the relative diversity, abundance, and distribution of native cold water species in the river are attributable to these physical habitat alterations as well as other watershed factors, including sedimentation and introduction of non-native species.

The adverse impacts of water temperature impairment to the cold freshwater fishery were noted to become progressively more significant downstream of the UNFFR Project through the Rock Creek–Cresta and Poe hydroelectric project reaches, where summer maximum water temperatures are highest (State Water Resources Control Board 2006). As a result of historic and current uses, the beneficial uses of the North Fork Feather River, as designated in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) (Central Valley Regional Water Quality Control Board 2011) include cold freshwater habitat, spawning and rearing habitat for cold water fisheries, and water-dependent wildlife habitat (see Table 2-1). For water quality management purposes, these biotic-related uses represent important and valued resources supported by the North Fork Feather River, the characteristics and qualities of which are sensitive to water quality degradation. Cold water fish habitat, particularly for salmonids, represents the beneficial use most sensitive to water temperature.

Habitat for cold water stream fishes consists of the physical, chemical, and biological constituents of the stream and adjacent riparian areas that provide for feeding, sheltering, behavioral interactions, reproduction, rearing, and in-river migrations (Bjornn and Reiser 1991, McCullough 1999, Moyle 2002). Water quality affects the physical and chemical aspects of aquatic habitat for fish and aquatic invertebrates. Of the many constituents of water quality, water temperature is one of the most important factors determining the geographic distributions, productivity, and survival of fish and aquatic invertebrates (Vannote and Sweeny 1980, Ward and Sanford 1982, Hawkins et al. 1997).

For cold water fishes, especially trout and salmon, the timing of reproductive cycles is closely correlated with seasonal water temperature patterns. Thermal tolerances and optimal physiological ranges for growth and survival vary over a species' life cycle. Fish species are partially dependent on an individual's cumulative thermal exposure history as well as nutrition and health status, but generally are bounded by ultimate lethal maximum and minimum temperatures (Brett 1952, Armour 1991). The lethal and optimal temperature ranges vary by species, life stage, genetic characteristics, nutritional and health status, ecological conditions, and the timing and duration of temperature exposure (Brett 1952, McCullough 1999, Sullivan et al. 2000).

Cold water salmonids are considered sensitive aquatic species with regard to water temperatures and are a general indicator species of good water quality and aquatic habitat condition (McCullough 1999, Sullivan et al. 2000). Based on information found in Wixom (1989), juvenile and non-spawning adult life stages of the rainbow trout are considered the most important life stages for evaluating the sensitivity of cold water fishes in the North Fork Feather River during the summer (refer to Appendix F for additional details). Key temperature thresholds above which some level of physiological impairment can occur are generally found to be over a temperature range of from 18°C to 21ºC for rainbow trout for chronic exposures, typically measured as the daily mean temperature over a time frame of one week or more (Bell 1990, McCullough 1999, Sullivan et al. 2000, McCullough et al. 2001, McCullough 2010).

Figure 5.6-1 displays the temperature range for rainbow trout lifecycles in streams draining the west slope of the Sierra Nevada, based on published temperature data (Piper et al. 1982, Wixom 1989, Bell 1990, Bjornn and Reiser 1991, McCullough 1999, Moyle 2002). Aquatic habitat is considered suitable for trout and other cold water fishes if water temperatures do not regularly exceed 20ºC and dissolved oxygen (DO) content is at least 80 percent of saturation with a concentration of at least 5.0 milligrams per liter (mg/L) (Bjornn and Reiser 1991).

Fish Community

The North Fork Feather River watershed supports a diverse assemblage of native and non-native fish species, many of which provide a forage base for game fish and avian predators (Table 5.6-1). The cold water fishery in the Seneca and Belden reaches is dominated by rainbow trout. The rainbow trout population depends on adequate year-round instream flows, suitable water temperatures, suitable spawning gravels, and access to tributaries that provide high-quality spawning areas and juvenile rearing habitat. Hardhead (*Mylopharodon conocephalus*) and Sacramento perch (*Archoplites interruptus*) are both special-status fish species in California that are known to occur in UNFFR Project waters. Introduced fish species, such as smallmouth bass (*Micropterus dolomieui*), largemouth bass (*Micropterus salmoides*), wakasagi (Japanese pond smelt) (*Hypomesus nipponensis*), and brown trout (*Salmo trutta*), have exploited the lentic environment of the reservoirs associated with the UNFFR Project, establishing self-sustaining populations (Pacific Gas and Electric Company 2002).

The historical fish community of the North Fork Feather River likely included anadromous spring and fall runs of Chinook salmon (Yoshiyama et al. 2001). Steelhead (*Oncorhynchus mykiss*), the anadromous form of rainbow trout, may have occurred as far upstream as the UNFFR Project reaches, but the actual extent of their original range is uncertain (Pacific Gas and Electric Company 2002). Although the majority of anadromous salmon may have been blocked by a set of naturally occurring falls near the town of Seneca, reports exist of salmon ascending the entire length of the North Fork Feather River through the area now inundated by Lake Almanor and into surrounding tributary streams (Yoshiyama et al. 2001).

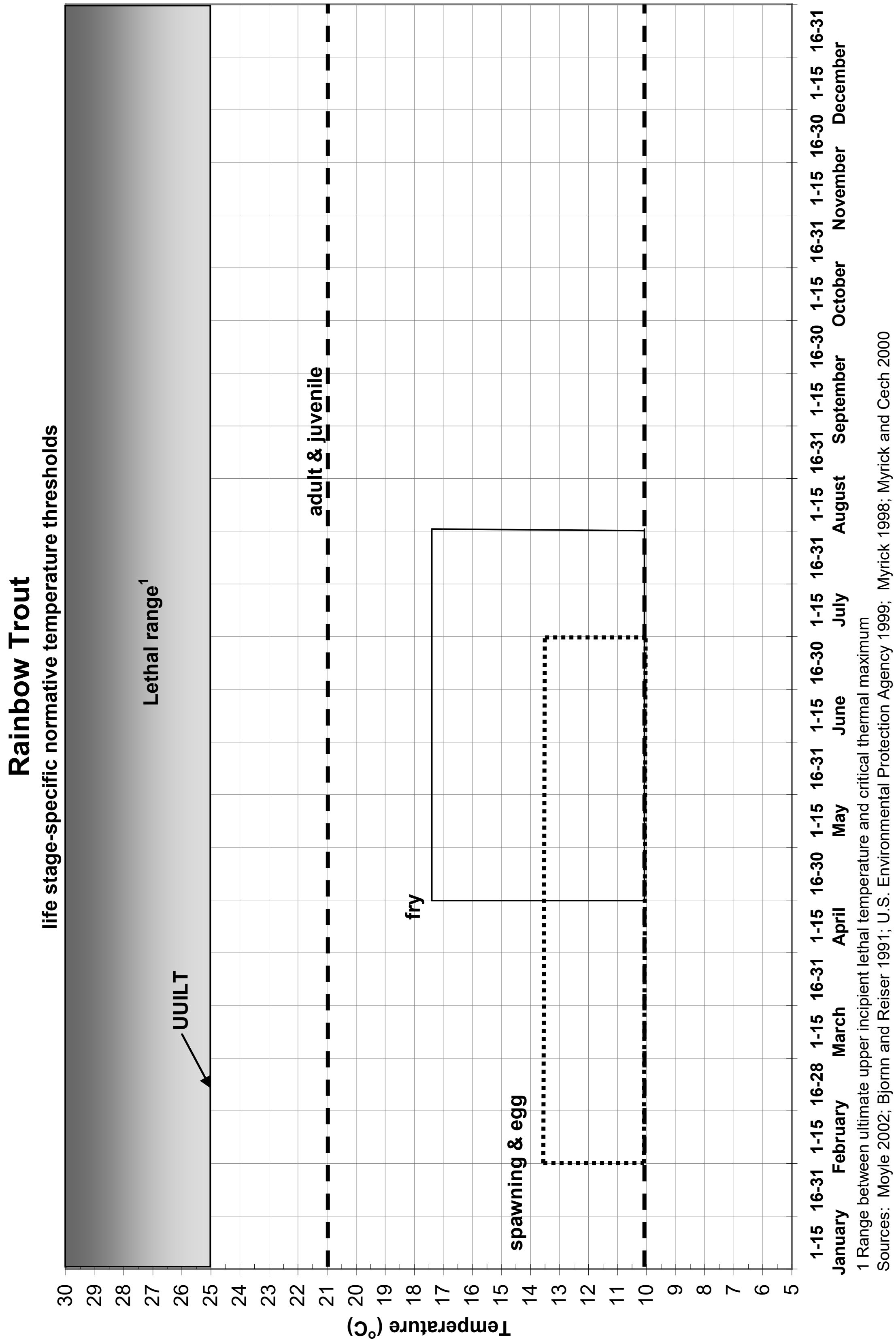

Figure 5.6-1 Typical Life Cycle Timing for Rainbow Trout in Streams Draining the West Slope of the Sierra Nevada

Table 5.6-1 Fish Species Documented in the Upper North Fork Feather River and Reservoirs

Common Name	Scientific Name	Game/Non-Game
Native Species		
Rainbow trout	*Oncorhynchus mykiss*	Game
Sacramento perch	*Archoplites interruptus*	Game
Sacramento sucker	*Catostomus occidentalis*	Non-game
Tahoe sucker	*Catostomus tahoensis*	Non-game
Sacramento pikeminnow	*Ptychocheilus grandis*	Non-game
Tui chub	*Gila bicolor*	Non-game
Baird sculpin	*Cottus bairdii*	Non-game
Riffle sculpin	*Cottus gulosus*	Non-game
Prickly sculpin	*Cottus asper*	Non-game
Hardhead	*Mylopharodon conocephalus*	Non-game
Hitch	*Lavinia exilicauda*	Non-game
Introduced Species		
Brown trout	*Salmo trutta*	Game
Brook trout	*Salvelinus fontinalis*	Game
Chinook salmon	*Oncorhynchus tshawytscha*	Game
Kokanee (Sockeye) salmon	*Oncorhynchus nerka*	Game
Silver salmon	*Oncorhynchus kisutch*	Game
Chum salmon	*Oncorhynchus keta*	Game
Smallmouth bass	*Micropterus dolomieui*	Game
Largemouth bass	*Micropterus salmoides*	Game
Bluegill	*Lepomis macrochirus*	Game
Green sunfish	*Lepomis cyanellus*	Game
Redear sunfish	*Lepomis microlophus*	Game
Brown bullhead	*Amerius nebulosus*	Game
Channel catfish	*Amerius punctatus*	Game
Wakasagi (Japanese pond smelt)	*Hypomesus nipponensis*	Non-game
Carp	*Cyprinus carpio*	Non-game
Lahontan redside	*Richardsonius etregius*	Non-game

Source: Pacific Gas and Electric Company 2002

Aquatic Habitat and Fisheries in the UNFFR Project Reservoirs

Lake Almanor

At normal maximum pool— about 4,500 feet (PG&E datum) above mean sea level—Lake Almanor stores approximately 1,142,000 acre-feet (af) of water, with an average depth of about 40 feet and a maximum surface area of 26,275 acres (California Department of Water Resources 1974, Jones and Stokes 2004, Stetson Engineers 2009). Lake Almanor generally reaches its highest seasonal elevation around the end of May and declines through the summer as water is released for hydroelectric generation (California Department of Water Resources 1974, Gast 2004). Lake Almanor water temperature stratifies during the summer months, forming a warm surface layer (epilimnion) and colder bottom layer (hypolimnion), usually beginning in mid-May, with a deepening of the epilimnion and maximum heat storage achieved around mid-August (California Department of Water Resources 1974, Stetson Engineers Inc. 2009). Thermal stratification begins to break down with cooling nighttime temperatures during September, and the temperature profile of Lake Almanor becomes nearly uniform in the fall months (Jones and Stokes 2004, Stetson Engineers 2009). During thermal stratification, DO concentrations in the hypolimnion can decline to near zero in the deepest portions of the lake, especially in the vicinity of Canyon dam (California Department of Water Resources 1974, Jones and Stokes 2004, Stetson Engineers Inc. 2009).

Suitable physical habitat in Lake Almanor for both warm water and cold water fish varies throughout the year. During most of the year, water temperatures and DO levels are within normal ranges for cold water fish (California Department of Water Resources 1974). Suitable conditions exist for reproduction of warm water fish within the epilimnion along littoral (near-shore) zones of the lake when surface water temperatures warm during the spring and summer months. In fact, smallmouth bass, considered a warm water species, dominated fish samples in the littoral zone of the lake during PG&E’s relicensing studies in August 2000 (Pacific Gas and Electric Company 2002). During the peak of the summer, high water temperatures may limit salmonid distribution in the epilimnion and low DO may limit their distribution in the hypolimnion, effectively restricting the zone of suitable temperature and DO to the narrow band between the epilimnion and hypolimnion of large lakes (Olson et al. 1988, Rowe and Chisnall 1995, Sierra Institute 2012). Lake Almanor’s large underwater springs have also been anecdotally reported to be localities where trout and salmon may congregate during the summer, when cold water habitat is limited. However, it is not known what portion of the lake’s cold water fish population may use these spring areas as a thermal refuge (Gast 2004).

Lake Almanor supports popular cold water and warm water fisheries (Pacific Gas and Electric Company 2002, Gast 2004, Central Valley Regional Water Quality Control Board 2011). Thirteen species of fish were identified in Lake Almanor during surveys conducted by PG&E between 1996 and 2002 and the California Department of Fish and Wildlife (California Department of Fish and Wildlife; formerly known as the California Department of Fish and Game) in 2008 and 2013 (California Department of Fish and Wildlife 2014).

Primary game fish occurring in the reservoir include rainbow trout, brown trout, Chinook salmon, smallmouth bass, and largemouth bass. Since 1933, CDFW has stocked a variety of game fish in the reservoir to supplement the sport fishery. A creel survey conducted by PG&E in 2000 revealed that the angler catch is dominated by rainbow trout and smallmouth bass, collectively representing 93 percent of the total recorded catch by participating anglers (EA Engineering, Science, and Technology, Inc. 2001). The primary warm water fishery is for smallmouth bass and largemouth bass (Pacific Gas and Electric Company 2002). These warm water sport fishes were first introduced in the 1950s and 1960s to diversify the fishery and as an attempt to compensate for the largely unsuccessful effort at that time to revitalize a robust trout fishery through stocking (California Department of Water Resources 1974).

Since the raising of Canyon dam in 1927, cold water fishery management has been challenged by balancing reservoir operations; competition with non-game species, such as non-native carp (*Cyprinus carpio*); and selecting and balancing compatible populations of forage fish with salmonid species (California Department of Water Resources 1974). Thermal stratification, along with the warm surface temperatures and associated effects on DO profiles during the summer, has long been thought to be a limiting factor for the cold water fishery in Lake Almanor (California Department of Water Resources 1974, Gast 2004). However, no mention of historic observations of mass fish die-offs during the summer were found in information in the FERC application or by inquiry to CDFW reservoir biologists. Additionally, no studies or data on seasonal fish distributions and other factors that may be limiting cold water fish in the lake were revealed through inquiry to CDFW reservoir biologists. Currently, the cold water fishery includes Eagle Lake-strain rainbow trout, brown trout (*Salmo trutta*), and Chinook salmon (*Oncorhynchus tshawytscha*), which are all stocked in Lake Almanor by CDFW and a non-profit sportfishing association to supplement natural production of native rainbow trout in tributary streams and springs, which is not sufficient by itself to support the recreational reservoir fishery (Pacific Gas and Electric Company 2002, Gast 2004). The Eagle Lake-strain rainbow trout used for this stocking program are derived from a trout strain that evolved in nearby Eagle Lake (Lassen County). The Eagle Lake-strain rainbow trout is known for its tolerance of high alkalinity (Moyle 2002) and warm temperatures up to 22°C, while maintaining normal feeding, metabolism, and growth patterns (see Appendix F). Annual stocking of catchable, sub-catchable, and fingerling trout and fingerling salmon collectively has ranged from 115,489 to 406,965 individuals since 2001 (Table 5.6-2).

Wakasagi (*hypomesus nipponensis*), which were introduced in the early 1970s, provide an important forage base for piscivorous (fish-eating) 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 (Hydroacoustic Technology, Inc. 2002). Wakasagi become entrained in the Prattville intake and are transported to downstream reservoirs and riverine reaches, where they likely provide an important forage base for piscivorous fishes and birds.

Butt Valley Reservoir and Upper Butt Creek

Butt Valley Reservoir is 4.75 miles long and an average of 0.75 miles wide and has a maximum depth of about 50 feet. The maximum surface area of the reservoir is 1,600 acres. Under normal operating conditions, Butt Valley Reservoir can fluctuate about ±1 foot per day and ±3 to 5 feet weekly during the summer months, and has an annual varial zone of about 10 feet. 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 more (Pacific Gas and Electric Company 2002). The duration of thermal stratification is influenced by the operation of the Caribou No. 1

unit (a deeper intake unit that drafts colder water). Due to operation of Caribou No. 1 early in the summer, by mid-July and August, the volume of cold water in Butt Valley Reservoir is typically at its minimum and the reservoir is weakly stratified.

Butt Valley Reservoir, which receives water from Lake Almanor through the Prattville diversion, also supports cold water and warm water fishes (Pacific Gas and Electric Company 2002). Butt Valley Reservoir provides cold water and warm water habitat and supports a trophy rainbow and brown trout fishery, with trout longer than 17 inches constituting a substantial portion (33 percent) of angler catch. The “trophy” trout fishery that occurs in Butt Valley Reservoir is attributed to the prey base comprised primarily of Wakasagi that have been entrained from Lake Almanor and discharged into Butt Valley Reservoir at the Butt Valley powerhouse (Pacific Gas and Electric Company 2002). Wakasagi are also reported to reproduce in the Butt Valley powerhouse tailrace and at the mouth of Butt Creek (Lee 2005). The primary warm water fishery is for smallmouth bass and largemouth bass (Pacific Gas and Electric Company 2002). The cold water and warm water fisheries are supported by natural reproduction in the reservoir and upper Butt Creek and partially by entrainment through the Prattville diversion. There is no fish stocking program for Butt Valley Reservoir or upper Butt Creek.

Table 5.6-2 Thousands of Fish Stocked for Lake Almanor, 2001 through 2015

	Brown Trout			Chinook Salmon			Eagle Lake Rainbow Trout			Rainbow Trout (var)		
Size	C	S	F	C	S	F	C	S	F	C	S	F
2001	64	0	0	0	0	164	96	0	0	0	0	0
2002	44	0	0	0	0	100	36	51	0	0	0	0
2003	59	0	0	0	0	0	40	37	14	0	0	0
2004	33	0	0	0	0	176	55	50	0	0	0	0
2005	19	0	0	0	0	60	71	50	0	0	0	0
2006	39	0	0	0	0	44	35	50	0	0	0	0
2007	38	0	0	0	0	60	56	50	0	0	0	0
2008	42	0	0	0	0	60	66	50	0	0	0	0
2009	63	0	0	0	0	34	55	50	0	0	0	0
2010	57	21	0	0	0	60	58	50	0	24	0	0
2011	30	0	0	0	0	65	52	34	0	0	0	0
2012	22	0	0	0	0	60	72	20	0	0	30	0
2013	20	0	0	0	0	0	45	0	0	0	50	0
2014	23	0	0	0	0	54	63	0	0	0	51	0
2015	12	0	95	0	0	23	44	16	0	42	0	175
Total	**565**	**21**	**95**	**0**	**0**	**960**	**845**	**509**	**14**	**66**	**131**	**175**

C = catchable   S = sub-catchable F = Fry
Source: Linda Radford and Amber Rossi, California Department of Fish and Wildlife, Statewide Hatchery Database – Provisional data, which are subject to change

Other fish species in Butt Valley Reservoir include Sacramento pikeminnow (*Ptychocheilus grandis*), Sacramento perch, Sacramento sucker (*Catostomus occidentalis*), and tui chub (*Gila bicolor*). Fish habitat diversity in the reservoir is limited, since the reservoir occupies a fairly confined valley.

The lake bed of Butt Valley Reservoir is composed of mud and shale, and most of the shoreline consists of shallow water with little or no aquatic vegetation. In 1996 and 1997, fish habitat enhancement structures (targeted at smallmouth bass) were constructed within the reservoir as mitigation for seismic remediation of the dam. The structures included 63 smallmouth bass cover and spawning modules in the reservoir and 25 boulder clusters grouped at three locations: (1) upper Butt Creek; (2) the powerhouse tailrace; and (3) the main body of the reservoir. The effectiveness of these habitat enhancement structures has not been investigated.

Upper Butt Creek, the only major tributary entering Butt Valley Reservoir, is an unregulated stream, flowing approximately 21 miles from its headwaters to Butt Valley Reservoir. Average monthly flows in upper Butt Creek range from 40 to 188 cubic feet per second (cfs), with an average annual flow of 99 cfs for water years 1970 –1999. The aquatic habitat in upper Butt Creek is dominated by a boulder and cobble creek bed, with pockets of gravel that provide spawning, rearing, and foraging habitat for rainbow and brown trout. 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 (Pacific Gas and Electric Company 2002).

Rainbow and brown trout are the only game fish present in upper Butt Creek; non-game fish species present include riffle sculpin (*Cottus gulosus*) and Sacramento sucker. Angler harvest data revealed that 64 percent of all trout caught in upper Butt Creek were 14 inches or longer. Rainbow trout from Butt Valley Reservoir enter upper Butt Creek during early spring (March through April) to spawn, while brown trout enter and spawn in the creek during the fall (October through November). Juvenile rainbow and brown trout have been documented in the creek during fishery surveys conducted in 2000 and 2001 in support of PG&E's relicensing efforts (ECORP Consulting Inc. 2003).

Belden Forebay

Belden forebay, with a surface area of 42 acres, is located on the North Fork Feather River downstream of the Seneca reach. The reservoir's daily water surface elevation can fluctuate between 5 and 10 feet, depending on power-generating operations. Flow into the forebay comes from the Caribou No. 1 and Caribou No. 2 powerhouses and the Seneca reach of the upper North Fork Feather River.

Fish species inhabiting Belden forebay include rainbow trout, brown trout, smallmouth bass, Sacramento sucker, and wakasagi. The presence of wakasagi is most likely due to its entrainment in the intakes of Caribou No. 1 and No. 2 powerhouses at Butt Valley Reservoir. No available fishery monitoring data suggests that wakasagi reproduce or reside in Belden forebay for prolonged periods.

Aquatic Habitat and Fisheries in North Fork Feather River

Seneca Reach of North Fork Feather River

The Seneca reach of the North Fork Feather River begins at the base of Canyon dam and extends 10.8 miles to Caribou No. 1 powerhouse at the upper end of Belden forebay. A year-round minimum flow of 35 cfs is released into this reach from Canyon dam per requirements in the current FERC license. Additional inflow is supplied from lower Butt Creek, the only major tributary that enters the Seneca reach. Spring seepage water occurs in the uppermost 0.5 miles of lower Butt Creek.

The Seneca reach has an average stream gradient of 2 percent, with varying aquatic habitat composed of low-gradient riffles, runs, high-gradient riffles, cascades, pools, step-runs, and pocket water. The lower 1.25 miles of the Seneca reach, from the lower Butt Creek confluence to the Caribou No. 1 powerhouse, contains a higher quality, more complex habitat than the upstream portions of the reach. The lower portion has a greater number of pools and additional flow from lower Butt Creek. The predominant fish species in the Seneca reach are riffle sculpin, rainbow trout, and prickly sculpin (*Cottus asper*) (ECORP Consulting Inc. 2003). Less abundant fish species include Sacramento sucker and brown trout. The rainbow trout population in the Seneca reach is considered to be self-sustaining, and the reach is not currently stocked with hatchery fish. PG&E estimated the rainbow trout spawning density in the Seneca reach to be 128 redds per mile (Thomas R. Payne and Associates 2002). Annual recruitment appears to be high since the rainbow trout population in the Seneca reach is dominated by age 1 and younger trout (ECORP Consulting Inc. 2003).

Belden Reach of North Fork Feather River

The Belden reach of the North Fork Feather River is 9.3 miles long, extending from Belden dam to its confluence with Yellow Creek. The current minimum flow in this reach is 140 cfs from the last Saturday in April to Labor Day and 60 cfs during the rest of the year, per requirements in the current FERC License. Aquatic habitat in the upper 7-mile section of the Belden reach between Belden dam and its confluence with the East Branch of the North Fork Feather River is variable, containing riffles, runs, pools, pocket water, and a 0.25- to 0.5-mile long section of split channels and shallow riffles. The lower section of the Belden reach, from the East Branch confluence to the Yellow Creek confluence, is substantially wider (150 to 200 feet) than the upper section and has a much greater volume of uncontrolled flow due to inflows from the East Branch of the North Fork Feather River, which is a large unregulated tributary. The habitat in this lower section of the Belden reach consists primarily of riffles, runs, and pocket water. Yellow Creek, a tributary that enters the North Fork Feather River near the Belden powerhouse tailrace, is a CDFW-designated wild trout stream that contributes inflows ranging from 40 to 170 cfs from June to September.

The fish community inhabiting the Belden reach is primarily composed of riffle sculpin, rainbow trout, Sacramento sucker, and prickly sculpin. Less abundant species include Sacramento pikeminnow and hardhead, a U.S. Forest Service (USFS) sensitive species and a California species of special concern. Angling pressure throughout the Belden reach is high due to several private and public campgrounds and easy river access along Caribou Road.

Rainbow trout naturally reproduce in the Belden reach, with spawning densities estimated at 23 redds per mile; however, this natural production is insufficient to meet angling demand. To increase angling opportunities, CDFW annually stocks the Belden reach with hatchery rainbow trout. The Belden reach of the North Fork Feather River has undergone a State-required pre-stocking evaluation protocol and has been approved for stocking of catchable-sized rainbow trout (California Department of Fish and Wildlife 2012).

From 1975 to 2014, a fish barrier at Ganser Bar extended across the river (Ganser Bar Fish Barrier). The barrier was constructed in 1975 by PG&E at the request of CDFG (now CDFW). In 2014, the Ganser Bar Fish Barrier was removed. The removal of this barrier now allows rainbow trout and other fish species to access and use habitat throughout all portions of the Belden reach.

Downstream of Belden Powerhouse

Three additional hydropower diversion dams, features of the Rock Creek–Cresta and Poe hydroelectric projects, occur on the North Fork Feather River downstream from the Belden powerhouse, creating three sequential regulating forebay reservoirs and riverine bypass reaches (Pacific Gas and Electric Company 2005). The Rock Creek–Cresta bypass reaches are confined channels with a 1.2 to 2.2 percent gradient and many bedrock-formed, slow-flowing deep pools connected by relatively short riffles and runs (Federal Energy Regulatory Commission 2001, Allen and Gast 2007). The river bed is dominated by boulders and cobbles in these reaches. Finer substrates, including suitable spawning-sized gravels, are generally limited to gravel deposits on tributary deltas and behind large boulders. Due to the limited trout spawning habitat in these reaches of the North Fork Feather River, the cold water fishery is heavily dependent on tributary streams for trout reproduction and recruitment (Wixom 1989). The Poe bypass reach, downstream of the Rock Creek–Cresta reaches, is characterized as a wide channel with a relatively low gradient; it has a narrow, steep canyon dominated by bedrock canyon walls and large boulders just above Bardee's Bar (Federal Energy Regulatory Commission 2006).

Fish species diversity in the North Fork Feather River downstream of Belden powerhouse is similar to that of the Seneca and Belden reaches, with increasing proportions of warm water and warm water-tolerant fishes. This longitudinal shift in fish assemblage is typical for west slope Sierra Nevada streams in the Central Valley zoogeographic sub-province (Moyle 2002, Allen and Gast 2007). However, the creation of the reservoirs, along with flow reduction in the bypassed reaches and increased water temperatures, changed the North Fork Feather River's aquatic habitat to favor the nongame species rather than trout (Moyle et al. 1983, Pacific Gas and Electric Company 1979 as cited in Federal Energy Regulatory Commission 2001). Before construction of the Rock Creek–Cresta Project in 1950, an excellent sport fishery for rainbow trout and brown trout existed in the North Fork Feather River reach that is now bounded by the Rock Creek development. The rainbow trout fishery was considered to be of "trophy" stature (Hazel et al. 1976 as cited in FERC 2001).

Contemporary fish surveys indicate that the dominant fish species observed in the Rock Creek and Cresta reaches of the North Fork Feather River during 2006 included rainbow trout, hardhead, Sacramento pikeminnow, largemouth and smallmouth bass, and Sacramento sucker. Ten species of fish are known to occur in the Poe reach, including those listed for the Rock Creek–Cresta reaches and riffle sculpin, speckled dace (*Rhinichthys osculus*), brown trout, and common carp. The Rock Creek and Cresta forebays include those species listed for the Rock–Cresta reaches, but also include wakasagi and brown bullhead catfish (*Ameiurus nebulosus*). Native minnow and sucker were the dominant fish species in these reservoirs, with rainbow trout constituting less than two percent of the catch (Li and Enplan 1994).

Special-Status Fish Species

The hardhead and Sacramento perch, which both occur in water bodies associated with the UNFFR Project, are designated as USFS sensitive species and California species of special concern. Other regional special-status species, such as Central Valley steelhead and Central Valley spring-run Chinook salmon, historically occurred in the North Fork Feather River; however, their present distribution is limited to the Feather River downstream of Oroville dam, which prevents the upstream migration of all migratory fishes (Federal Energy Regulatory Commission 2001).

Hardhead

Hardhead are known to occur in the North Fork Feather River throughout much of the mid-elevation reaches below Belden dam (Moyle 2002). Within the UNFFR Project vicinity, hardhead have been observed in the vicinity of the Belden powerhouse to the confluence with the East Fork Feather River based on observations (Pacific Gas and Electric Company 2002, ECORP Consulting Inc. 2003) and were observed among fish salvaged in the lower portion of the Belden reach up to the Gansner Bar fish barrier prior to its removal in 2014 (Larry Wise, Senior Aquatic Biologist, PG&E, personal communication 2015). Since removal of the Ganser Bar fish barrier in 2014, hardhead would be expected to now occur upstream to Belden dam. This fish is an omnivorous species that feeds 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). The fish requires clear, deep pools in undisturbed perennial channels. Hardhead can colonize reservoirs, but persist only if exotic species, especially centrarchid (sunfish) basses, are not present.

Sacramento Perch

Sacramento perch, the only centrarchid native to California, is known to occur in the North Fork Feather River above Belden powerhouse. 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 in the shallow littoral zones, which are critical for food and cover for juveniles. The species was introduced by an unknown source into the North Fork Feather River and was most recently documented in Lake Almanor in 2000 and in Butt Valley Reservoir between 1996 and 1998. This species is not expected to be entrained by UNFFR Project facilities because of its habitat preferences and the lack of suitable habitat around the intake structures in Lake Almanor and Butt Valley Reservoir (ECORP Consulting Inc. 2003).

Environmental Impacts and Mitigation Measures

Methodology

Impacts on fisheries were analyzed using a combination of quantitative and qualitative methods and professional judgment. Studies prepared for PG&E in support of its relicensing application were used to establish the baseline conditions for the discussion of the environmental setting and to characterize the warm water and cold water fisheries of the UNFFR Project waters, including the presence of special-status fish species. Additional literature and studies were used to supplement the information provided by PG&E.

The analysis of environmental impacts is informed by the Final FERC EIS, as well as a technical study (North State Resources, Inc. 2012) that evaluates the anticipated water quality and fisheries impacts of the various combinations of water quality measures considered in Stetson Engineers' (2009) Level 3 Report: Analysis of Temperature Control Alternatives Advanced from Level 2 Designed to Meet Water Quality Requirements and Protect Cold Freshwater Habitat Along the North Fork Feather River (Appendix E), and the supplemental modeling of Alternatives 1 and 2 (Appendix E1). The North State Resources, Inc. (2012) study, included as Appendix F to this RDEIR, provides additional detail on the methodology used to analyze impacts and assumptions used in the analysis. In summary, the study considered how water temperatures and DO levels would change with implementation of the alternatives considered in the 2014 Draft EIR and the resulting effect on cold water habitat. The study focused on changes in the frequency and duration of exceedances of critical chronic and acute upper temperature tolerances and requirements of non-spawning adult and juvenile rainbow trout during the period of maximum summer water temperatures. The results of the North State Resources, Inc. (2012) analysis, Stetson Engineers' 2009 Level 3 Report, and the supplemental modeling of Proposed Project and the alternatives (Appendices E3 and F) were used to determine the range of impacts on fisheries resources discussed in this RDEIR.

For the purposes of this fisheries resource impact analysis, the methodology for assessing impacts to cold and warm freshwater habitat is described in section 5.5, Water Quality, and supported by the supplemental modeling in Appendix E3 and detailed analysis included in Appendix F. As described in section 5.5, the most suitable summer cold water refugial habitat in UNFFR Project reservoirs was defined as water with temperatures equal to or less than 20ºC and DO levels greater than 5 mg/L. Additionally, 21ºC and 22ºC were selected as secondary thermal refuge criteria for this evaluation because suitable habitat meeting the ≤20°C primary criteria and containing sufficient DO can be absent at times in Lake Almanor even under the baseline conditions (Jones and Stokes 2004). The spatial limits of the analysis encompass the immediate vicinity with respect to construction impacts and the North Fork Feather River system from Lake Almanor to the Poe reach with respect to operational impacts.

Thresholds of Significance

Impacts on fisheries would be significant if Proposed Project or the alternatives would:

- substantially affect, either by direct take or through habitat degradation (e.g., adverse changes in flow or deterioration of water quality), a special-status fish species;
- substantially interfere with the movement of any resident or migratory fish species;
- cause a fish population to drop below self-sustaining levels; or
- substantially affect native or introduced fish species, resulting in a reduction in the quality of the recreational fishery provided by Lake Almanor, Butt Valley Reservoir, and the North Fork Feather River.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of Proposed Project and the alternatives on special-status fish and the recreational fishery in the North Fork Feather River and identifies mitigation measures for significant impacts. Table 5.6-3compares the final level of significance of each impact (with incorporation of mitigation measures, if appropriate) associated with the Proposed Project and the three alternatives.

Table 5.6-3 Summary of Fishery (FS) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact FS-1: Construction activities associated with Proposed Project or the alternatives could affect fish populations in Lake Almanor, Butt Valley Reservoir, and the North Fork Feather River through direct and indirect impacts on individuals or habitat.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact FS-2: Implementation of Proposed Project or the alternatives could alter aquatic habitat conditions in Lake Almanor.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact FS-3: Implementation of Proposed Project or the alternatives could alter aquatic habitat conditions in Butt Valley Reservoir.	Less than significant	Less than significant (beneficial)	Less than significant (beneficial)	Less than significant (beneficial)
Impact FS-4: Implementation of Proposed Project or the alternatives could alter cold freshwater habitat conditions in the North Fork Feather River over the long term.	Less than significant (beneficial)	Less than significant (beneficial)	Less than significant (beneficial)	Less than significant (beneficial)
Impact FS-5: Implementation of Proposed Project or the alternatives could adversely affect the recreational fishery of Butt Valley Reservoir as a result of fewer forage fish in the reservoir.	Less than significant	Less than significant	Less than significant	Less than significant

Impact FS-1: Construction activities associated with Proposed Project or the alternatives could affect fish populations in Lake Almanor, Butt

Valley Reservoir, and the North Fork Feather River through direct and indirect impacts on individuals or habitat.

Proposed Project

Pages 3-222 to 3-239 of section 3.3.5 of the Final FERC EIS contain descriptions of the 30 recreational facilities and improvements to be implemented under Proposed Project. These descriptions, without FERC's environmental effects analysis, are hereby incorporated into this RDEIR by reference. The 30 recreational facilities and improvements make up the majority of the construction activities associated with Proposed Project. The construction activities associated with these recreational facilities and improvements will be located near Lake Almanor, Butt Valley Reservoir, and various reaches of the North Fork Feather River. Each improvement is not fully designed, but the State Water Board can address their potential impacts along water bodies based on similar recreation facilities (restrooms, picnic areas, boat ramps). In reviewing these proposals, the State Water Board must be conservative in making its determination concerning whether to certify compliance with the basin plan in order to ensure the continued protection of water quality objectives and designated beneficial uses.

In addition to these recreational facilities and improvements, PG&E has also proposed removal of the NF-9 gage weir as part of its proposed project. The Gansner Bar fish barrier, which was located in the Belden reach of the North Fork Feather River approximately 0.2 miles upstream of the confluence with the East Branch of the North Fork Feather River, was removed in 2014 as part of 2004 Settlement Agreement. The NF-9 gage weir is located in lower Butt Creek between Butt Valley dam and the stream's confluence with the North Fork Feather River. A monitoring plan will be developed, in consultation with CDFW, the State Water Board, USFS, and United States Fish and Wildlife Service, to determine whether the NF-9 gage weir blocks fish passage. If the monitoring efforts determine that the NF-9 gage weir is blocking fish passage, PG&E has agreed to remove or modify it in order to provide passage.

Due to the proximity of Proposed Project sites to the waters of Lake Almanor, Butt Valley Reservoir, and the North Fork Feather River and the potential for earth-disturbing activities, the construction impacts on individual fish populations or habitat within waterbodies is considered **significant without mitigation**.

Alternatives 1, 2, and 3

Alternatives 1, 2, and 3 contain the construction activities and facility improvements incorporated into Proposed Project. Alternatives 1 and 2 also include additional construction activities associated with the thermal curtains at the Prattville and Caribou intakes. Alternatives 1 and 3 include modification of the Canyon dam outlet structure that would disturb aquatic habitat and could affect fish in Lake Almanor. No impacts to hardhead, a special-status species, are anticipated because the species is not known to occur in Lake Almanor or Butt Valley Reservoir. Construction-related impacts on Sacramento perch, another special-status species, are also not anticipated because suitable habitat for this species is not present around the Prattville and Caribou intakes and the Canyon dam outlet structure, where in-water construction activities would take place.

Under Alternatives 1 and 2, in-water construction activities for installation of the thermal curtain at Lake Almanor would be restricted to an approximately 45-acre area around the Prattville intake, including the bin walls, which would extend approximately 300 feet offshore. In-water activities for installation of the thermal curtain at Butt Valley Reservoir would be restricted to an approximately 50-acre area around the Caribou intakes, including the bin walls, which would extend approximately 200 feet offshore. In-water construction activities for the thermal curtains would take place when the reservoirs are drawn down, typically from late September through April. On-land construction could occur any time of the year. It is anticipated that construction would take place over two seasons. Temporary disturbance to shallow, near-shore (littoral) lake bed habitat would occur during installation of the bin walls and thermal curtains at Lake Almanor and Butt Valley Reservoir and could result in temporary increases in turbidity around the construction areas. These underwater activities could also incidentally result in direct impacts to individual fish, although most fish would be expected to disperse from the construction area at the onset of the disturbance. A small but long-term reduction in lake bed littoral habitat would also result from installation of the thermal curtains, as discussed under Impacts FS-2 and FS-3.

The bin walls would not require excavation because of the use of geotechnical grids or geotextile fabrics on the lake bed, which would minimize disturbance to lake bed habitat. They would, however, require placement of fill material into the reservoirs for the foundation, which could temporarily increase turbidity, as discussed in Section 5.5, Water Quality.

Turbidity affects fish by impairing vision and altering feeding behavior, predator avoidance, and behavioral interaction with other fishes; particularly in habitats where turbidity is relatively low (Anderson 1996; Bash et al. 2001). In any aquatic habitat, very high levels of suspended sediment can cause physical harm to gill tissues and cause physiological effects that ultimately can result in injury or death. In aquatic systems, there is a general relationship between the duration of exposure, magnitude of turbidity, and severity of effects to fish and other organisms (Newcombe and McDonald 1991; Newcombe and Jensen 1996; Bash et al. 2001). Generally, the longer the duration of a turbidity event, the lower turbidity needs be to have adverse effects. For example, salmonids can tolerate very high spikes in turbidity (e.g., 400+ NTU) if the duration is brief enough or if the fish can move to lower turbidity environments (e.g. Noggle 1978; Bisson and Bilby 1982; Gregory and Northcote, 1993; Gregory and Levings 1996; Gregory and Levings 1998), while moderate increases of turbidity over a longer period may cause shifts in aquatic species composition (Whitman et al. 1982; Shaw and Richardson 2001; Sutherland et al. 2002).

Based on the size of the shoreline/lake bed construction area relative to the sizes of Lake Almanor and Butt Valley Reservoir (0.17% of Lake Almanor and 0.31% of Butt Valley Reservoir), a turbidity barrier is not expected to form or to impede fish migration through the construction area. Suspended sediment would not be expected to significantly affect primary production due to the relatively small size of the construction area and the ability of fish to move to low turbidity sections of the lake. As described in Chapter 3, PG&E would be required to implement appropriate management practices and other water quality measures during in-water construction activities to minimize water quality impacts. With the implementation of these measures and compliance with the water quality certification, construction-related impacts on fish or aquatic habitat during installation of the thermal curtains would be **less than significant**.

Under Alternatives 1 and 3, modification of the Canyon dam outlet tower gates would be accomplished using divers and underwater construction techniques, including a barge-mounted crane and diving platform or floating walkway to install pre-fabricated steel bulkheads with built-in slide gates to the existing outlet tower. This activity would be confined to the vicinity of the outlet tower, which is located in deep water near the dam, and would not disturb lake bed littoral habitat. Based on the expected levels of disturbance and the size of the shoreline/lake bed construction area relative to the sizes of Lake Almanor (0.19% of Lake Almanor), minimal disturbance is anticipated. Fish and other aquatic organisms would be minimally disturbed by this activity, and any fish in the vicinity would likely disperse away from the area during most of the construction activities.

Spills of fuels, lubricants, and hydraulic fluids could occur on the crane barge. These materials are hazardous to aquatic life and could cause adverse effects if even small quantities were to enter the lake. As described in Chapter 3, PG&E would be required to implement appropriate management practices and other water quality measures during in-water activities to prevent and manage spills to ensure rapid and effective clean up and minimize water quality impacts. Construction activities at the Canyon dam outlet tower may affect instream flow releases and cause flow fluctuations within the Seneca reach on a short-term, intermittent basis. Such fluctuations could result in the dewatering of fish habitat, which could negatively impact fish populations. Therefore, construction-related impacts on fish during modification of the Canyon dam outlet structure have the potential to be **significant without mitigation**.

Collectively, because all three alternatives would also include the construction activities contained in Proposed Project, impacts on fish populations and habitat in Lake Almanor, Butt Valley Reservoir, and downstream water bodies is considered **significant without mitigation.**

Mitigation Measures

Mitigation Measures GGS-1: Approval of construction activities by the State Water Board (Turbidity and Total Suspended Solids) and WQ-8: Approval of construction activities by the State Water Board (Hazardous Materials)

See sections 0 (p 143) and 5.5.2 for mitigation measures associated with construction activities related to Proposed Project and alternatives.

Mitigation Measure FS-1: Minimum instream flows at Canyon Dam during construction activities

PG&E will maintain the minimum instream flow requirement of 35 cfs in the Seneca reach below Canyon dam during construction modifications to the low-level outlet. If a pump or siphon is needed to divert flows from the lake to the Seneca reach, it would be equipped with an appropriately designed fish screen to prevent small fish from being entrained in the pump or siphon system.

Significance after Mitigation

Implementation of Mitigation Measures GGS-1 and WQ-8, and FS-1 would reduce the impact from the Proposed Project and Alternatives 1, 2, and 3 to a **less-than-significant** level.

Impact FS-2: Implementation of Proposed Project or the alternatives could alter aquatic habitat conditions in Lake Almanor.

Proposed Project

Implementation of the Proposed Project would result in increased releases from Canyon Dam, with equivalent decreases at the Prattville intake, as outlined in the 2004 Settlement Agreement. Changes in lake temperature and dissolved oxygen could potentially impact the aquatic habitat in Lake Almanor. The impacts of the Proposed Project on temperature and dissolved oxygen are discussed in Water Quality Chapter 5.5 Impact WQ-1. The Proposed Project shows a habitat loss of up to 13 percent in *dry years* for day with the lowest total habitat, and 100 percent reduction for *critical dry years*. The seasonal loss for all water year types is less than 0.5 percent. In addition, the response of Lake Almanor's cold water fish population to restricted thermal refugial habitat even under current conditions in *critically dry years* is uncertain due to a lack of information on fish distribution; there are no historic records of fish health issues or mortality during these conditions. Nonetheless, as a result of the limited cold water habitat during *dry* and *critical dry years*, any reduction in cold water habitat could significantly impact the cold water fishery, and therefore the impact of Proposed Project on aquatic habitat in Lake Almanor would be potentially **significant without mitigation**.

Alternatives 1, 2, and 3

Either separately or combined, the operation of a thermal curtain at the Prattville intake and increased water releases of up to 250 cfs from mid-June to mid-September through the Canyon Dam low-level outlet structure, with a parallel decrease in the Prattville intake diversion, would affect the distribution of water temperatures in Lake Almanor during the period of summer thermal stratification. The effects on thermal stratification are modeled in Appendix E and analyzed Water Quality Chapter 5.5 Impact WQ-1. Based on a seasonal habitat volume, Alternatives 1, 2, and 3 increase seasonal habitat volume over baseline and the proposed project for *normal* and *dry years*. During *critical dry years*, Alternatives 1, 2, and 3 result in a decrease in seasonal habitat volume of 2.0, 1.0, 0.2 percent respectively. During August, when the total cold water habitat volume is the smallest, the percent loss can be as high as 100 percent. The total habitat volume lost is only 360 acre-feet or 0.1 percent of the Lake Almanor volume at the time. The modeling results do not indicate any significant gain or loss of habitat volume for an extended duration. In addition, the response of Lake Almanor's cold water fish population to restricted thermal refugial habitat even under current conditions in *critically dry years* is uncertain due to a lack of information on fish distribution; there are no historic records of fish health issues or mortality during these conditions. Nonetheless, as a result of the limited cold water habitat during *dry* and *critical dry years*, any reduction in cold water habitat could significantly impact the cold water fishery, and therefore the impacts of Alternatives 1, 2, or 3 on Lake Almanor aquatic habitat would be potentially **significant without mitigation**.

Mitigation Measure WQ-1 (Proposed Project, Alternatives 1, 2, and 3): Implement Water Quality and Fish Monitoring, Augment Stocking of Cold Water Fishery in Lake Almanor, and Adaptively Manage Canyon Dam Releases

Under this mitigation measure, PG&E would be required to develop and implement a water quality monitoring program to collect water temperature and DO depth profiles throughout Lake Almanor and develop and implement a Lake Almanor fish monitoring program. PG&E would also be required to evaluate the monitoring data annually to determine, in consultation with applicable resource agencies, whether CDFW's Lake Almanor fish stocking program should be augmented to ensure the Project's operations do not adversely affect Lake Almanor's fishery. Supplemental fish stocking will be consistent with CDFW's current program of stocking catchable trout.

Additionally, PG&E would be required to adaptively manage the Canyon Dam releases in consultation with applicable resource agencies and as required by the State Water Board. Data collected as part of the water quality monitoring program and Lake Almanor fish monitoring program will be used to monitor and assess potential impacts to the suitable habitat in Lake Almanor, which may result in a determination that releases from Canyon Dam for purposes of meeting minimum instream flows or temperature control should be modified or suspended. The goal of adaptive management of the Canyon Dam releases would be to mitigate or avoid the impacts to suitable habitat in Lake Almanor while affording reasonable protection to habitat in the North Fork Feather River.

Significance after Mitigation

Mitigation Measure WQ-1 would (1) reduce the uncertainty associated with aquatic habitat estimates for Lake Almanor by increasing the base of monitoring information to improve the understanding of cold water habitat conditions,(2) improve the ability of the cold water fishery to recover if adverse impacts occur, and (3) avoid impacts to the extent feasible through the adaptive management of Canyon Dam releases. Implementation of this mitigation measure would reduce the impact to a **less-than-significant** level.

Impact FS-3: Implementation of Proposed Project or one of the alternatives could alter aquatic habitat conditions in Butt Valley Reservoir.

Proposed Project

The Proposed Project contains operational changes, as outlined in the 2004 Settlement Agreement, that may reduce the inflows and outflows at Butt Valley Reservoir by up to 115 cfs in *wet years* from April to June and as little as 25 cfs for all year types September to November (see Table 3-1). The flow difference would occur as a result of decreasing some of the inflow from the Prattville intake to increase releases from Canyon Dam and flows in the Seneca reach. The hydrodynamics within Butt Valley Reservoir would vary only slightly from the baseline condition because of the small change in inflows and outflows.

In general, aquatic habitat conditions in Butt Valley Reservoir would be similar to the baseline condition with some minor differences in late August and September, when the suitable cold water habitat can become limited, especially in dry and critically *dry years*. On a seasonal basis, the biggest change would occur during *dry years*, when the modeling shows a 7.1 percent loss of cold water habitat, but no difference would occur on a seasonal basis during *critically dry years* (Table 5.5-1). Based on the analysis done in Appendix E and the analysis in Chapter 5.5, the impact of the Proposed Project on aquatic habitat in Butt Valley Reservoir would be **less than significant**.

Alternatives 1, 2, and 3

Either separately or combined, the operation of a thermal curtain at the Prattville intake and increased water releases of up to 250 cfs from mid-June to mid-September through the Canyon Dam low-level outlet structure, with a corresponding decrease in the Prattville intake diversion, would affect the distribution of water temperatures in Butt Valley Reservoir during the period of summer thermal stratification. The effects on thermal stratification are modeled in Appendix E and analyzed in Chapter 5.5 impact WQ-2. Based on a seasonal habitat volume, Alternative 2 (thermal curtains only) would improve the habitat volume for all year types compared to baseline conditions. Alternative 1 (thermal curtains and increased releases from Canyon Dam) would increase habitat volume over baseline conditions only in *critically dry years*. Alternatives 1 and 2 and the proposed project are within 10 percent of the baseline for all water years types. Alternative 3 would increase seasonal habitat volume during *critically dry years* when compared to baseline conditions, but also would result in a seasonal loss of 13.1 percent during *dry years*. The period of significantly reduced habitat would be extended, but under Alternative 3 conditions would return to within 95 percent of the baseline habitat conditions within two weeks. Due to the short duration and small magnitude of cold water habitat volume changes, the impact of Alternatives 1, 2, or 3 on aquatic habitat conditions would be **less than significant**.

Impact FS-4: Implementation of Proposed Project or the alternatives could alter cold freshwater habitat conditions in the North Fork Feather River over the long term.

Proposed Project

Under the Proposed Project's minimum flow schedule for the Seneca and Belden reaches, the weighted usable area (WUA) decreases for Juvenile rainbow trout and macroinvertebrate community diversity, but increases for adult rainbow trout, rainbow trout spawning, juvenile rainbow trout, and Sacramento sucker adults. (see Figure 5.6-2 and Figure 5.6-3). The Proposed Project would decrease juvenile rainbow trout WUA by 11 percent at the highest minimum instream flow of 150 cfs, however the Proposed Project would increase WUA for adult rainbow trout and spawning by 104 percent and 158 percent, respectively. The large increase in adult rainbow trout and spawning WUA compensates for the loss in the juvenile rainbow trout WUA, resulting in an overall improvement in trout habitat.

The lower temperatures during the summer would result in somewhat slower growth rates for rainbow trout in the Seneca and Belden reach, but the change in growth rates is likely to be minor because the existing temperature regime is already relatively cold in most years. Since no evidence was provided in the FERC EIS record that either juvenile trout habitat area or growth rates are considered to be limiting trout populations in the Seneca or Belden reach, this effect is considered to be **less than significant**.

The Proposed Project minimum flow schedule would have a minimal effect on water temperature in these reaches reducing the average daily degree-d-km by less than the 20 percent (Table 5.5-4); however, thermal conditions in the Seneca reach would remain suitable for cold water fish (Appendix E3 – Figures 1 – 8). Habitat for cold water fish would continue to be limited by temperature in the Belden reach and downstream reaches of the North Fork Feather River during summer months. When compared to baseline conditions, the impact of the Proposed Project on cold freshwater habitat in the UNFFR Project bypass reaches would be considered generally beneficial; therefore, this impact would be **less than significant (beneficial).**

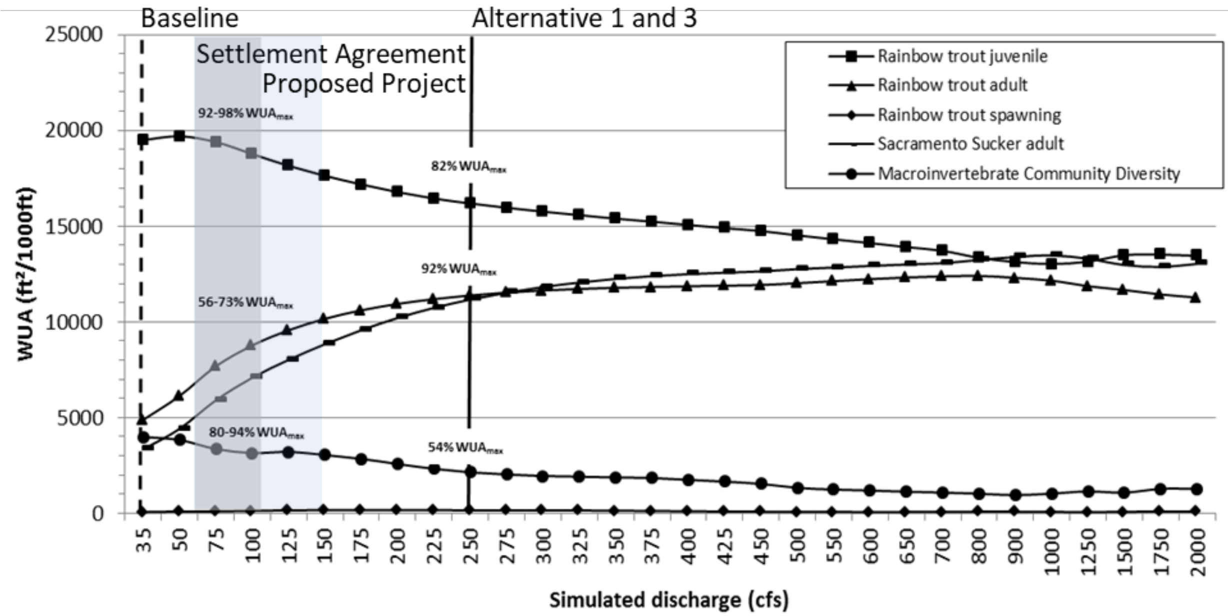

Figure 5.6-2. Total Weighted Usable Area (WUA) for Seneca Reach [a]

a. Total weighted usable area (WUA) values evaluated using the one velocity calibration method habitat index simulation in the Seneca Study Reach. Adapted from FERC (2005). Vertical lines indicate WUA flows of project, baseline (dashed line), Settlement Agreement (dark grey band), Proposed Project (dark grey and light grey bands), and Alternative 3 (solid line).

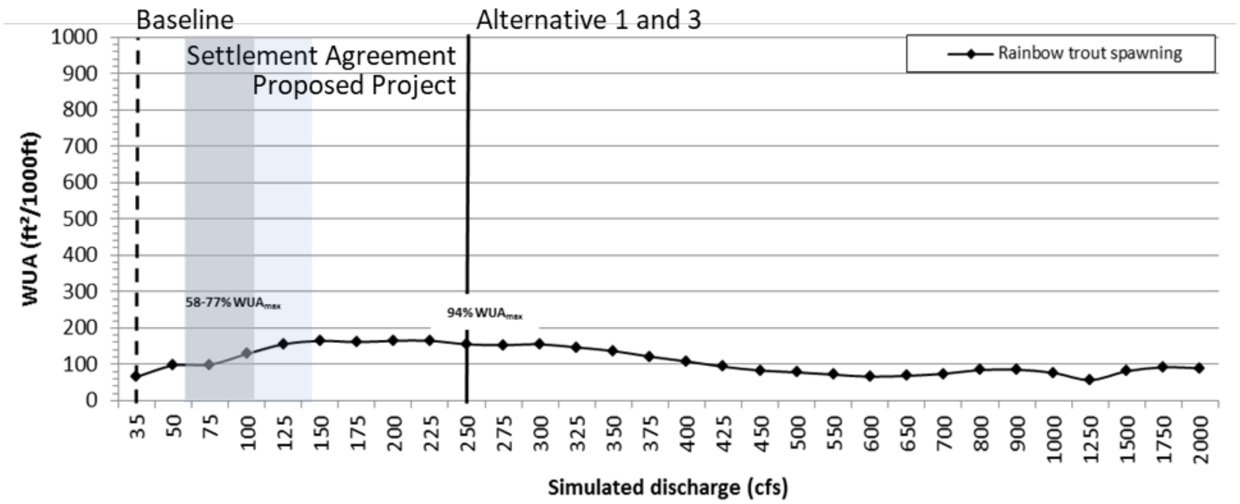

Figure 5.6-3. Total Weighted Usable Area (WUA) for Seneca Reach for Rainbow Trout Spawning[a]

a. Description of graph detail is the same as for Table 5.6-2 with vertical axis rescaled for rainbow trout spawning.

Alternative 1

A release of up to 250 cfs from mid-June to mid-September from the Canyon Dam outlet structure into the Seneca reach to Poe would decrease water temperatures and increase streamflow compared to baseline conditions. This release would increase the suitable habitat area for adult rainbow trout, including spawning habitat, but decrease it for juvenile rainbow trout (Table 5.6-1 and Figure 5.6-2). The lower temperatures during the summer could result in somewhat slower growth rates for rainbow trout in this reach, but the change in growth rates is likely to be minor because the existing temperature regime is relatively cold in most years. Since no evidence was provided in the FERC EIS record that either juvenile trout habitat area or growth rates are considered to be limiting trout populations in the Seneca reach, the impact of decreased temperatures on the fishery in the Seneca reach would be less than significant.

Under Alternative 1, the average degree-d-km above the threshold of 20°C from Belden to Poe would be reduced by 86 percent in *wet years* and 67 percent in *critical dry years* (Table 5.5-4). The overall effect of Alternative 1 would be to prevent thermal conditions from exceeding stressful temperatures for rainbow trout throughout much of the North Fork Feather River downstream through the Cresta reach. Growth, disease resistance, and ecological interactions contributing to cold water fish survival would be expected to significantly improve compared to baseline conditions. As a result, the effects of the increased Canyon Dam releases and the thermal curtains on the North Fork Feather River would be beneficial overall for trout and other cold water-dependent aquatic species in the Belden and downstream reaches of the Upper North Fork Feather River. As a result of the increase in spawning and adult WUA and decrease in temperature, the effect is considered to be **less than significant (beneficial)**.

The reduced water temperatures in the North Fork Feather River below Belden dam would slightly reduce the length of river with temperatures preferred by hardhead, primarily during June and July, based on hardhead thermal preferences (>20°C for growth, 24°C to 28°C for optimal physiological performance) reported by Moyle (2002) and shown in Figure 5.6-4 However, water temperature conditions downstream of the Belden dam would still provide a gradient and a diversity of thermal conditions within the temperature range tolerated and preferred by hardhead. Additionally, each of the downstream hydroelectric projects provides deep, slow-current habitat preferred by hardhead at their diversion dams. Hardhead would be expected to continue to move seasonally, as they do under baseline conditions, to preferred physical and thermal habitats within the various hydropower project reaches during the summer months (Moyle et al. 1983, Moyle 2002). Effects on hardhead in the North Fork Feather River would, therefore, be **less than significant**.

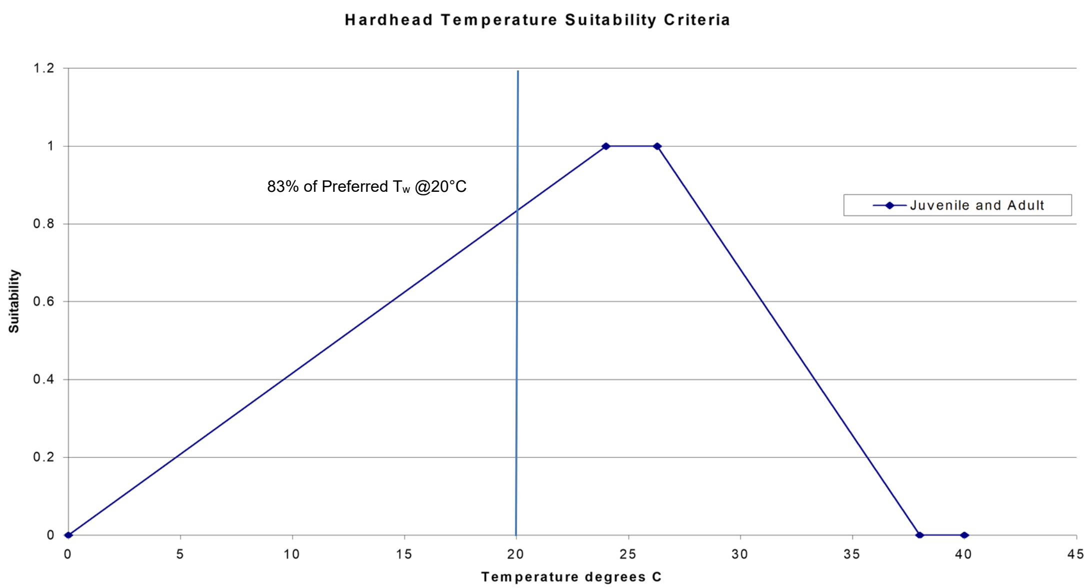

Figure 5.6-4. Hardhead (adult and juvenile) water temperature suitability criteria curve (adapted from Gast et al. 2004).

Alternative 2

Alternative 2 would provide a benefit for cold water fish habitat in the North Fork Feather River, but at a lesser amount than Alternative 1. Beneficial thermal effects from the thermal curtains at Prattville and Caribou intakes without the increased Canyon dam release under Alternative 2 would result in less temperature reduction than Alternative 1. No significant change in trout growth or survival would be expected in the Seneca Reach compared to baseline conditions. The amount of usable habitat for all life stages of rainbow trout would be greater than the baseline condition with the exception of juvenile trout, which would slightly decrease compared to baseline (Figure 5.6-2 and Figure 5.6-3).

The average degree-d-km exceedances over 20°C would be reduced by 78 percent in *wet years* to 52 percent in *critical dry years* (see Table 5.5-4). Under Alternative 2, temperatures would remain near or below 20°C throughout much of the North Fork Feather River downstream through the Cresta reach in *normal years*. In *dry* and *critically dryyears* during warm weather, the water temperatures could result in diel fluctuations that reach or exceed lethal levels in the Poe reach. Growth, disease resistance, and ecological interactions contributing to cold water fish survival would be expected to improve under Alternative 2 compared to baseline conditions.

The reduction in the length of river with temperatures preferred by hardhead would be slightly less than baseline conditions; however, adequate hardhead habitat (as discussed above for Alternative 1) would still be available. As a result, the thermal curtains would have a **less than significant impact** on the fisheries resources of the North Fork Feather River.

Alternative 3

Without thermal curtains, the effect of increased Canyon Dam releases of up to 250 cfs would provide a benefit on the cold water fish habitat in the North Fork Feather River, but to a lesser degree than Alternatives 1 or 3. The average degree-d-km exceedances over 20°C would be reduced by 52 percent in *wet years* to 39 percent in *critical dry years* (see Table 5.5-4).

The reduction in the length of river with temperatures preferred by hardhead would be slightly less than the baseline condition, however, adequate hardhead habitat (as discussed above for Alternative 1) would still be available. As a result, the impact of increased Canyon dam releases of up to 250 cfs on the North Fork Feather River cold water habitat would be **less than significant.**

Impact FS-5: Implementation of Proposed Project or one of the alternatives could adversely affect the recreational fishery of Butt Valley Reservoir as a result of fewer forage fish in the reservoir.

Proposed Project

Under the Proposed Project, the operational transfer of water from Lake Almanor to Butt Valley Reservoir would be very similar to baseline conditions. Under the Proposed Project, no structural modifications would be made to the Prattville intakes. Diversions to Butt Valley Reservoir would be reduced as a result of equivalent increased releases from Canyon dam, as outlined in the 2004 Settlement Agreement (Appendix A). This change in the diversion rate would be relatively small and would not be expected to greatly change the entrainment and transfer of forage fish from Lake Almanor to Butt Valley Reservoir. Therefore, the impact of Proposed Project on the forage fish population and recreational fishery at Butt Valley Reservoir would be **less than significant**.

Alternatives 1 and 2

Installation of a thermal curtain at the Prattville intake in Lake Almanor was identified by Gast (2004) as having the potential to reduce the entrainment of wakasagi, a forage fish, through the Prattville intake, thereby reducing its transport to, and abundance in, Butt Valley Reservoir. Large numbers of wakasagi, but very few other species, currently become entrained at the Prattville intake and are conveyed by the Butt Valley tunnel to the Butt Valley powerhouse tailrace (Pacific Gas and Electric Company 2002).

The entrained fishes likely support the trophy trout fishery, which preys on the wakasagi, in the Butt Valley powerhouse tailrace and reservoir. Gast (2004) hypothesized that installation of a thermal curtain could reduce entrainment of wakasagi at the Prattville intake, reducing the prey base in Butt Valley Reservoir for trophy trout and increasing the wakasagi abundance in Lake Almanor. Gast subjected this hypothesis to a modeling exercise that used simple assumptions on wakasagi distribution and vulnerability to entrainment along with PG&E data and modeling on withdrawal strata profiles, with and without a thermal curtain, to determine relative differences in wakasagi entrainment. In the absence of definitive data on wakasagi distributions and associated environmental conditions for Lake Almanor, Gast made an assumption that wakasagi are distributed throughout the water strata with suitable temperatures and DO concentrations and are entrained in proportion to volumes of water containing wakasagi withdrawn into the intake. Gast adopted a maximum temperature threshold of 22ºC and minimum DO thresholds of 5 mg/L and 6 mg/L, which confined the wakasagi to the metalimnion and much of the epilimnion for the summer period. This modeling concluded that, in *normal years*, wakasagi entrainment could be reduced by up to 95 percent to 99 percent in July and August and by less than 30 percent in June and September. In *critically dry years*, entrainment could be reduced by 86 percent to 99 percent from June to September.

Documents contained in the relicensing record do not provide adequate evidence either for or against Gast's hypothesis concerning the potential for a significant change in wakasagi entrainment at the Prattville intake or its impact on the Butt Valley Reservoir fishery. The only information on wakasagi depth distributions in the vicinity of the Prattville intake is from hydroacoustic surveys performed in August 2001 as part of the relicensing studies (Pacific Gas and Electric Company 2002). The surveys indicated that wakasagi schools occurred at depths of 10 to 14 meters (33 to 46 feet) and were mostly near the lake bottom (Gast 2004). This depth would place fish within the withdrawal zone of the thermal curtain. However, at the time of this survey, low lake levels put the top of the thermocline near the elevation of the thermal curtain opening, which may have affected fish distribution (Gast 2004). Nonetheless, the PG&E surveys are consistent with reports of wakasagi congregating in and just below the thermocline in Lake Oroville (Lee 2005), which suggests that while wakasagi will congregate in water strata surrounding the thermocline, they may not be as restricted to the epilimnion during the summer as presumed by Gast (2004).

Additionally, wakasagi have spread and are abundant throughout the entire North Fork Feather River system from Lake Almanor to Lake Oroville, including Butt Valley Reservoir. Wakasagi populations in all reservoirs along the North Fork Feather River have increased dramatically since their initial stocking in Lake Almanor in 1972 to 1973 (Moyle 2002). Their broad thermal and salinity tolerances and ability to spawn in sand and small gravel on the beds of feeder streams and along the shorelines of ponds, lakes, and reservoirs have likely led to their adaptability and expanding range throughout California (Moyle 2002). It is probable that wakasagi have established self-sustaining populations in Butt Valley Reservoir, and any reduction in wakasagi entrainment at the Prattville intake as a result of the thermal curtain is not expected to have a significant effect on the presence of forage fish in the reservoir. This impact would therefore be **less than significant**.

Alternative 3

Without thermal curtains, the effect of increased Canyon dam releases of up to 250 cfs on Butt Valley Reservoir's recreational fishery would be similar to that of Proposed Project. The impact would be **less than significant**.

5.7 Vegetation, Wildlife, and Sensitive Biological Resources

This section describes the plant and wildlife communities and sensitive biological resources in the vicinity of the Upper North Fork Feather River Hydroelectric project (UNFFR Project) and analyzes the effects of the operation of the UNFFR Project on these resources under a new Federal Energy Regulatory Commission (FERC) license.

Environmental Setting

The biological setting is described in both regional and site-specific contexts to provide an overview of the biological resources in the vicinity of the UNFFR Project and at each area that would be impacted by the project alternatives. The regional description encompasses the UNFFR Project area and surrounding plant and wildlife communities (referred to as the biological study area in this section). The information describing the biological study area for the UNFFR Project area is based on studies previously conducted for Pacific Gas and Electric Company (PG&E) to support its relicensing application to FERC for the UNFFR Project (FERC Project No. 2105).

The site-specific setting focuses on the three areas illustrated on Figure 3-2 where construction and ground-disturbing activities associated with the alternatives to Proposed Project could occur (referred to as activity areas in this section). These activity areas include locations at Lake Almanor and Butt Valley reservoir and are referred to as the Canyon dam outlet structure, Prattville intake, and Caribou intake activity areas. (For detailed location information, refer to section 3.5 of this RDEIR). Focused studies have not been conducted specifically for the activity areas; the description of the site-specific setting for these activity areas is instead based on a review of aerial imagery, Calveg geographic information system (GIS) data (Calveg Tiles 2010), and results of the previous FERC relicensing studies conducted in the vicinity.

Regional Plant and Wildlife Communities in the Biological Study Area

The UNFFR Project is in the California Floristic Province at the northern edge of the Sierra Nevada. The varied elevation and geologic characteristics of the area support diverse plant communities that are found in a complicated mosaic, providing habitat for a wide variety of wildlife species.

Lake Almanor was formerly a large meadow, known as Big Meadows, through which the Upper North Fork Feather River flowed. The Lake Almanor area still contains large, grassy meadows around the reservoir that are subject to flooding at high water levels. Wet meadows and seasonally wet volcanic flats are common throughout the region. Vegetative cover near Lake Almanor and Butt Valley reservoir is predominantly mixed conifer forest. Serpentine outcrops in a steep, eroded landscape occur between Butt Valley reservoir and the Caribou powerhouses. Downstream of the Caribou powerhouses, the vegetation consists of mixed conifer forest and montane chaparral. Steep, rocky slopes forming the North Fork Feather River canyon are dominated by montane hardwood forest. Seeps and springs are common in the area around the Belden forebay.

The following descriptions of plant and wildlife communities follow the classification used in A Guide to Wildlife Habitats of California (Mayer and Laudenslayer Jr. 1988). Plant community descriptions were excerpted from PG&E's license application, Appendix E3.3-1: Special-Status Plant Survey and Noxious Weed Survey (Pacific Gas and Electric Company 2002a); A Guide to Wildlife Habitats of California (Mayer and Laudenslayer Jr. 1988); Botany Survey for PG&E's Belden and Caribou Camp Projects (ICF International 2015); Biology Report for Belden Siphon Drainage Repair (Pacific Gas and Electric Company 2016); PG&E's Gansner Bar Fish Barrier Removal Project-Yellow Starthistle Monitoring (Pacific Gas and Electric Company 2015); and Botanical Surveys for PG&E's Belden Siphon Piezometer Trail Decommissioning and Improvements Project (Garcia and Associates 2014 and 2015). The overview of invasive species and sensitive biological resources (e.g., special-status species, waters of the United States) in the biological study area follows the community descriptions.

Montane Hardwood

Montane hardwood forest is a diverse habitat found on serpentine and non-serpentine substrates in the biological study area between the Caribou and Belden powerhouses. On non-serpentine soils, this habitat is dominated by canyon live oak (*Quercus chrysolepis* var. *chrysolepis*). Other common overstory species include Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), Pacific madrone (*Arbutus menziesii*), and ponderosa pine (*Pinus ponderosa*). On steep slopes, the understory is limited to leaf litter and rock outcrops are common. On gentle slopes and along roadsides or openings in the dense canopy, the understory includes a mix of native shrubs and forbs such as deer brush (*Ceanothus integerrimus*), poison oak (*Toxicodendron diversilobum*), western mock orange (*Philadelphus lewisii*), toyon (*Heteromeles arbutifolia*), manzanita (*Arctostaphylos* spp.), California pipevine (*Aristolochia californica*), trail plant (*Adenocaulon bicolor*), woolly sunflower (*Eriophyllum lanatum*), and blue wildrye (*Elymus glaucus* ssp. *glaucus*).

On serpentine-derived soils, the montane hardwood community is more open, with emergent Douglas-fir and foothill pine (*Pinus sabiniana*). Dominant species in the shrub layer include California bay (*Umbellularia californica*), wedgeleaf ceanothus (*Ceanothus cuneatus*), toyon, and hoary coffeeberry (*Rhamnus tomentella*).

Nuts provided by montane hardwood forests are an important food source for many species, including Lewis' woodpecker (*Melanerpes lewis*), Steller's jay (*Cyanocitta stelleri*), mountain quail (*Oreortyx pictus*), western gray squirrel (*Sciurus griseus*), and mule deer (*Odocoileus hemionus*). In addition, cavities in mature trees provide habitat for species such as northern flicker (*Colaptes auratus*), western screech owl (*Otus kennicottii*), American kestrel (*Falco sparverius*), and little brown bat (*Myotis lucifugus*). Many reptiles are found on the forest floor in this community, including the western skink *(Eumeces skiltonianus)*, California mountain kingsnake (*Lampropeltis zonata*), and rubber boa *(Charina bottae)*.

Sierran Mixed Conifer

In the biological study area between the Caribou and Belden powerhouses, the montane hardwood community transitions to Sierran mixed conifer on gentler slopes away from the steep, rocky canyon walls of the North Fork Feather River. This community is more common near Butt Valley reservoir and Lake Almanor. Dominant overstory species include ponderosa pine, Douglas-fir, incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*), canyon live oak, black oak (*Quercus kelloggii*), and bigleaf maple (*Acer macrophyllum*). The shrub and herb layer is poorly developed in the dense shade of the forest. Openings in the dense forest canopy are dominated by deer brush, poison oak, greenleaf manzanita (*Arctostaphylos patula*), hoary honeysuckle (*Lonicera hispidula* var. *vascillans*), Pacific dogwood (*Cornus nuttallii*), and other shrubs and herbs.

At the higher elevations around Lake Almanor and Butt Valley reservoir, Douglas-fir is no longer a dominant species in the overstory; rather, ponderosa pine and white fir are dominant and incense cedar and sugar pine (*Pinus lambertiana*) are important components. In forest openings, dominant shrubs include mountain whitethorn (*Ceanothus cordulatus*), Sierra gooseberry (*Ribes roezlii*), greenleaf manzanita, and creeping snowberry (*Symphoricarpos mollis*).

The multi-layered vegetation in the Sierran mixed conifer community supports a variety of wildlife species. A significant feature of the community is the presence of cavity-bearing trees and snags (dead trees that are still standing), which are a valuable resource for birds such as the flammulated owl (*Otus flammeolus*) and northern pygmy owl (*Glaucidium gnoma*) and for mammals that prefer to nest and den in cavities. Snags also support wood-boring insects that provide food for bark-gleaning insectivorous birds, such as the brown creeper (*Certhia americana*). Other birds that forage and/or breed in the Sierran mixed conifer community include the sharp-shinned hawk (*Accipiter striatus*), mountain quail, western wood-pewee (*Contopus sordidulus*), and western tanager (*Piranga ludoviciana*). Mammals typical of this community include the long-eared myotis (*Myotis evotis*), northern flying squirrel (*Glaucomys sabrinus*), long-tailed weasel (*Mustela trenata*), bobcat (*Lynx rufus*), and black bear (*Ursus americanus*). Common reptiles include the rubber boa and western skink.

White Fir

White fir (*Abes concolor*) dominant communities are found below the southern edge of Lake Almanor and along the southern edge of the Butt Valley reservoir. White fir communities occur at low- to mid-elevation forests and have cool and moist habitat conditions. White fir can form pure stands or can be intermixed in conifer forests with incense-cedar, red fir (*Abies magnifica*), ponderosa pine, lodgepole pine (*Pinus contorta* ssp. *murrayana*), and sugar pine. Understory vegetation tends to be inhibited by shade and a dense layer of woody debris. Open stands may contain species such as chinquapin (*Chrysolepis* spp.), canyon live oak, and mahala mat (*Ceanothus prostratus*), while dense stands tend to be inhabited by wake robin (*Trillium* spp.), snow plant (*Sarcodes* spp.), and pipsissewa (*Chimaphila* spp.).

White fir communities are home to many mammal species including mule deer, common porcupine (*Erethizon dorsatum*), black bear, and weasels (*Mustela* spp.) Birds are also common in white fir–dominated communities. Large birds of prey include California spotted owl (*Strix occidentalis* ssp. *occidentalis*) and bald eagle (*Haliaeetus leucocephalus*), while insect-gleaning avian species include yellow-rumped warbler (*Dendroica coronata*), western tanager, mountain chickadee (*Poecile gambeli*), chestnut-backed chickadee (*Poecile rufescens*), golden-crowned kinglet (*Regulus satrapa*), and black headed grosbeak (*Pheucticus melanocephalus*). White fir seeds are a food source for chipmunks (*Tamias* spp.), northern flying squirrels, chickadees (*Poecile* spp.), red crossbills (*Loxia curvirostra*), and Clark’s nutcracker (*Nucifraga columbiana*).

Ponderosa Pine

Single-species stands of ponderosa pine (*Pinus ponderosa*) are found throughout the biological study area. Ponderosa pine is also found in association with white fir, incense-cedar, sugar pine, Douglas-fir, canyon live oak, and California black oak. Understory vegetation may include manzanita, *ceanothus* spp., mountain misery (*Chamaebatia foliolosa*), Pacific dogwood, hairy yerba santa (*Eriodictyon trichocalyx*), bitter cherry (*Prunus emarginata*), buckthorn (*Rhamnus* spp.), poison oak, Sierra gooseberry, Orcutt's brome (*Bromus orcuttianus*), *Carex* spp., blue grass (*Poa* spp.), bedstraw (*Galium* spp.), bracken fern (*Pteridum aquilinum* var. *pubescens*), C*larkia* spp., *Eriastrum* spp., splendid woodland-gilia (*Saltugilia splendens*), *Iris* spp., whisker brush (*Leptosiphon ciliatus*), lupine (*Lupinus* spp.), nightshade (*Solanum* spp.), and violet (*Viola* spp.). Typical wildlife species that use ponderosa pine communities in the biological study area are similar to those found in the Sierran mixed conifer, white fir, and lodgepole pine communities.

Lodgepole Pine

The single-species lodgepole pine (*Pinus contorta* ssp. *murrayana*) community is found in a band around the edges of wet montane meadows in the Lake Almanor area. Lodgepole pine occurs only at the higher elevations of the biological study area. Stands of slender, small-diameter trees are dense and have a thick layer of leaf litter. Understory vegetation is generally a sparse layer of species associated with adjacent wet and dry montane meadows (see description of this community below) that primarily occur in canopy openings.

Lodgepole pine stands have low structural diversity and are relatively low in animal species diversity. Many species found in lodgepole pine stands are associated with the meadow edge. The majority of birds found in this community belong to the group that feed on insects found in foliage or on bark. Foliage insects are combed off the needles by birds such as the yellow-rumped warbler, ruby-crowned kinglet (*Regulus calendula*), and mountain chickadee. Bark insects are pulled from crevices by brown creepers, red-breasted nuthatches (*Sitta canadensis*), and northern black-backed woodpeckers (*Picoides articus*). Lodgepole seeds are savored by species such as the Clark's nutcracker, pine siskin (*Carduelis pinus*), and red crossbill. The sooty grouse (*Dendragapus fuliginosus*) can digest resin-soaked needles, allowing it to spend the winter in lodgepole pine forests. Raptors, such as the northern goshawk (*Accipiter gentiles*) and red-tailed hawk (*Buteo jamaicensis*), may build large stick nests near the tops of the largest trees. Mammals, such as the common porcupine and black bear, gnaw on the bark of lodgepole pines to access the sweet inner layer, and downed trees are used by small animals such as the western red-backed vole (*Clethrionomys californicus*) and moisture-dependent toads and salamanders.

Valley Foothill Riparian

Valley foothill riparian communities are found adjacent to the North Fork Feather River in the Seneca and Belden reaches from Canyon dam downstream to the Belden powerhouse and along Butt Creek. The riparian corridor is narrow and discontinuous. Common species found in this community include Himalayan blackberry (*Rubus discolor*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), arroyo willow (*Salix lasiolepis*), California wild grape (*Vitis californica*), Bolander's sedge (*Carex bolanderi*), hedgenettle (*Stachys ajugoides* var. *rigida*), and bracken fern.

Riparian woodlands represent some of the most important wildlife habitats due to their high floristic and structural diversity, high biomass (and therefore high food abundance), and high water availability. In addition to providing breeding, foraging, and roosting habitat for a diverse array of animals, riparian habitats also provide movement corridors for some species, connecting a variety of habitats throughout the region. Riparian areas have been identified as one of the most threatened and degraded habitats in the Sierra Nevada (Sierra Nevada Ecosystem Project 1996, Siegel and DeSante 1999).

The leaf litter, fallen tree branches, and logs associated with the riparian community provide cover for amphibians such as the western toad (*Bufo boreas*) and Pacific chorus frog (*Pseudacris regilla*). The northwestern fence lizard (*Sceloporus occidentalis*), western skink, and northern alligator lizard (*Elgaria coerulea*) also occur in riparian communities. Common species nesting and foraging primarily in the riparian tree canopy include the tree swallow (*Tachycineta bicolor*), bushtit (*Psaltriparus minimus*), white-breasted nuthatch (*Sitta carolinensis*), and Nuttall's and downy woodpeckers (*Picoides nuttallii* and *Picoides pubescens*, respectively). Other resident species, such as the spotted towhee (*Pipilo maculatus*) and song sparrow (*Melospiza melodia*), nest and forage on or very close to the ground, usually in dense vegetation. A variety of mammals also occur in riparian communities, including the deer mouse (*Peromyscus maniculatus*), raccoon (*Procyon lotor*), and ringtail cat (*Bassariscus astutus*).

Mixed Chaparral

A mixed chaparral community occurs on serpentine substrates near the Caribou powerhouses and the Belden reach of the North Fork Feather River. This community is dominated by leather oak (*Quercus durata*) and wedgeleaf ceanothus, with rubber rabbitbrush (*Chrysothamnus nauseosus*), Fremont's silk-tassel (*Garrya fremontii*), prickly phlox (*Leptodactylon pungens*), and yerba santa (*Eriodictyon californicum*). The herb layer is restricted to openings in the mostly dense chaparral and is dominated by colorful native forbs, such as common blue dicks (*Dichelostemma capitatum* ssp. *capitatum*), rayless daisy (*Erigeron inornatus*), purple sanicle (*Sanicula bippinnatifida*), Sierra morning-glory (*Calystegia malacophylla*), several lomatiums (*Lomatium* spp.), and scarlet fritillary (*Fritillaria recurva*).

Mixed chaparral provides habitat for a wide variety of wildlife species. It provides seeds, fruit, and protection from predators and harsh weather. In addition, it provides singing, roosting, and nesting sites for many species of birds, including the California quail (*Callipepla californica*), spotted towhee, and Anna's hummingbird (*Calypte anna*). Mammals common in this habitat include the black-tailed jackrabbit (*Lepus californicus*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), and deer mouse. Reptiles that make use of this habitat include the western fence lizard and northern alligator lizard.

Montane Chaparral

The montane chaparral community is common in disturbed areas around Lake Almanor. Greenleaf manzanita is the dominant species, but mountain whitethorn (*Ceanothus cordulatus*), Sierra gooseberry, Bloomer's goldenbush (*Ericameria bloomeri*), and mahala mat are important components. The herb layer varies in density and is dominated by white hackelia (*Hackelia californica*), needlegrass (*Achnatherum* sp.), coyote mint (*Monardella odoratissima*), Torrey's monkeyflower (*Mimulus torreyi*), pygmy tarweed (*Madia minima*), Torrey's cryptantha (*Cryptantha torreyana*), diffuse groundsmoke (*Gayophytum diffusum*), and mountain violet (*Viola purpurea* ssp. *purpurea*).

The wildlife values of montane chaparral are similar to those described for mixed chaparral.

Perennial Grassland

The perennial grassland community is common on the upland slopes adjacent to Lake Almanor. Dominant species vary from site to site, but generally include one or more of the following: Kentucky bluegrass (*Poa pratensis*), tufted hairgrass (*Deschampsia caespitosa*), common yarrow (*Achillea millefolium*), meadow penstemon (*Penstemon rydbergii*), beaked sedge (*Carex utricularia*), Jones' muhly (*Muhlenbergia jonesii*), long-stalked clover (*Trifolium longipes* var. *nevadense*), and sheep sorrel (*Rumex acetosella*).

The value of the grassland community is enhanced by the communities that surround it (e.g., communities that provide shelter for species that forage in the open grasslands). Perennial grasslands support several herbivores, including mule deer, California ground squirrels (*Spermophilus beecheyi*), deer mice, and black-tailed jackrabbits. These species attract predators that breed in adjacent habitats, such as the bobcat, coyote, red-tailed hawk, and great-horned owl (*Bubo virginianus*). Reptile species expected to occur here include the northwestern fence lizard, western skink, and gopher snake (*Pituophis catenifer*).

Annual Grassland

The annual grassland community occurs in scattered patches throughout the biological study area. Species present in these communities include brome (*Bromus* spp.), barley (*Hordeum* spp.), fescue (*Festuca* spp.), clover (*Trifolium* spp.), popcornflower (*Plagiobothrys* spp.), and California poppy (*Eschscholzia californica*).

Annual grassland provides foraging habitat for numerous wildlife species including northwestern fence lizard, northern Pacific rattlesnake (*Crotalus oreganus* ssp. *oreganus*), black-tailed jackrabbit, California ground squirrel, coyote, and American kestrel.

Wet Meadow

Wet meadow communities, including seeps, springs, and freshwater marshes, are found scattered throughout the biological study area. Seeps and springs are common in both the Last Chance Marsh and the Caribou powerhouse area. Freshwater marsh is found as a fringe of marsh habitat around portions of Lake Almanor and Butt Valley reservoir and in small ponds near the Chester Airport (northwest of Lake Almanor). Dominant species vary with wet meadow type and location.

Montane meadow habitat is extremely important to the Sierra Nevada avifauna (Siegel and DeSante 1999). Not only do numerous species depend on montane meadows for breeding habitat, but meadows also serve as important supplemental habitat for many species that breed in other habitats. In addition, montane meadows provide critical molting and pre-migration staging areas for juveniles and adults of a broad array of Sierra Nevada landbird species (Siegel and DeSante 1999), and the population densities of many forest-inhabiting species are often highest near meadow edges.

Wet meadows are generally too wet to provide suitable habitat for small mammals; however, deer may feed in wet meadows. Amphibians and reptiles are common in wet meadows, including the Pacific chorus frog, American bullfrog (*Rana catesbeiana*), Cascades frog (*Rana cascadae*), and terrestrial garter snake (*Thamnophis elegans*).

Riverine

The North Fork Feather River and its tributaries provide perennial and intermittent stream (riverine) habitats for aquatic communities within the biological study area. These habitats are important to many wildlife species including birds, mammals, reptiles, amphibians, and fish. Aquatic communities are described in more detail in section 5.6, Fisheries.

Lacustrine

Lake Almanor is the largest water body in the North Fork Feather River watershed. This reservoir provides approximately 27,000 acres of lacustrine (open water) habitat at its maximum water surface elevation (see Chapter 3, and section 5.4, Water Resources, for additional details). Butt Valley reservoir provides approximately 1,600 acres of lacustrine habitat at its maximum water surface elevation. Belden forebay, with a surface area of 42 acres, is the smallest impoundment.

Lacustrine habitats in the watershed are extensively used by mammals (e.g., beavers, otters, and muskrats); birds (e.g., ducks, geese, osprey, and grebes); reptiles (e.g., turtles and snakes); amphibians (e.g., toads, frogs, and salamanders); and both cold and warmwater fish (e.g., trout, bass, and sunfish). Fish are described in more detail in section 5.6, Fisheries.

Barren

Barren habitat occurs in portions of the Lake Almanor, Butt Valley reservoir, and Seneca and Belden reaches and includes features such as open shorelines, roads, and dams or related facilities. Barren habitat is defined as containing little to no vegetation; the composition is largely dependent upon surrounding habitats.

Barren habitat is primarily used by burrowing amphibians and reptiles, nesting avian species, and foraging chiropterans. Rocky barren cliffs along riverine habitats are used by species such as bank swallow (*Riparia riparia*) and western red bat (*Lasiurus blossevillii*). Sand and gravel substrates are used by northwestern fence lizard, northern Pacific rattlesnake, nesting frog species, nighthawk (*Chordeiles* spp.), and common poorwill (*Phalaenoptilus nuttallii*).

Non-Native and Invasive Plant Species

Several invasive and noxious weeds have been introduced to the biological study area and now occur in disturbed areas around the reservoirs, along roads, and along the North Fork Feather River. Garcia and Associates (GANDA) conducted surveys for invasive and noxious weed species in 2000 in support of PG&E's relicensing application (Pacific Gas and Electric Company 2002a), and in 2014 and 2015 for PG&E's Belden Siphon Piezometer Trail Decommissioning and Improvements project, and ICF International special-status plant and noxious weed survey for PG&E's Belden intake bridge abutment repair, Caribou Camp water supply project, and Belden spillway wall panel and drain repair projects (2015). These species are listed in Table 5.7-1 with their pest ratings (see Chapter 4 for an explanation of the ratings).

Table 5.7-1 Invasive and Noxious Weeds in the Biological Study Area

Common Name	Scientific Name	Cal-IPC List*	CDFA List*
Russian knapweed	*Acroptilon repens*	Moderate	A
Jointed goatgrass	*Aegilops cylindrica*	—	B
Barb goatgrass	*Aegilops triuncialis*	High	B
Tree of heaven	*Ailanthus altissima*	Moderate	—
Giant reed	*Arundo donax*	—	—
Cheat grass	*Bromus tectorum*	High	—
Hairy whitetop	*Cardaria pubescens*	Limited	B
Musk thistle	*Carduus nutans*	Moderate	A
Italian thistle	*Carduus pycnocephalus* ssp. *pycnocephalus*	Moderate	B
Diffuse knapweed	*Centaurea diffusa*	Moderate	A
Spotted knapweed	*Centaurea maculosa*	High	A
Malta star-thistle	*Centaurea melitensis*	Moderate	—
Yellow starthistle	*Centaurea solstitalis*	High	C
Squarrose knapweed	*Centaurea virgata* ssp. *squarrosa*	Moderate	A
Rush skeletonweed	*Chondrilla juncea*	Moderate	A
Canada thistle	*Cirsium arvense*	Moderate	B
Yellowspine thistle	*Cirsium ochrocentrum*	—	A
Bull thistle	*Cirsium vulgare*	Moderate	—
Artichoke thistle	*Cynara cardunculus*	Moderate	B
Scotch broom	*Cytisus scoparius*	High	C
Stinkwort	*Dittrichia graveolens*	Moderate	—
Leafy spurge	*Euphorbia esula*	Moderate	A
French broom	*Genista monspessulana*	High	C
Klamathweed	*Hypericum perforatum*	Moderate	C
Dyer’s woad	*Isatis tinctoria*	Moderate	B
Hairy whitetop	*Lepidium appelianum*	Limited	B
Lens-podded hoary cress	*Lepidium chalepensis*	Moderate	B
Hoary cress	*Lepidium draba*	Moderate	B
Perennial pepperweed	*Lepidium latifolium*	—	B
Ox-eye daisy	*Leucanthemum vulgare*	Moderate	—

Table 5.7-1 Invasive and Noxious Weeds in the Biological Study Area

Common Name	Scientific Name	Cal-IPC List*	CDFA List*
Dalmatian toadflax	*Linaria genistifolia ssp. dalmatica*	Moderate	A
Butter-and-eggs	*Linaria vulgaris*	Moderate	—
Purple loosestrife	*Lythrum salicaria*	High	B
Scotch thistle	*Onopordum acanthium* ssp. *acanthium*	High	A
Sulfur cinquefoil	*Potentilla recta*	—	—
Locust tree	*Robinia pseudoacacia*	Limited	—
Himalayan blackberry	*Rubus armeniacus*	High	—
Bouncing-bet	*Saponaria officinalis*	Limited	—
Medusahead	*Taeniatherum caput-medusae*	High	C
Woolly mullein	*Verbascum thapsus*	Limited	—

*See Table 4-1 in Chapter 4 for category definitions and an overview of the lists.
CAL-IPC – California Invasive Plant Council
CDFA – California Department of Food and Agriculture

Site-Specific Plant and Wildlife Communities

Plant and wildlife communities in the three activity areas include Sierran mixed conifer forest, white fir, ponderosa pine, montane chaparral, annual grassland, barren, riverine, and lacustrine. The Canyon dam activity area has already been disturbed and is mostly devoid of vegetation, although there are small patches of Sierran mixed conifer forest along the western boundary. Lacustrine habitat in Lake Almanor dominates the northern portion of the Canyon dam activity area. The Prattville intake activity area is composed primarily of the lacustrine habitat in Lake Almanor, with Sierran mixed conifer forest along the southwestern boundary. The Caribou intakes activity area is composed primarily of the lacustrine habitat in Butt Valley reservoir, with Sierran mixed conifer forest along the western and southern boundaries, combined with white fir, ponderosa pine, montane chaparral, and annual grassland. Freshwater emergent wetlands may occur along the shorelines of Lake Almanor and Butt Valley reservoir within the activity areas. Riverine habitat occurs in the southern portion of both the Canyon dam and Caribou intake activity areas. Extending south from Lake Almanor and Butt Valley reservoir are the Seneca and Belden reaches, respectively; proposed water level and streamflow changes may have potential effects on aquatic resources in these reaches.

The plant and wildlife communities in and near the activity areas may support numerous special-status species. The list of potentially occurring special-status species in the biological study area (Appendix G) was further evaluated to determine species that potentially occur in the activity areas. This assessment was based on the results of PG&E's studies and surveys documented in its FERC application and information on the species' habitat requirements.

Conclusions regarding the potential of species to occur in the biological study area and the activity areas are based on the knowledge of local professional biologists, historic survey information, and comments provided on the Draft EIR.

Sensitive Biological Resources

The biological study area supports a wide range of special-status species and other sensitive biological resources. A list of potentially occurring special-status species and their general habitat requirements was compiled by performing searches of the California Natural Diversity Database (CNDDB) and California Native Plant Society (CNPS) Electronic Inventory database for the two quadrangles (Canyon dam and Caribou) encompassing the three activity areas and the adjacent four quadrangles (Chester, Twain, Almanor, and Westwood West), reviewing the United States Fish and Wildlife Service (USFWS) list of federal special-status species (species listed as threatened or endangered or threatened or candidates for listing as threatened or endangered under the federal Endangered Species Act) potentially occurring within the boundary of the biological study area and a half mile buffer surrounding the area; wildlife queries for Plumas and Butte Counties using California Wildlife Habitat Relationships (CWHR) database developed by CDFW, and reviewing biological literature for the region.

For the purposes of this evaluation, special-status plant and wildlife species are those that are (1) listed as threatened or endangered under the federal or California endangered species acts; (2) proposed for listing as threatened or endangered; (3) candidates for listing as threatened or endangered; (4) designated as rare by CDFW; (5) ranked by the California rare plant ranking system as 1B or 2; or (5) designated by the Regional Forester for the USDA Forest Service (USFS), Region 5 as sensitive pursuant to the National Forest Management Act (NMFA). Each species on the list was assessed for its potential to occur in the biological study area based on the species' known distribution and habitat requirements, vegetation communities mapped in the biological study area, elevation limits (approximately 2,200 to 4,500 feet) of the biological study area, and surveys of portions of the biological study area. The assessment of potentially occurring special-status plant and wildlife species for the biological study area is presented in Appendix G. Based on the initial background research and selection criteria, 82 special-status plant species were identified for review to determine their potential to occur in the biological study area. Following additional review of the species' known geographic range and habitat requirements, 54 special-status plant species were determined to potentially occur in the biological study area. These include two federally listed species, one state-listed species, one federal candidate species, and several other special-status plants. Additionally, based on the initial background research and selection criteria, 61 special-status wildlife species were identified for review to determine their potential to occur in the biological study area. Following additional review of the species' known geographic range and habitat requirements, 38 special-status wildlife species were determined to potentially occur in the biological study area. These include three federally listed species, one federal candidate species, five state-listed species, and several other species. Many special-status plant and wildlife species identified during the initial background research are not expected to occur in the biological study area based on the species' known geographic range or habitat requirements, as noted in Appendix G.

The biological study area contains several water bodies that fall under the jurisdiction of the Corps and the State (see Chapter 4). The primary water bodies are the North Fork Feather

River and its tributary streams and reservoirs (e.g., Lake Almanor). As described above in descriptions of the vegetation and wildlife communities, wetlands are found along the perimeters of reservoirs and scattered throughout the biological study area. These wetlands may also fall under the regulatory jurisdiction of the Corps or the State.

Special-Status Plants

Of the 56 special-status plant species potentially occurring in the biological study area, 48 species were identified as potentially occurring in one or more of the activity areas. Potential habitat for the Webber’s ivesia, which is listed as threatened under the ESA, is present in the activity areas. No other federally or state-listed plant species are expected to occur in the activity areas; however, several other special-status plants could occur in the activity areas.

Table 5.7-2 lists the species with the potential to occur in the activity areas and describes their general habitat requirements and recorded occurrences in the biological study area.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Federally or State-Listed and Candidate Species			
Webber's ivesia *Ivesia webberi*	T/1B.1/S	Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland at elevations of 3,280–6,807 feet. Flowers May–Jul.	Potentially occurs in woodland habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas.
Layne's ragwort *Senecio* (*Packera*) *layneae*	T/R,1B.2/—	Chaparral, cismontane woodland at elevations of 650–3,300 feet. Flowers April-Aug.	Potentially occurs in chaparral habitat at the Caribou intake activity area.
Other Special-Status Species			
Jepson's onion *Allium jepsonii*	–/1B.2/S	Chaparral, cismontane woodland, and lower montane coniferous forest at elevations of 984–4,330 feet. Flowers Apr–Aug.	Potentially occurs in montane chaparral and woodland habitats at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Constance's rockcress *Arabis constancei* Syn: *Boechera constancei*	–/1B.1/−	Chaparral, lower montane coniferous forest, and upper montane coniferous forest at elevations of 3,198–6,644 feet. Flowers May–Jul.	Potentially occurs in chaparral habitat in or adjacent to the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas. Occurrences documented in CNDDB in 2002 in the Caribou and Twain USGS quadrangles and in 2004 in the Canyon dam USGS quadrangle.
Webber's milkvetch *Astragalus webberi*	–/1B.2/S	Lower montane coniferous forest at elevations of 2,624–4,101 feet. Flowers May–Jul.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Occurrences documented in CNDDB in 2003 and 2007 in the Caribou and Twain USGS quadrangles, respectively.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Big-scale balsamroot *Balsamorhiza macrolepis* var. *macrolepis*	–/1B.2/S	Chaparral, cismontane woodland, and valley and foothill grassland/sometimes serpentinite at elevations of 295–5,101 feet. Flowers Mar–Jun.	Potentially occurs in chaparral, woodland, and grassland habitats at the Caribou intake activity area.
Dwarf resin birch *Betula glandulosa*	–/2B.2/–	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps, and subalpine coniferous forest/mesic at elevations of 4,265–7,546 feet. Flowers May–Jun.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Occurrences documented in CNDDB in 1998, 2001, and 2007 in the Caribou, Almanor, and Chester USGS quadrangles, respectively.
Scalloped moonwort *Botrychium crenulatum*	–/2B.2/S	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps, and upper montane coniferous forest at elevations of 4,160–10,761 feet. Flowers Jun–Sep.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Occurrence documented in CNDDB in 2014 in the Westwood West USGS quadrangle.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Stalked moonwort *Botrychium pedunculosum*	–/2B.1/S	Meadows and seeps, upper montane coniferous forest within granitic, volcanic, and andesitic habitats.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.
Watershield *Brasonia schreberi*	--/2B.3/--	Freshwater marshes and swamps.	Potentially occurs in or adjacent to the activity areas. Historical occurrence documented in CNDDB in the Canyon dam and Westwood West USGS quadrangles.
Green bug-on-a-stick *Buxbaumia viridis*	–/1B.3/S	Occurs on large-diameter logs in advanced decay in riparian habitat in coniferous forest. Low to alpine elevations.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Mud sedge *Carex limosa*	–/2B.2/–	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps, and upper montane coniferous forest at elevations of 3,937–8,858 feet. Flowers Jun–Aug.	Potentially occurs in coniferous forest habitat in the Caribou and Prattville intake activity areas. Historical occurrence documented in CNDDB in the Almanor USGS quadrangle.
Sheldon's sedge *Carex sheldonii*	–/2B.2/–	Lower montane coniferous forest, marshes and swamps, and riparian scrub at elevations of 3,937–6,601 feet. Flowers May–Aug.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Occurrence documented in CNDDB in 1998 in the Caribou USGS quadrangle.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	Status[1] (Fed/State/ USFS)	General Habitat	Comments
Mildred's clarkia *Clarkia mildrediae* ssp. *mildrediae*	–/1B.3/S	Cismontane woodland and lower montane coniferous forest at elevations of 804–5,610 feet. Flowers May–Aug.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Occurrence documented in CNDDB in 2001 in the Caribou USGS quadrangle.
Mosquin's fairyfan *Clarkia mosquinii*	–/1B.1/S	Cismontane woodland and lower montane coniferous forest at elevations of 607–3,999 feet. Flowers May–Jul.	Potentially occurs in montane, woodland, and coniferous forest habitat at the Caribou intake activity area and the coniferous forest habitat at the Prattville intake area.
Clustered lady's slipper *Cypripedium fasciculatum*	–/4.2/S	Lower montane coniferous forest and North Coast coniferous forest at elevations of 328–7,989 feet. Flowers Mar–Aug.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Mountain lady's slipper *Cypripedium montanum*	–/4.2/S	Broad-leafed upland forest, cismontane woodland, lower montane coniferous forest, and North Coast coniferous forest at elevations of 607–7,300 feet. Flowers Mar–Aug.	Potentially occurs in montane chaparral and woodland habitats at the Caribou intake activity area and the coniferous forest habitat at the Caribou and Prattville intake activity areas.
Branched collybia *Dendrocollybia racemosa*	–/–/S	Grows on remains of decayed mushrooms or in duff of mixed hardwood conifer forests.	Potentially occurs in mixed conifer forest habitat at the Caribou and Prattville intake activity areas.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
English sundew *Drosera anglica*	–/2B.3/–	Bogs, fens, meadows, and seeps at elevations of 4,265–6,562 feet. Flowers Jun–Sep.	Potentially occurs in or adjacent to the activity areas. The species has been recorded in the vicinity of the Prattville intake activity area (California Department of Fish and Wildlife 2014). Occurrence also documented in the CNDDB in 1998 in the Almanor USGS quadrangle.
California twisted spikerush *Eleocharis torticulmis*	–/1B.3/S	Bogs and fens, meadows and seeps, lower montane coniferous forest at elevations of 3,300–3,900 feet.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Species documented in CNDDB in the Twain USGS quadrangle in 2000.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Clifton's eremogone *Eremogone cliftonii*	–/1B.3/S	Chaparral, lower montane coniferous forest, and upper montane coniferous forest in openings and usually in granitic areas at elevations of 1,492–5,807 feet. Flowers Apr–Sep.	Potentially occurs in chaparral habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas.
Tracy's eriastrum *Eriastrum tracyi*	–/3.2/S	Chaparral and cismontane woodland at elevations of 1,033–5,396 feet. Flowers May-July.	Potentially occurs in chaparral and woodland habitats at the Caribou intake activity area.
Plumas rayless daisy *Erigeron lassenianus var. deficiens*	–/1B.3/–	Gravelly, sometimes serpentinite, sometimes disturbed sites in lower montane coniferous forest at elevations of 4,461–6,496 feet. Flowers Jun-Sep.	Potentially occurs in coniferous forest habitat and at disturbed sites at the activity areas. Species occurrences documented in CNDDB in 2009 in the Twain area and in 2010 in the Almanor and Chester USGS quadrangles.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Ahart's buckwheat *Eriogonum umbellatum var. ahartii*	–/1B.2/S	Cismontane woodland at elevations of 1,300–6,500 feet.	Potentially occurs in woodland habitat at the Caribou intake activity area.
Brook pocket moss *Fissidens aphelotaxifolius*	–/2B.2/S	Lower montane coniferous forest, upper montane coniferous forest at elevations of 0–7,200 feet.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.
Caribou coffeeberry *Frangula purshiana* ssp. *ultramafica*	–/1B.2/S	Lower montane coniferous forest, upper montane coniferous forest, chaparral at elevations of 2,700–6,330 feet.	Potentially occurs in chaparral habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas. Species occurrence documented in CNDDB in 2015 in the Caribou and Twain USGS quadrangles.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Butte County fritillary *Fritillaria eastwoodiae*	–/3.2/S	Chaparral, cismontane woodland, and lower montane coniferous forest at elevations of 164–4,921 feet. Flowers Mar–Jun.	Potentially occurs in chaparral and woodland habitats at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas.
Dudley's rush *Juncus dudleyi*	–/2B.3/–	Lower montane coniferous forest in mesic areas at elevations of 1,492-6,561 feet. Flowers July-August.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Occurrence documented in CNDDB in 1996 in the Canyon Dam USGS quadrangle.
Santa Lucia dwarf rush *Juncus luciensis*	–/1B.2/S	Chaparral, Great Basin scrub, lower montane coniferous forest, meadows and seeps, and vernal pools at elevations of 984–6,692 feet. Flowers April-July.	Potentially occurs in chaparral habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Cantelow's lewisia *Lewisia cantelovii*	–/1B.2/S	Broadleafed upland forest, chaparral, cismontane woodland, and lower montane coniferous forest at elevations of 1,083–4,495 feet. Flowers May–Oct.	Potentially occurs in chaparral and woodland habitats at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas. Species was identified during GANDA surveys in 2000 in the Caribou area. A species occurrence was also documented in CNDDB in 2015 in the Caribou USGS quadrangle.
Tufted loosestrife *Lysimachia thyrsiflora*	–/2B.3/–	Meadows and seeps, marshes and swamps, and upper montane coniferous forest at elevations of 3,198–5,495 feet. Flowers May-Aug.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Historical occurrence documented in CNDDB in the Almanor USGS quadrangle.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	Status[1] (Fed/State/ USFS)	General Habitat	Comments
Broad-nerved moss *Meesia uliginosa*	–/2B.2/S	Bogs and fens, meadows and seeps, subalpine coniferous forest, and upper montane coniferous forest at elevations of 4,265–9,199 feet. Flowers in Oct.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.
Elongate copper moss *Mielichhoferia elongata*	–/2B.2/S	Cismontane woodland.	Potentially occurs in woodland habitat at the Caribou intake activity area.
Follett's monardella *Monardella follettii*	–/1B.2/S	Lower montane coniferous forest at elevations of 1,969–6,562 feet. Flowers Jun–Sep.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Species occurrences documented in CNDDB in 2003 and 2007 in the Twain and Caribou USGS quadrangles, respectively. Historical occurrence also documented in CNDDB in the Canyon dam USGS quadrangle.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Stebbins's monardella *Monardella stebbinsii*	–/1B.2/S	Broadleafed upland forest, chaparral, and lower montane coniferous forest at elevations of 2,559–3,609 feet. Flowers Jul–Sep.	Potentially occurs in chaparral habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas. Species was identified during GANDA surveys in 2000. Occurrence also documented in CNDDB in 2007 in the Caribou USGS quadrangle.
Tall alpine-aster *Oreostemma elatum*	–/1B.2/S	Bogs, fens, meadows, seeps, and upper montane coniferous forest at elevations of 3,297–6,890 feet. Flowers Jun–Aug.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Species occurrences documented in CNDDB in 2000, 2011, and 2015 in the Twain, Westwood West, and Canyon dam USGS quadrangles, respectively.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Lewis Rose’s ragweed *Packera eurycehphala* var. *lewisrosei*	–/1B.2/–	Chaparral, cismontane woodland, and lower montane coniferous forest/serpentinite at elevations of 899–6,201 feet. Flowers Mar–Jul.	Potentially occurs in chaparral and woodland habitats at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas. Species occurrence documented in CNDDB in 2009 in the Caribou USGS quadrangle.
Close-throated beardtongue *Penstemon personatus*	–/1B.2/S	Chaparral, lower montane and upper montane coniferous forest at elevations of 3,494–6,955 feet. Flowers Jun–Sep.	Potentially occurs in chaparral habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas. Species occurrence documented in CNDDB in 2009 in the Twain and Canyon dam USGS quadrangles.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	Status[1] (Fed/State/ USFS)	General Habitat	Comments
Susanville beardtongue *Penstemon sudans*	–/1B.3/S	Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland at elevations of 3,937–7,956 feet. Flower Jun–Jul.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.
Sierra blue grass *Poa sierrae*	–/1B.3/S	Openings in lower montane coniferous forest at elevations of 1,197-4,921 feet. Flowers April-June.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.
Sticky goldenweed *Pyrrocoma lucida*	–/1B.2/S	Great Basin scrub, lower montane coniferous forest, meadows, and seeps at elevations of 2,297–6,397 feet. Flowers Jul–Oct.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas.
Columbia yellow cress *Rorippa columbiae*	–/1B.2/S	Meadows and seeps, pinyon and juniper woodland, playas, and vernal pools at elevations of 3,937–5,906 feet. Flowers May–Sep.	Potentially occurs in woodland habitat at the Caribou intake activity area.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Hall's scurf-pea *Rupertia hallii*	–/1B.2/S	Cismontane woodland and lower montane coniferous forest at elevations of 1,788–7,382 feet. Flowers Jun–Aug.	Potentially occurs in woodland habitat at the Caribou intake activity area and coniferous habitat at the Caribou and Prattville intake activity areas.
Marsh skullcap *Scutellaria galericulata*	–/2B.2/–	Lower montane coniferous forest, meadows, seeps, marshes, and swamps at elevations up to 6,890 feet. Flowers Jun–Sep.	Potentially occurs in coniferous forest habitat at the Caribou and Prattville intake activity areas. Species was identified during GANDA surveys in 2000. Occurrences were also documented in CNDDB in 2004 in the Chester and Almanor USGS quadrangles.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat**	**Comments**
Feather River stonecrop *Sedum albomarginatum*	–/1B.2/–	Chaparral and lower montane coniferous forest at elevations of 853–6,398 feet. Flowers May–Jun.	Potentially occurs in chaparral habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas. Species was identified during GANDA surveys in 2000. Occurrences also documented in CNDDB in 2001 and 2007 in the Almanor and Caribou USGS quadrangles, respectively.
Western campion *Silene occidentalis* ssp. *longistipitata*	–/1B.2/–	Chaparral and lower and upper montane coniferous forest at elevations of 3,281–6,562 feet. Flowers Jun–Aug.	Potentially occurs in chaparral habitat at the Caribou intake activity area and coniferous forest habitat at the Caribou and Prattville intake activity areas.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	Status[1] (Fed/State/ USFS)	General Habitat	Comments
Long-leaved starwort *Stellaria longifolia*	–/2B.2/–	Bogs, fens, meadows, seeps, and riparian woodlands. Elevation 2,953-6,004 feet. Flowers May–Aug.	Potentially occurs in or adjacent to the activity areas.
Flat-leaf bladderwort *Utricularia intermedia*	–/2B.2/–	Bogs, fens, meadows, seeps, marshes, and swamps at elevations of 3,937– 8,858 feet. Flowers Jul–Aug.	Potentially occurs in or adjacent to the activity areas. Species was identified during surveys in 2000.
Cream-flowered bladderwort *Utricularia ochroleuca*	–/2B.2/–	Meadows, seeps, marshes, and swamps at elevations of 4,708–4,724 feet. Flowers Jun–Jul.	Potentially occurs in or adjacent to the activity areas. Species was identified during GANDA surveys in 2000. An occurrence was also documented in CNDDB in 1994 in the Chester USGS quadrangle.

Table 5.7-2 Special-Status Plants with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	Status[1] (Fed/State/ USFS)	General Habitat	Comments

Sources: U.S. Forest Service Sensitive Species List, 2013; California Natural Diversity Database and California Native Plant Society Rare Plant Inventory, July 2016; California Department of Fish and Wildlife 2016; Garcia and Associates Special-Status Plant Survey and Noxious Weed Survey, November 2000; U.S. Fish and Wildlife Service IPaC Trust Resources, July 2016.

[1] Status Codes

FED (United States Fish and Wildlife Service)

E = Endangered; **T** = Threatened; **C** = Candidate; **–** = no federal status

USFS (United States Forest Service, Lassen and Plumas National Forests)

S = Forest Service Sensitive; **–** = no Region 5 status

State (California Department of Fish and Wildlife)

E = Endangered; **R** = Rare; **--** = no state status

1B = Plants Rare or Endangered in California and elsewhere;

2B = Plants Rare or Endangered in California, but more common elsewhere;

3 = Plants about which we need more information – a review list;

4 = Plants of limited distribution – a watch list

- **.1** Seriously threatened in California
- **.2** Moderately threatened in California
- **.3** Not very threatened in California

Special-Status Wildlife

Of the 38 special-status wildlife species potentially occurring in the biological study area, 37 were identified as potentially occurring in the activity areas and may use the sites for breeding, nesting, roosting, or foraging. Table 5.7-3 lists the species, their general habitat requirements, and recorded occurrences within the biological study area

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	Status[1] (Fed/State/ USFS)	General Habitat Description	Comments
Federally and State Listed and Candidate Species			

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
California red-legged frog *Rana draytonii*	T/SC/–	Requires aquatic habitat for breeding, also uses a variety of other habitat types including riparian and upland areas.	Potentially occurs in or adjacent to the three activity areas.
Mountain yellow-legged frog *Rana muscosa*	E/E/–	Ponds, lakes, and streams at moderate to high elevations.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.
Golden eagle *Aquila chrysaetos*	–/FP/–	Breeds on cliffs, in large trees, or on electrical towers, forages in open areas.	Potentially occurs in or adjacent to the Canyon dam and Prattville intake activity areas.
Willow flycatcher *Empidonax traillii*	–/E/S	Wet meadow and montane riparian habitats; dense willow thickets required for nesting and roosting.	Potentially occurs in or adjacent to the Canyon dam and Prattville intake activity areas. Historical occurrences were documented in CNDDB in the Almanor and Westwood West USGS quadrangles. Known breeding locations in the biological study area on the northwestern and southwestern shores of Lake Almanor (Humple et al. 2004, Burnett et al. 2004).

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Greater sandhill crane *Grus canadensis tabida*	–/T, FP/S	Wetlands required for breeding; forages in nearby pastures, fields, and meadows.	Potentially occurs in or adjacent to the Canyon dam and Prattville intake activity areas. Species occurrences were documented in CNDDB in 1999 and 2000 in the Westwood West and Chester USGS quadrangles, respectively.
Bald eagle *Haliaeetus leucocephalus*	D/E, FP/S	Requires large bodies of water or free-flowing rivers with abundant fish and adjacent snags and large trees for perching and nesting.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches. Species and nests were observed in the biological study area during 2014 PG&E surveys. Occurrences were also documented in CNDDB in 2002 in the Prattville and Butt Valley USGS quadrangles.
Ringtail cat *Bassariscus astutus*	–/FP/–	Riparian habitats and brush stands of most forest and shrub habitats. Nests in rock recesses, hollow trees, logs, snags, abandoned burrows or woodrat nests.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Sierra Nevada red fox *Vulpes necator*	–/T/S	Red fir and lodgepole pine forests in the sub-alpine zone and alpine fell-fields of the Sierra Nevada.	Potentially occurs in or adjacent to coniferous forests at the three activity areas. Species occurrences were documented in CNDDB in 1996 in the Chester USGS quadrangle. Historical occurrences were also documented in CNDDB in the Almanor and Westwood West USGS quadrangles.
		Other Special-Status Species	
Foothill yellow-legged frog *Rana boylii*	–/SC/S	Rocky streams in a variety of habitats.	Potentially occurs in or adjacent to riverine habitat in the Canyon dam and Caribou intake activity areas and the Seneca and Belden reaches.
Cascades frog *Rana cascadae*	–/SC/S	Open coniferous forests along the sunny, rocky banks of ponds, lakes, streams, and meadow potholes. From 2,600–9,000 feet in elevation in Cascades and Trinity Mountains.	Potentially occurs in or adjacent to coniferous forest habitat in the three activity areas. Historical occurrences were documented in CNDDB in the Butt Creek and Chester USGS quadrangles.

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Western pond turtle *Emys marmorata*	–/SC/S	Slow water aquatic habitat with available basking sites. Hatchlings require shallow water with dense submergent or short emergent vegetation. Requires an upland oviposition site in the vicinity of the aquatic site	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.
Western bumble bee *Bombus occidentalis*	–/–/S	Habitats containing continuous blooms from spring to fall and where burrowing rodents provide subterranean nesting locations	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches. Species occurrences were documented in CNDDB in 2007 and 2014 in the Twain and Westwood West USGS quadrangles, respectively.
California floater *Anodonta californiensis*	–/–/S	Fresh water shallow muddy or sandy habitat in large rivers, reservoirs, and lakes at low elevations.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.
Nugget pebblesnail *Fluminicola seminalis*	–/–/S	Cool, clear, flowing water and gravel-cobble substrate in large creeks and rivers or on soft mud substrates in large spring pools.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Great Basin rams-horn *Helisoma newberryi*	–/–/S	Large lakes and slow rivers with a muddy substrate.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.
Black juga *Juga nigrina*	–/–/S	Seepages and creeks in ephemeral water.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.
Scalloped juga *Juga occata*	–/–/S	Large rivers, in cold, moving waters, often spring-influenced with stable boulder and cobble substrate.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.
Montane peaclam *Pisidium ultramontanum*	–/–/S	Large lakes and rivers, often spring-influenced in areas with gravel substrate.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.
Northern goshawk *Accipiter gentilis*	–/SC/S	Breeds in dense, mature conifer and deciduous forests, interspersed with meadows, other openings and riparian areas; nesting habitat includes north-facing slopes near water.	Potentially occurs in or adjacent to coniferous forest habitat in the three activity areas. Species occurrences were documented in CNDDB in 1996 in the Chester, Butt Valley Reservoir, and Prattville areas, and in 1998 in the Almanor USGS quadrangle.

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Greater white-fronted goose *Anser albifrons*	–/SC/–	Occurs in moist grasslands, pastures, croplands, secluded ponds, and emergent wetlands.	Potentially occurs in or adjacent to the three activity areas.
Redhead *Aythya americana*	–/SC/–	Prefers large lakes that contain extensive areas of emergent vegetation.	Potentially occurs in or adjacent to the three activity areas.
Vaux's swift *Chaetura vauxi*	--/SC/--	Prefers redwood and Douglas-fir habitats, nests in hollow trees and snags or, occasionally, in chimneys; forages aerially.	Potentially occurs in or adjacent to coniferous forest habitat in the three activity areas.
Black tern *Chlidonias niger*	–/SC/–	Occurs on lakes and ponds and use emergent wetlands, moist grasslands, and agricultural fields. May also be found in coastal areas during migration.	Potentially occurs in or adjacent to the three activity areas.
Olive-sided flycatcher *Contopus cooperi*	–/SC/--	Occurs in montane conifer forests that overlook canyons, meadows, or lakes.	Potentially occurs in or adjacent to coniferous forests habitat in the three activity areas.
Yellow warbler *Setophaga petechia*	–/SC/–	Breeds in riparian woodlands, particularly those dominated by willows and cottonwoods.	Potentially occurs in or adjacent to the three activity areas and the Seneca and Belden reaches.

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Yellow-breasted chat *Icteria virens*	–/SC/–	Breeds in riparian habitats having dense understory vegetation, such as willow and blackberry.	Potentially occurs in or adjacent to the three activity areas.
American white pelican *Pelecanus erythrorhynchos*	–/SC/–	Occurs in large freshwater and salt water lakes. Nests usually occur on small islands free of human disturbance.	Potentially occurs in or adjacent to the three activity areas.
Purple martin *Progne subis*	–/SC/–	Occurs in old-growth, multi-layered open forest, woodlands, and low-elevation coniferous forests of Douglas-fir, ponderosa pine, and Monterey pine. Nests in tall, old trees near water, and occasionally residential areas and man-made structures.	Potentially occurs in or adjacent to coniferous forest and woodland habitat in the three activity areas.
California spotted owl *Strix occidentalis*	–/SC/S	Dense, multi-layered mixed conifer, redwood, and Douglas-fir habitats with large overstory trees.	Potentially occurs in or adjacent to coniferous habitat in the three activity areas.
Pallid bat *Antrozous pallidus*	–/SC/S	Forages over many habitats; roosts in buildings, large oaks or redwoods, rocky outcrops and rocky crevices in mines and caves.	Potentially occurs in or adjacent to the three activity areas.

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name ***Scientific Name***	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Townsend's big-eared bat *Corynorhinus townsendii*	–/CT,SC/S	Roosts in colonies in caves, mines, tunnels, or buildings in mesic habitats. Habitat must include appropriate roosting, maternity, and hibernacula sites free from disturbance by humans.	Potentially occurs in or adjacent to the three activity areas. Species occurrences documented in CNDDB in 2002 in the Twain USGS quadrangle.
Spotted bat *Euderma maculatum*	–/SC/–	Occurs in a variety of habitat types. Prefers cracks/crevices of high cliffs and canyons for roosting.	Potentially occurs in or adjacent to the three activity areas.
Western mastiff bat *Eumops perotis californicus*	–/SC/–	Occurs in extensive open areas. Uses crevices in cliff faces, high buildings, trees, and tunnels for roosting.	Potentially occurs in or adjacent to the three activity areas.
Western red bat *Lasiurus blossevillii*	–/SC/S	Prefers sites with a mosaic of habitats that include trees for roosting and open areas for foraging. Strongly associated with riparian habitats.	Potentially occurs in or adjacent to riverine habitat in the Canyon dam and Caribou intake activity areas and the Seneca and Belden reaches.
Fringed myotis *Myotis thysanodes*	–/–/S	Roosts in caves, mines, and buildings in desert-scrub, oak woodlands, and pinyon woodlands between 4,000 and 7,000 feet.	Potentially occurs in or adjacent to woodland habitat in the three activity areas.

Table 5.7-3 Special-Status Wildlife Species with Potential to Occur in the Activity Areas

Common Name *Scientific Name*	**Status[1] (Fed/State/ USFS)**	**General Habitat Description**	**Comments**
Pacific marten *Martes caurina*	–/–/S	Mixed evergreen forests with abundant cavities for denning and nesting and open areas for foraging.	Potentially occurs in or adjacent to coniferous habitat in the three activity areas.
Pacific fisher *Martes pennanti pacifica*	–/SC/S	Intermediate to large dense stages of coniferous forests and deciduous riparian habitats with greater than 50 percent canopy closure.	Potentially occurs in or adjacent to coniferous forests in the three activity areas.

[1] Status Codes:

Federal and State Codes: **E** = Endangered, **T** = Threatened, **C** = Candidate, **SC** = Species of Special Concern (State), **PD** = Proposed for Delisting, **D** = Delisted, **FP** = California Fully Protected species

USFS Codes: **S** = Sensitive

Sources: Zeiner et al. 1990a, 1990b, 1990c; Jennings and Hayes 1994; Shuford and Garcia 2008; USDA Forset Service 2013, USFW 2016; CDFW 2016a, 2016

Managed Deer Herds

The study area includes deer herds managed by the California Department of Fish and Wildlife (CDFW; formerly the California Department of Fish and Game (CDFG)). During the late 1960s and early 1970s, deer herds in most of California exhibited serious long-term declines. In 1976, the CDFG (now CDFW) developed a statewide plan to address the decline, and, in 1977, a Deer Management Policy was adopted by the California Fish and Game Commission. CDFW is responsible for developing and approving deer herd management plans, including designating critical winter range. Critical winter range is that portion of a winter range that deer depend on during severe winter weather.

At lower elevations, the biological study area overlaps the range of the Bucks Mountain Deer Herd and East Tehama Deer Herd. A portion of the Bucks Mountain Deer Herd winter range lies within the biological study area between the Caribou and Belden powerhouses. The summer range of the East Tehama Deer Herd extends outward a distance of 3 to 5 miles from the shorelines of Lake Almanor and Butt Valley reservoir. This large population of California mule deer winters at lower elevations outside the biological study area in Butte and Tehama counties. Traditional migration routes occur in the immediate vicinity of the biological study area, to the north and south of Lake Almanor.

Grebes

Comments on the 2014 Draft EIR included concerns about the potential impacts of Proposed Project and the alternatives analyzed in the Draft EIR on the population dynamics and breeding success of the grebe (*Aechmophorus* spp.) population in Lake Almanor. Two sympatric grebe species, Western grebe (*A. occidentalis*) and Clark's grebe (*A. clarkii*), use Lake Almanor, among other inland waterbodies, as a breeding location. Floating nests, consisting of anchored emergent vegetation, are constructed by breeding pairs between June and August in shallow areas in the northwestern portion of the lake. Nesting habitat and nest success may be adversely affected by declining water surface elevations in the lake, particularly by the rate of decline during the nesting period. PG&E has consistently operated Lake Almanor water levels for about the past 15 years, but lake levels are adjusted to respond to seasonal climatic conditions and unplanned and/or unpredictable operational events. Although Western and Clark's grebes are not considered special-status species as defined above, they are considered "species of local concern" and potential effects to these species resulting from Proposed Project and the alternatives are addressed in this document.

The Plumas Audubon Society in association with the Audubon Society of California conducted a grebe conservation project, producing a2010-2016 population and nest monitoring report (Plumas Audubon Society 2016). The monitoring results show that increases in the rate of lake level drawdown during the grebe breeding season correlated with decreased reproductive success. The monitoring results also show that population trends indicate the number of breeding grebes at Lake Almanor has steadily increased over the past decade. Additionally, population trends show an overall decrease at other known inland grebe breeding sites, including Antelope Lake, Eagle Lake, and Davis Lake (Plumas Audubon Society 2016). It is unknown if decreased breeding success and/or climatic conditions at these other breeding sites are possibly contributing to population stress and decreased reproductive success on grebe species at Lake Almanor.

Environmental Impacts and Mitigation Measures

Methodology

Impacts on biological resources were analyzed using a combination of quantitative and qualitative methods and professional judgment. Studies prepared for PG&E supporting its relicensing application were used to establish the baseline conditions for the discussion of the environmental setting and to determine the potential for sensitive biological resources, particularly special-status species, to occur and be affected by construction activities or implementation of Proposed Project or the alternatives. The potential effects of the proposed project on terrestrial resources is analyzed in section 3.3.3 of FERC's Final EIS, which is incorporated by reference. Accordingly, this analysis focuses primarily on the potential for activities to affect special-status species and their habitat in the three activity areas. Only the potential for direct and indirect impacts, not long-term effects of reservoir levels[33], on special-

[33] The reservoir levels incorporated into The Proposed Project and the alternatives are consistent with the baseline conditions described in Chapter 3 of this RDEIR.

status plants and wildlife in lacustrine habitat and the riverine reaches located in or adjacent to the activity areas due to construction activities are addressed in the following analysis. Direct impacts include direct disturbance, injury, and mortality, and indirect effects include loss and degradation of habitat and other factors.

Thresholds of Significance

Impacts on vegetation would be significant if Proposed Project or the alternatives:

- substantially reduce the number, or restrict the range, of a special-status plant species; or
- conflict with any adopted policies, ordinances, or plans related to the protection of native or special-status plant species.

Impacts on wetlands or other sensitive communities would be significant if Proposed Project or the alternatives would:

- result in a substantial loss of riparian habitat or other sensitive natural community, such as wetlands, identified in local or regional plans, policies, or regulations; or
- substantially affect federally regulated wetlands, or waters of the United States, through direct removal, filling, hydrological interruption, or other means.

Impacts on wildlife would be significant if Proposed Project or the alternatives would:

- substantially reduce the habitat of a wildlife species;
- substantially reduce the number or restrict the range of a special-status wildlife species;
- substantially disrupt or block major terrestrial wildlife migration or travel corridors; or
- conflict with any adopted policies, ordinances, or plans relating to the protection of native or special-status wildlife species.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of Proposed Project and the alternatives on vegetation, wildlife, and sensitive biological resources and identifies mitigation measures for significant impacts. Table 5.7-4 identifies the final level of significance of each impact after incorporation of mitigation measures, if appropriate.

Table 5.7-4. Summary of Vegetation, Wildlife, and Sensitive Biological Resources (BR) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact BR-1: Construction activities associated with Proposed Project or the alternatives could affect special-status plants or their habitat through removal of individuals, habitat modification, or the spread of invasive plants.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-2: Construction activities associated with Proposed Project or the alternatives could affect special-status reptiles and amphibians (California red-legged frog, mountain yellow-legged frog, foothill yellow-legged frog, Cascades frog, and western pond turtle) or their habitat.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-3: Construction activities associated with Proposed Project or the alternatives could affect special-status bats (pallid bat, Townsend’s big-eared bat, spotted bat, western mastiff bat, western red bat, and fringed myotis) or their habitat.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-4: Construction activities associated with Proposed Project or the alternatives could affect forest carnivores (Pacific fisher, Sierra Nevada red fox, ringtail cat, and American marten) or their habitat.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation

Table 5.7-4. Summary of Vegetation, Wildlife, and Sensitive Biological Resources (BR) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact BR-5: Construction activities associated with Proposed Project or the alternatives could affect nesting birds or their habitat.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-6: Construction activities associated with Proposed Project or the alternatives could result in adverse impacts on wetlands regulated under federal or State law.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact BR-7: Implementation of Proposed Project or the alternatives could restrict movement of wildlife species through the activity areas.	Less than significant	Less than significant	Less than significant	Less than significant

Impact BR-1: Construction activities associated with Proposed Project or the alternatives could affect special-status plants or their habitat through removal of individuals, habitat modification, or the spread of invasive plants.

Proposed Project and Alternatives 1, 2, and 3

Special-status plants that could occur in the UNFFR Project area could be affected by construction activities associated with Proposed Project and the alternatives (see Table 5.7-2). Most of the habitat in the activity areas is of low quality for special-status plants; however, focused surveys have not been conducted to determine the presence or absence of the special-status plants.

Construction activities associated with Proposed Project and the alternatives could crush or damage special-status plants or modify suitable habitat through soil compaction. The construction activities could also increase the potential for invasive plants or noxious weeds to become established in the disturbed areas, reducing the suitability of the habitats for special-status plants.

Construction activities associated with the Prattville intake thermal curtain (Alternatives 1 and 2) and the Canyon dam outlet structure modifications (Alternatives 1 and 3) would disturb soils and vegetation along the shore of Lake Almanor as vehicles and equipment access the staging area and lay down materials. Most construction activities in the Lake Almanor activity area would take place on the lake instead of on land; vegetation removal would consequently not be necessary in this activity area. Staging activities at Prattville intake would occur primarily in previously disturbed areas (barren habitat) along the shoreline. Staging activities at Canyon dam would occur primarily in previously disturbed areas on the northern side of State Route 89 along the northern/upstream face of Canyon dam. These activities are not expected to affect special-status plants because the work would be done in barren or previously disturbed areas where the plants are unlikely to occur. No impacts to Sierran mixed conifer forests are anticipated at the Lake Almanor activity area.

Construction activities associated with the Caribou intakes thermal curtain (Alternatives 1 and 2) would disturb soils and vegetation along the shore of Butt Valley reservoir and would require vegetation removal along the western shore for construction of an access road. These activities would affect previously disturbed habitat near Butt Valley dam and Sierran mixed conifer, white fir, ponderosa pine, montane chaparral, and annual grassland habitat along the western shore of Butt Valley reservoir. The removal of less than 1 acre of vegetation for road construction along the western shore of Butt Valley reservoir would remove habitat for special-status plants and could remove special-status plants, if present. This impact would be potentially **significant without mitigation.**

Mitigation Measures

Mitigation Measure BR-1a: Prevent Weed Introduction

PG&E will implement the following measures throughout the construction phase to prevent the spread of noxious weeds:

- When using Imported erosion control materials (as opposed to rock and dirt berms), use only mulch and seed, reducing the potential of establishing non-native plant populations to the extent possible.
- Thoroughly wash all construction equipment prior to its entering the worksite. Inspect equipment to ensure that it is free of plant parts as well as soils, mud, or other debris that may carry weed seeds.
- Use a mix of native grasses, forbs, and non-persistent non-native species for seeding disturbed areas that would be subject to infestation by non-native and invasive plant species. Where appropriate, use a heavy application of mulch to discourage introduction of invasive plant species. Planting plugs of native grass species may also be used to accelerate the vegetation of disturbed sites and increase the likelihood of establishing a self-sustaining population of native plant species.

Mitigation Measure BR-1b: Avoid Disturbance of Special-Status Plants

PG&E will protect individuals or populations of special-status plants. To the extent feasible, ground-disturbing activities (e.g., vehicle traffic, equipment staging, and vegetation removal) in upland areas will be limited to areas of barren habitat. Habitat types to be avoided will be clearly delineated using exclusion fencing or flagging. If ground disturbance in non-barren habitat is expected, PG&E will retain a qualified botanist prior to the onset of the first season of construction to conduct pre-construction surveys of suitable habitat to determine if special-status plant species occur within the impacted areas or adjacent habitats (out to approximately 10 feet). A minimum of two surveys will be conducted during the blooming periods of potentially occurring plants if one survey would not encompass the blooming period of all potentially occurring plants to determine: (1) if a special-status species is present; and (2) the quality, location, and extent of any individual or populations of special-status plants.

If a special-status plant species is found within 10 feet of potential disturbance areas, the following measure will be implemented:

- Prior to the start of disturbance, exclusionary fencing will be erected around any known occurrences of special-status plants. If necessary, a qualified botanist will be present to assist with locating special-status plant populations. The exclusionary fencing will be periodically inspected throughout construction and be repaired as necessary. All fencing will be removed at the end of construction.

If a population cannot be fully avoided, PG&E will retain a qualified botanist to (1) determine appropriate salvage and relocation measures; and (2) coordinate with USFWS, CDFW, or USFS staff, as appropriate, to implement these measures.

Significance after Mitigation

These mitigation measures fall outside the purview of the State Water Board. However, PG&E has agreed to implement Mitigation Measures BR-1a and BR-1b, as proposed in an email dated March 3, 2014 (Appendix H). The implementation of Mitigation Measures BR-1a and BR-1b would reduce potential impacts on special-status plants to a **less-than-significant** level.

Impact BR-2: Construction activities associated with Proposed Project or the alternatives could affect special-status reptiles and amphibians (California red-legged frog, mountain yellow-legged frog, foothill yellow-legged frog, Cascades frog, and western pond turtle) or their habitat.

Proposed Project and Alternatives 1, 2, and 3

Special-status reptiles and amphibians that could occur within the UNFFR Project area, including the activity areas, could be affected by construction activities. These activities have the potential to disturb potential lacustrine and adjacent upland habitat for the western pond turtle, California red-legged frog, mountain yellow-legged frog, foothill yellow-legged frog, and Cascades frog, and could affect western pond turtle nests or burrows along the shore. In-water construction activities would occur late in the season after frog breeding has occurred and when adults and juveniles are mobile in both terrestrial and aquatic habitats. In-water activities to install the thermal curtains at Lake Almanor and Butt Valley reservoir would include the installation of bin walls, foundations, anchors, and curtains that could disturb or injure the above-mentioned reptile and amphibians in the water if their mobility is impeded. Similar disturbance could occur during modification of the Canyon dam outlet structure during access and staging activities on or near the shoreline. Staging and vehicle/equipment access on the shore, as well as construction of the footings and placement of anchors necessary to install the thermal curtains, could disturb western pond turtle nests and/or burrows or injure individuals basking or nesting along the shore. Construction activities could also degrade water quality of the lake and reservoir or soils along the shore through increased erosion and sedimentation or hazardous materials spills or leaks. These activities could adversely affect western pond turtles and amphibians. The impact would be potentially **significant without mitigation.**

Mitigation Measures

Mitigation Measure BR-2a: Avoid Disturbance of Western Pond Turtle

PG&E will be required to avoid disturbance of western pond turtles and minimize the potential for direct impacts. To determine whether pond turtles or their nests are present in the Lake Almanor and Butt Valley reservoir areas, PG&E will retain a qualified biologist to conduct at least one pre-construction survey within 1 week prior to the onset of construction. The survey will be conducted within the portions of the impacted areas that contain potential nesting habitat (i.e., open, gently sloping areas that are sparsely vegetated and have compact soil) within 660 feet of the shoreline. If a pond turtle nest is found, the biologist will flag the site and determine whether construction activities can avoid affecting the nest. If the nest cannot be avoided, the nest will be excavated by the biologist and reburied at a suitable location outside of the construction limits.

If a pond turtle is observed within the construction limits during construction, PG&E will temporarily halt construction activities until the turtle has moved to a safe location outside of the construction limits. If a nest is encountered during construction, a qualified biologist will assess the nest status to determine if it is active and coordinate with CDFW on the need for avoiding the nest or the best approach to relocating the nest outside the construction limits.

Mitigation Measure BR-2b: Avoid Disturbance of Special-Status Amphibians

PG&E will be required to avoid disturbance of special-status amphibians (California red-legged frog, mountain yellow-legged frog, foothill yellow-legged frog, and Cascades frog) and minimize the potential for direct impacts. To determine the presence of special-status amphibians in the Lake Almanor and Butt Valley reservoir areas, PG&E will retain a qualified biologist to conduct a pre-construction survey immediately prior to construction. During the survey, the biologist will also look for and identify burrows that could be used by special-status amphibians as refugia, and these areas will be flagged for avoidance. Work should be avoided from October 16 (or the first measurable rainfall of 1 inch or greater) through May 14. If work cannot be avoided during this period, a qualified biological monitor will be present during construction. If construction requires more than one day and equipment or materials are left onsite overnight, the biological monitor will survey around and underneath the equipment or materials prior to moving them the following day the ensure that no amphibians are present. Plastic monofilament netting (erosion control matting) or a similar material will not be used at the project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

If special-status amphibians are observed in or adjacent to the work site and are in danger of injury, construction in the vicinity will cease until the amphibian moves off site to a safe location on its own.

Mitigation Measure GGS-1: Approval of construction activities by the State Water Board (turbidity and total suspended solids) and Mitigation Measure WQ-8: Approval of construction activities by the State Water Board (hazardous materials)

Mitigation Measures GGS-1 and WQ-8 contain measures for construction activities related to Proposed Project and the alternatives. These mitigation measures would reduce the potential for impacts on aquatic habitat during construction activities.

Significance after Mitigation

Implementation of Mitigation Measures BR-2a, BR-2b, and GGS-1, would reduce potential impacts on special-status amphibians and reptiles and their habitat to a **less-than-significant** level.

Impact BR-3: Construction activities associated with Proposed Project or the alternatives could affect special-status bats (pallid bat, Townsend's big-eared bat, spotted bat, western mastiff bat, western red bat, and fringed myotis) or their habitat.

Proposed Project and Alternatives 1, 2, and 3

Construction activities associated with Proposed Project and the alternatives could disrupt the roosting and foraging activities of six special-status bats in the UNFFR Project area, including the three activity areas: Townsend's big-eared, pallid, spotted, western mastiff, western red, and fringed myotis bats. Staging and construction activities, including vehicle access and equipment use, would create noise and other disturbances that could discourage use of potential bat habitat in or near the project area (including the activity areas) and could disrupt roosting activities. The removal of Sierran mixed conifer, ponderosa pine, or white fir forests in the activity areas could also disrupt roosting activities. Bats foraging in the vicinity would likely avoid the activity areas during construction and use other foraging habitat in the vicinity. No long-term adverse impacts on foraging habitat are anticipated.

Construction activities at Lake Almanor would not require the removal of potential roosts (i.e., large trees in Sierran mixed conifer forests). However, noise and visual disturbances associated with construction activities could disrupt bats roosting within and directly adjacent to UNFFR Project facilities or activities. Although less than 1 acre of vegetation (e.g., conifers) would be removed in conjunction with the construction of a new access road on the western shore of Butt Valley reservoir, it could disrupt any bat maternity colonies present in cavities in the removed trees and kill or injure individual bats, which could affect the species' population and reproductive success. Potential construction-related impacts on roosting special-status bats would be **significant without mitigation**.

Mitigation Measures

Mitigation Measure BR-3: Avoid Disturbance of Special-Status Bat Roosts

PG&E will implement measures to avoid disturbing special-status bat roosts or hibernacula in or near impacted areas during construction. To determine whether roosts or hibernacula are present, PG&E will retain a qualified biologist to conduct a preconstruction survey of potential habitat within the UNFFR Project area, including the activity areas and immediately adjacent suitable habitat as applicable, as determined by the qualified biologist. Activities that could disturb active roosts of special-status bats will not proceed until the surveys have been completed. If no active roosts are found, no further action is needed. If an active maternity roost or hibernaculum for a special-status bat is found, the tree or structure occupied by the roost will be retained, if feasible. Because some bats are known to abandon young when disturbed, a qualified bat biologist will determine the extent of a construction-free zone to be implemented around any occupied maternity roost during the bat maternity roost season (March 1–July 31). CDFW will be notified of any active bat maternity roosts in the disturbance zones.

If a tree or structure with an active maternity roost for a special-status bat cannot be avoided, it will be removed or demolished before bat maternity colonies form (i.e., prior to March 1) or after young are volant (flying) (i.e., after July 31). The following disturbance protocol will be implemented for trees with non-breeding bat roosting on the same day tree removal will occur:

- Create noise and disturbance at the tree base such that roosting bats would experience vibration. Disturbance should be nearly continuous for two minutes, then another five minutes should pass with no disturbance to allow bats time to evacuate the tree. Create disturbance for another minute, and then wait another minute before felling the tree.

Significance after Mitigation

The foregoing mitigation measure falls outside the purview of the State Water Board. PG&E has agreed to implement Mitigation Measure BR-3, as proposed in an email dated March 3, 2014 (Appendix H). Implementation of Mitigation Measure BR-3 would reduce potential impacts on special-status bats to a **less-than-significant level**.

Impact BR-4: Construction activities associated with Proposed Project or the alternatives could affect forest carnivores (Pacific fisher, Sierra Nevada red fox, ringtail cat, and American marten) or their habitat.

Proposed Project and Alternatives 1, 2 and 3

Construction activities associated with Proposed Project and the alternatives could disturb special-status forest carnivores (Pacific fisher, Sierra Nevada red fox, ringtail cat, and American marten) and affect potential foraging and denning habitat for these species. While some vegetation impacts could occur under Proposed Project and the alternatives from development and improvement of UNFFR Project facilities (see section 3.4), removal of vegetation associated with Sierran mixed conifer, ponderosa pine, and white fir forests would occur to varying degrees. Openings created by the removal of conifers and associated herbaceous vegetation may provide foraging habitat for special-status forest carnivores. These species may also use cavities and snags in these forest types for denning. Staging and construction activities, including vehicle access and equipment use, would create noise and other disturbances that could discourage use of nearby habitat and could disrupt denning activities. Individuals foraging in the vicinity would likely avoid the impacted areas during construction and instead use other foraging habitat in the vicinity. Any tree removal necessary for road construction at Butt Valley reservoir could result in the take of individuals if they are denning in cavities in trees or snags that would be removed. Impacts on forest carnivores would be potentially **significant without mitigation**.

Mitigation Measures

Mitigation Measure BR-4: Avoid Disturbance of Special-Status Forest Carnivores

PG&E will implement measures to avoid disturbing active dens in or adjacent to the activity areas. To determine whether active dens are present, PG&E will retain a qualified biologist to conduct a preconstruction survey for signs of ringtail cats, Pacific fisher, Sierra Nevada red fox, and American marten and their dens in potential habitat in and adjacent to impacted areas.

Activities that could result in disturbance to active dens will not proceed until the survey has been completed. If no active dens are found, no further action is needed.

If an active den is found, the tree occupied by the den will be retained, if feasible. If tree removal is necessary, it will commence outside the breeding season (February 1 to August 30). Trees with dens that need to be removed will first be disturbed at dusk, just prior to removal that same evening, to allow individuals to escape during the darker hours. If a non-breeding den is found in a tree scheduled to be removed, the individuals will be safely evicted under the direction of a qualified biologist.

Significance after Mitigation

This mitigation measure falls outside the purview of the State Water Board. However, PG&E has agreed to implement Mitigation Measure BR-4, as proposed in an email dated March 3, 2014 (Appendix H). Implementation of this measure would reduce potential impacts on special-status forest carnivores to a **less-than-significant** level.

Impact BR-5: Construction activities associated with Proposed Project or the alternatives could affect nesting birds or their habitat.

Proposed Project and Alternatives 1, 2, and 3

Potential impacts to the grebe population and reproductive success at Lake Almanor as a result of Proposed Project or the alternatives are not expected to occur. Likewise, no impacts to willow flycatcher habitat on the northwestern and southwestern shores of Lake Almanor will occur. The normal surface elevation of Lake Almanor is 4,494 feet (PG&E elevation datum; refer to section 3.4). Following implementation of Proposed Project or any of the alternatives, Lake Almanor water levels, including the rate of decline, are expected to remain consistent with current PG&E operations (i.e., baseline condition). Accordingly, no impact to grebes or willow flycatcher habitat will occur as a result of a change in water levels relative to baseline conditions.

Construction activities associated with Proposed Project or the alternatives could disturb nesting bird species that are protected under the Migratory Bird Treaty Act (MBTA). In addition to lacustrine and riparian habitat associated with Lake Almanor and other water bodies within the UNFFR Project boundary, Sierran mixed conifer, white fir, ponderosa pine, montane chaparral, annual grassland, and barren habitats in the activity areas may provide avian nesting and foraging habitat. Additionally, these habitats along with montane hardwood conifer forests occur in the vicinity of the activity areas, potentially providing avian habitat. Staging and construction activities would create noise that could disrupt nesting and foraging activities within and adjacent to impacted areas.

Any vegetation removal within impacted areas or their surroundings, or road construction at the Caribou activity area, could result in take of birds if they are nesting in the vegetation that is removed. No long-term adverse impacts on foraging habitat are anticipated. Impacts on nesting birds would be potentially **significant without mitigation**.

Mitigation Measures

Mitigation Measure BR-5: Avoid disturbance of nesting birds.

PG&E will be required to implement measures to avoid disturbing nesting birds in or adjacent to impacted areas if work is scheduled to occur during the nesting season (February 15 to August 31). To determine whether active nests are present, PG&E will retain a qualified biologist to conduct a preconstruction survey for nesting birds in potential habitat within and adjacent to the impacted areas no more than 14 days before the start of work. Work will not proceed until the survey has been completed. If work cannot be completed within 14 days of a survey, work areas will be resurveyed. If no nests are found, no further action is needed.

If an active nest is found, the vegetation containing the nest will be retained and a standard species-specific buffer will be established around the nest in accordance with PG&E's Avian Conservation Strategy guidelines. If vegetation removal is necessary, it will be done outside the avian nesting season or after the young have fledged and left the vicinity.

Significance After Mitigation

Implementation of Mitigation Measure BR-5 would reduce the potential impacts to nesting birds and their habitat to a **less-than-significant** level.

Impact BR-6: Construction activities associated with Proposed Project or the alternatives could result in adverse impacts on federally regulated wetlands.

Proposed Project and Alternatives 1, 2, and 3

Because of the type and scale of the UNFFR Project, there has been no systematic effort to delineate jurisdictional waters consistent with the requirements of Corps or State Water Board. Although construction activities associated with the Proposed Project or the alternatives within and adjacent to these water bodies would not be expected to result in the loss of jurisdictional waters, including wetlands, the potential for impacts exists. Due to the location and nature of the construction activities, the potential impact on wetlands from The Proposed Project and the alternatives is potentially **significant without mitigation**.

Mitigation Measures

Mitigation Measure BR-6: Comply with Federal and State Laws and Regulations that Protect Wetlands

To prevent the loss of wetlands, PG&E shall comply with applicable U.S. Army Corps of Engineers and State Water Board laws and regulations that protect wetlands including the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. For any activity that could result in the discharge of dredged or fill material into waters of the United States, PG&E shall obtain a permit from the Corps under section 404 of the Clean Water Act (33 U.S.C. § 1344) and water quality certification from the State Water Board under section 401 of the Clean Water Act (33 U.S.C. § 1341). (See also Cal. Code

Regs., tit. 23, §§ 3855-3861.) In addition, PG&E shall comply with any waste discharge requirements established pursuant to State law. (See, e.g., State Water Board Order WQ 2004-004-DWQ [establishing general waste discharge requirements for certain discharges to wetlands that are not subject to section 404].)

Significance after Mitigation

Compliance with applicable federal and State regulations will ensure that the habitat and other beneficial uses provided by wetlands are reasonably protected, and impacts to wetlands are avoided or minimized, or appropriate compensatory mitigation is implemented, consistent with the California Wetlands Conservation Policy. (Executive Order W-59-93.) Implementation of Mitigation Measure BR-6 would reduce potential impacts on wetlands to a **less-than-significant** level.

Impact BR-7: Implementation of Proposed Project or the alternatives could restrict movement of wildlife species through the activity areas.

Proposed Project and Alternatives 1, 2, and 3

Lake Almanor, Butt Valley reservoir, and the Seneca and Belden reaches of the North Fork Feather River provide vegetation communities that provide habitat and movement corridors for numerous wildlife species, such as migratory waterfowl and deer. Lake Almanor and Butt Valley reservoir also provide habitat for migratory birds (e.g., grebes, willow flycatcher). The three activity areas evaluated under Alternatives 1, 2, and 3 are outside the traditional migratory corridors for deer.

Disturbance from construction associated with Proposed Project and the alternatives could temporarily alter localized foraging patterns of resident wildlife species and disrupt local wildlife movement. However, long-term impediments to wildlife movement are not anticipated. Therefore, the impacts would be **less than significant.**

5.8 Recreation

This section describes recreational uses in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts on recreation. Impacts on recreational mining along the North Fork Feather River are evaluated in section 5.2, Land Use.

The following topic is not discussed in this RDEIR for the reason noted:

- **Physical deterioration of recreational facilities:** Neither Proposed Project nor the alternatives are expected to increase the use of recreational facilities in a manner that could result in their deterioration.

The potential impacts of Proposed Project (described in section 3.4) were evaluated in the *Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project* issued by FERC. As allowed for under Section 15150 of the California Environmental Quality Act (CEQA) Guidelines, the State Water Resources Control Board (State Water Board) incorporates, by reference, applicable sections of the FERC EIS that analyze the impacts of Proposed Project on recreational resources. Since the FERC EIS did not analyze Alternatives 1, 2, or 3 (described in section 3.5) in the EIS, they are discussed in this section of the RDEIR with respect to recreational resources.

Environmental Setting

The UNFFR Project encompasses approximately 30,920 acres, including three reservoirs, a 20-mile reach of the North Fork Feather River, and 4 miles of Butt Creek, in Plumas County, California. Lake Almanor, Butt Valley reservoir, Belden forebay, and the Seneca and Belden reaches of the North Fork Feather River support a variety of recreational opportunities. These areas contain numerous dispersed recreation sites, facilities, and trails that are used seasonally and year-round by recreational enthusiasts. Figure 3-1 in Chapter 3 of this RDEIR displays the locations of many of the recreational sites in the UNFFR Project area.

"Recreation contact" is a designated beneficial use identified in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) for Lake Almanor and the North Fork Feather River downstream of Canyon dam (Central Valley Regional Water Quality Control Board 2018). "Recreation noncontact" is also a designated beneficial use for the North Fork Feather River. Designated beneficial uses for the North Fork Feather River apply to Butt Valley reservoir because it receives its water from Butt Creek, a tributary to the North Fork Feather River.

Recreation contact is defined as "uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs." "Recreation noncontact" is defined as uses of water where there is "proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, fishing, camping, boating, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities." See Chapter 2, State Water Board's

Regulatory Responsibilities, of this RDEIR for a detailed discussion of the beneficial uses of UNFFR Project area water bodies.

Recreation Facilities

Regional Facilities

Recreational opportunities in the vicinity of the UNFFR Project are distributed among four major use areas: Lake Almanor, Butt Valley reservoir, Belden forebay, and the North Fork Feather River. To varying degrees, these four areas provide year-round recreational opportunities, with seasonal activities and access depending on the weather.

During the summer, both contact and non-contact activities occur, including swimming, fishing, camping, picnicking, hiking, motor-boating, non-motorized water sports, and wildlife and scenery viewing (Federal Energy Regulatory Commission 2005). Fishing and hunting are the predominant recreational activities that occur during the fall, winter, and spring.

Lake Almanor is well known for both warmwater (bass) and cold water (trout) fisheries. The lake is open for fishing year around, but snow and ice often preclude access during the winter.

Although no winter recreation facilities have been developed in the general vicinity of the UNFFR Project, opportunities for winter activities such as snowmobiling, snowshoeing, and cross-country skiing are available on both public and private lands. All recreational facilities open to the general public within the UNFFR Project boundary are administered and managed by the United States Forest Service (USFS) or owned and operated by Pacific Gas and Electric Company (PG&E).

Public recreational facilities at Lake Almanor include five campgrounds, four swimming areas, two boat ramps, five picnic areas, an outdoor amphitheater, two trailheads, and several angler sites (Federal Energy Regulatory Commission 2005). In 2005, PG&E received approval to construct the Marvin Alexander day use area and it was constructed the following year. In addition to land and shoreline activities, recreationists use the abundant surface water for boating, water skiing, wakeboarding, and personal watercraft use. Publicly owned boat launches are provided on the west shore of Lake Almanor at the Almanor boat launch and day use area and on the south shore at the Canyon dam boat launch. In addition to PG&E- and USFS-operated facilities, the Lake Almanor area contains 22 privately owned recreation facilities. The private facilities provide lodging, tent and recreational vehicle camping, picnic facilities, swimming beaches, stores, fishing access, boat launching, and boat slip use/rentals.

Facilities at Butt Valley reservoir include two campgrounds, a day use area with boat launch, and two swimming areas (Federal Energy Regulatory Commission 2005). Most of the reservoir is accessible for day use recreation, such as boating, fishing, and wildlife viewing; however, boats are excluded from the southern-most end of the reservoir during the winter months. A log boom is configured the remainder of the year to provide boat access to the area near the Caribou 1 intake and the face of the dam. For safety reasons, personal watercraft and water skiing are not allowed on the reservoir, and posted regulations limit boat speeds to 25 miles per hour. The Alder Creek day use area has a public boat launch. In addition to the three developed sites, Butt Valley reservoir contains three dispersed, undeveloped sites on the eastern shore of the reservoir; there is no public road access to the western shore of the reservoir. The existing dispersed, undeveloped sites are primarily used for fishing and kayaking.

Belden forebay, located near the Caribou powerhouses, does not have any developed recreation facilities, and boating and other recreational activities are prohibited on the forebay because sudden releases of water through the powerhouses would pose a safety concern. The North Fork fishing trail follows the western and northern sides of the Belden forebay as it extends north toward the Seneca reach. Signs at Belden forebay direct users to the trail.

The Seneca reach of the North Fork Feather River provides diverse recreational activities, including boating/kayaking, fishing, hiking, wildlife viewing, picnicking, swimming, canoeing, backpacking, equestrian use, sightseeing, and camping. The North Fork fishing trail follows the lower part of the Seneca reach, extending from the lower Butt Creek confluence to Belden forebay (Federal Energy Regulatory Commission 2005). Two dispersed, undeveloped campsites are available in this area.

The Belden reach of the North Fork Feather River provides recreational opportunities similar to those along the Seneca reach, but tends to receive much higher use during the fishing season because it is more accessible from State Route 70. Three developed public campgrounds (Queen Lily, North Fork, and Gansner), 20 dispersed sites, and two privately owned campgrounds occur along the Belden reach (Federal Energy Regulatory Commission 2005). The Belden reach has a put-and-take fishery[34] in the vicinity of the campgrounds and also provides opportunities for recreational gold panning. The Belden rest stop adjacent to State Route 70 is located adjacent to the Belden powerhouse at the downstream end of the reach. The rest stop offers a comfort station and tables and functions as a day use area; it also serves as a trailhead for the Yellow Creek, Indian Springs, and Pacific Crest trails.

Additional details for these recreational facilities are described in section 3.3.5 (Recreational Resources) of FERC's Final EIS. Figure 3-16 of the Final EIS (pg. 3-223) shows the locations of proposed recreation facility improvements in the UNFFR Project area, and Appendix C to this RDEIR provides additional information on these proposed improvements.

Local Facilities

As described in PG&E's proposed recreation resource management plan (Item #29 of the Settlement Agreement – Appendix C), there is a wide array of recreational facilities that would be improved, enhanced and developed within and adjacent to the boundary of the UNFFR Project. Several of the facilities within the project area fall within or adjacent to one of the activity areas illustrated in Figure 3-2. The Prattville intake activity area is adjacent to the Marvin Alexander day use area; this activity area is associated with Alternatives 1 and 2. The Caribou intakes activity area includes a portion of Butt Valley reservoir and the associated shoreline; this activity area is associated with Alternatives 1 and 2. The Canyon dam boat ramp and associated days use facilities are within the Canyon dam activity area; this activity area is associated with Alternatives 1 and 3.

[34] Put-and-take fishery refers to a type of stocking in which the stocked fish are of sizes that anglers are immediately interested in catching and would consider keeping. This differs from "put-grow-take" stocking.

Prattville Intake Activity Area

Recreational uses in the vicinity of the Prattville intake activity area include boating, swimming, wildlife and scenery viewing, photography, fishing, picnicking, and hiking. PG&E's Marvin Alexander day use facility occupies a portion of the Lake Almanor shore adjacent to the Prattville intake structure. Other recreational facilities include the nearby Almanor campground, Almanor boat launch and day use area, Dyer View day use area, Plumas Pines Resort, and Wilson's Camp Prattville (see Figure 3-1).

Both the Almanor campground and Almanor boat launch and day use area are located 0.75-mile northwest of the Prattville intake structure. These areas are operated and maintained for the USFS by California State University, Chico Research Foundation, under a special-use permit. The campground has 102 campsites, 20 restroom facilities, and an outdoor amphitheater (Federal Energy Regulatory Commission 2005). The Lake Almanor recreation trail passes through the Almanor campground. The paved 9.5-mile-long trail is open to walking, hiking, bicycling, and cross-country skiing. Motorized use of the trail is not permitted. The Almanor boat launch and day use area is adjacent to the south side of the Almanor campground. The day use area has two concrete boat launches, a wooden courtesy dock, a large paved area with space for 53 vehicles and trailers, and several day use facilities, including restrooms, picnic areas, cooking grills, and a large beach with designated swimming areas.

PG&E's Marvin Alexander and the USFS' Dyer View day use areas are located southeast of the Prattville intake structure. Prior to 2005, the Marvin Alexander day use area was an undeveloped area south of the existing intake structure. This day use area was upgraded in 2006 to accommodate the recreational demands of the area (Pacific Gas and Electric Company 2005). Facilities at the day use area currently include restrooms; a gravel parking area; paved, ADA-compliant access trails to picnic areas; and an imported sandy beach with designated swimming areas. The shore immediately south of the intake structure is used for sunbathing, photography, and other activities. The intake structure is visible from most locations within the day use area. The Dyer View day use area is operated and maintained by the USFS (Federal Energy Regulatory Commission 2005). The facility includes paved parking areas, interpretive signs, benches, and restroom facilities. Trailheads for the Lake Almanor recreation trail and shoreline beach are located in the Dyer View day use area.

Plumas Pines Resort and Wilson's Camp Prattville are privately owned commercial resorts located near the Prattville intake activity area. The Plumas Pines Resort is located northwest of the intake facility, and Wilson's Camp Prattville is located southeast of the intake facility. Plumas Pines Resort has eight cabins, a recreational vehicle park, and nine motel rooms (Federal Energy Regulatory Commission 2005). The Plumas Pines Resort also includes a marina, restaurant, and bar. Wilson's Camp Prattville has seven cabin/duplex rentals, a 30-space marina, and a café.

Canyon Dam Activity Area

Recreational activities in the vicinity of the Canyon dam activity area include boating, fishing, wildlife and scenery viewing, photography, camping, picnicking, and hiking. Recreational facilities located near the activity area include the Rocky Point campground, Canyon dam boat launch, Camp Conery group campground, Canyon dam day use areas, Almanor scenic overlook, and East Shore day use area.

The Rocky Point campground and the Canyon dam boat launch are northwest of the Canyon dam outlet structure. PG&E owns and operates the Rocky Point campground, formerly called the Lake Almanor campground. The facility contains 131 campsites and 30 overflow sites and includes access to the Lake Almanor recreation trail (Federal Energy Regulatory Commission 2005). The Canyon dam boat launch facility is owned and operated under a special-use permit from the USFS and includes two concrete boat-launch lanes and several day use facilities, including picnic areas, cooking grills, two restrooms, and a paved parking area with 33 single vehicle spaces and 51 vehicle-with-trailer spaces.

The Camp Conery group campground and Canyon dam day use areas are located east of Canyon dam and are owned and operated by PG&E (Federal Energy Regulatory Commission 2005). The Camp Conery group campground 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, paved parking, and a volleyball and basketball court. Parking for recreational vehicles is available but does not include hookups. The Canyon dam day use area includes picnic areas, cooking grills, restrooms, ample parking, and an undeveloped swimming beach.

The Almanor scenic overlook and East Shore day use area are located northeast of the dam on the east shore of Lake Almanor. PG&E owns and operates both facilities. The Almanor scenic overlook includes paved parking and restroom facilities (Federal Energy Regulatory Commission 2005). The overlook offers views of Canyon dam and Lake Almanor; it formerly provided views of Mt. Lassen, but these views have become obscured by vegetation over time. The East Shore day use area contains picnic areas, restroom facilities, and undeveloped shoreline access for anglers.

Caribou Intakes Activity Area

Recreational uses (e.g., fishing, boating wildlife viewing) in the vicinity of the Caribou intakes activity area is limited to locations outside the existing log boom during the winter months. No recreational facilities have been developed near the intakes or Butt Valley dam.

Visitation

Lake Almanor receives approximately 1,214,000 visitors annually, and Butt Valley reservoir receives approximately 40,900 visitors annually (Federal Energy Regulatory Commission 2005). Visitor use fluctuates seasonally. The highest use occurs during the summer and on holiday weekends. At Lake Almanor, the most used campground is the Rocky Point campground. The Canyon dam boat launch on Lake Almanor is frequently near capacity and periodically exceeds capacity (Pacific Gas and Electric Company 2002). PG&E estimated visitor use at Rocky Point campground to be approximately 35,000 visitors annually (Federal Energy Regulatory Commission 2005). At Butt Valley reservoir, Ponderosa Flat is the most used campground. The highest annual use of Ponderosa Flat campground is estimated at 15,000 visitors.

Environmental Impacts and Mitigation Measures

Methodology

The analysis of impacts on recreation in the UNFFR Project vicinity is based on information gathered from FERC's Final EIS, PG&E's relicensing application, and other relevant sources. The impact analysis addresses the potential for Proposed Project and the alternatives to substantially affect existing recreational opportunities or create hazards for water recreationists.

Thresholds of Significance

Impacts on recreation would be significant if Proposed Project or the alternatives would:

- substantially affect existing recreational opportunities, such as through restricted access or changes in the quality of the visitor experience; or
- substantially increase recreation-related hazards due to incompatible uses (e.g., a structure in the water).

Impacts and Mitigation Measures

This section discusses the anticipated impacts related to recreation associated with the Proposed Project and the alternatives, and, if applicable identifies mitigation measures for significant impacts. Table 5.8-1 compares the final level of significance for each impact (with incorporation of mitigation measures if appropriate).

Table 5.8-1 Summary of Recreation (RE) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact RE-1: Construction activities associated with Proposed Project or the alternatives could disrupt recreational activities at Lake Almanor and Butt Valley reservoir.	Less than significant	Less than significant	Less than significant	Less than significant
Impact RE-2: Implementation of Proposed Project or the alternatives could reduce the quality of recreational opportunities at Lake Almanor or Butt Valley reservoir and create hazards for recreationists.	Less than significant	Significant and Unavoidable	Significant and Unavoidable	Less than significant
Impact RE-3: Implementation of Proposed Project or the alternatives could affect the quality of recreational fishing opportunities in the North Fork Feather River below Canyon dam by increasing flows in the Seneca and Belden reaches.	Less than significant	Less than significant	Less than significant	Less than significant

Impact RE-1: Construction activities associated with Proposed Project or the alternatives could disrupt recreational activities at Lake Almanor and Butt Valley reservoir.

Proposed Project

Construction activities associated with infrastructure development and/or improvements proposed by PG&E could cause temporary water quality, air quality, noise, visual, and other typical construction impacts, which could impair the peaceful enjoyment by visitors at nearby recreational areas. Under Proposed Project, construction activities would primarily be for recreational improvements agreed to in the 2004 Settlement Agreement. A description of these activities is summarized is section 3.4 of this RDEIR; additional detail can be found on pages 3-222 to 3-239 of section 3.3.5 of the FERC's Final EIS, which is hereby incorporated into this RDEIR by reference.

Activities near the construction sites would be affected primarily by construction traffic and indirect disturbance, such as from noise and fugitive dust. These impacts could disrupt recreational activities during the construction period; however, construction would be spread out over time and space. While one recreational facility could be closed for construction, others would remain open. Additionally, all of the construction would be temporary and would be aimed at improving access to recreational opportunities and the overall recreational experience.

Construction activities would not substantially disrupt recreational activities at Lake Almanor or Butt Valley reservoir and, upon completion, would improve the overall access and/or the quality of the recreational experience at most sites. Impacts on recreational uses during construction would be **less than significant**.

Alternatives 1, 2, and 3

The alternatives include the infrastructure and development proposed by PG&E. The impacts described in the preceding section would therefore occur with any of the alternatives.

Construction activities associated with the Prattville intake thermal curtain and Canyon dam low-level outlet modifications would cause temporary water quality, air quality, noise, visual, and other typical construction impacts, which could impair the peaceful enjoyment by visitors to nearby recreational areas at Lake Almanor. Recreational activities on the water in the vicinity of the Prattville intake and Canyon dam would be the most affected because of access restrictions to these areas during construction and the possible temporary closure of the Canyon dam boat launch associated with modification of the Canyon dam outlet. Recreational activities on the adjacent beaches and at nearby facilities would be affected primarily by construction traffic and indirect disturbance, such as from noise and fugitive dust. However, users would be able to recreate at other unaffected facilities at Lake Almanor for the duration of the construction if the construction activities are too disruptive.

The Canyon dam boat launch for Alternatives 1 and 3 or a boat launch closer to Prattville intake for Alternatives 1 and 2 would be used during construction to launch a construction barge; temporary closures may be required periodically (from several hours to several days) to minimize conflicts with other vessels. If temporary ramp closure is necessary, PG&E would be required to prepare a boat launch closure plan designed to minimize impacts on recreational boating. This plan may include measures to limit launch closure during high public use periods and implementation of a public information program to inform boaters of alternate launch facilities. Because several public and privately-owned boat ramps are located along the western shore of Lake Almanor, temporary closure of the Canyon dam boat launch would not substantially disrupt boating activity.

Construction activities associated with the Caribou intakes thermal curtain on Butt Valley reservoir would generate impacts similar to those described for the Prattville intake thermal curtain, but fewer recreationists would be affected. Recreational sites at Butt Valley reservoir are limited to the eastern shore of the reservoir and are distant enough from proposed construction activities that visual, air quality, and noise impacts would be minimal. However, some construction noise may travel across the reservoir and affect recreationists on the reservoir or at sites adjacent to the reservoir. Construction activities would not affect boat use on Butt Valley reservoir because the location of PG&E's log boom isolating the Caribou intakes is adjusted seasonally to enable boat access to the area between the dam and the intakes. Boats are excluded only from the southern-most portion of the reservoir during the winter when use is very low. The construction activities would not prevent use of nearby recreation facilities or affect the facilities themselves.

Alternatives 1 and 3 may require the temporary placement of the 60-foot by 60-foot construction barge and 200 foot clear area around the barge associated with the Canyon Dam outlet structure improvements, but the resulting loss of area during construction would not be substantial in proportion to the amount of lake area that would remain available for boating.

Construction of the thermal curtains would not substantially disrupt recreational activities at Lake Almanor or Butt Valley reservoir. Impacts on recreational uses during construction would be **less than significant**.

Impact RE-2: Implementation of Proposed Project or the alternatives could reduce the quality of recreational opportunities at Lake Almanor or Butt Valley reservoir and create hazards for recreationists.

Proposed Project

Proposed Project includes improvement to existing and construction of new recreational facilities; these activities would increase recreational opportunities on Lake Almanor and Butt Valley reservoir (see Appendix C). Under its proposed project, PG&E intends to replace and expand the North Shore public boat launch. However, the structures would be relatively small and are intended to improve the quality of recreational opportunities at Lake Almanor. The placement of structures in Lake Almanor would not create substantial hazards for water. The seasonal adjustment of the location of the log boom in Butt Valley reservoir near the Caribou intakes would continue consistent with current practices. The long-term recreational impacts of Proposed Project would be **less than significant.**

Alternative 1

The thermal curtain at the Prattville intake would extend approximately 900 feet offshore around the intake (see Figure 3-3). This portion of the activity area would be off-limits to boaters and other water recreationists and would be demarcated by buoys, lighting, and signs, similar to those that currently exist at the marinas on either side of the activity area. The curtain would reduce the amount of Lake Almanor area available for recreational uses near the intakes by approximately 20 acres. The reduction in the lake area available for boating on Lake Almanor would not be substantial in proportion to the amount of lake area that would remain available for boating (approximately 0.07 percent of the lake's surface area would be unavailable). Warning signs and navigation lights would warn boaters of the thermal curtain's location, and signs would be posted to reduce boat speeds to 5 miles per hour between the marinas and thermal curtain in compliance with county boat speed limits near buoys and booms. Once outside these speed reduction areas, boaters would be able to recreate on Lake Almanor as they currently do. Warning signs, navigation lights, and compliance with county boat speed limits near buoys and booms would ensure that the thermal curtain would not create a hazard for boaters.

The thermal curtain at the Prattville intake is also not expected to substantially impair the use of the commercial marinas near the activity area because boaters using these facilities would have adequate lake area to safely use these marinas. The marina northwest of the activity area (Plumas Pines marina) is about 900 feet from the intake structure. The distance between the marina breakwater and the closest part of the thermal curtain structure would be about 600 feet, which would be adequate for boats to safely move in and out between the marina and the lake. To provide context, the area within the Plumas Pines marina’s breakwater measures approximately 600 feet by 380 feet, which is sufficient for boats to safely maneuver around the docks and moored boats within the marina. The marina southeast of the Prattville intake (Prattville marina) is about 1,400 feet from the intake structure. The closest part of the curtain structure to the Prattville marina breakwater would be about 1,100 feet, which would also allow adequate distance for boats to safely move in and out from the marina to the lake.

Implementation of the thermal curtain at the Prattville intake would result in the permanent closure of the Marvin Alexander day use area. The location of the thermal curtain and associated binwalls would render most of the Marvin Alexander day use area inaccessible to the public. Due to lack of access to Lake Almanor, the current Marvin Alexander day use area would be decommissioned. The 2014 Draft EIR included a mitigation measure to relocate Marvin Alexander day use area. The State Water Board received comments regarding the feasibility of the mitigation measure. Commenters raised concerns about any suitable alternative beach locations around Lake Almanor and whether the level of access of an undetermined location would be an effective mitigation.

The modifications to the outlet structure at Canyon dam would not increase the size of the outlet structure and as a result would not impact operations around the intake.

Installation of a thermal curtain at the Caribou intakes would not affect boat use in Butt Valley reservoir because the existing log boom would be reconfigured to restrict boat access around the activity area while enabling boats to navigate between the intake area and the dam face. Boats are excluded from the southern-most end of the reservoir during the winter season. The Caribou intakes thermal curtain would not create a hazard for boaters or other recreationists at Butt Valley reservoir.

Installation of thermal curtains at the Prattville and Caribou intakes and modification of the Canyon dam outlet[35] structure would not substantially reduce the quality of recreational opportunities in Lake Almanor or Butt Valley reservoir. These measures would not create substantial hazards for water recreationists due to the placement of structures in the lake. However, due to the closure of the popular Marvin Alexander day use area and uncertainty regarding the existence of a suitable relocation site, the long-term recreational impacts have the potential to be **significant**.

Alternative 2

Recreational impacts at the Prattville and Caribou intakes would result in the same impacts as described under Alternative 1 for the Prattville and Butt Valley dam areas. No impacts would occur in the vicinity of Canyon dam under this alternative. Implementation of Alternative 2 would, therefore, not reduce the quality of recreational opportunities at Lake Almanor or Butt

[35] Canyon dam “intake” and Canyon dam “outlet” are synonymous.

Valley reservoir or create substantial hazards for water recreationists due to the placement of structures in the reservoirs. Long-term recreational impacts have the potential to be **significant**.

Alternative 3

Implementation of Alternative 3 would involve the same activities at the outlet structure at Canyon dam on Lake Almanor as described for Alternative 1, but without the impacts associated with actions at the Prattville or Caribou activity areas. Although modifications to the outlet structure at Canyon dam would require temporary use restrictions that may inhibit use of the Canyon dam boat launch and associated parking for shoreline access, these impacts would not substantially reduce the quality of ongoing recreational opportunities in Lake Almanor. Alternative 3 would, therefore, not create substantial hazards for water recreationists due to the placement of structures in the lake. The long-term recreational impacts would be **less than significant.**

Mitigation Measure

Mitigation Measure RE-2 (Alternatives 1 and 2): Relocation of the Marvin Alexander Day Use Area

PG&E shall relocate the Marvin Alexander day use area. PG&E shall work with the State Water Board, stakeholders, and signatories of the 2004 Settlement Agreement to identify an appropriate location at which to relocate the Marvin Alexander day use area. The new site shall be required to provide the same level of access to Lake Almanor and must be equipped with the same amenities with respect to facilities and capacity. Construction activities associated with the relocation of the Marvin Alexander day use area would be subject to Mitigation Measures Geology, Geomorphology, and Soils (GGS)-1and Water Quality (WQ)-8 as outlined in Sections 6.3.2 and 6.8.2, respectively, to prevent erosion and sedimentation and ensure the protection of water quality resources.

Significance after Mitigation

Implementation of Mitigation Measure RE-2 would be performed to maintain the current level of recreational opportunities at and around Lake Almanor. Implementation of this mitigation measure may reduce the impact to less than significant, but it is uncertain whether an alternative location exists that would provide the same level recreational opportunities taking into consideration access, location, and views. The impact is **significant and unavoidable** because of the uncertainty with the mitigation measure.

Impact RE-3: Implementation of Proposed Project or the alternatives could affect the quality of recreational fishing opportunities in the North Fork Feather River below Canyon dam by increasing flows in the Seneca and Belden reaches.

Proposed Project and Alternatives 1, 2, and 3

Flows released into the Seneca and Belden reaches would be modified under Proposed Project and the alternatives. The river would experience a change in the monthly flow regime for all water year types in both the Seneca and Belden reaches, as outlined in Tables 3-1 and

3-2. The ramping rate discussed in section 3.4[36] would ensure that these changes are implemented in a manner that minimizes impacts to the quality of recreational fishing in both reaches. Because of the timing of the increased flows through Canyon dam from June 16 through September 15 under Alternatives 1 and 3 as shown in Table 3-4, accessibility and use of some fishing spots in the Seneca reach could be adversely affected under these alternatives.

Proposed Project and the alternatives would include the requirement for channel maintenance pulse flows through the Seneca and Belden reaches during January, February and March of certain water year types. These pulse flows would occur when the fishing season is closed in these reaches. Additional pulse flows could be required to provide boating/kayaking opportunities in the Belden reach during the months of July, August, September, and October, as shown in Table 3-3. The summer recreation pulse flows would occur over the course of one or two days and would be subject to the ramping restrictions described previously. To varying degrees, the pulse flows in the Belden reach would affect recreational fishing opportunities with respect to access, river conditions, and level of use.

Higher flows in the North Fork Feather River reaches could reduce the quality of recreational fishing in these reaches. In support of its relicensing application, PG&E conducted a “fishability” study[37] along the Seneca and Belden reaches during May 2001, testing flows at 100, 300, and 700 cfs with four angler groups: fly anglers, spin anglers, bait anglers, and core fly anglers (Pacific Gas and Electric Company 2002). In this study, 11 sites were established throughout the Seneca Reach and average acceptability levels were established for each angler group; spin and bait anglers were grouped together based on the results of the study. For the Seneca reach, the study suggests that fly anglers prefer lower flows, estimating that flows between 70 and 230 cfs would be acceptable, but that optimum levels would be in the range of 90 to 175 cfs." Bait/spin anglers suggested that "spin angling would be acceptable as low as 100 cfs and at as high as 250 cfs; the best flows are between 100 and 175 cfs."

Under Alternatives 1 and 3, some fishing spots may experience an increase in flow to a point that the quality of fishing for some individuals would be reduced. However, the flow increases could improve fishing opportunities at other locations along the river. To some extent, the increase in summer flows through the Seneca reach would reduce water temperatures, which could have some effect on growth rates, size of, and relative abundance of catchable fish. The modified flow regimes, including periodic recreational pulse flows in the Belden reach, would result in a small percentage of days when increased flows could affect fishing conditions. However, the pulse flows would occur only for short periods and fishing opportunities would be similar to current conditions for most of the fishing season. Impacts on fishing opportunities would be **less than significant**.

[36] Implement a ramping rate of 0.5 foot per hour, in all months, at Canyon dam, measured at gage NF-2, and at Belden dam, measured at gage NF-70, when the ramping rate can be controlled.
[37] Appendix E5-R, Additional Results from Recreational Fishability Study.

5.9 Aesthetics

This section describes the process used to assess aesthetic values and resources in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts to aesthetic resources. This assessment is based on a review of documents prepared as a part of Pacific Gas and Electric Company's (PG&E's) relicensing application, local land use plans and policies related to aesthetics, and field reconnaissance. The following topics are not discussed in this RDEIR for the reasons noted:

- **Impacts on a state scenic highway corridor:** No designated or eligible state scenic highways in Plumas County would be affected by the UNFFR Project.
- **Wild and Scenic River:** The North Fork Feather River is not a state or federally designated Wild and Scenic River.

The potential impacts of Proposed Project (described in section 3.4) were evaluated in the Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project issued by FERC. As allowed for under Section 15150 of the California Environmental Quality Act (CEQA) Guidelines, the State Water Resources Control Board (State Water Board) incorporates, by reference, applicable sections of the FERC EIS that analyze the impacts of Proposed Project on aesthetic resources. Since the FERC EIS did not analyze Alternatives 1, 2, or 3 (described in section 3.5 of this RDEIR) in the EIS, they are discussed in this section of the RDEIR with respect to aesthetic values and resources.

Environmental Setting

The visual assessment process involved establishing an understanding of the visual environment in the UNFFR Project vicinity, determining the visual sensitivity of the environment based on anticipated viewer responses, identifying viewer groups, and defining visual assessment units (VAUs) or viewsheds. An overview of this process is provided in this section followed by a description of the existing visual setting around the activity areas and along the North Fork Feather River. The discussion of the visual environment is based on a field reconnaissance; photographs (taken from key observation points (KOPs) are shown in Appendix I.

Visual Environment

The visual environment, or character, is a function of both the natural and artificial landscape features that make up a view. The aesthetic value of an area is a measure of its visual character and quality, combined with the viewer's response to the area (Federal Highway Administration 1988). Geologic, hydrologic, botanical, wildlife, recreational, and urban features, such as roads, homes, and earthworks, directly influence visual character.

The perception of the visual character of an area can vary significantly by season and even by hour as light, shadow, weather, and the elements that compose the view change. Form, line, color, and texture are the basic components used to describe visual character and quality for most visual assessments. The dominance of each of these components on the landscape serves to form the viewer's impression of the area being observed. A viewer's impression directly corresponds to the aesthetic value of the landscape. The aesthetic value of an area is a culmination of its visual character and scenic quality combined with the viewer response.

Lake Almanor, Butt Valley reservoir, and the North Fork Feather River dominate the visual environment of the UNFFR Project area. PG&E's historic hydroelectric generation system facilities and the mountainous, forested setting contribute to the visual character of the existing landscape.

Visual Sensitivity and Viewer Response

The overall response of a viewer to the quality of a view is based on a combination of viewer exposure and viewer sensitivity. Viewer exposure refers to the visibility of resources in the landscape, the proximity of the vantage point to the view, the elevation of the viewer relative to the view, the frequency and duration of the viewing, the number of observers, and preconceived expectations of individual viewers or groups. Viewer sensitivity relates to the extent of the public's concern for particular landscapes.

Judgments concerning visual quality and viewer response should be based on the regional frame of reference. The geographical setting and nature of the visual resource can greatly influence the degree of visual quality and sensitivity experienced by the viewer. For example, the presence of a small hill in an otherwise flat landscape may be viewed as a significant visual element, but such a hill may have very little significance when surrounded by mountainous terrain.

Viewer Groups

The perceptions of viewers are influenced by their location, specific activities in which they are engaged, personal degree of awareness, and individual values and goals. The three distinct viewer groups in the vicinity of the UNFFR Project are motorists, residents, and recreationists.

Motorists

Motorists are people who would view the UNFFR Project facilities from a moving vehicle. Motorists may be drivers or passengers. This user group typically consists of commuters, local residents, business travelers, and tourists. Tourists are often acutely aware of viewshed opportunities and aesthetics associated with an area when viewed from roadways, but are less likely to be aware of visual changes unless they visit the area frequently. Business travelers, commuters, and local residents who travel the same routes frequently may be acclimated to the general view, but are more likely to be aware of visual changes than occasional passersby. With the exception of views from State Route (SR) 89 over Canyon dam, views of the UNFFR Project facilities from area roadways are generally obscured by dense forests, the distance between the roads and the facilities, and the remoteness of much of the area.

Residents

Residents are people whose homes and property are near the UNFFR Project facilities and who have full or partial views of the facilities. The existing landscape features in the vicinity of the UNFFR Project offer a variety of visual experiences that reflect various land use practices and natural processes. The individual sensitivity of residents to aesthetics and changes within a viewshed is highly variable. The sensitivity of residents to changes in the viewshed should also be considered in the context of view point location and the length of time that the view may be altered (e.g., temporary or permanent changes to topography or vegetation, or construction activities associated with UNFFR Project facilities). There are a number of residents who can see the western shore of Lake Almanor from the peninsula. Some of these residents can see the existing infrastructure associated with the Prattville intake, as well as the marinas on either side of this feature. The distance from the Prattville intake to the residential areas on the peninsula ranges between 1.5 and 3 miles. At night, lighting from PG&E facilities as well as the two marinas on the western shore may be visible from some residences.

Recreationists

Recreationists are members of the community or the general public who use the recreational resources available in the UNFFR Project vicinity. Like residents, recreational users are highly sensitive to the visual character of the terrain, vegetation, Lake Almanor, Butt Valley reservoir, the North Fork Feather River, and UNFFR Project features and facilities.

Visual Assessment Units and Key Observation Points

The Federal Highway Administration (1988) defines a viewshed as all of the surface area visible from a particular location (e.g., a highway pullout) or from a sequence of locations (e.g., a highway or trail). To describe the viewsheds, eight VAUs were identified in the UNFFR Project vicinity to represent views of visually sensitive resources and the activity areas from recreation areas, roads, and other KOPs. Within each VAU, one or more KOPs were established along commonly traveled routes and in public recreation areas, residential areas, and other likely observation points from which a viewer group (residents, recreationists, or motorists) is able to view UNFFR Project facilities or portions thereof. Locations of KOPs are shown in Figure 5.9-1. Appendix I provides a summary of the VAUs and KOPs established to represent views of the UNFFR Project vicinity and photographs associated with each KOP.

The visual environment, sensitivity, and viewer groups is described below for each of the VAUs and associated KOPs.

Marvin Alexander Day Use Area/Prattville Intake

The Marvin Alexander day use area is a public recreation facility on the west shore of Lake Almanor south of the Prattville intake; it is used primarily between May and September. The VAU from the day use area encompasses views across Lake Almanor towards the peninsula, the surrounding forests, hills, and Mount Lassen. Picnic tables are scattered along the water’s edge, and a public swimming area is cordoned off with small buoys just south of the Prattville intake structure. A short chain link fence separates PG&E’s intake facilities from the public access area and restricts access to the cove encompassing the intake.

Views of the intake structure and surrounding cove are visible from KOP 1 (Photographs 1c and 2a in Appendix I) and are partially obstructed by vegetation from KOP 3 and the day use area parking lot (Photograph 3). Views from the shore at KOP 1 and KOP 2 toward the northwest and Mount Lassen are partially obstructed by the intake structure. The orientation of the day use area directs views toward Lake Almanor and surrounding forests and mountains to the northeast and east, and generally away from the intake structure (Photographs 1a, 1b, 2b, and 2c). Views in this direction are more apparent than those toward the intake structure and disturbed areas around the day use area.

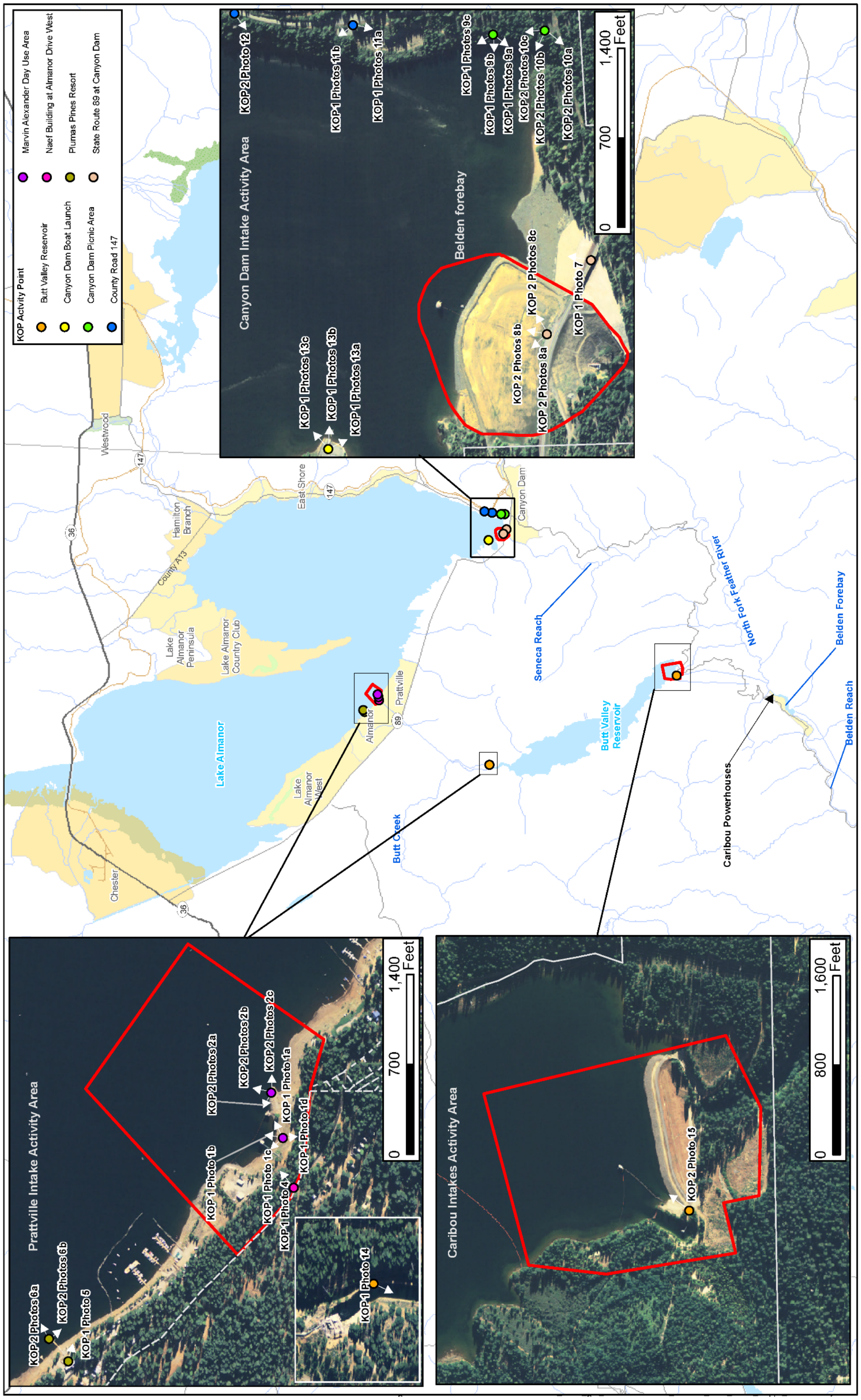

Figure 5.9-1 Photo Viewpoint Locations

The primary viewer group for the Marvin Alexander day use area is recreationists. Residents in nearby communities may also visit the day use area and view the surrounding scenery periodically.

Doug Naef Building Driveway at Almanor Drive West

The VAU from the Doug Naef building at Almanor Drive West is dominated by tall trees and the surrounding forest with limited views across Lake Almanor. Views from KOP 1 (Photograph 4) toward the Prattville intake and Lake Almanor are mostly obstructed by the surrounding forest. These views would not be considered sensitive to changes around the intake. The primary viewer group from this area is motorists traveling along Almanor Drive West.

Plumas Pines Resort

The VAU from the Plumas Pines Resort encompasses Lake Almanor and the surrounding forest, with limited views of the Prattville intake. Views from the restaurant (KOP 1, Photograph 5) toward the intake are obscured by tall trees. The intake is visible from the boat ramps (KOP 2, Photograph 6b), but because of the distance between the ramps and the intake, the intake structure is not prominent in the view; rather, the view is dominated by the lake, surrounding forest, and mountains. Activities at the day use area are difficult to see from the ramps, although activities on Lake Almanor may be more noticeable. The Plumas Pines Resort is a private resort near the community of Prattville. Viewer groups are members of the resort and their guests.

State Route 89 at Canyon Dam

Although SR 89 has not been officially designated a state scenic highway by the California Department of Transportation, it has been determined eligible (California Department of Transportation 2007). At the federal level, however, SR 89 is a designated part of the Volcanic Legacy Scenic Byway—a route that extends from Crater Lake, Oregon, south into northern California and around the shores of Lake Almanor. SR 89 has also been officially designated as an All-American Road based on its breathtaking vistas and cultural, historic, natural, recreational, and scenic qualities (Federal Highway Administration 2009). Scenic views from SR 89 are considered sensitive.

The VAU from SR 89 at Canyon dam encompasses views of Lake Almanor, Canyon dam, the Canyon dam outlet structure, and occasional views of trees along the shore. As the highway crosses over Canyon dam, motorists traveling in both directions have unobstructed views toward the Canyon dam outlet structure and shore of Lake Almanor (KOPs 1 and 2, Photographs 7 and 8a-b). The slightly elevated road bed coupled with the presence of low-growing vegetation (grasses and small shrubs) between the highway and lake allows motorists expansive views of the Canyon dam outlet structure, Lake Almanor, and the dam spillway. The spillway partially blends in with the forest in the background and is mostly obscured by the topography between the dam and spillway (Photograph 8c). The views are not necessarily scenic because of the existing disturbance associated with the dam and the prominent tower on the lake, but distant views are more scenic, with the surrounding mountains and forests providing a contrasting backdrop beyond the outlet structure and spillway. The primary viewer group from the highway is motorists.

Canyon Dam Picnic Area

The VAU from the Canyon dam picnic area encompasses unobstructed views of Canyon dam, the Canyon dam outlet structure, the spillway, and Lake Almanor from the shore (KOP 1, Photographs 9a-c). Views from the picnic area parking lot are generally unobstructed toward the lake and Canyon dam, with some trees in the foreground (KOP 2, Photographs 10a-b). Distant views from the picnic area are more scenic, encompassing the lake, surrounding forest, and mountains. Foreground views are not considered sensitive because of the existing disturbance associated with the dam and spillway and the generally barren area along the shore.

The picnic area is on PG&E-owned lands near the intersection of SR 89 and County Road 147 (also known as Almanor Drive East). It sits on the shoreline near the south side of the dam. The primary viewer group at the picnic area is recreationists.

County Road 147

The VAU from County Road 147 along the eastern shore of Lake Almanor in the vicinity of Canyon dam encompasses dense forest in the foreground with occasional views of the lake and distant mountains in the background (KOPs 1 and 2, Photographs 11a, b and Photograph 12). Views of the Canyon dam outlet structure and Canyon dam are only briefly available as motorists travel along the road. The distance between the road and outlet structure and the intervening trees reduces the sensitivity of views from the road to activities at Canyon dam. The primary viewer group along County Road 147 is motorists.

Canyon Dam Boat Launch

The VAU from the Canyon dam boat launch encompasses Lake Almanor and the surrounding forests and mountains, with unobstructed views of Canyon dam and the Canyon dam outlet structure (KOP 1, Photographs 13a-c). Boaters on the lake in the vicinity of the boat launch also have unobstructed views of Canyon dam, the outlet structure, and the shoreline of Lake Almanor. Surrounding views of the forests and mountains are generally scenic, although views toward Canyon dam are considered less scenic because of the barren nature of the dam. Views toward the outlet structure are nonetheless considered sensitive to change because of the unobstructed views and the viewer group.

The primary viewer group is recreationists, particularly boaters. The boat launch is a popular, easily accessible recreational facility operated by the USFS and is heavily used. Viewers may be sensitive to changes at the outlet structure because of the desire to enjoy the scenic views of the lake and surrounding scenery.

Butt Valley Reservoir

The VAU from Butt Valley reservoir is of a long, fairly narrow body of water and the surrounding forested hills (KOP 1, Photograph 14). The reservoir is popular with recreationists seeking a quieter, more remote outdoor experience than is found at more densely populated recreation areas such as Lake Almanor. The Prattville-Butt Valley Reservoir Road parallels the eastern shore of the reservoir, allowing motorists and recreationists fairly consistent views of the water from both traveling directions. Although there are several public campgrounds along the reservoir’s edge, none are near Butt Valley dam or the Caribou intakes. Because of the scenic quality of the surrounding reservoir and forests, views from developed and dispersed recreation sites and from the road are considered sensitive. The distance to the Caribou intake structures and dam from primary viewpoints makes these views less sensitive to change (i.e., activities around the intake structures would be less noticeable). The intake structures are not visible or substantially noticeable from most viewpoints along the eastern shore.

Views from Butt Valley dam are of the reservoir and the Caribou intake structures (KOP 2, Photograph 15). The southern portion of the reservoir is dominated by the outlet structures and tree stumps protruding from the water, reducing the quality of the views (Photograph 16). Aside from PG&E workers and, possibly, anglers, few people access the dam area.

The primary viewer groups at Butt Valley reservoir include recreationists on the eastern shore and in the water (e.g., anglers) and motorists.

Light and Glare

Because of the generally rural nature of the UNFFR Project vicinity, the primary sources of artificial light are limited to vehicles passing through the area on state, local, and private roads; concentrations of commercial/residential buildings around the Prattville area and shores of Lake Almanor; and, to a lesser degree, recreational features and facilities. Glare may occur during the daylight hours as the sun is reflected off water, rocks, or light-colored sediments that are exposed as reservoir levels fluctuate during periods of low waters.

Lights from numerous residents and safety lights on public and private docks can be seen from across the lake. Boat and dock lighting meet the requirements of the United States Coast Guard,

Environmental Impacts and Mitigation Measures

Methodology

A field assessment was conducted for the purpose of identifying areas of visual sensitivity and scenic resources and to assess the existing character and quality of the aesthetic resources. VAUs were determined based on the distinct visual character of the landscape; KOPs were identified as representative views within each VAU; and photo points were established to graphically illustrate these views. Photographs from each KOP are provided in Appendix I. This information was used to qualitatively assess the change in visual quality or character that would occur as a result of the Proposed Project and the alternatives.

Thresholds of Significance

Impacts on aesthetics would be significant if Proposed Project or the alternatives would:

- obstruct a scenic view or vista from public viewing areas;
- substantially degrade the existing visual character or quality of a VAU; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of Proposed Project or the alternatives on aesthetic resources and identifies mitigation measures for significant impacts. Table 5.9-1 compares the final level of significance of each impact, with incorporation of mitigation measures if appropriate.

Table 5.9-1 Summary of Aesthetics (AE) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact AE-1: Construction activities associated with Proposed Project or the alternatives could temporarily degrade the visual quality of Lake Almanor or Butt Valley reservoir.	Less than Significant	Less than Significant	Less than Significant	Less than Significant
Impact AE-2: Proposed Project or the alternatives could degrade or obstruct scenic views from VAUs.	Less than Significant	Significant and Unavoidable	Significant and Unavoidable	Less than Significant
Impact AE-3: Proposed Project or the alternatives could substantially change the character of, or be disharmonious with, existing land uses and aesthetic features around Lake Almanor, Butt Valley reservoir or along the North Fork Feather River.	Less than Significant	Significant and Unavoidable	Significant and Unavoidable	Less than Significant
Impact AE-4: Proposed Project or the alternatives could create a new source of light or glare at Lake Almanor and Butt Valley reservoir.	Less than Significant	Less than Significant	Less than Significant	Less than Significant

Impact AE-1: Construction activities associated with Proposed Project or the alternatives could temporarily degrade the visual quality of Lake Almanor and Butt Valley reservoir.

Proposed Project

Activities associated with the development, improvement, and operations and maintenance of recreational facilities and other infrastructure as described in section 3.4 of this RDEIR would require construction on and near the shorelines of Lake Almanor and Butt Valley reservoir, as well as certain locations along both the Seneca and Belden reaches of the North Fork Feather

River. Although these construction activities would have the potential to affect views within their immediate vicinity, they would all be temporary. Furthermore, the overall visual quality would not be substantially affected because the construction activities would take place in localized areas on or adjacent to the shoreline of Lake Almanor or Butt Valley reservoir, along the banks of the Seneca and Belden reaches, and in previously disturbed areas. Changes in visual character and quality would be localized around these construction areas and would primarily affect recreationists and motorists. Construction activities would result in **less-than-significant** impacts on the visual quality of Lake Almanor, Butt Valley reservoir, and the Seneca and Belden reaches of the North Fork Feather River.

Alternatives 1, 2, and 3

In addition to the impacts associated with Proposed Project, installation of the Prattville intake thermal curtain under either Alternative 1 or 2 would require the use of construction equipment on the shoreline and in the water around the intake over a 6 to 8 month period over two construction seasons (May through October) and would temporarily degrade views of the immediate lake area from the Marvin Alexander day use area. However, if construction activities actually occur within or adjacent to this facility, most of the work would occur during the time of year when Lake Almanor is drawn down and use of this facility is low, thus reducing the number of sensitive viewers. Due to the distance between the Prattville intake activity area and the residential developments on the peninsula (1 to 3 miles), it is unlikely that construction activities within this activity area would be visible to the casual observer without using binoculars or other optical equipment. Views from other VAUs in the vicinity of the Prattville intake (Ponderosa Pine Resort and Doug Naef building) would be less affected by the construction activities because the activities would be less noticeable or not in the viewer’s direct line of sight.

Construction equipment and activities around the Prattville intake would be noticeable from the lake, but they would not substantially degrade the scenic views. Views toward the northwest and the intake structure are generally less scenic because of the existing intake structure and disturbance around the shoreline. Although equipment on the water and shore, in conjunction with activities associated with curtain installation, would be noticeable from the lake and would temporarily degrade views to the northwest from the lake, the visual impacts would not be substantial because the activities would not degrade overall views of Lake Almanor or the surrounding mountains.

Modification of the Canyon dam outlet structure under Alternatives 1 and 3 would require the use of construction equipment on the shoreline and in the water around the outlet, which would temporarily affect views from SR 89, the Canyon dam picnic area, and the Canyon dam boat launch. Activities would be noticeable from these view points, but they would not substantially detract from the surrounding scenic views of the lake, mountains, and forests. The existing outlet structure and generally barren nature of the dam reduce the quality of views toward Canyon dam. Views toward more scenic vistas, like the surrounding mountains and the overall lake, would not be substantially affected by the temporary construction activities at the outlet structure.

The overall visual quality of Lake Almanor would not be substantially affected because the construction activities associated with the alternatives and activities in the vicinity of the Prattville intake and Canyon dam would be localized and temporary. Changes in visual character and quality would be localized around the activity areas and would primarily affect recreationists and motorists. Construction activities at and near Lake Almanor would result in **less-than-significant** impacts on visual quality.

Installation of a thermal curtain at the Caribou intakes on Butt Valley reservoir under either Alternative 1 or 2 would require the use of construction equipment on the shoreline and in the water around the intakes for a period of 6 to 8 months over two construction seasons (May through October). To provide construction and maintenance access, a new unpaved road 30 feet wide and 1,200 feet long would be constructed on PG&E-owned lands along the west shore of Butt Valley reservoir to provide long-term access between the dam and Caribou intakes thermal curtain facility. These construction activities, including building the access road, could be noticeable from some viewpoints on the eastern shore of the reservoir, but they would not substantially detract from the scenic quality of the surrounding views of the forests and reservoir. Motorists along nearby roadways would have minimal views of the construction activities, while boaters on the reservoir and recreational users on the shoreline would see the activities to varying degrees, depending on the distance and angle of the view. The nature and amount of use within this activity area is limited, and construction activities would be limited to a small portion of Butt Valley reservoir and the adjacent shoreline; construction activities at this location would therefore not substantially degrade the quality of views in the area. Construction activities associated with a thermal curtain and short access road at Butt Valley reservoir would result in **less-than-significant** impacts on visual quality.

Impact AE-2: Proposed Project or the alternatives could degrade or obstruct scenic views from VAUs.

Proposed Project

PG&E proposes to construct recreational facilities and associated infrastructure around Lake Almanor and Butt Valley reservoir. Based on their anticipated size and location, the facilities and infrastructure will not degrade or obstruct scenic views from VAUs. Impacts on scenic views are considered **less than significant**.

Alternatives 1 and 2

Alternatives 1 and 2 include the activities considered under the Proposed Project. Under these alternatives, most of the facilities that would be constructed are on or below the surface of Lake Almanor and Butt Valley reservoir, with only minimal structures that could obstruct scenic views from key viewpoints. Bin walls, buoys, and the upper portion of the trolleys associated with the thermal curtains would be visible on the surface of the water or on the shore. The curtains would be under the water around the intakes.

The Prattville intake thermal curtain would extend approximately 900 feet from the shoreline and would be 770 feet across. The primary visible structures would be the large stabilizing buoys holding up the thermal curtain as well as the safety buoys that would delineate the boundary of the curtain and its anchors to prevent boaters from approaching the curtain. The buoys and other structures closer to the shore would be visible from nearby recreational areas and from the boat ramps at the Plumas Pines Resort (see Figure 5.9-2). The stabilizing buoys would be much larger than the existing buoys around the intake. The safety buoys would be similar to the existing buoys and floating structures around the intake, boat launches, and swimming area, but the curtain would require a larger number of buoys than nearby smaller structures. Lights may be required at night because of safety concerns for boaters. New lights would match existing lake lighting already in use. If necessary, lights would be placed or shielded to limit visibility from adjacent viewsheds.

Alternatives 1 and 2 would require stabilization buoys that are larger than what is currently seen on Lake Almanor (see Figure 5.9-2) and additional exclusion buoys. The stabilizing buoys would be much larger than the existing buoys around the intake. The safety buoys would be similar to the existing buoys and floating structures around the intake, boat launches, and swimming area, but the curtain would require a larger number of buoys than nearby smaller structures. Due to the introduction of larger buoys and the expansion of the buoyed area, long-term impacts on scenic views around the Prattville intake have the potential to be **significant and unavoidable**.

The Caribou intakes thermal curtain would be less noticeable than the Prattville intake thermal curtain because of its distance from key viewpoints. Viewer groups would be limited to recreationists and motorists who would notice the changes at this small area of Butt Valley reservoir. The new buoys and other structures would be located in a portion of the reservoir that is already visually affected by existing structures and tree stumps. Current boating restrictions may negate a requirement for lights. The thermal curtain would not substantially degrade or obstruct views from key areas around Butt Valley reservoir. The long-term visual impacts for a thermal curtain at Butt Valley Reservoir would therefore be **less than significant**.

Alternatives 1 and 3

Modifications to the Canyon dam outlet structure under Alternatives 1 and 3 would involve placement of a new bulkhead on a lower gate near the bottom of the lake. These modifications would not be noticeable from nearby viewpoints along SR 89 or the Canyon dam picnic area. Construction activities at Canyon dam could temporarily modify VAUs at this location.

As a result, impacts from Alternatives 1 and 3 would be **less than significant.**

Figure 5.9-2 Graphic Rendering of the Thermal Curtain Stabilization Buoys at the Prattville Intake for Alternatives 1 and 2

Impact AE-3: Proposed Project or the alternatives could substantially change the character of, or be disharmonious with, existing land uses and aesthetic features around Lake Almanor, Butt Valley reservoir, or along the North Fork Feather River.

Proposed Project

Proposed Project would not include the construction or implementation of any structure or facility that conflicts with current land uses and aesthetic features around Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.

Changes to the flow regime of the Seneca and Belden reaches would provide increases in the level and velocity of water released from Canyon dam and Belden forebay. Over time, these changes would influence the type and degree of riparian vegetation that is visible along these reaches but the changes would not be disharmonious with existing land uses and aesthetic features. This impact would be **less than significant**.

Alternatives 1 and 2

The thermal curtains at Lake Almanor and Butt Valley reservoir under Alternatives 1 and 2 would be visible from nearby viewpoints. Visible elements of both thermal curtains have the potential to detract from the existing scenic views of the surrounding forests and mountains from the overall visual quality of Lake Almanor and Butt Valley reservoir, especially within and adjacent to the activity areas. The trolley systems for each of the curtains would allow the curtains to move up and down with changing water levels, reducing the potential for algae growth or other changes to water quality that could diminish the appearance of the water around the intakes. The southern trolly system for the Prattville thermal curtain would be located adjacent to Alexander Marvin day use area. As a result of the location of the trolly system next to a day use area and the localized distraction caused by the presence of lighted and signed buoys at the Prattville Intake, the impact of the thermal curtains contained in alternatives 1 and 2 on the visual character would be **significant and unavoidable.**

Alternatives 1 and 3

Similar to the Proposed Project, the alternatives would change the flow regimes in the Seneca and Belden reaches. Under Alternatives 1 and 3, the increased releases from Canyon dam between June 16 and September 15 would change the visual character of the Seneca reach with respect to water levels and riparian vegetation, but the resulting change would be consistent with the aesthetics features of the riparian reaches. Modifications to the Canyon dam outlet structure under Alternatives 1 and 3 would not affect the visual character of Lake Almanor because the modifications would not be visible from nearby viewpoints. Impacts from the modification of the Canyon Dam Outlet or increased flows under alternatives 1 and 3 would be **less than significant.**

Impact AE-4: Proposed Project and the alternatives could create a new source of light or glare at Lake Almanor and Butt Valley reservoir.

Proposed Project

The Proposed Project would include construction at and improvements to recreational facilities and PG&E infrastructure around Lake Almanor and Butt Valley reservoir. The construction of these facilities or improvements would occur during the day and very little additional lighting would be necessary. However, it can be assumed that some of these recreational facilities or improvements would include the installation of new lighting structures for recreational and safety purposes. Any lighting structures included in these facilities or improvements would be similar to those existing under current conditions. PG&E permits and manages buoys and docks around the lake. There are lights for operational requirements around the intakes, lights and buoys for no wake zones around hazards and public docks, and lights and buoys for the 1,400 land owners around the lake. New lighting would be subject to the same regulation and would not represent a significant increase to lighting in the area. The impact would therefore be **less than significant**.

Alternatives 1, 2, and 3

The thermal curtains would create a new source of light from the safety lighting on buoys to warn boaters and other watercraft users of the location of the Prattville and Caribou intakes thermal curtains. Temporary lighting may also be required for work in the Canyon dam activity area under Alternatives 1 and 3. If necessary, lights would be placed to limit their visibility from adjacent viewsheds and would be limited to the period of construction. The safety lighting would be typical of lighting used on barriers in the water and would employ technology to direct the lights and reduce glare and long-distance visibility. Light impacts associated with the thermal curtain’s buoys at the Prattville and Caribou intakes would therefore be **less than significant**. Lighting in the Canyon dam activity area would be temporary, and as a result the impact would be **less than significant**.

5.10 Public Services and Utilities

This section describes public services and utilities in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts on public services, utilities, and energy. This section does not address energy as it relates to outputs of the UNFFR Project (see sections 5.16, Climate Change, and 5.17, Power Loss, for a discussion of this topic).

The following topics are also not discussed in this section for the reasons noted:

- **Schools, parks, and other public facilities:** Neither Proposed Project nor the alternatives would increase demand for public services.
- **Utility facilities:** Neither Proposed Project nor the alternatives would increase the demand on utility service providers, including water suppliers, wastewater treatment facilities, and solid waste disposal facilities.

Environmental Setting

Public Services

Law Enforcement

The Plumas County Sheriff's Office provides law enforcement for the entire county. Headquartered in Quincy, the office maintains a substation in Chester that is staffed by a sergeant and three to four patrol deputies. In addition to their regular patrol duties, deputies are cross-trained in a variety of areas, including K-9, investigations, and a Special Weapons and Tactics team. Each deputy is also a deputy coroner and is responsible for death investigations. The Sheriff's Office also provides year-round off-highway patrols of the snowmobile and off-highway vehicle routes in the area as well as boating patrols on lakes and reservoirs.

The California Highway Patrol (CHP) operates area offices in Susanville and Quincy and serves as the primary law enforcement agency for state facilities and transportation corridors (e.g., State Route 89) in the vicinity of the UNFFR Project. The CHP also maintains a communications/dispatch center in Susanville and works closely with the Plumas County Sheriff's Office to provide law enforcement coverage to Plumas County.

The United States Department of Agriculture, Forest Service (USFS) provides law enforcement in association with its land management activities. USFS law enforcement focuses on two main areas: the safety and protection of the public and USFS personnel and the protection of public resources on National Forest System (NFS) lands from theft and destruction (United States Department of Agriculture, Forest Service 1988, 1992). Both the Lassen and the Plumas National Forests maintain agreements and operating plans with other federal, state, and local law enforcement agencies to provide coordinated law enforcement coverage. The Mount Hough Ranger District of the Plumas National Forest manages NFS lands around Butt Valley reservoir. The Lake Almanor Ranger District of the Lassen National Forest manages NFS lands around Lake Almanor, including those in the vicinity of Prattville and Canyon dam.

The UNFFR Project is in the Northern District of the California Department of Fish and Wildlife (CDFW; formerly known as the California Department of Fish and Game). CDFW wardens in Plumas County are responsible for enforcing laws pertinent to fish and wildlife, but may be called upon to enforce any of California's laws.

Fire Protection/Emergency Services

The Plumas County Office of Emergency Services (OES) is responsible for planning and coordinating emergency response for all county departments and coordinates assistance from outside agencies when major disasters or emergencies occur. The goal of the OES is to coordinate preparedness planning for emergency response in the county when persons or property are at risk of harm. The program is coordinated with the State OES and, at the federal level, the Federal Emergency Management Agency.

Fire protection needs in the UNFFR Project vicinity are currently met by a combination of volunteer fire departments, the California Department of Forestry and Fire Protection (CalFire), and the USFS. By law, CalFire is responsible for wildland fire protection on all private lands in Plumas County and, in certain instances, on lands managed by United States Bureau of Land Management. The USFS is responsible for wildland fire protection on all NFS lands. The CalFire station in Susanville and the USFS fire station in Chester are fully staffed only during the summer fire season, which is normally May to November. The community of Prattville is provided additional protection by the Prattville-Almanor Fire Protection District, a primarily volunteer department that provides structural fire protection and rescue services in the Prattville and Canyon dam areas year-round.

During the summer fire season, all fire agencies in the county respond to any reported fire, regardless of legal jurisdiction. CalFire and USFS are legally and financially responsible for managing wildland fires within their jurisdiction; however, volunteer fire departments are often the first to respond to wildfires or other incidents such as traffic accidents. CalFire and USFS depend on the volunteer fire departments, such as the one in Prattville, to provide initial attack support on wildfires along the west shore of Lake Almanor. CalFire and USFS have agreements with local volunteer fire departments to reimburse them for their assistance.

Plumas County Search and Rescue, a nonprofit volunteer organization coordinated by the Plumas County Sheriff's Office, provides support to the local community, averaging about 50 response calls annually. Upon request, this organization responds to calls throughout Plumas County, including search and rescue operations and other critical incidents affecting public health and safety (e.g., wildfires, vehicle accidents).

Medical Services

Medical services in Plumas County include several hospitals and ambulance services. The Seneca District Hospital in Chester and the Plumas District Hospital in Quincy are the closest hospitals to UNFFR Project facilities; both hospitals provide 24-hour emergency services. Emergency transfers to hospitals in Chico, Reno, and other urban areas are provided by aircraft or ground transport. Ambulance service is provided by the Chester, Westwood, and Peninsula fire departments or by the hospital in Quincy.

Utilities

Water Supply and Distribution and Wastewater Treatment

The community of Prattville is served by a community water system, and residents and businesses in Prattville operate individual septic systems (Plumas Corporation 2002). Public use facilities associated with the UNFFR Project are served by groundwater wells for water supply and individual septic systems or pit toilets for wastewater. UNFFR Project administrative and recreational facilities use local water sources (e.g., wells, springs).

Electric

Pacific Gas and Electric Company's (PG&E's) hydroelectric generation systems along the North Fork Feather River provide a reliable source of power to users throughout northern California. Throughout Plumas County, PG&E supplies electrical power to commercial, industrial, and residential customers via the local transmission network. While electric service is available in the Lake Almanor and Caribou areas, it is limited in the vicinity of Butt Valley reservoir. None of the UNFFR Project recreational facilities have electrical service, other than for administrative purposes (e.g., campground hosts).

Gas

Natural gas is not available in Plumas County (Plumas Corporation 2002). A number of privately owned companies use truck-mounted delivery service to provide propane and fuel oil to businesses and residents throughout the county.

Telephone and High-Speed Telecommunications

Telephone service is available in developed residential areas, but reliable cell phone service is available only in population centers, primarily because of the mountainous terrain (Plumas Corporation 2002). DSL or digital subscriber line computer service is available via the phone lines, and wireless computer service is geographically limited.

Solid Waste Collection and Disposal

Plumas County's Public Works Department operates solid waste transfer stations and recycling centers in Chester and Greenville to serve residents of the Prattville area and other rural residents in the UNFFR Project vicinity. Plumas County has three sanitary landfills; the landfill in Chester is closest to the UNFFR Project. The Chester landfill, which is projected to reach capacity within 20 years, accepts uncontrolled waste, including construction materials. A green waste recycling program is also available to county residents at collection sites in Westwood, Quincy, and other locations.

Environmental Impacts and Mitigation Measures

Methodology

The information presented in this section is derived from applicable local planning documents, communication with local service providers, and field reconnaissance within the general vicinity of the UNFFR Project. The impact analysis addresses the potential impacts of Proposed Project and the alternatives on the following public services and facilities: water supply and distribution, wastewater collection and treatment, law enforcement, solid waste collection and disposal, emergency services and fire protection, telephone service, and electric service.

Thresholds of Significance

Impacts on public services would be significant if Proposed Project or the alternatives would:

- require the construction of new or physically altered fire or police protection facilities that could have an adverse effect on the environment.

Impacts on utilities and energy would be significant if Proposed Project or the alternatives would:

- result in a disruption to utility services for an extended period as a result of relocating infrastructure, accidental disruption, or a reduction in energy delivered to customers; or
- encourage activities that result in the use of large amounts of fuel or energy, or use fuel or energy in a wasteful manner.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of Proposed Project and the alternatives on public and utility services and identifies mitigation measures for significant impacts. Table 5.10-1 compares the final level of significance of each impact, with incorporation of mitigation measures if appropriate.

Table 5.10-1 Summary of Public Services and Utilities (PS) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact PS-1: Construction activities associated with Proposed Project or the alternatives could result in the temporary disruption of utility services in the area.	No impact	No impact	No impact	No impact
Impact PS-2: Proposed Project or the alternatives could create public safety hazards and increase the demand for emergency response services, resulting in the need for new or expanded facilities that could affect the environment.	Less than significant	Less than significant	Less than significant	Less than significant

Impact PS-1: Construction activities associated with Proposed Project or the alternatives could result in the temporary disruption of utility services in the area.

Proposed Project

Construction activities associated with Proposed Project would not adversely affect utility services in the vicinity of the activity areas. Overhead utility poles and utility lines along the local roads and highways and in the activity areas would be avoided by construction equipment; the poles and lines typically provide adequate vehicular clearance to allow access. Any trenching or excavation activities that may be required would follow applicable best management practices and use all measures necessary to avoid any underground lines. Proposed Project would not result in a temporary or long-term disruption of utility services in the area; therefore, **no impacts** would occur.

Alternatives 1, 2, and 3

Construction activities associated with the alternatives would not adversely affect utility services in the vicinity of the activity areas. Construction activities would occur in the water and along the shores of Lake Almanor near the Prattville intake and Butt Valley reservoir near the Caribou intakes, where no utility lines are located. Overhead utility poles and lines along the local roads and highways would be avoided by construction equipment. The poles and lines typically provide adequate vehicular clearance to allow access. Trenching or excavation activities would not be necessary; therefore, underground lines would not be affected. None of the alternatives would result in a temporary or long-term disruption of utility services in the area; therefore, **no impacts** would occur.

Impact PS-2: Proposed Project or the alternatives could create public safety hazards and increase the demand for emergency response services, resulting in the need for new or expanded facilities that could affect the environment.

Proposed Project

Proposed Project would not involve the construction of any major structures that could create any new public safety hazards. However, the instream releases would result in increases in water depths and velocities, depending on the month and water year type. Based on studies performed by PG&E, these increases could affect access across, or adjacent to, both the Seneca and Belden reaches for commercial and recreational users. Section 3.4 of this RDEIR describes USFS 4e conditions 25, 27, 28, and 30, which pertain to establishing and publicizing reservoir water levels and flow regimes in the UNFFR Project reaches. Implementation of these conditions would be adequate to inform users along the Seneca and Belden reaches of any public safety hazards and the means to avoid said hazards. Impacts associated with additional demands placed on emergency response services in the area as a result of increased instream releases would therefore be **less than significant**.

Alternatives 1, 2 and 3

The construction and operation of a thermal curtain at the Prattville intake under Alternatives 1 and 2 would increase the area that would be restricted from use by flatwater recreation users on Lake Almanor by about 22 acres. Although the thermal curtain and its associated structures would be clearly marked with buoys and signs, they could pose a hazard to waterskiers, wakeboarders, and others being towed behind boats and to other water-based recreationists passing through the Prattville area. The increased potential for accidents at Lake Almanor could increase the demand for local emergency services, particularly during peak use periods, but this increase would be minimal and would not result in the need for new or expanded emergency facilities. Therefore, impacts related to emergency response would be **less than significant**.

Modification of the Canyon dam outlet under Alternatives 1 and 3 would require barges and/or platforms to support underwater construction. Short-term restrictions at the Canyon dam boat ramp could be required in this activity area. The seasonal increase in flows to the Seneca reach between June and September under Proposed Project would also occur with all of the alternatives. This seasonal increase under Alternatives 1 and 3 would result in an increase in water depth and velocity along the Seneca reach. Implementation of USFS 4e conditions 25, 27, 28, and 30, which pertain to establishing and publicizing reservoir water levels and flow regimes in the UNFFR Project reaches, would be adequate to inform users along the Seneca and Belden reaches of any public safety hazards and the means to avoid said hazards. Impacts associated with additional demands placed on emergency response services in the area as a result of increased releases from Canyon dam would therefore be **less than significant**.

A thermal curtain at the Caribou intakes under Alternatives 1 and 2 could result in a minor increase in hazards to flatwater recreation boating activity; however, the existing booms and seasonal restrictions would remain in place. Personal watercraft and activities such as waterskiing are not allowed on Butt Valley reservoir. Therefore, impacts related to emergency response would be **less than significant**.

5.11 Hazards and Hazardous Materials

This section describes hazardous materials and wildland fire hazards in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) as well as hazards associated with UNFFR Project operations. Many issues related to hazards and hazardous materials in the UNFFR Project vicinity are addressed in other sections of this chapter (e.g., geologic hazards are addressed in section 5.3, flood hazards are addressed in section 5.4, and recreation hazards are addressed in section 5.8). Included in this section is an evaluation concerning whether the operation of UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts associated with hazardous materials, fire hazards, and operational hazards.

The following topics are not discussed in this RDEIR for the reasons noted:

- **Hazards effects near schools:** No schools occur near the activity areas[38] shown on Figure 3-2.
- **Hazards associated with airports:** No airports occur near the activity areas.

Environmental Setting

The UNFFR Project vicinity is characterized by diverse topography, two large reservoirs, and a picturesque river corridor. On the more than 30,000 acres of land within the UNFFR Project boundary, a variety of potential hazards exist that pose risks to human health and safety. Many of these hazards are naturally occurring (e.g., steep terrain, seismic instability, fire-evolved vegetation, and fast-moving water), while other potential hazards are manmade (e.g., reservoirs, dams, and mountain roads). This section focuses on hazardous materials in the area and potential hazards associated with wildland fires and the operation of the UNFFR Project.

Although access into much of the area is limited by the rugged terrain and seasonal conditions, ample recreational opportunities attract visitors to the Chester and Lake Almanor area year-round. Visitors to Butt Valley reservoir are primarily recreationists; access is limited to over-the-snow travel in the winter (e.g., snowmobilers and cross-country skiers). Anglers and white-water boaters are the most common users of the more remote Seneca and Belden reaches of the North Fork Feather River, while fishing, boating, picnicking, and camping are popular activities at the area's reservoirs. Permanent residents reside in developments adjacent to Lake Almanor, including Chester, Prattville, and Canyon dam, as well as along both the Seneca and Belden reaches of the river.

Hazardous Materials

Operation and maintenance of the UNFFR Project facilities involve the use of lubricants and other substances that contain hazardous materials or generate hazardous waste. Polychlorinated biphenyl (PCB), a highly toxic industrial compound once used in electrical transformers, hydraulic fluids, and lubricants, was banned from manufacture in 1977. However, PCB-contaminated mineral oil is still present in some of the UNFFR Project facilities,

[38] Activity areas encompass areas surrounding and portions of Lake Almanor and Butt Valley reservoir.

including the Caribou No. 1 penstock and Caribou No. 2 powerhouse. A rockslide in February 1984 damaged these facilities, resulting in a release of PCB-contaminated mineral oil into the environment. In addition to the hazardous waste in the slide debris, some of the waste was discharged into Belden forebay and the North Fork Feather River. The slide debris was removed from the location of the slide and placed in a confined location above the floodplain of the river to comply with regulatory requirements and prevent further contamination of the water. The State Water Resources Control Board (State Water Board) and the California Department of Fish and Wildlife (formerly known as the California Department of Fish and Game) expressed concerns about the potential adverse effects of residual PCBs on fishery and wildlife resources. In response to these concerns, Pacific Gas and Electric Company (PG&E) expanded cleanup activities to remove all detectable PCBs (Gallavan pers. comm. 1984) from areas that could affect fish and wildlife and instituted monitoring efforts as part of relicensing studies.

Two state-listed hazardous waste sites occur in Plumas County; both are at the Army Depot in Herlong, California, approximately 50 miles east of Lake Almanor (California Department of Toxic Substances Control 2007). Four hazardous waste sites identified in the United States Environmental Protection Agency's Comprehensive Environmental Response, Compensation and Liability Information System database are located near Quincy, approximately 20 miles south of Canyon dam (United States Environmental Protection Agency 2004). These known hazardous waste sites are too far from the UNFFR Project to affect its operations or persons using the recreation facilities associated with the UNFFR Project. No known hazardous waste sites occur in the UNFFR Project boundary.

Wildland Fire Hazards

Mountainous topography and a mosaic of mixed-conifer and montane hardwood coupled with hot, dry summers create high fire danger in the vicinity of the UNFFR Project. Lightning accounts for the majority of the fires in Plumas County—about 60 percent of the total fire ignitions per year (Plumas County Fire Safe Council 2005). Human-caused fires have also been documented in Plumas County and within the boundary of the UNFFR Project, particularly along roadways and near developed areas. Calfire developed a Fire Hazard Zone map[39] for Plumas county which delineates parts of Project Lands as Very High Fire Hazard. The Cal Fire map focuses on areas where California has responsibility, so does not include USFS lands. Operation of the UNFFR Project facilities also creates a potential for wildland fire hazards because of the generation and transmission of electricity, as well as PG&E's ongoing maintenance and repair activities. While most fires are small (less than 1 acre), the North Fork Feather River watershed has periodically experienced significant large fires. The Storrie Fire in early September 2000, for example, burned more than 46,000 acres in the watershed, including UNFFR Project facilities near the Belden powerhouse. In 2012, the Chips fire burned more than 75,000 acres, including lands on either side of Butt Valley reservoir and the Seneca reach.

The Lassen National Forest conducts vegetation thinning projects on its lands to minimize the potential for extreme fires by removing excess fuels. Fuel reduction projects occurred in 2005

[39] Plumas County Fire Hazard Severity Zones in State Responsibility
https://osfm.fire.ca.gov/media/6746/fhszs_map32.pdf

in the areas surrounding Prattville and Canyon dam, with additional thinning along Highway 89, east of Canyon dam (Callenberger and Lunder 2009). In addition, timber management companies operating on private lands around Lake Almanor and Butt Valley reservoir undertake fuel reduction projects in the general vicinity of UNFFR Project facilities.

Fuel loading in urban interface areas is a hazard that faces many communities throughout California. The density and type of fuel loads in the general vicinity of Prattville create a hazard of surface fires with low fire behavior or passive fires with moderate fire behavior if the fire affects the tree crowns. Currently, surface fuel accumulations and understory vegetation in the vicinity of Canyon dam pose a hazard of moderate to severe fire behavior. Topography, limited access, heavy ladder fuels, and combustible vegetation could lead to extreme fire behavior with active crowning along the Seneca reach (Callenberger and Lunder 2009). Wildfires in the general vicinity of UNFFR Project would create hazards for workers, residents, and visitors facilities and for the environment.

Wildland fire, regardless of the cause, can be detrimental to the natural resources in the North Fork Feather River watershed because it can kill vegetation, burn the organic matter in litter and soil, and form impervious soil layers. These factors contribute directly to accelerated runoff during and immediately after a storm that can carry pollutants and sediment to the river and other waterbodies. Concentrated runoff discharged over a shorter period of time can result in increased flood hazards; in 2013, a large debris flow from lands burned in the 2012 Chips Fire affected a portion of the Seneca reach. Bare soils and increased runoff can also increase the risk of landslides.

Fire protection needs in the UNFFR Project vicinity are currently met by a combination of volunteer fire departments, the California Department of Forestry and Fire Protection (CalFire), and the United States Department of Agriculture, Forest Service (USFS). By law, CalFire is responsible for wildland fire protection on all private lands in Plumas County, and the USFS is responsible for wildland fire protection on all National Forest System lands. Both Cal Fire and USFS fire stations are staffed only during the summer fire season, which normally lasts from May to October. Most of the USFS-administered lands in the UNFFR Project vicinity are in Urban Wildland Intermix zones, which are areas that need to be managed to reduce the threat, spread, and potential intensity of fire. The community of Prattville is provided additional protection by the Prattville-Almanor Fire Protection District, a primarily volunteer department that provides structural fire protection and rescue services in the Prattville and Canyon dam communities throughout the year.

UNFFR Project Operational Hazards

Because the reservoirs and rivers in the UNFFR Project area are part of a dynamic hydroelectric power system, fluctuating water levels are a common occurrence. The water levels of Lake Almanor fluctuate throughout the year, with smaller fluctuations during the summer. Butt Valley reservoir water levels may fluctuate between 1 and 2 feet per day, and Belden forebay water levels may change by up to 10 feet per day. These water elevation changes do not occur so rapidly as to create a life-threatening hazard. In addition, boating is currently not allowed on Belden forebay pursuant to a Plumas County Ordinance. The Seneca and Belden reaches of the North Fork Feather River are subject to occasional dramatic and often sudden (hourly and daily) fluctuations in surface elevations as discharge rates from canyon dam or Belden dam change due to extreme weather conditions or to accommodate operational needs. PG&E uses a combination of visual and audio warning systems around its facilities to warn the public of sudden changes in water levels.

Environmental Impacts and Mitigation Measures

Methodology

The impact analysis for hazards and hazardous materials is based on a review of the existing hazards and hazardous materials in the vicinity of the UNFFR Project. Information for the environmental setting was derived from state and federal hazardous materials websites, the Plumas County Fire Safe Council, USFS Land and Resource Management Plans, and information from PG&E's relicensing application. The impact analysis qualitatively discusses the potential for Proposed Project or the alternatives to create or expose people to hazards or hazardous materials impacts.

Thresholds of Significance

Impacts associated with hazards and hazardous materials would be significant if Proposed Project or the alternatives would:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment; or
- expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

Impacts and Mitigation Measures

This section discusses the anticipated impacts related to hazards and hazardous materials associated with Proposed Project and the alternatives and identifies mitigation measures for significant impacts. Table 5.11-1compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.11-1 Summary of Hazards and Hazardous Materials (HM) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact HM-1: Construction activities associated with Proposed Project or the alternatives could expose people and the environment to hazards associated with the use of hazardous materials.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation

Table 5.11-1 Summary of Hazards and Hazardous Materials (HM) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact HM-2: Implementation of Proposed Project or the alternatives could increase the potential for wildfires and expose people to hazards from wildfires.	Less than significant	Less than significant	Less than significant	Less than significant

Impact HM-1: Construction activities associated with Proposed Project or the alternatives could expose people or the environment to hazards associated with the use of hazardous materials.

Proposed Project and Alternatives 1, 2 and 3

Under Proposed Project and the alternatives, construction activities would require the use of potentially hazardous materials (e.g., oil, fuels) to operate vehicles and construction equipment. Spills of hazardous materials at the activity areas could pose a hazard to recreationists, workers, and residents in the area and could contaminate soils or water in the vicinity of the spill.

All of the alternatives would result in construction and maintenance activities in or near one of the water bodies associated with the UNFFR Project. During the course of these activities, vehicles and vessels used to transport construction materials could accidentally discharge hazardous materials into one or more water bodies, affecting water quality in a manner that could affect one or more beneficial uses.

Applicable regulations and safety procedures outlined in section 3.6 of this RDEIR would be followed when hazardous materials are used. If a spill occurs, it would be quickly contained using a spill containment kit that would be kept onsite at all times according to the PG&E's Hazardous Materials Business Plan submitted to California Environmental Reporting System. In addition, appropriate management practices would be implemented during construction to minimize the potential for a spill or contamination of soils or water in the activity areas.

Transportation of hazardous materials to the construction or maintenance sites within the UNFFR Project area could also pose a hazard for other travelers and the environment if an accident occurs during transit. The potential for a traffic accident is higher in areas with larger traffic volumes (i.e., on State Routes 70 and 89) and where roads are steep or narrow (i.e., local roads near Butt Valley reservoir). In easily accessible areas, such as around Lake Almanor, spills could be quickly contained and cleaned up to minimize impacts. In less accessible areas, such as around Butt Valley reservoir, spills could require more effort to clean up and may have greater effects on the environment. Compliance with applicable traffic laws, hazardous materials handling, transport and disposal regulations, and safety precautions would reduce the potential for accidents and minimize environmental impacts.

Construction activities have the potential to result in hazardous materials spills. Impacts associated with hazardous materials would therefore be **significant without mitigation.**

Mitigation Measures

Mitigation Measure WQ-8: Approval of construction activities by the State Water Board (Hazardous Materials)

See section 5.5.2 for mitigation measures associated with construction activities for Proposed Project and the alternatives.

Significance after Mitigation

Implementation of Mitigation Measure WQ-8 would reduce the impact to a **less-than-significant** level.

Impact HM-2: Implementation of Proposed Project or the alternatives could increase the potential for wildfires and expose people to hazards from wildfires.

Proposed Project and Alternatives 1, 2, and 3

Under Proposed Project and the alternatives, construction and/or maintenance activities would use equipment that could ignite nearby vegetation or construction materials and cause a wildfire, creating a hazard for residents, recreationists, workers, and structures in the vicinity of the UNFFR Project area. Operational changes to UNFFR Project facilities would not increase the potential for a fire hazard, but ongoing operations (e.g., generation and transmission of electricity) would continue to create a risk for fires.

The fire potential in the Prattville intake vicinity is considered low to moderate due to a sparse understory in the surrounding forest as a result of periodic vegetation thinning to protect recreational, residential, and other uses from wildland fire risks. However, crown fires in the Prattville area have the potential to be severe and could result in substantial damage to structures. PG&E is complying with Senate Bill 901 requiring all California electric utilities to prepare plans for constructing, maintaining, and operating their electrical lines and equipment to minimize the risk of catastrophic wildfire. PG&E's 2019 Wildfire Safety Plan is available online[40].

Surface fuel accumulations and understory vegetation in the vicinity of Canyon dam create a moderate to severe fire potential. Vegetation along the Lake Almanor shore, including around the Prattville intake and at Canyon and Butt Valley dams, is limited to sporadic grasses and herbaceous weeds, which would not likely carry a fire beyond the activity areas. Although most of the area surrounding Butt Valley reservoir and, to varying degrees, the watershed of the Seneca reach were burned in the 2012 Chips Fire, this landscape still has high fuel load levels and thus has a potential for another fire. A wildfire near the Caribou intakes could create a substantial hazard to the surrounding forest and people or structures in the vicinity if the fire spreads.

[40] https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/Wildfire-Safety-Plan.pdf

Construction activities would follow standard construction practices and would have a low potential to cause a wildfire based on the fuel conditions in the activity areas and the nature and location (primarily on the water) of the activities. None of the activities or facilities would increase the potential for or severity of wildfires in the UNFFR Project area and would not increase the exposure of the public or nearby structures to fire hazards. Therefore, impacts associated with wildfire hazards would be **less-than-significant**.

5.12 Cultural Resources

This section describes the prehistory, ethnography, and history of the Lake Almanor and North Fork Feather River region and provides a general context for understanding the importance, origin, and types of cultural resources documented in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project). The section also evaluates whether the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts on cultural resources.

The following topics are not discussed in this RDEIR for the reasons noted:

- **Paleontological resources**: Neither Proposed Project nor the alternatives is expected to affect paleontological resources because no paleontological resources have been documented in the activity areas or other potentially affected areas.
- **Unique geologic or archaeological resources**: Neither Proposed Project nor any of the alternatives is expected to affect unique geological or archaeological resources because no unique geological or archaeological resources have been documented in the activity areas or other potentially affected areas.

The potential impacts of Proposed Project (described in section 3.4) were evaluated in the Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project issued by FERC. As allowed for under Section 15150 of the California Environmental Quality Act (CEQA) Guidelines, the State Water Resources Control Board (State Water Board) incorporates, by reference, applicable sections of the FERC EIS that analyze the impacts of Proposed Project on cultural resources. Since the FERC EIS did not analyze Alternatives 1, 2 or 3 (described in Section 3.5), they are discussed in this section of the RDEIR with respect to cultural resources.

Environmental Setting

The cultural resources setting is described in a regional context, with a brief description of the prehistory and history of the region and the cultural resources and traditional cultural properties in the vicinity of the UNFFR Project. The information presented in the setting section is summarized from Pacific Gas and Electric Company's (PG&E's) Cultural Resources Management Plan (CRMP) (Pacific Gas and Electric Company 2002) and is based on other cultural research of the area, as cited in the CRMP.

Regional Archaeology and Ethnography

Human occupation of lands in the vicinity of the UNFFR Project dates to the Archaic period (6,000 BC–500 AD). Evidence of human occupation from the Middle to Late Archaic periods and more recently from the Emergent period (500 AD–Historic Contact) and Euro-American contact period has been recorded and documented in previous studies in the region. Periods are characterized by their "pattern," a term that refers to a culture's technology, which is defined by the type and sophistication of its tools.

Prehistory

Evidence of human occupation during the Archaic period has been recorded at sites around Lake Almanor (Johnson 1980, Peak and Associates 1983, Pacific Gas and Electric Company

2002). Big game hunting, a representative activity during the prehistoric era, appears to be closely tied to lakes and streams, and human occupation prior to the Archaic period may have encompassed the lands around the UNFFR Project, particularly along the North Fork Feather River. Large leaf-shaped and wide-stemmed points[41] and Martis series points (corner-notched, contracting stem, and expanding stem), evidence of the Middle and Late Archaic periods, have been recorded at sites around Lake Almanor (Peak and Associates 1983, Pacific Gas and Electric Company 2002).

The Emergent period is represented by permanent villages that occupied California at the time of historic contact with Euro-American cultures. Permanent villages were established by native populations in valleys, and subsistence staples became more broadly based, with acorn, deer, and anadromous fish particularly important. In the UNFFR Project vicinity, the Emergent period is marked by the presence of Gunther-Stemmed points, Cottonwood Triangular points, and Desert Side-Notched points (Kowta 1988, Pacific Gas and Electric Company 2002). The presence of small quantities of these points and the increased use of mortars in the region are possible evidence of the Maidu's arrival into the region around 1,000 AD (Johnson 1980). Other evidence of the Maidu's early presence in the region, specifically around Bucks Lake and upper Lake Almanor, has been found in the form of points and cultural assemblages (Johnson 1980; Peak and Associates 1983; Kowta 1980, 1988).

Ethnographic Overview

The Northeastern Maidu, or Mountain Maidu, were a Penutian-speaking people who inhabited the steep slopes and mountain valleys in the vicinity of the upper reaches of the North and Middle Forks of the Feather River (Pacific Gas and Electric Company 2002). The Mountain Maidu lived in village communities with a main village or a group of smaller settlements led by a chief or headman (Dixon 1905, Kowta 1988). Typically, these communities were permanent and contained three types of structures: a large, semi-subterranean structure that served as a dance house, sweat lodge, and dwelling for the headman; a small, conically shaped, bark-covered dwelling constructed over a shallow depression; and a small dwelling with a roof made of open branches for use during summer months.

The locations of villages were dictated by access to resources and topographic features such as rivers, streams, springs, clearings, meadows, and flat upland areas (Dixon 1905, Kroeber 1976). Most meadows were associated with water bodies of various sizes and tended to remain moist or swampy year round; therefore, villages were usually established on upland areas along the edges of these features. The permanent villages served as a central point from which gathering, hunting, and traveling were conducted. The Mountain Maidu followed a yearly cycle of hunting and gathering. The Mountain Maidu spent the winter, spring, and fall months gathering seeds and fishing in the lowlands along the rivers and in the foothills and the summer months hunting in the higher elevations (Kowta 1988, Kroeber 1976).

Contact Period

The incursion of Euro-Americans into the Mountain Maidu's traditional lands had a significant, transforming effect on Maidu population and culture. By the 1830s, trappers, including Jedediah Smith and men from the Hudson's Bay Company, made contact with the Maidu

[41] Artifacts made from stone or rock.

(Dixon 1905). In 1833, the various Maidu populations were decimated by a malaria epidemic. A rapid influx of gold miners to the Feather River took place in the 1840s and 1850s. Over time, the rivers and forests in the Feather River watershed were modified by various resource management activities, and conflicts arose between Mountain Maidu populations and Euro-American settlers, resulting in a further decline in the Maidu population (Dixon 1905, Pacific Gas and Electric Company 2002).

In an attempt to resolve these conflicts, many of the Maidu were transferred to reservations in Butte, Nevada, and Amador counties and to the Nome Lackee and Nome Cult reservations in Round Valley (Pacific Gas and Electric Company 2002). Although many of the Mountain Maidu were relocated, a number of Maidu were able to remain in the Big Meadows area (present day Lake Almanor), living together with the new settlers. Over time, many Mountain Maidu returned from the reservations and were granted land allotments (Pacific Gas and Electric Company 2002). Employment was found in the ranching and logging industries and with the Great Western Power Company (now PG&E). Many present-day Mountain Maidu continue to live in the communities of Chester and Greenville, where they actively maintain their belief systems and cultural traditions and continue to pass their knowledge down through the generations.

Regional and Local History

Regional Land Uses before the Twentieth Century

Historical land use in the UNFFR Project vicinity has been dominated by mining, ranching, logging, and hydroelectric generation. Mountain valleys and the region's steep canyons influenced the historical land uses of the area. While settlements and agricultural production have been primarily limited to the valley and lowlands associated with the North Fork Feather River and its tributaries, the development of natural resources, including minerals, wood, and water, has been key to the economy of Plumas County. Extensive mining and the development of hydroelectric generation stimulated the establishment of farms and settlements throughout the watershed, especially during the late nineteenth and early twentieth centuries.

The meadow that occupied what is now inundated by Lake Almanor offered travelers and their animals a place to rest and regain strength before moving on to the Sacramento Valley. News of the meadow's resources quickly spread to other travelers, and it soon became a regular stop on the Lassen Overland Emigrant Trail (Farris and Smith 1882). While the earliest travelers lingered long enough to regain their strength, none of them intended to stay; their goal was to reach the Sacramento Valley (Pacific Gas and Electric Company 2002). Miners established a migratory pattern between the North Fork Feather River area and the Sacramento Valley, retreating to the valley during winter and returning to the area in the spring. Ranchers established self-sustaining, year-round settlements throughout the region in the 1850s.

Mining, ranching, and recreational land uses continued to dominate the region for decades, although mining opportunities began to dwindle in the latter part of the 1800s (Pacific Gas and Electric Company 2002). While ranching and mining continued into the twentieth century, the emerging logging and hydroelectric generation operations soon overshadowed their importance to the county's economy (Pacific Gas and Electric Company 2002). Commodities produced by these two growing, generally unrelated industries had a significant effect on the growth of northern California as lumber and electricity coming out of the UNFFR Project region were used to fulfill the demands of burgeoning cities, such as Redding and San Francisco.

Hydroelectric Projects in the Twentieth Century

The North Fork Feather River's potential for hydroelectric power development was first recognized during a Harvard University geological expedition conducted in the 1880s (Pacific Gas and Electric Company 2002). Recognizing this potential, financiers Edwin and Guy Earl purchased 30,063 acres of land in the early 1900s and incorporated the Western Power Company, the precursor to the Great Western Power Company of California (now PG&E), in 1902. Water appropriation claims were filed on behalf of the Earls in April 1902 (Coleman 1952, Bidwell 1956, Pacific Gas and Electric Company 2002). With additional financial backing from eastern financiers, development of a proposed major hydroelectric generation system along the North Fork Feather River was soon underway. As part of its ongoing effort toward consolidation by acquisition, PG&E purchased the Great Western Power Company in 1930. Construction of the UNFFR Project infrastructure occupied a long period of time, beginning in 1910 with the start of construction on Almanor dam (now Canyon dam). The UNFFR Project was built out in 1969 with construction of the Belden powerhouse.

Table 5.12-1 provides a timeline of community establishment and development and construction of the primary facilities associated with the UNFFR Project and other hydroelectric projects in the vicinity. A description of the components of the UNFFR Project is provided in Chapter 3, and a discussion of their eligibility for listing on the National Register of Historic Places (NRHP) and the California Register of Historic Resources (CRHR) is provided below.

Table 5.12-1 Development Timeline for the North Fork Feather River Watershed

Primary Communities in the UNFFR Project Vicinity (approximate establishment)	
1850s	Big Meadows
1867	Prattville
1870s	Caribou
1894	Chester
1900	Lake Almanor
1913	Westwood
1920s	Canyon dam
Infrastructure Development	
1902	Western Power Company formed, began purchasing land and water rights
1910	Construction begins on Almanor dam (later renamed Canyon dam)
1912	Original Butt Valley powerhouse constructed
1914	Almanor dam construction completed and Lake Almanor created
1921	Caribou No. 1 powerhouse construction completed
Early 1920s	Prattville tunnel completed

Table 5.12-1 Development Timeline for the North Fork Feather River Watershed

1924	Indian Ole dam constructed, created Mountain Meadows reservoir (aka Walker Lake)
1925	Lake Almanor capacity increased by construction of newer Canyon dam
1926	PG&E converted Caribou powerhouse into a permanent employee compound
1937	Feather River Canyon Highway (State Route 70) completed
1950	Rock Creek powerhouse and dam constructed
1950	Cresta powerhouse and dam constructed
Early 1950s	Lake Almanor storage capacity increased to 47 square miles
1956	Belden dam and forebay constructed
1958	Butt Valley powerhouse constructed
1958	Caribou No. 2 powerhouse constructed
1958	Poe powerhouse constructed
1969	Belden powerhouse constructed
1997	Butt Valley reservoir drained and dam reconstructed to meet seismic safety standards

Sources: Zemke 2006, Pacific Gas and Electric Company 2002

Cultural Resources and Traditional Cultural Properties

Cultural resources include archaeological, traditional, and built environment resources including buildings, structures, objects, districts, and sites. These resources represent human culture and heritage that have been identified and documented as being significant to local or state history, architecture, archaeology, engineering, or culture. Historic properties are defined by the National Historic Preservation Act as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places . . . .” (36 C.F.R. § 800.16(l)(1).) (See Chapter 4 for additional information on the NRHP.) Under the California Environmental Quality Act, the term historical resource is used when referring to historical or archaeological resources eligible for inclusion in the CRHR.

The term traditional cultural property (TCP) refers a particular place or property that reflects the beliefs, customs, and practices of a living human community, typically reflecting the heritage of Native American tribes. Both federally and non-federally recognized tribes can identify TCPs. TCPs are considered a type of historic property under the National Historic Preservation Act. Under California regulations, Native American TCPs are generally referred to as “Sacred Sites” and are regulated under Public Resources Code 5097.9–5097.991.

Brief discussions of the cultural resources listed or eligible for listing in the NRHP or CRHR and TCPs known to exist within the UNFFR Project boundary or that could be affected by UNFFR Project activities are provided below.

Prehistoric-Era Cultural Resources

Prehistoric-era cultural resources in the UNFFR Project vicinity can be tied to the presence of the native Maidu people. Many of these resources consist of sparse lithic scatters, while a few appear to be more extensive habitation sites (Pacific Gas and Electric Company 2002). The lithic scatters contain varying combinations and densities of obsidian, basalt, quartz, greenstone, and other types of flakes. The habitations vary in size and contain biface fragments, projectile points, or other artifacts indicative of the prehistoric era and may also contain lithic scatters. Many of the documented cultural resource sites in the UNFFR Project boundary have been modified or adversely affected by environmental factors and human activities, such as recreational uses, wave action, inundation, vandalism, and grazing (Pacific Gas and Electric Company 2002). These ongoing effects could continue to alter the features of the sites and affect their eligibility for listing on the NRHP or CRHR.

Formal evaluation of the prehistoric-era cultural resource sites would require sub-surface archaeological test investigations; however, the Maidu Consultation Group (a tribal representation group) has expressed concerns about the potential effects of archaeological test excavation and data recovery on prehistoric sites (Pacific Gas and Electric Company 2002). These concerns were also voiced in letters received from the federally recognized Susanville and Greenville Indian rancherias. The Maidu prefer that, wherever possible, preservation, education, and monitoring or patrolling of prehistoric sites be conducted regardless of NRHP eligibility. Given the Maidus' concerns and preferences for the management of prehistoric cultural resources, PG&E has elected not to conduct formal NRHP evaluations of the known sites within the UNFFR Project boundary. In the absence of such evaluations, sites within the UNFFR Project boundary containing prehistoric components are considered potentially eligible for inclusion on the NRHP and CRHR.

Traditional Cultural Properties

TCPs are an important part of Native American heritage. Several TCPs in the UNFFR Project vicinity have been identified by Maidu tribal members. These sites continue to be used for resource gathering and ceremonies or have other significance to the Maidu people. Because of the sacred nature of these resources, PG&E has not formally evaluated the NRHP eligibility of the individual sites, but informal recommendations of NRHP eligibility were made in a report prepared by Albion Environmental Inc. for the relicensing application (Pacific Gas and Electric Company 2002). The Albion report identified fourteen potential TCPs in the UNFFR Project boundary and found five sites that retain the qualities of a TCP. Although the potential TCP's have not been formally evaluated by the California State Historic Preservation Office (SHPO) for NRHP listing, PG&E has agreed to treat all unevaluated prehistoric sites as though they are potentially eligible (FERC FEIS, pp. 3-300 – 3-302, Table 3-39, pp. 3-316 – 3-317, 3-322) and included measures to manage these properties in a draft Historic Properties Management Plan (HPMP).

In addition to the TCPs considered by Albion, a Maidu cemetery may occur below the ordinary high-water mark of Lake Almanor around the Prattville intake area (reported in comments received during public scoping for the environmental impact report, September 27, 2005 meeting transcript). The current condition of any burials associated with the cemetery is unknown; however, the cemetery or burials could be TCPs or archaeological sites and eligible for NRHP listing. Despite being submerged, such resources still figure prominently in the identity of present day Maidu.

Historic-Era Cultural Resources

Historic-era cultural resources are defined as resources (e.g., site, building, structure, object, or district) that were created during or after Euro-American settlement in the region. The UNFFR Project, including its powerhouses, tunnels, and dams, is an example of the type of historic-era resources found along the North Fork Feather River (Pacific Gas and Electric Company 2002). Other types of resources in the area include sawmills; railroads; campsites associated with mining, logging, and hydroelectric projects; and ranch-related structures. Some of these resources have be inundated by the UNFFR Project reservoirs, while others have been affected by environmental factors and human activities in the area.

Most of the historic-era cultural resources were assessed for NRHP eligibility by PAR Environmental Services (Maniery and Compas 2002, Baker and Bakic 2001). Many of the historic-era sites not part of the UNFFR Project were determined ineligible, but one historic-era ranch was determined eligible (Maniery and Compas 2002). Three sites inundated by Butt Valley reservoir contain campsites, a railroad, and a sawmill and were not formally evaluated, although they are considered potentially eligible for listing on the NRHP based on previous studies.

Collectively, the UNFFR Project hydroelectric generation system has been assessed for eligibility as a historic district, and each component of the system (i.e., individual structure or group of related structures) has also been assessed individually and listed in Table 5.12-2. As a single historic district, the UNFFR Project is not considered eligible for listing, although some components may be eligible as smaller, localized districts or individual resources (Baker and Bakic 1996, Pacific Gas and Electric Company 2002). Key components in the vicinity of the activity areas include Lake Almanor, Canyon dam (referred to as Almanor dam), the Canyon dam outlet tower (referred to as the Almanor outlet tower), and Caribou No. 1 powerhouse.

Lake Almanor is, by itself, considered an important resource because of its association with the development of California's hydroelectric infrastructure and as the world's largest man-made reservoir for its time (1913 to 1927) (Baker and Bakic 1996, Pacific Gas and Electric Company 2002). Canyon dam is also an important piece of hydroelectric project development history because its construction was considered an engineering feat for the time and generated comment from hydroelectric specialists, engineers, and the media. Seismic remediation on the dam in 1996 modified the dam, but did not significantly alter its appearance or integrity. The Canyon dam outlet structure exhibits the Gothic Revival style preferred by hydroelectric facility architects throughout the United States in the 1920s. The tower has an eight-sided, steep-pitched turret shape, which clearly expresses the European castle and fortress image of the Gothic Revival style (Dames and Moore 1992). The release gates under the surface have been modified over time, but the tower remains intact and largely unmodified.

The Caribou No. 1 powerhouse at Belden forebay, downhill of Butt Valley reservoir, is important because of its association with "the planning and construction of a large, complex, and interrelated power system which serves and made possible the development of a huge urban area, the San Francisco Bay Area" (Shoup and Cornford 1987). The powerhouse represents a piece of history extending from its construction commencing in 1919 to 1924, when the third of its three generators went online, increasing its energy production (Pacific Gas and Electric Company 2002). Other than upgrading and replacing old equipment, no major modifications to the Caribou No. 1 powerhouse have occurred.

Table 5.12-3 provides a summary of the components of the UNFFR Project, by location unit, and the eligibility of each resource for listing on the NRHP, as determined by the findings of PAR Environmental Services (Baker and Bakic 2001) and discussed in the CRMP (Pacific Gas and Electric Company 2002). Resources eligible for listing on the NRHP are also considered eligible for listing on the CRHR, with the assumption that the current condition of the resource has not been adversely affected since the eligibility determination was made.

Table 5.12-2 UNFFR Project NRHP Historic District Components

Feature	Identification No.	Construction Date	NRHP Eligible	NRHP Ineligible
Almanor Unit				
Almanor (Canyon) dam	P32-001638-H	1913–1924	X	
Almanor (Canyon dam) intake tower	P32-001639-H	1913–1924	X	
Lake Almanor	—	1913–1924	X	
Prattville intake towers	P32-001640	1913–1924		X
Butt Valley tunnel	—	1958		X
Butt Valley Unit				
Butt Valley powerhouse	—	1958		X
Butt Valley dam	—	1919–1924		X
Butt Lake reservoir	—	1919–1924		X
Butt Valley dam intake tower	—	1924		X
Caribou Unit				
Caribou No. 1 powerhouse	—	1921–1924	X	
Caribou No. 2 powerhouse	—	1958		X
Caribou No. 1 penstock	—	1984		X
Caribou No. 2 penstock	—	1984		X
Belden Unit				
Belden dam	—	1958		X
Belden reservoir	—	1958		X
Belden powerhouse	—	1969		X

Source: Pacific Gas and Electric Company 2002

Environmental Impacts and Mitigation Measures

Methodology

The cultural resources impact analysis was based on information provided in the CRMP that was prepared as part of the relicensing application (Pacific Gas and Electric Company 2002) and an analysis of the anticipated effects of Proposed Project and the alternatives on eligible or potentially eligible resources. The CRMP presents the results of previous assessments of cultural resources in the UNFFR Project vicinity, including application-related studies, and discusses consultations and communications with Native American tribes and other agencies, as well as recommended measures to protect cultural resources. The CRMP is an implementing mechanism for the consideration of historic properties prescribed in the Draft Programmatic Agreement for the UNFFR Project (see Chapter 4 for a description of the Programmatic Agreement). The proposed management strategy for protecting cultural resources will be enforced through the Final Programmatic Agreement once the new UNFFR Project license is issued.

The cultural resource evaluations from previous studies, including application-related studies, were conducted in accordance with National Historic Preservation Act requirements and focus on the eligibility of the resources for listing on the NRHP based on their integrity and the NRHP criteria. The eligibility determinations discussed in the CRMP were used as the basis for determining the significance (or importance) of the resources in the impact analysis in this section. Despite not having determinations on the eligibility of resources for listing on the CRHR, current state procedure is to routinely accept for placement on the CRHR all resources that are placed on the NRHP. Following the state procedure, those resources determined eligible for the NRHP were also determined eligible for the CRHR (see Table 5.12-3).

The analysis of effects focuses on the potential for Proposed Project and the alternatives to adversely affect eligible or potentially eligible historical resources and to result in a determination that the resource(s) would no longer be considered eligible (i.e., result in a significant impact). Impacts associated with inadvertent discoveries of cultural resources or human remains were assessed based on the potential for resources to occur and the potential for ground disturbance or other activities to disturb those resources. Mitigation measures were identified to reduce significant impacts to non-significant levels.

Thresholds of Significance

Impacts on cultural resources would be significant if Proposed Project or the alternatives would:

- cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5 of the California Environmental Quality Act Guidelines; or
- disturb any human remains, including those interred outside of formal cemeteries.

Section 15064.5 of the CEQA Guidelines defines a “historical resource” to include (1) resources listed in or determined by SHPO to be eligible for listing in the CRHR, (2) resources included in certain local registers of historical resources or identified as significant in certain historical resource surveys, and (3) resources that the lead agency determines meet the criteria for listing in the CRHR, or that the lead agency otherwise considers to be historically significant.

Impacts and Mitigation Measures

This section discusses the anticipated impacts related to cultural resources associated with Proposed Project and the alternatives and, if applicable, identifies mitigation measures for significant impacts. Table 5.12-3 compares the final level of significance for each impact, (with incorporation of mitigation measures, if appropriate).

Table 5.12-3 Summary of Cultural Resources (CR) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact CR-1: Construction activities associated with Proposed Project or the alternatives could disturb or damage historical or archaeological resources .	Less than significant	Less than significant	Less than significant	Less than significant
Impact CR-2: Construction activities associated with Proposed Project or the alternatives could disturb or damage previously undiscovered historical or archaeological resources or human remains.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation

Impact CR-1: Construction activities associated with Proposed Project or the alternatives could disturb or damage historical or archaeological resources.

Proposed Project

The Proposed Project involves multiple minor construction activities (e.g., boat ramps) in and around Lake Almanor, Butt Valley reservoir, Belden forebay, and parts of the North Fork Feather River. The historical and archaeological resources identified in the cultural resource studies that have been performed to date are not co-located with any of the Proposed Project's construction activities. The FERC Staff additions to the project, summarized in Section 3.4.2, include site specific treatment measures for historic archaeological sites. The draft HPMP will be finalized as part of the project and outlines additional measures to avoid, reduce, or mitigate effects on cultural and historic resources. The HPMP will be finalized following consultation with USFS, Plumas County, and the Maidu community. The Proposed Project would not cause a substantial adverse change to any "historic resources" as that term is defined in the CEQA Guidelines that are known to be present in the UNFFR Project boundary. Therefore, the potential to disturb historical or archaeological resources is **less than significant**

Alternatives 1, 2, and 3

Construction of thermal curtains around the Prattville and Caribou intakes under Alternatives 1 and 2 would not require the excavation of material below the high-water line of Lake Almanor or Butt Valley reservoir; some excavation would be required in conjunction with construction of a new access road on the west shore of Butt Valley reservoir. Imported fill material would be used to construct the foundation for the bin walls, and anchors would be placed by divers to stabilize the curtains in Lake Almanor and Butt Valley reservoir (see Figure 3-2). All mechanical placement of materials on the inundated surface would occur in a manner that does not require any subsurface excavation, thereby avoiding any impacts to inundated surface or subsurface historical or archaeological resources. Greenville Rancheria commented that the weight of the fill and anchors could crush Native American remains, graves, or artifacts. The marginal increase in load to the lake bottom soil is a function of the density and the volume of fill. The load would be distributed over the lake bottom in a manner that provides maximum resistance to lift forces without penetrating the lake bottom or disturbing the soil below the lake bottom. Placement of fill over currently inundated surfaces could also help preserve sites known to occur in the vicinity of the Prattville and Caribou intakes and is not expected to adversely affect the features that make the sites potentially eligible. Effects on the inundated cultural resources at these two locations would therefore be **less than significant**.

Canyon dam and the Canyon dam outlet tower under Alternatives 1 and 3 are historical resources that have been determined eligible for NRHP listing and, therefore, CRHR listing. Modifications to the outlet structure gates would occur below the water surface and would require bolting steel bulkheads to gates near the bottom of the outlet structure. These modifications would be similar to previous gate modifications implemented by PG&E and would involve the use of divers' barges and cranes to install the bulkheads. The modifications would not affect the visible part of the outlet tower (the turret), which is the feature that makes it eligible, or the dam itself. Because of the eligibility of the outlet tower, PG&E would comply with the CRMP and Final Programmatic Agreement, which would require necessary precautions during construction activities to avoid accidental damage to the turret. Therefore, impacts on historical resources associated with the Canyon dam outlet structure modifications under Alternatives 1 and 3 would be **less than significant**.

None of the TCPs known to be present in the UNFFR Project boundary would be affected by the alternatives.

Impact CR-2: Construction activities associated with Proposed Project or the alternatives could disturb or damage previously undiscovered historical or archaeological resources or human remains.

Proposed Project and Alternatives 1, 2, and 3

The UNFFR Project vicinity has an extensive cultural history, and many prehistoric and historic cultural resources have been documented within its boundary. Based on the area's history and the extent of cultural resource discoveries, it is possible that previously undiscovered historical and archaeological resources, such as lithic scatters, prehistoric habitations, historic campsites, and remnants of hydroelectric project construction, exist in the activity areas and vicinity. Buried or previously undiscovered resources, including new features of previously recorded sites, could be encountered during ground-disturbing activities on the shore, in upland areas, or underwater. None of the activities would involve dredging or excavation in the water; therefore, inundated resources are not expected to be adversely affected (see Impact CR-1). Ground disturbance along the shores and in upland areas could result from staging activities, equipment storage, vegetation removal, road creation, and other elements of the 2004 Settlement Agreement. These activities would involve minimal soil disturbance and would have a low potential to disturb buried resources. However, if resources are discovered, impacts on the resources could be significant if they are determined eligible for listing on the NRHP or CRHR and the impact would affect their eligibility.

Neither Proposed Project nor the alternatives would alter the seasonal water-level elevations in Lake Almanor. The pattern of inundation (e.g., seasonal exposure during periods of low water) to which historical and archaeological resources below the ordinary high water mark of Lake Almanor are currently exposed would be similar to current conditions, with occasional wave action and periodic changes in the water surface elevation. Neither Proposed Project nor the alternatives would increase the potential for adverse effects on discovered or undiscovered resources near the lake's surface.

The installation of a thermal curtain around the Prattville intake is not expected to disturb inundated burials that are part of a possible Maidu cemetery. Construction would not entail underwater excavation or dredging, but fill material would be placed in the water for the bin walls, and anchors would be installed along the bottom of the lake to secure the curtain in place. These anchors would be installed by divers to minimize disturbance along the lake bottom.

Should previously undiscovered eligible historical or archaeological resources or human remains that are eligible for listing on the NRHP or CRHR be encountered during construction, PG&E would comply with the CRMP and Final Programmatic Agreement by assessing the resource(s) and determining appropriate measures to avoid or reduce impacts. In the absence of specific details on such undiscovered resources or specific treatment measures, adverse impacts could be **significant without mitigation**.

Mitigation Measures

Mitigation Measure CR-2a: Implement Treatment Measures and Record Previously Undiscovered Resources

PG&E will comply with relevant measures in the CRMP and Programmatic Agreement if potential cultural resources are discovered during construction activities. If a discovery is made, construction will cease immediately within the vicinity of the discovery and PG&E's Cultural Resources Specialist and Hydroelectric Superintendent will be notified immediately. The find will be examined by a qualified professional archaeologist to determine if it is a cultural resource. Any cultural resources discovered during construction will be recorded according to accepted contemporary standards. If significant impacts to the resource are unavoidable, it will be evaluated to determine eligibility for listing on the CRHR. PG&E will identify any impacts on the resources and will identify specific treatment measures if eligible resources would be significantly affected. PG&E will implement any specific measures necessary to avoid, reduce, or mitigate significant impacts, including protection in place, interpretation, data recovery, or curation of recovered materials.

Mitigation Measure CR-2b: Implement Treatment Measures for Human Remains

PG&E will comply with appropriate measures in the CRMP and Programmatic Agreement if human remains are discovered during construction activities. If removal is necessary, remains will be treated according to the provisions set forth in Section 7050.5 of the California Health and Safety Code and Section 5097.98 of the California Public Resources Code.

Significance after Mitigation

The mitigation measures fall outside the purview of the State Water Board. However, PG&E has agreed to implement Mitigation Measures CR-2a and CR-2b, as proposed in an email dated March 3, 2014 (Appendix H). Implementation of Mitigation Measures CR-2a and CR-2b would reduce potential impacts on previously undiscovered historical or archaeological resources or human remains encountered during construction to a **less-than-significant**

Level.

5.13 Transportation and Traffic

This section describes the transportation network and traffic conditions in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts on transportation and traffic.

The following topics are not discussed in this section for the reasons noted:

- **Air Traffic**: Neither Proposed Project nor the alternatives would affect air traffic patterns, local airports, or landing strips.
- **Hazardous Road Features**: Neither Proposed Project nor the alternatives would involve road modifications that could create hazardous design features.
- **Alternative Transportation**: Neither Proposed Project nor the alternatives would affect alternative forms of transportation.

Environmental Setting

Transportation Network

The main highways in Plumas County are State Routes (SRs) 70, 89, and 36 (Figure 5.3-1). These highways connect to local roads managed by the United States Department of Agriculture, Forest Service (USFS), Plumas County, and private entities that provide essential access for Pacific Gas and Electric Company (PG&E) personnel who maintain UNFFR Project facilities and for commercial, residential, and recreational access for the public. Motorists using the main highways include recreationists, construction and maintenance workers, local commuters, truck drivers, and others traveling through Plumas County to other destinations. Local roads associated with the UNFFR Project facilities are primarily used by PG&E personnel, the USFS and other agency personnel, and recreationists.

SR 70, also known as the Feather River Highway, provides access to the central part of Plumas County from SR 99 and Oroville in Butte County and from U.S. Highway 395 in southeastern Lassen County. SR 70 follows the North Fork Feather River canyon and East Branch of the North Fork Feather River and connects to SR 89 about 15 miles east of the confluence of the East Branch with the Belden reach. SR 89 follows Indian Creek and passes through Crescent Mills and Greenville as it heads north along the western side of Lake Almanor. SR 89 is a well-used transportation corridor between communities in the Lake Almanor basin and Quincy, the Plumas County seat. SR 89 connects to SR 36 northwest of Lake Almanor. SR 36 is a major transportation corridor between Red Bluff and Susanville, with connecting access into Lassen Volcanic National Park and to U.S. Highway 395 toward the Reno area. SR 36 passes through Chester and crosses Lake Almanor via a causeway at the northern end of the lake.

SR 70 is also designated the Feather River Scenic Byway, a 130-mile-long USFS-designated scenic byway that provides scenic views along the Feather River and through the Sierra Nevada (National Scenic Byways Program 2009). The segments of SR 89, 36, and 147 around Lake Almanor are part of the 500-mile-long Volcanic Legacy Scenic Byway, an all-

American road. A description of the visual setting of the area is provided in section 5.9, Aesthetics, of this RDEIR.

Residential, commercial, and recreation access to the Lake Almanor area is provided by SR 89, 36, and 147, and local roads provide access to the other UNFFR Project facilities. SR 147 is a 12-mile-long road following the eastern side of Lake Almanor from its intersection with SR 36 near Westwood to its intersection with SR 89 east of Canyon dam. The 4.2-mile-long County Road A-13 connects SR 36 to SR 147 west of the SR 147–SR 36 intersection and provides access to the Lake Almanor and Hamilton Branch communities. Caribou Road provides primary access to the Caribou and Oak Flat powerhouses, Butt Valley reservoir, and Belden forebay. Prattville–Butt Reservoir Road provides access from Butt Valley reservoir to SR 89 and Lake Almanor, including the Prattville intake activity area. Five UNFFR Project roads are essential to PG&E operations and maintenance: Butt Valley Dam Road, Butt Valley Powerhouse Spurs, Oak Flat Powerhouse Road, French Creek Road, and Belden Surge Chamber Road. Characteristics of these and other roads in the area are summarized in Table 5.13-1, excerpted from the Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project (Federal Energy Regulatory Commission 2005).

Table 5.13-1 UNFFR Project Roads

Road Name	Surface	Maintenance Responsibility	Length (miles)	Notes
Belden Surge Chamber Road	Native	PG&E	0.7	Spur off Longville-Belden spur
Butt Valley Powerhouse Spurs	Aggregate/ asphalt	PG&E	0.4	Two spur roads provide access to Butt Valley powerhouse.
Caribou Road	Paved	PG&E/USFS	7.8	Provides access to Caribou powerhouses.
French Creek Road	Aggregate	PG&E	0.3	Provides access to local potable water supply system
Oak Flat Powerhouse Road	Aggregate	PG&E	0.2	Spur off Caribou Road
Prattville–Butt Reservoir Road	Aggregate/ asphalt	Plumas County	10.4	Plowed in winter by PG&E

Source: Federal Energy Regulatory Commission 2005.

Recreation access to sites along the North Fork Feather River is provided via undeveloped pullouts along SR 70 and Caribou Road as well as designated parking areas. Various USFS, county, and private roads provide access from SR 89 to recreation sites around Lake Almanor.

Recreationists also park along the roads where parking areas are not available or are at capacity, which is common during holiday weekends in summer months.

Trails provide another form of transportation around Lake Almanor and along the North Fork Feather River. The main trails include the Lake Almanor Recreation Trail along the southwest side of the lake, the North Fork fishing trail upstream of Caribou No. 1 powerhouse, and the Yellow Creek, Indian Springs, and Pacific Crest trails at the Belden rest stop (Federal Energy Regulatory Commission 2005). Additional details on recreational uses of the area are provided in section 5.8, Recreation.

The California Department of Transportation is considering improvements to SR 89 in the vicinity of Canyon dam, including the roadway that crosses the dam. These improvements may have potential impacts on traffic and transportation.

Traffic Conditions

Traffic counts on the state highways (SR 70, 89, and 36) are recorded annually by Caltrans' Traffic Data Branch. Annual average daily traffic volumes in 2014 for the segments of the highways near the UNFFR Project are provided in Table 5.13-2 (California Department of Transportation 2014). Average annual daily traffic ranges from 1,450 to 2,600 vehicles on SR 70 between the Butte/Plumas County line and SR 89; from 1,550 to 2,050 vehicles on SR 89 between SR 70 and SR 36; and from 2,850 to 3,800 vehicles on SR 36 between SR 89 and Big Springs Road. The level of service (LOS) of these highways derived from 2008 traffic volumes (2014 LOS was not available from Caltrans) ranged from LOS B to D on SR 36 between SR 89 and County Road A-13 and from LOS C to D on SR 89 from SR 36 to just east of Canyon dam (Lumos & Associates 2011). The desired LOS for these state highways is at least LOS D (California Department of Transportation 1994).

Definitions of LOS B, C, and D are:

- **LOS B:** Traffic flow is stable, and speeds are at or near the posted speed limit on level terrain. Passing has minimal constraints.
- **LOS C:** Traffic flow is susceptible to congestion, and speeds are within 10 miles per hour of the speed limit. Passing becomes more constrained.
- **LOS D:** Traffic flow is variable, and passing becomes difficult. Average speed is within 15 miles per hour of the speed limit.

Table 5.13-2 Annual Average Daily Traffic (AADT) on State Highways

State Highway	Segment Start	AADT
70	Butte/Plumas County Line	1,450
70	Junction with SR 89 North	2,600
89	Junction with SR 70	2,050
89	Arlington Road	2,050
89	Stampfli Lane (Eagle Mine)	2,300
89	Greenville (Main Street)	2,7,50

Table 5.13-2 Annual Average Daily Traffic (AADT) on State Highways

State Highway	Segment Start	AADT
89	Junction with SR 147	1,100
89	Almanor	1,550
89	Junction with SR 36; Chester West	41,550
36	Junction with SR 89	2,850
36	Farrar Drive (in Chester)	2,900
36	Feather River Bridge (in Chester)	4,800
36	Chester, Melissa Avenue	3,800
36	Big Springs Road	3,800

Source: California Department of Transportation 2008.

The UNFFR Project roads have been rated by PG&E using the USFS classification system. Under this system, the majority of the roads operate at a traffic service level C (Federal Energy Regulatory Commission 2005), 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. Portions of Caribou Road and Prattville–Butt Reservoir Road operate at a traffic service level B, which means they are congested during periods of heavy traffic, have slower speeds, and high dust along unpaved sections, but are capable of accommodating all legal vehicles. Belden Surge Chamber Road operates at a traffic service level D, which means it has slow or blocked traffic flow, a rough and irregular surface, and is difficult for two-way traffic, but is capable of accommodating high-clearance vehicles.

Environmental Impacts and Mitigation Measures

Methodology

The analysis of transportation and traffic impacts is based on characteristics of the transportation network and traffic conditions for local highways and roads and a qualitative discussion of increased traffic and traffic-related hazards associated Proposed Project and the alternatives. Information for the environmental setting was collected from the Caltrans website (http://www.dot.ca.gov/), Plumas County Regional Transportation Plan, Plumas County Department of Transportation traffic report, and information from PG&E's relicensing application. The impact analysis addresses the effects of construction- and operation-related traffic on the local transportation network.

Thresholds of Significance

Impacts on transportation or traffic would be significant if Proposed Project or the alternatives would:

- cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., would result in a substantial increase in the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections);
- create safety hazards for other motorists; or
- result in inadequate emergency access or parking capacity.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of Proposed Project and the alternatives on traffic and the transportation network and identifies mitigation measures for significant impacts. Table 5.13-3compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.13-3 Summary of Transportation and Traffic (TT) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact TT-1: Construction activities associated with Proposed Project or the alternatives would generate a short-term increase in traffic and could affect traffic flow on local highways and roads.	Less than significant	Less than significant	Less than significant	Less than significant
Impact TT-2: Construction activities associated with Proposed Project or the alternatives could increase traffic hazards and impede emergency access.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation

Impact TT-1: Construction activities associated with Proposed Project or the alternatives would generate a short-term increase in traffic and could affect traffic flow on local highways and roads.

Proposed Project and Alternatives 1, 2, and 3

Construction activities associated with Proposed Project and the alternatives may involve the use of construction equipment, haul trucks to transport the materials, and construction worker vehicles at various locations proposed for development or improvement of recreation and other project-related facilities described in section 3.4 and 3.5 of this RDEIR. Heavy equipment would be transported to these areas at the beginning of construction and would be removed when it is no longer needed. Haul trucks would be used more frequently as materials and supplies are needed. Worker traffic would occur on a daily basis (typically Monday through Friday) for the duration of construction.

Construction traffic would primarily use SR 70 and SR 89 to access the Lake Almanor area under Alternatives 1, 2, and 3. Under Alternatives 1 and 2, construction traffic would follow local roads to the Prattville activity area. Construction traffic would use SR 89 and adjacent areas along the dam for access to the Canyon dam activity area. Construction traffic would contribute to the daily traffic on SR 89 and to some degree on SR 70 throughout construction (estimated to last two construction seasons), but the increase in traffic would not be substantial and would typically be limited to Mondays through Fridays when recreational traffic is lower. The increased construction traffic is not expected to contribute to a decreased LOS along the highways. SR 89 near Canyon dam and the Prattville intake currently operates at an acceptable LOS D or better, and the number of vehicle trips generated by the construction activities would not be substantial enough to reduce highway conditions to LOS E or worse.

Construction traffic accessing the Caribou intakes activity area under Alternatives 1 and 2 would use local UNFFR Project roads, primarily the Prattville–Butt Reservoir Road and possibly Caribou Road, in addition to SR 70 and SR 89. Haul trucks would be expected to use Prattville–Butt Reservoir Road because of the steep grade on Caribou Road. Winter conditions in the area may prevent access on some roads, but Prattville–Butt Reservoir road is maintained in good condition and would be capable of handling construction traffic throughout the year.

Construction activities would not substantially increase traffic volumes along SR 70 or SR 89. Caribou and Prattville–Butt Reservoir roads currently operate at acceptable levels, and the increase in traffic from construction activities would not degrade their operating conditions. Impacts on traffic conditions would be **less than significant**.

Impact TT-2: Construction activities associated with Proposed Project or the alternatives could increase traffic hazards and impede emergency access.

Proposed Project and Alternatives 1, 2, and 3

Construction equipment and trucks accessing the UNFFR Project area would create safety hazards for other motorists along SR 89 as the slow-moving vehicles travel along and enter or exit the highway, increasing the potential for accidents. Temporary delays would occur during periods of higher truck traffic at the beginning of construction and when equipment and materials are transported to and from the area. These delays could impede emergency access vehicles from quickly reaching their destinations and increase driving times for recreationists and others passing through the area. No road or lane closures are expected to be necessary, and traffic conditions would return to normal following construction. Traffic control measures would be implemented during construction to alert drivers to the activity areas and expected delays.

Under Alternatives 1 and 2, construction traffic on Prattville–Butt Reservoir Road and to a lesser extent on Caribou Road could create hazards for recreationists using pullouts or parking areas along the roads in addition to delaying emergency access vehicles. Access to the Butt Valley reservoir is limited to winding, steep, and narrow roads, which increase the potential for accidents and decrease accessibility for emergency vehicles. Existing traffic includes maintenance vehicles and recreation users, with little residential or through traffic. Construction traffic, including heavy equipment (e.g., road grader) used to maintain these roads during construction, would create hazards for other motorists and could limit accessibility to some areas because of the narrow roads. Because of the existing road conditions, the use of these local roads by construction traffic would create a substantial safety hazard.

Because of the increased potential for safety hazards associated with construction traffic, impacts associated with potential traffic hazards and emergency access would be **significant without mitigation**.

Mitigation Measures

Mitigation Measure TT-2: Implement Traffic Control Plan

PG&E will implement a traffic control plan during construction activities to alert motorists to the activity areas and truck traffic. The plan will include details concerning construction routes, emergency access, reductions in speed limits through the construction zones, signage and appropriate traffic control devices, illumination during limited visibility, and use of safety clothing/vests to ensure visibility of construction workers by motorists. Additional elements of the plan include provisions that signs will be posted along the highways near the activity areas to notify motorists about trucks entering or exiting the highway, the locations of activity areas, and the duration of construction and that all traffic control measures will be removed at the end of construction.

Significance after Mitigation

Mitigation measure TT-w falls outside the purview of the State Water Board. However, PG&E has agreed to implement Mitigation Measure TT-2, as proposed in an email dated March 3, 2014 (Appendix H). Implementation of Mitigation Measure TT-2 would reduce the potential impacts related to safety hazards to a **less-than-significant** level.

5.14 Air Quality

This section describes the climate and air quality conditions in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and analyzes the potential effects of the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license on air quality and odors.

The potential impacts of Proposed Project were evaluated in the Final Environmental Impact Statement (EIS) for the Upper North Fork Feather River Project issued by FERC. As allowed for under Section 15150 of the CEQA Guidelines, the State Water Resources Control Board (State Water Board) incorporates, by reference, applicable sections of the FERC EIS that analyze the impacts of UNFFR Project operations on air quality.

Environmental Setting

Climate and Topography

Plumas County is in northeastern California where the Sierra Nevada and Cascade Range meet. The county's four-season climate attracts visitors and residents to the area. It also provides good conditions for hydropower production. Temperatures range from an average low in January of 18°F in Portola to an average high in July of 91°F in Quincy (Plumas County Fire Safe Council 2005). Annual precipitation ranges from 82 inches in Strawberry on the west side of the county to 22 inches in Portola on the east side of the county. The major canyons in the county, including the North Fork Feather River canyon, affect wind patterns and create localized variations in climate and air quality. The wide range of elevations—1,600 feet to more than 10,000 feet at Mt. Lassen—also influences variations in climate across Plumas County. Within the UNFFR Project boundary, the difference in elevation of Lake Almanor and Belden powerhouse is more than 2,000 feet, which results in climate variations between the upper and lower facilities.

At Lake Almanor, precipitation occurs primarily during the winter months, with substantial snow accumulation (Federal Energy Regulatory Commission 2005). Normal annual precipitation at Lake Almanor and at Butt Valley reservoir is approximately 38 inches, and summer months are typically dry and mild with occasional summer thunderstorms. Average monthly temperatures in Chester near the shore of Lake Almanor range from lows of 31°F in January to highs of 67°F in July (Northern Sierra Air Quality Management District 2005). Because the Caribou and Belden powerhouses are at lower elevations than the reservoirs, seasonal temperatures tend to be higher at the powerhouses. Annual average precipitation at the Caribou powerhouses and Belden powerhouse is 41 inches, and snow accumulation is typically rare.

Regional Air Quality

Plumas County is in the Mountain Counties Air Basin, and air quality is regulated by the Northern Sierra Air Quality Management District (AQMD). The county has generally good air quality, but air pollutants from the Sacramento region, and to a lesser extent the San Francisco Bay Area, are occasionally transported into Plumas County during strong northerly winds. Wildfires also create a source of smoke and poor air quality, primarily during the summer months.

The State established California ambient air quality standards (CAAQS) for 10 criteria pollutants, and the California Air Resources Board (CARB) is tasked with assigning area designations based on available air quality data and the CAAQS (see Chapter 4 for description of standards). The CAAQS are more stringent than the national ambient air quality standards (NAAQS) established by the United States Environmental Protection Agency (USEPA). USEPA classifies areas as attainment, nonattainment, or unclassified based on the NAAQS. Plumas County is classified as nonattainment for respirable particulate matter (PM10) under the CAAQS and is in attainment or unclassified for other CAAQS and all NAAQS. The nonattainment status is likely a result of periodic smoke from wildfires, dust, and pollutant accumulation from the Sacramento region.

Ambient Air Quality

The Northern Sierra AQMD and CARB monitor air quality in Plumas County at three monitoring stations. The Chester monitoring station at 222 1st Avenue is closest to the UNFFR Project (northwest shore of Lake Almanor), and the Quincy monitoring station on North Church Street is about 15 miles southeast of the UNFFR Project. The Chester station collects data on PM2.5. The Quincy station collects data on PM2.5 and weather. The Quincy station formerly monitored ozone and PM10 (replaced by PM2.5 monitoring). Data collected at these stations during the month of August 2009 indicate generally good air quality, with occasional violations of the federal 24-hour standard for PM2.5 in Quincy (California Air Resources Board 2009). Chester air quality remained under the 24-hour standard throughout the month. Annual and monthly averages were not available for recent years; however, based on the air quality monitoring data for the first part of 2009, exceedances of the CAAQS for PM10 likely occurred periodically throughout the year.

Particulate matter is the primary pollutant of concern in Plumas County and in the vicinity of the UNFFR Project, especially in areas of concentrated development around Lake Almanor and, to a lesser degree, Butt Valley reservoir. Particulate matter consists of fine mineral, metal, soot, smoke, and dust particles suspended in the air. For health reasons, particulate matter that is less than 10 microns in diameter (PM10) is monitored throughout the state. Primary contributors to PM10 include wood stoves, wind-blown dust from dirt roads and agriculture, open burning from backyard burn piles, and prescribed burning. Wildland fires and construction activities also result in short-term increased levels of particulate matter. The electrical facilities associated with the UNFFR Project create a risk for wildfires, and several small fires and at least one large fire have been reported in the area by PG&E, although the ignition source may not have been from the UNFFR Project facilities (Federal Energy Regulatory Commission 2005). Diesel emissions from construction equipment and dust from ground disturbance also affect air quality. Some of these sources contribute to increases in local PM10 concentrations, while others, such as vehicle traffic and periodic wildland fires, affect regional concentrations.

Odors

During the fall months, the water released from Canyon dam into the Seneca reach has carried hydrogen sulfide odors, which are occasionally noticeable from State Route (SR) 89 (Federal Energy Regulatory Commission 2005). Odors are most noticeable during normal and wet water years when the Canyon dam outlet draws water from the hypolimnion (lower level) of Lake Almanor. The odors are a result of sulfates at the water/sediment level of the lake being reduced to sulfides under low dissolved oxygen concentrations and the release of hydrogen sulfide into the air as the water is released below the dam. Water drawn from the metalimnion (middle layer) of the lake during below normal water levels tends to be lower in sulfides and has a less noticeable odor. This topic is discussed in detail in Section 5.5, Water Quality.

Sensitive Receptors

Plumas County is a rural mountain county with a few urban areas along the major highways. Rural residences are scattered throughout the county. Near the UNFFR Project facilities, development is primarily limited to Chester, Prattville, Greenville, and other communities along SR 70, SR 89, and SR 36 and around Lake Almanor. Recreational uses are the dominant public use along the North Fork Feather River and at Lake Almanor and Butt Valley reservoir. Sensitive uses around the UNFFR Project facilities that could be affected by air quality are predominantly recreation-based, with scattered residential uses. The residential and recreation receptors may include children, the elderly, and other health-sensitive people, who have higher sensitivity to air pollution.

The primary sensitive receptors within the general vicinity of the UNFFR Project include recreationists at the campground, boat launch, and viewing areas near Canyon dam; recreationists at day use areas, boat launches, and other recreation sites near the Prattville intake; recreationists (boaters and fishermen) on the water at Lake Almanor near Canyon dam and the Prattville intake; residents and workers at the PG&E camp downstream of Canyon dam; residents in the communities near the Prattville intake; and various wildlife. The Prattville community is approximately 0.3 mile southeast of the Prattville intake, and the Almanor community is approximately 0.5 mile northeast of the Prattville intake. The Canyon dam community is approximately 0.8 mile east of Canyon dam. The primary sensitive receptors in the vicinity of the Caribou intakes activity area at Butt Valley reservoir include campers, boaters (fishing and sailing), other recreationists on the east shore, and wildlife. No residential uses occur in the vicinity of Butt Valley dam.

Environmental Impacts and Mitigation Measures

Methodology

The air quality impact analysis is based on air quality information for Plumas County and a qualitative discussion of increased emissions associated with Proposed Project and the action alternatives. Key sources used to define the environmental setting include the Northern Sierra AQMD website (http://www.myairdistrict.com/), Plumas County website (http://www.countyofplumas.com/), and relevant technical reports. Increased emissions from construction activities and traffic were qualitatively analyzed in terms of their potential to contribute to air quality violations in the area or to exceed air quality standards.

Thresholds of Significance

Impacts on air quality would be significant if Proposed Project or the alternatives would:

- result in a cumulatively considerable net increase of any criteria pollutant (e.g., PM_{10}) for which the region is in non-attainment;
- expose sensitive receptors to substantial pollutant concentrations; or

- result in other emissions, such as those leading to odors that would adversely affect a substantial number of people.

Impacts and Mitigation Measures

This section discusses the anticipated impacts of Proposed Project and the alternatives on air quality and identifies mitigation measures for significant impacts. Table 5.14-1 compares the final level of significance for each impact with incorporation of mitigation measures if appropriate.

Table 5.14-1 Summary of Air Quality (AQ) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact AQ-1: Construction activities associated with Proposed Project or the alternatives would generate fugitive dust and result in a cumulatively considerable net increase of particulate matter.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact AQ-2: Construction traffic associated with Proposed Project or the alternatives would contribute to air pollution along access routes.	Less than significant	Less than significant	Less than significant	Less than significant
Impact AQ-3: Proposed Project or the alternatives could generate odors that would affect sensitive receptors at Lake Almanor and along the North Fork Feather River.	No impact	Less than significant	No impact	Less than significant

Impact AQ-1: Construction activities associated with Proposed Project or the alternatives would generate fugitive dust and result in a cumulatively considerable net increase of particulate matter.

Proposed Project and Alternatives 1, 2, and 3

Construction activities would involve truck and equipment traffic on unpaved surfaces and ground disturbance at various locations throughout the UNFFR Project area in conjunction with implementation of Proposed Project, as well as activities associated with the alternatives. Depending on the time of year and climatic conditions, these activities have the potential to generate fugitive dust. Equipment and truck exhaust would emit particulate matter, nitrogen oxides, reactive organic gasses, and other pollutants. Diesel particulate matter is a toxic air contaminant (TAC), and exposure to TACs can result in adverse health effects, particularly for people sensitive to air quality impacts. Under Alternatives 1 and 2, fugitive dust and pollutant emissions from construction activities at Prattville intake could create unhealthy conditions within and adjacent to this activity area and for residents to the south of the area. Under Alternatives 1 and 3, pollutant emissions from construction activities at Canyon dam could create unhealthy conditions for travelers along SR 89, residents and workers at the PG&E camp to the south, and recreationists at the nearby day use area, campground, and on the lake.

Under both Alternatives 1 and 2, construction activities at Butt Valley reservoir would result in fugitive dust and particulate matter emissions similar to those described for the Lake Almanor area; however, air quality impacts at Butt Valley reservoir would affect fewer sensitive receptors because no residences occur in the vicinity of Butt Valley dam, and recreational use is focused on the eastern shore of the reservoir.

Although construction emissions would be temporary and primarily localized around specific construction areas, the increase in particulate matter would result in a cumulatively considerable net increase of particulate matter in the county . Operation of construction equipment will be required to comply with the Northern Sierra AQMD air quality rules and applicable permits, and PG&E would be required to minimize fugitive dust and emissions. However, construction impacts on air quality would be **significant without mitigation** because of the proximity of sensitive receptors and the existing nonattainment status of Plumas County for particulate matter.

Mitigation Measures

Mitigation Measure AQ-1: Implement a Fugitive Dust and Emission Control Plan

Construction projects could result in temporary air quality effects. During ground disturbing construction projects, PG&E shall implement the following requirements:

- Construction access roads and the construction site will be sufficiently watered to prevent excessive amounts of dust.
- Pursuant to the California Vehicle Code (Section 23114), cover or maintain adequate freeboard on all trucks hauling soil or other loose material to and from the activity area to ensure retention of materials within the truck bed (e.g., ensure 1 to 2 feet vertical distance between top of load and the trailer).
- Suspend all ground-disturbing activities with the potential to generate dust when winds exceed 20 miles per hour.
- Designate a qualified person to monitor dust control and order increased watering as necessary to prevent transport of dust offsite. This person would also respond to any citizen complaints. In the event that conditions become unfavorable, the monitor would have the authority to modify or slow down operation until conditions are acceptable again.
- After construction is complete, the construction site(s) will be seeded with native grasses or plants consistent with USFS or land owner requirements.

- Equipment engines will be maintained in good condition with proper tuning, as set forth in manufacturers' specifications.

Significance after Mitigation

This mitigation measure falls outside the purview of the State Water Board. However, PG&E has agreed to implement Mitigation Measure AQ-1, as proposed, in an email dated March 3, 2014 (Appendix H). Implementation of Mitigation Measure AQ-1 would reduce fugitive dust and particulate matter emissions to a **less-than-significant** level.

Impact AQ-2: Construction traffic associated with Proposed Project or the alternatives would contribute to air pollution along access routes.

Proposed Project and Alternatives 1, 2 and 3

Construction traffic accessing the UNFFR Project areas would use SR 70, SR 89, and local roads in the vicinity of Lake Almanor, Butt Valley reservoir and along the Seneca and Belden reaches of the North Fork Feather River. Truck and worker vehicle emissions would contribute to existing motor vehicle emissions in the region. However, construction traffic emissions would be temporary and would not result in a substantial increase in air pollutants based on the anticipated number of workers and the equipment expected to be used. Plumas County is currently in nonattainment status for particulate matter and the portion of Plumas County in the general vicinity of the UNFFR Project is in attainment or unclassified for other pollutants. Construction-related impacts associated with particulate matter are discussed under Impact AQ-1. Traffic-related impacts on other pollutants during the construction period would be **less-than-significant** and would not result in a cumulatively considerable net increase in particulate matter.

Impact AQ-3: Proposed Project or the alternatives could generate odors that affect sensitive receptors at Lake Almanor and along the North Fork Feather River.

Proposed Project

No increase in odors are anticipated under Proposed Project. The activities associated with Proposed Project are not expected to generate odor around Lake Almanor or increase odors in water released downstream. Odors are not currently a concern. Proposed Project would have **no impact** on odors.

Alternatives 1 and 3

Modifications to the Canyon dam outlet structure would result in substantial increases in the quantity of cool water pulled from the hypolimnion of Lake Almanor and released into the North Fork Feather River between June and September. The release of hypolimnion water could result in hydrogen sulfide odors similar to those that are currently noticeable near Canyon dam along SR 89 during the fall, but the increased quantity of water is expected to dilute the odors. These odors may be noticeable to recreational users in the immediate vicinity of the North Fork Feather River just below Canyon dam, but they would not affect a large area or a substantial number of people. Odors resulting from the increase in Canyon dam releases would have a **less-than-significant** impact.

Alternative 2

No odor impacts are anticipated under Alternative 2. The thermal curtains at Prattville intake and Butt Valley reservoir are not expected to generate odor or increase odors in water released downstream. Odors are not currently a concern at these locations. Alternative 2 will have **no impact** on odors.

5.15 Noise

This section describes the noise setting in the vicinity of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) and evaluates whether the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license would result in impacts on the noise environment.

The following topic is not discussed in this section of RDEIR for the reason noted:

- **Airport Noise:** None of the activities included in Proposed Project or the alternatives would expose sensitive receptors to airport noise.

Environmental Setting

Noise Overview

Noise is generally defined as excessive and unwanted sound. Noise levels are measured by the extent of pressure exerted by a sound using an A-weighted decibel scale (dBA). The dBA scale correlates to the range of sounds audible to the human ear (where 10 dBA is at the low threshold of hearing and 120–140 dBA is the threshold of pain). Table 5.15-1 identifies typical noise levels for common activities. Human responses to noise are subjective and may include:

- annoyance and dissatisfaction;
- interference with activities such as speech, sleep, and learning; and
- physiological effects such as hearing loss or sudden startling.

The subjective effects of noise are difficult to measure as are the corresponding reactions of annoyance and dissatisfaction. Individual tolerance thresholds vary widely based on an individual's past experiences with noise and the environment. The intensity, duration, frequency, and time of the noise and any existing background noises can influence individual responses to noise.

Table 5.15-1 Noise Levels for Common Sources

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Civil defense siren (100 feet)	130-140		Pain threshold
Jet takeoff (200 feet)	120		
	110	Rock music concert	Very loud
Pile driver (50 feet)	100		
Ambulance siren (100 feet)	90	Boiler room	
Normal boat (50 feet)	80	Printer	Loud
Pneumatic drill (50 feet)		Garbage disposal	
Freeway (100 feet)	70		Moderately loud
Vacuum cleaner (100 feet)	60	Department store/office	
Light traffic (100 feet)	50	Private business office	Quiet
Large transformer (200 feet)	40		
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
	0-10		Hearing threshold

Note: The A-weighted sound level deemphasizes very low and very high frequency components of sound similar to the response of the human ear

Noise Sources

Major sources of noise in Plumas County include highway traffic, trains, airport operations, and local industrial uses (e.g., sawmills and mining activities). Boat noise is also a consideration in the vicinity of both Lake Almanor and Butt Valley reservoir, primarily during the period between Memorial Day and Labor Day. The community noise equivalent level (CNEL) of these noise sources can exceed 65 decibels (dB), which is the normally acceptable maximum noise level for residential uses in the county (Plumas County 2004).

Primary sources of noise in the vicinity of the UNFFR Project area include vehicle traffic, trains, hydroelectric facility operations, and recreation activities (e.g., power boats). The Lassen National Forest maintains an air base on the north shore of Lake Almanor on the outskirts of

Chester, California, with planes and helicopters for fire suppression. Noise associated with air traffic and flat water recreation activities is more typical during the summer; during the off-season, limited recreational use, ongoing hydroelectric activities, and local traffic generate noise. In general, the UNFFR Project area is fairly quiet with few noise sources and receptors.

The Union Pacific Railroad follows the North Fork Feather River downstream of the Belden reach, and trains can be heard from several places along this reach. Operation and maintenance of UNFFR Project facilities (e.g., powerhouses and transmission lines) are a source of noise associated with the generation of electricity and flow of water. Periodic changes in powerhouse operations at Butt Valley reservoir, Caribou powerhouses, and Belden powerhouse result in large increases in noise levels that can be heard by various receptors (i.e., workers, visitors, and wildlife). The release of water from Canyon dam is also a source of noise; changes in the releases result in changes to noise levels. In addition to the noise of the powerhouses, audible alarms (e.g., civil defense siren) are used to warn of periodic changes in water elevation downstream of the powerhouses. Transmission lines are fairly quiet but a humming noise may be heard by nearby receptors (e.g., humans, wildlife).

Recreation uses at Lake Almanor, Butt Valley reservoir, Belden forebay, and along the Seneca and Belden reaches of the North Fork Feather River also generate noise from voices, watercraft (motorized watercraft are allowed only on Lake Almanor and Butt Valley reservoir), vehicles, and common recreation activities. Noise tends to travel further and is typically more noticeable at Lake Almanor and Butt Valley reservoir as the sound travels across the open water. The topography and vegetation surrounding the North Fork Feather River, Lake Almanor, and Butt Valley reservoir tend to prevent noise associated with the UNFFR Project facilities and recreation activities from traveling long distances.

Sensitive Noise Receptors

Sensitive noise receptors are specific geographic points, such as schools, hospitals, convalescent homes, residences, and parks, where people could be exposed to unacceptable levels of noise that affect daily activities or that result in health effects such as hearing loss or reduced sleep. Noise-sensitive receptors in the general vicinity of the UNFFR Project area include residents adjacent to Lake Almanor, recreationists (e.g., hikers, picnickers, anglers, boaters, and rafters), and wildlife.

Public and private recreation facilities have been developed along Lake Almanor and State Route 89. Noise tolerance levels for these groups are subjective, varying widely between individuals. Typical ambient outside noise levels in residential (single-family homes) and recreational areas range from 40 to 60 dBA, and community noise exposure levels are considered compatible up to 65 to 70 dB for residential areas and up to 75 dB for water recreation areas (Plumas County 2004). Topography, vegetation, and increased distance from the source often serve as noise buffers and help reduce noise levels by the time the noise reaches sensitive receptors.

The primary sensitive receptors in the vicinity of the Canyon dam and Prattville activity areas include recreationists at the campgrounds, boat launch, and viewing areas near Canyon dam; recreationists at day use areas, boat launches, and other recreation sites near the Prattville intake; recreationists (boaters and fishermen) on the water at Lake Almanor near Canyon dam and the Prattville intake; residents and workers at the PG&E camp downstream of Canyon dam; residents in the communities near the Prattville intake; and wildlife. The Prattville community is approximately 0.3 mile southeast of the Prattville intake, and the Almanor community is approximately 0.5 mile northeast of the Prattville intake. The Canyondam community is approximately 0.8 mile east of Canyon dam. The primary sensitive receptors in the vicinity of the Caribou intakes activity area at Butt Valley reservoir include campers, boaters (fishing and sailing), other recreationists on the east shore, and wildlife. No residential uses occur in the vicinity of the Butt Valley dam, other than a seasonal campground host.

Environmental Impacts and Mitigation Measures

Methodology

The analysis of impacts related to noise in the vicinity of the UNFFR Project is based on general information about noise and the noise environment, including Plumas County noise information and a site visit to observe noise levels in the area. The impact analysis considers the potential for the quantitative noise levels associated with typical construction equipment and the qualitative effects of construction-related noise generated from Proposed Project and the alternatives to substantially affect sensitive receptors in the area.

Thresholds of Significance

Impacts associated with noise would be significant if Proposed Project or the alternatives would:

- cause a substantial temporary or permanent increase in ambient noise levels in the vicinity above existing levels without Proposed Project or the Alternatives;
- generate, noise levels in excess of standards established in the Plumas County General Plan or applicable standards of other agencies; or
- generate, excessive ground-borne vibration or ground borne-noise levels.

Impacts and Mitigation Measures

This section discusses the anticipated impacts related to noise associated with Proposed Project and the alternatives and, if applicable, identifies mitigation measures for significant impacts. Table 5.15-2 compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.15-2 Summary of Noise (NO) Impacts

Impact	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Impact NO-1: Construction activities associated with Proposed Project or the alternatives could increase noise levels above acceptable standards and may expose sensitive receptors to excessive noise or groundborne vibrations.	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation	Less than significant with mitigation
Impact NO-2: Implementation of Proposed Project or the alternatives could increase ambient noise levels around Lake Almanor and Butt Valley reservoir or along the North Fork Feather River.	Less than significant	Less than significant	Less than significant	Less than significant

Impact NO-1: Construction activities associated with Proposed Project or the alternatives could increase noise levels above acceptable standards and may expose sensitive receptors to excessive noise or groundborne vibrations.

Proposed Project and Alternatives 1, 2, and 3

Construction activities would generate temporary noise and could generate occasional groundborne vibrations. Construction locations on Lake Almanor are near recreational uses, and a number of residences and commercial buildings occur in the immediate vicinity of the Prattville intake activity area as well as other locations where proposed improvements and activities described in section 3.4 of this RDEIR would occur. In addition to residents, workers, and recreationists along the shore of Lake Almanor, boaters and wildlife would be subjected to noise from construction activities at locations throughout the UNFFR Project area, including the three activity areas. Noise associated with construction activities at Lake Almanor may travel across the water and be noticeable to boaters, residents, commercial establishments, and other receptors. Some receptors (e.g., boaters, campers, wildlife) are inherently mobile and may leave or avoid the activity areas during construction periods. Groundborne vibrations would be minimal and would occur only at the Prattville activity area if equipment that generates vibrations is used during installation of a thermal curtain (Alternatives 1 and 2). The vibrations would not travel far enough to affect residential or recreation-related structures, which occur more than 500 feet from the Prattville activity area.

Typical noise levels for construction equipment range from about 75 dBA to 90 dBA (loud to very loud) at 50 feet from the source (U.S. Department of Transportation 2006). These noise levels exceed acceptable levels for recreational uses and could adversely affect recreationists at the recreational sites adjacent to activity areas. Because of the distance and intervening topography and vegetation between the activity areas and nearby homes, the noise levels would be expected to attenuate (decrease in intensity) to acceptable levels before reaching the nearest residents. Recreational uses further from the construction areas would also experience lower noise levels.

Construction activities at Butt Valley reservoir under Alternatives 1 and 2 would generate similar types of noise impacts, but fewer sensitive receptors would be affected. Although there is a seasonal campground host, there are no residences within several miles of the Butt Valley reservoir and recreational sites are limited to the eastern shore of the reservoir. Some construction noise may affect recreationists on the reservoir or at sites adjacent to the reservoir; wildlife occurring in the vicinity could also be affected. Recreational activities, such as boating, fishing, and birding, would be influenced by construction-related noise to varying degrees, depending on the distance of the receptor. Wildlife subjected to construction noise may avoid or leave the activity area.

The addition of a new source of noise (construction equipment and activities) in a relatively quiet area could degrade visitor experience. Construction noise would be more noticeable at Butt Valley reservoir due to the relatively quiet existing noise environment. Some recreationists may avoid the area during the construction period, while others who continue to use nearby recreation facilities could experience impacts from the construction noise. Construction noise, although temporary, would exceed acceptable standards and could adversely affect visitor experience. Therefore, construction noise impacts would be **significant without mitigation**.

Mitigation Measures

Mitigation Measure NO-1: Implement Noise Reduction Measures

During construction, PG&E will implement measures to reduce construction-related noise. Noise reduction measures include, but are not limited to, the following:

- Equip construction equipment with manufacturer’s specified noise-muffling devices or use newer construction equipment manufactured to reduce noise;
- Place stationary noise-generating equipment as far away as feasible from sensitive noise receptors or in an orientation that minimizes noise impacts (e.g., behind existing barriers, storage piles, unused equipment);
- Turn off all engines when not in use;
- Maintain low vehicle speeds in and around the construction areas (less than 15 miles per hour); and
- Operate construction equipment only during daylight hours.

Significance after Mitigation

This mitigation measure falls outside the purview of the State Water Board. However, PG&E has agreed to implement Mitigation Measure NO-1, as proposed in an email dated March 3, 2014. Implementation of Mitigation Measure NO-1 would reduce construction noise at nearby recreational sites to a **less-than-significant** level.

Impact NO-2: Implementation of Proposed Project or the alternatives could increase ambient noise levels around Lake Almanor and Butt Valley reservoir or along the North Fork Feather River.

Proposed Project and Alternatives 1, 2, and 3

Operation of the UNFFR Project would be modified to varying degrees under Proposed Project and the alternatives. Increases in operational noise would be primarily associated with increased flow from Canyon dam under Proposed Project and Alternatives 1, 2, and 3. Under Alternatives 1 and 2, noise associated with waves hitting the new buoys at the Prattville and Caribou activity areas would be heard by various receptors periodically based on level of use and climatic conditions. Modifications to the flow regime in the Seneca and Belden reaches would allow increased flow into the Seneca and Belden reaches of the North Fork Feather River; Alternatives 1 and 3 would result in an increase in summertime flows to the Seneca reach above those associated with Proposed Project and Alternative 2. Ongoing sounds would be generated by the flow released to these reaches and as water flows downstream. The sound of flowing water is not generally considered an unwanted noise and may positively contribute to the outdoor experience.

Localized noise from waves hitting the buoys could be noticeable in the immediate vicinity of the thermal curtains at Prattville intake and Caribou intakes. The noise would be more noticeable at the Prattville intake because of the proximity of recreational uses to the proposed thermal curtain location and the presence of sensitive receptors nearby. Although wave noise could be noticeable, it would not likely detract from the visitor experience or dominate the noise environment, which already consists of recreational noise and waves hitting the shore and existing buoys around the intakes and adjacent marinas.

Overall, noise related to operations and facilities under Proposed Project and the alternatives would increase slightly over existing levels, but the new and modified noise sources would blend in with the existing noise environment and would not substantially degrade the quality of the environment. Operation-related noise impacts would be **less than significant**.

5.16 Climate Change

Proposed Project and the alternatives put forth in this RDEIR would result in varying levels of greenhouse gas (GHG) emissions. The California Environmental Quality Act (CEQA) and the State CEQA Guidelines require a lead agency to consider GHG emissions from a proposed project in determining whether the project has the potential to cause significant impacts.

This section provides an overview of climate change and describes the relationship of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) to the energy grid in California, estimates the GHG emissions resulting from the operation of the UNFFR Project under a new Federal Energy Regulatory Commission (FERC) license, and evaluates whether the GHG emissions from Proposed Project and the alternatives would cause a significant impact on the environment. The analysis focuses on the indirect effects of the GHG emissions that would be generated by a non-hydroelectric energy source to offset the reduction in UNFFR Project energy generation. The information presented in this section is based on the GHG analysis report in Appendix J.

Environmental Setting

Climate Change Overview

Evidence of climate change has been observed throughout the world as atmospheric conditions and seasonal temperatures and patterns change. Global climate change could have widespread consequences that would affect the availability of important resources in California and elsewhere, including water and energy. Human activities that emit carbon dioxide (CO_2) and other heat-trapping gasses, such as methane (CH_4), nitrous oxide (N_2O), and fluorinated gases, to the atmosphere contribute to the changing climate. These gasses are collectively referred to as GHGs. The potential for global warming is correlated to the residence time of the compound in the atmosphere and its ability to warm the planet, measured in CO_2 equivalent (CO_2e) metric tonnes.

Examples of human activities that contribute to GHG emissions include burning of fossil fuels, clearing of forests, and land development. Electricity generation using fossil fuels primarily produces CO_2 emissions, with other GHG emissions tending to be smaller and more easily controlled. Coal and petroleum coke-fired energy generation facilities emit larger quantities of GHG emissions than other sources, such as gas, nuclear, biomass, and geothermal facilities. Hydroelectric generation facilities tend to generate the smallest quantity of GHG emissions when compared to those mentioned above.

GHG Programs

To address climate change impacts, the United States has developed regulations and programs to expand research and identify actions to reduce GHG emissions. The United States Environmental Protection Agency (U.S. EPA) proposed a Prevention of Significant Deterioration program and New Source Review rule changes to regulate GHGs. In December 2009, the U.S. EPA declared that GHG emissions threaten the public health and welfare of the American people (the endangerment finding), resulting in a new federal rule (40 C.F.R. § 98), effective December 29, 2009, that requires reporting of GHGs for certain GHG-emitting facilities.

The U.S. EPA then proposed the Clean Power Plan on August 3, 2015, which requires states to reduce GHG emissions from its fleet of existing power plants using one of several methods[42]. U.S. EPA adopted the rule on October 23, 2105, but the U.S. Supreme Court stayed implementation of the rule on February 9, 2016.

California has demonstrated its intent to address global climate change through research, adaptation, and GHG inventory reductions. The California Legislature enacted the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32 [Statutes 2006, Chapter 488, Nunez], Health and Safety Code Section 38500 et seq.) to implement standards that will reduce GHG emissions to 1990 levels. In the act, the Legislature found that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California," which is consistent with the U.S. EPA's endangerment finding. The Legislature adopted further reduction targets of 40 percent below 1990 levels by 2030 in Senate Bill 32 (2016), and targets and mandates for specific sectors, including electricity, in Senate Bill 350 (2015).

Energy Generation in California and Future Scenarios

The California electric power grid (managed by the California Independent System Operator (CAISO)) is supplied by a large, interconnected system that receives electricity from basic energy production and ancillary services. Ancillary services are used to provide the generation capability to meet loads that vary throughout the day. Because of the integrated electricity system, the contributions of energy resources are constantly changing to adapt to the load demands. The most reliable and economically feasible resources are used to meet the demand, with alternate sources available as needed. Some facilities are operated to provide both basic energy production and ancillary services, whereas others serve only one purpose. Additional details on how the CAISO operates can be found in Appendix J.

Pacific Gas and Electric Company (PG&E) operates facilities that provide both basic energy production and ancillary services, as demand requires and as PG&E is able to contribute to the energy markets. Its hydroelectric resources and facilities in northern California provide up to 75 percent of the ancillary services in the area (specifically spinning reserves, see Appendix J for information). Hydropower facilities are especially well suited to provide ancillary services because of their quick start-up capability and proven reliability.

The California Energy Commission (CEC) has evaluated the future of the energy industry in California in relation to the State's goals for reducing GHG emissions. The CEC envisions changes in the long-term role of fossil-fueled power plants in California's electricity system. Gas-fired power plants will likely play a diminished role as more renewable and storage resources come on line to support a low-GHG system (California Energy Commission 2015)[43]. Net GHG emissions from the integrated electric system are expected to decline as new

[42] U.S. EPA, "Clean Power Plan for Existing Power Plants," https://www.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants, retrieved December 15, 2016.

[43] California Energy Commission, *Final 2016 Environmental Performance Report of California's Electrical Generation System*, Prepared in Support of the 2016 Integrated Energy, Policy Report Proceeding (16-IEPR-03), California Energy Commission, Staff Report CEC-700-2016-005-SF, October 2016.

renewable power plants are developed. In addition, as contracts for coal-fired facilities expire (pursuant to Public Utilities Code sections 8340-8341), use of new and existing facilities will replace the lost energy and capacity. Some replacement energy will come from renewable sources, and some will come from new and existing natural gas-fired facilities. New generation resources are expected to emit significantly less GHG than the coal and petroleum coke-fired generation facilities. The analysis by the CEC of potential future outcomes is the basis of the methodology used to assess reasonably expected bounding cases for changes in GHG emissions related to the UNFFR Project.

Of particular note is that the pattern of hourly system loads within a day, or the diurnal "net load profile," being met by conventional and fossil-fueled power plants is evolving as more renewables come on line. Hydro resources typically are dispatched against this subdivision of the overall load profile so as to minimize operational costs. The analysis conducted for this report relies on how the UNFFR project was operated in the 2002 to 2004 period, but the emission impact estimates use modeling results forecasted for 2020. The UNFFR units probably will operate significantly differently in 2020 than in 2004 simply because of this system evolution that is now occurring.

After the McCloud-Pit Hydroelectric Project, with 729.3 megawatts (MW) rated capacity, the North Fork Feather River system upstream of Lake Oroville accounts for the second largest portion of PG&E's hydroelectric generation. The UNFFR Project capacity is 362.3 MW or about half of this capacity. (California Public Utilities Commission 2000.)

The North Fork Feather River system has both large inflows and very large amounts of storage, which provide for the ability to control levels of generation and water releases on both a daily and seasonal basis. Besides permitting winter-spring runoff to be stored for use in the summer, the considerable storage provided by Lake Almanor and other PG&E reservoirs can be used to coordinate generation with high electricity load periods on an hourly and daily basis. During off-peak hours when market prices for electricity are low, flows through powerhouses are typically reduced, usually to minimum levels, to preserve water for release during high-load periods. Butt Valley, Caribou No. 1, and Caribou No. 2 powerhouses rarely operate at sustained rated generating capacity (maximum flows) because they are used to provide ancillary services[44].

The UNFFR Project provides flexible, dispatchable, and fast ramping power and serves as an important supporting resource for the intermittent renewable generation needed to achieve PG&E's renewable portfolio standard (RPS) and GHG emission goal. The UNFFR Project operations contribute to the CAISO by:

- providing flexible, dispatchable power necessary to integrate some of the increasing generation from intermittent renewable sources, such as wind and solar generation;
- displacing some less efficient gas-fired facilities that are required to provide electricity reliability in PG&E's service territory;

[44] Belden powerhouse was not evaluated because no operational changes are foreseen at that facility.

- partially replacing out-of-state coal electricity generation that must be phased out in conformance with the State's Emissions Performance Standard; and
- providing other services, including integration of renewable energy, local generation displacement, ancillary services, grid system and emergency support, and general energy support.

Environmental Impacts and Mitigation Measures

Methodology

Section 15064.4 of the CEQA Guidelines directs in pertinent part that:

(a) A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of GHG emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to:

(1) Quantify GHG emissions resulting from a project; and/or

(2) Rely on a qualitative analysis or performance based standards.

(b) [T]he lead agency should focus its analysis on the reasonably foreseeable incremental contribution of the project's emissions to the effects of climate change. . . . A lead agency should consider the following factors, among others, when determining the significance of impacts from GHG emissions on the environment:

(1) The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting.

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions . . . . Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution to GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR [environmental impact report] must be prepared for the project.

The information presented in this section is summarized from a technical report (Appendices J and J1) that evaluates the effects of Proposed Project and the alternatives related to power loss and the resulting increase in indirect GHG emissions generated by a replacement non-hydroelectric energy source. Detailed methodology for the analysis is provided in Appendix J. In summary, a three-step process was used to conduct the analysis to assess the anticipated changes in UNFFR Project hydropower generation under different operations and flow regimes, anticipating the resources that would be used to offset any losses to meet future electricity demand, and calculating the estimated indirect GHG emissions related to alternatives discussed in this RDEIR:

- Step one required preparation of a spreadsheet that initially converted monthly energy changes into hourly operational changes; this provided a model that represents a typical week of hourly operations for the summer period for three water-year types (Dry, Above Normal, and Below Normal).
- Step two involved preparation of an estimate of short-term and long-term incremental energy system resource additions using the year 2020 that was used to delineate the type of generation resources, distributed generation, and demand-side management in order to characterize resources necessary to replace reduced generation by the UNFFR Project.
- The third step was to use the information developed to estimate the changes in incremental generation resources based on the changes to baseline conditions under various hydrologic conditions.

The type of replacement energy resource was an important assumption to estimate GHG emissions because different energy resources generate different levels of GHG emissions. To estimate the amount of GHG emissions resulting from the change in UNFFR Project hydropower generation considered in this RDEIR, a replacement energy resource scenario was used in this analysis. Incremental CO_2 rates from the scenarios were multiplied by the estimated difference in hourly MW generation to determine the approximate CO_2e in tonnes for Proposed Project and the alternatives.

Future energy generation and customer-side resources in California are expected to change to reflect the State's goals for reducing GHG emissions, but the mix of those resources is unknown. The future resource mix is constrained by the various state laws and policies listed in Chapter 4 related to climate change as well as requirements for reliability and safety and the California Public Utilities Commission's joint objectives of maintaining low-cost electricity rates while ensuring the financial integrity of the investor-owned utilities like PG&E. The CEC examined several future scenarios or plans to meet State goals in its *Integrated Energy Policy Report* (California Energy Commission 2015).[45]

The scenario that currently best represents a reasonably expected outcome under the CEQA Guidelines achieves a 33 percent renewable portfolio standard (RPS) by 2020. The supporting analysis assumes that the future resource plan will be implemented and only operations will change. This scenario includes a 33 percent RPS, which requires almost all new resources to be zero-emitting renewables except when a new combustion turbine-driven thermal power plant is required to provide peak capacity and ancillary services. Together, the incremental changes in emissions in this scenario represent potential future conditions for purposes of evaluating the contribution of Proposed Project and the alternatives to GHG emissions.[46]

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[45] California Energy Commission, *2015 Integrated Energy Policy Report*, CEC-100-2015-001-CMF, 2015.

[46] The California Energy Commission Staff provided electricity system simulation model results from its 2020 base case analysis that shows forecasted hourly GHG emissions. The analysis presented here uses the calculated incremental hourly GHG emissions from that model run.

Thresholds of Significance

Impacts on climate change would be significant if Proposed Project or the alternatives would:

- contribute substantially to GHG emissions through increased fuel or energy consumption or emission of GHGs; or
- conflict with the adopted statewide 2020 GHG emissions limit or the plans, programs, and regulations adopted to implement the Global Warming Solutions Act of 2006.

In 2011, the Bay Area Air Quality Management District (BAAQMD) adopted air quality guidance that included quantitative thresholds of significance and recommended best management practices (BMPs) and mitigation measures for GHG emissions, among other pollutants. Projects categorized as stationary sources have a threshold of 10,000 tonnes of CO_2e per year. Although the UNFFR Project lies outside the jurisdictional boundaries of the BAAQMD, these thresholds were used because no other standards were readily available.

Impacts and Mitigation Measures

This section discusses the anticipated impacts related to climate change associated with Proposed Project and the alternatives and, if applicable, identifies mitigation measures for significant impacts. Table 5.16-1 compares the final level of significance for each impact (with incorporation of mitigation measures, if appropriate).

Table 5.16-1 Summary of Climate Change (CC) Impacts

Impact	Proposed project	Alternative 1	Alternative 2	Alternative 3
Impact CC-1: Implementation of Proposed Project or the alternatives could indirectly increase GHG emissions and conflict with policies adopted to reduce GHG emissions.	Less than significant	Less than significant	Less than significant	Less than significant

Impact CC-1: Implementation of Proposed Project or the alternatives could indirectly increase GHG emissions and conflict with policies adopted to reduce GHG emissions.

Proposed Project and Alternatives 1, 2, and 3

Construction

Construction activities relevant to GHG emissions under the Proposed Project and the alternatives are discussed in section 5.14, Air Quality, specifically under Impacts AQ-1 and AQ-2. Construction activities would generate GHG emissions from diesel-powered construction equipment, diesel-powered generators, and diesel- and gasoline-powered vehicles, including trucks and worker personal vehicles. GHGs emitted from the combustion of fuel associated with this equipment would consist mainly of CO_2, with small amounts of CH_4

and N_2O. All construction activities would occur for a relatively short time period (see Chapter 3 for the construction schedule). Additionally, construction activities related to recreational improvements would be spread out over the term of the new FERC license. Therefore, the impacts of the construction activities related to GHG emissions would be **less than significant**.

Operation

Proposed Project and the alternatives would entail flow modifications associated with releases to the Seneca and Belden reaches for four water year types: Wet, Normal, Dry, and Critically Dry. In addition, minimum flow releases to the Seneca reach would be increased by up to 250 cubic feet per second (cfs) from mid-June to mid-September under Alternatives 1 and 3. Increased releases from Canyon dam would require decreased releases through the Prattville intake during these months on an annual basis. These flow modifications would reduce the ability of the Butt Valley and Caribou powerhouses to generate electricity, resulting in an overall reduction in the UNFFR Project's electricity generation during the season when peak power is necessary to respond to increased use; this effect would be greater under Alternatives 1 and 3 than under Proposed Project and Alternative 2. While changes in operations would not directly increase GHG emissions, the operational changes could induce compensating changes elsewhere in the interconnected energy grid. The compensating changes could cause indirect increases in GHG emissions from power plants that rely on fossil fuels.

Thermal curtains at the Prattville and Caribou intakes under either Alternatives 1 or 2 would not affect flows through the Butt Valley and Caribou powerhouses; there would be no reduction in electricity generation or a change in GHG emissions from the thermal curtains.

With the proposed flow modifications to the Seneca and Belden reaches under either the Proposed Project or the alternatives, the UNFFR Project would be able to continue providing ancillary services if operational changes are implemented that continue to allow water to be stored and released at a critical time in response to load demand and needs. The relatively small changes in hydropower generation as a result of the alternatives under all water conditions would not have a substantial effect on the ancillary services. Flow regimes from Canyon dam under Proposed Project and the alternatives would be consistent for eight months of the year (see Tables 3-1 and 3-2); under Alternatives 1 and 3, additional flow would be released from Canyon dam between June 16 and September 15 (see table 3-4).

If other short-term (days, weeks, months) sources of electricity generation are needed to replace the lost UNFFR Project generation in order to continue meeting the California load demands, existing or already-committed new resources available in the CAISO would be used, depending on future conditions and the ability to use existing resources. The GHG effects of using other sources would vary, depending on future conditions and the specific resources used (Table 5.16-2). This impact analysis recognizes the two valuable attributes of the generating assets—the ability to shape energy production into the highest demand and value periods and to rapidly respond to changes in demand and provide ready reserves. Typically, alternate resources used to replace lost services in the CAISO come from higher emitting fossil-fueled plants, such as older natural-gas fired steam turbines and less efficient combustible turbine facilities.

For the electricity system scenario considered for this analysis with respect to Proposed Project and the alternatives, the mix of generation and customer-side resources would likely change under the 33 percent RPS scenario described in Appendix J. The potential annual increase in GHG emissions in 2020 under each alternative is presented in Table 5.16-2. The resulting energy loss from flow modifications would result in an indirect increase in GHG emissions of between approximately 0 and 6,288 tonnes of CO_2e per year. Under Alternatives 1 and 3, modifications to the flow schedules for the Seneca and Belden reaches coupled with 250 cfs releases through Canyon dam from mid-June to mid-September would result in an indirect increase in GHG emissions of between approximately 0 and 20,062 tonnes of CO_2e per year. GHG emissions under Alternative 2 resulting from the modifications to instream flow schedules for the Seneca and Belden reaches would be between approximately 0 and 6,288 tonnes of CO_2e per year, which is similar to the emissions under Proposed Project.

Table 5.16-2 Potential Annual Change in GHG Emissions for Proposed Project and the Alternatives from Baseline Assuming Marginal GHG from 2020 Energy Sources

	Average GHG Emissions (MT per year)
Proposed Project	6,288
Alternative 1 (thermal curtains, Canyon dam 250 cfs releases)	20,062
Alternative 2 (thermal curtains)	6,288
Alternative 3 (Canyon dam 250 cfs releases)	20,062

The estimates in Table 5.16-2 were developed using the minimum flows in each alternative. Additional details on the estimates of the GHG emissions are included in Appendix J1.

The annual total amount of GHG emissions in the State of California was reported to be about 441.5 million tonnes of gross CO_2e in 2011 (California Energy Commission 2016). The increase in GHG emissions would be minor under Proposed Project and the alternatives relative to the total annual amount in California (less than 0.005 percent). The replacement sources would be required to comply with California Air Resources Board (CARB) programs and mandatory reporting requirements to achieve state-wide goals for GHG emissions. Other requirements mandating compliance with AB 32, SB 32, and SB 350, or other laws, such as a cap and trade program proposed by CARB, will be effective through 2030, and future sources will need to comply with these as well. Because PG&E as a load-serving entity (LSE) must comply with the mandates that cap overall GHG emissions regardless of underlying changes in the operations of individual plants, any changes in the operation of the UNFFR Project would be automatically offset by changes elsewhere in PG&E’s system and generation portfolio. In other words, state requirements related to GHG emissions from the electricity system already inherently mitigate any potential impacts. Based on the estimated GHG emissions and the need to comply with federal and state programs, impacts associated with GHG emissions would be **less than significant**.

5.17 Energy

Under the baseline condition the UNFFR Project has a combined annual generation of 1,171.9 gigawatt hours/year (GWh/yr). Through the FERC relicensing process, PG&E has proposed no increase in this capacity.

The proposed PG&E project and each action alternative discussed in this RDEIR would result in different amounts of estimated power loss (Stetson Engineers 2016). The estimated power losses are compared in Table 5.17-1.

The total estimated power loss was calculated using: the increased minimum flows required by the partial settlement agreement (see Tables 3-1 and 3-2); plus the additional power generation loss due to the required pulse flow releases (see Table 3-3); conservatively assuming the March water temperatures of dam releases from Canyon Dam and Belden Forebay Dam were always lower than 10ºC; plus the additional power generation loss due to the required Belden Reach summertime recreational flows relative to the proposed PG&E project, conservatively assuming the number of boats per day exceeds 100 on an annual basis.

The total water required for minimum instream flow releases including the Canyon dam pulse flow releases and from Belden Reach summertime recreational flows will change from the current baseline condition and the proposed PG&E project and action alternatives would result in some degree of power loss on an annual basis. Under both the proposed PG&E project and Alternative 2, the annual foregone power generation loss would be 61.60; this would be a 5.3 percent reduction in annual power generation. Under Alternatives 1 and 3, the 99.59 GWh/yr reductions equate to an 8.5 percent reduction in annual power generation; the difference being the increase summertime flow releases from Canyon dam.

Construction Energy

As discussed in Chapter 5.14 Air Quality, construction activities would be of limited duration and intensity and would not have a significant air quality impact. Individual construction projects would be completed in one season except the thermal curtains under Alternatives 1 and 2, which may require two construction seasons. Energy use from construction equipment, hauling of materials, and worker commutes is not quantified in this analysis, but based on the nature of the project, total energy consumed during construction would be less than one percent of the energy generation loss from increased instream flows.

Table 5.17-1 Summary Comparison of Estimated Power Generation Loss

Alternative	Total Power Generation Loss (GWh/yr)
Proposed PG&E Project	
• Power generation loss from partial settlement agreement flows	47.94
• Power generation loss from pulse flows	13.76
Total power generation loss	**61.70**
Alternative 1	
• Power generation loss from partial settlement agreement flows	47.940
• Power generation loss from Canyon dam low level outlet release up to 250 cubic feet per second	37.89
• Power generation loss from pulse flows	13.76
Total power generation loss	**99.59**
Alternative 2	
• Power generation loss from partial settlement agreement flows	47.94
• Power generation loss from pulse flows	13.76
Total power generation loss	**61.70**
Alternative 3	
• Power generation loss from partial settlement agreement flows	47.940
• Power generation loss from Canyon dam low level outlet release up to 250 cubic feet per second	37.89
• Power generation loss from pulse flows	13.76
Total power generation loss	**99.59**

[a] Pulse flow power loss of 9.05 GWh/yr due to required pulse flow releases at Canyon dam and Belden Forebay dam, plus anticipated 4.71 GWh/yr power loss due to required summertime recreational flow releases at Belden forebay dam.

Chapter 6 Cumulative Impacts and Other CEQA Considerations

This chapter addresses certain statutory considerations, including cumulative impacts, that must be evaluated pursuant to the California Environmental Quality Act (CEQA).

6.1 Introduction

This chapter addresses the following topics:

- cumulative impacts;
- growth-inducing impacts;
- significant effects, including significant unavoidable effects, significant irreversible environmental changes, effects found not to be significant, and the potential impacts of anticipated projects outside the jurisdiction of the State Water Resources Control Board (State Water Board) for which sufficient information is not available;
- mitigation measures proposed to minimize the significant effects and the related Mitigation Monitoring and Reporting Plan; and
- the CEQA findings process.

Some of the analyses provided in this chapter are similar to those in the environmental impact statement (EIS) prepared by the Federal Energy Regulatory Commission (FERC).

6.2 Cumulative Impacts Analysis

This section discusses the anticipated cumulative impacts of the operation of the Upper North Fork Feather River Hydroelectric Project (UNFFR Project) under a new FERC license along with other past, present, and reasonably foreseeable future projects in the North Fork Feather River watershed. Effects of past projects are incorporated into the description of the baseline, or environmental setting, in Chapter 5; these effects have contributed to the current environmental conditions in the watershed and are not specifically discussed in this section. Present and reasonably foreseeable future projects are identified in this section and form the basis for the cumulative impact analysis.

An environmental impact report (EIR) is required to include an assessment of cumulative impacts when the proposed project's incremental effects would be cumulatively considerable (Section 15130 of the CEQA Guidelines). The assessment involves examining project-related effects on the environment in the context of similar effects that have been caused by past or existing projects and that would be caused by reasonably foreseeable future projects. A cumulative impact is defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (Section 15355 of the CEQA

Guidelines). A project's incremental effects are cumulatively considerable if the effects are significant when considered in connection with other related projects.

Cumulative impacts occur when the incremental effects of a project overlap with the effects of related actions in space (geographic) or time (temporal). A cumulative impact may be significant in the context of all projects being analyzed, but an individual project's contribution may be less than significant. Under CEQA, if a lead agency determines that a project-related contribution to a significant cumulative impact is less than considerable, the agency shall identify facts and analysis that support its conclusion. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. Incremental effects that are not cumulatively considerable do not need to be discussed in detail. In addition, discussions of cumulative impacts need not provide as much detail as is provided for the effects attributable to the project alone; however, the analysis should reflect the severity of the impacts and the likelihood of occurrence (Section 15130 of the CEQA Guidelines).

Past, Present, and Reasonably Foreseeable Future Projects

Past, present, and reasonably foreseeable future projects can be identified by either: (a) a list of past, present, and probable future projects, including, if necessary, those outside the agency's control; or (b) a summary of projections contained in an adopted general plan or related planning document or in a prior adopted or certified environmental document that described or evaluated regional or area-wide conditions contributing to the cumulative impact, provided that such documents are referenced and made available for public inspection at a specified location (Section 15130 of the CEQA Guidelines). A related project is one that occurs in the same geographic area as the proposed project, would be implemented in the same general time period as the proposed project, and would result in impacts similar to those described for the proposed project.

For the cumulative impact analysis, the list of projects initially considered in the 2104 Draft EIR was reviewed and revised as appropriate to reflect new or updated information. The following related projects were considered:

- development around Lake Almanor;
- mining and dredging activities along the North Fork Feather River;
- timber harvesting on the Lassen and Plumas National Forests;
- vegetation management on the Lassen and Plumas National Forests;
- watershed management activities, specifically implementation of the Lake Almanor Watershed Management Plan;
- Plumas County General Plan update; and
- Pacific Gas and Electric Company's (PG&E's) Bucks Creek relicensing (FERC Project No. 619), Poe Project relicensing (FERC Project No. 2107), and Rock Creek-Cresta license implementation (FERC Project No. 1962) (for more information see http://www.ferc.gov).

Cumulative Impacts Analysis Approach

This cumulative impact analysis considers the cumulative effects of Proposed Project and the alternatives along with the related past, present, and foreseeable projects in the North Fork Feather River watershed listed above. The geographical scope of the analysis is the North Fork Feather River watershed. The temporal scope is 30 to 50 years into the future, which correlates to the period of time requested by PG&E for a new FERC license for the UNFFR Project.

Cumulative impacts were evaluated to determine if Proposed Project and the alternatives, when considered with related past, present, or reasonably foreseeable future projects, would contribute to cumulative adverse impacts on any of the resource areas discussed in Chapter 5. The incremental effects of the alternatives on each resource area are described in Chapter 5, and the analysis in this chapter focuses on those incremental effects that could contribute to cumulative effects in the region. The significance thresholds identified in each resource section were used to determine the significance of each cumulative impact.

Cumulative Impacts Analysis

This section discusses the potential cumulative impacts on resources described in various sections of Chapter 5.

Land Use and Minerals (Section 5.2)

Impacts of Proposed Project and alternatives would be localized within the UNFFR Project boundary. Impacts would also be associated with flow releases to the North Fork Feather River between Canyon dam and Belden powerhouse. The ownership patterns and limited opportunity for development in these areas make it unlikely that there could be cumulatively considerable impacts on these resources. None of the other related projects are expected to affect land uses or mineral resources in these localized areas, and the Plumas County General Plan update did not modify land use designations in the localized areas to improve compatibility between uses and establish consistency with land use policies.

Geology, Geomorphology, and Soils (Section 5.3)

The impacts of Proposed Project and alternatives would be localized within the UNFFR Project boundary and would not be cumulatively considerable. Ongoing watershed restoration and erosion control efforts on United States Department of Agriculture, Forest Service (USFS) and commercial timberlands continue to address soil erosion and compaction issues throughout the project area.

Water Resources (Section 5.4)

Proposed Project and alternatives would result in similar minimum changes to flows in the Seneca and Belden reaches of the North Fork Feather River during most of the year. Alternatives 1 and 3 would also result in increased releases (up to 250 cubic feet per second) to the Seneca reach through the Canyon dam low-level outlet from mid-June through mid-September. Under Alternative 1 and 3, these changes would increase flows in the Seneca reach; under Alternatives 1, 2 and 3, they are not likely to affect the flow regime in the North Fork Feather River downstream of the Belden powerhouse.

Changes to flows as part of the relicensing of other hydroelectric projects in the North Fork Feather River watershed could cause a cumulative change in flows along the North Fork Feather River from the Belden powerhouse downstream to Lake Oroville. However, the highly regulated nature of each reach affected by the various hydroelectric project facilities (i.e., powerhouses, dams, intake structures) and the coordinated operation of all of the hydroelectric projects would sufficiently manage flows in the river to prevent flooding or substantial scouring along the river banks. Cumulative changes in flows along the North Fork Feather River would not result in adverse impacts along the river, and the effects associated with Proposed Project and the alternatives are not expected to vary much with respect to baseline conditions. Therefore, the incremental effects from impacts on water resources would be not be cumulatively considerable.

Water Quality (Section 5.5)

Construction activities associated with Proposed Project and the alternatives could result in temporary increases in pollutants and sediment in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River during construction. Other land management, development, and site-specific construction projects in the North Fork Feather River watershed could also affect water quality in the reservoirs and the North Fork Feather River and its tributaries, but activities associated with the downstream hydroelectric projects (e.g., Rock Creek–Cresta) would not affect water quality within the area influenced by the UNFFR Project. The cumulative increase in potential pollutants and sediment in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River from construction activities associated with Proposed Project and the alternatives would be controlled by best management practices and other standard measures described in previous chapters of this document (Chapters 3 and section 5.5). Any authorized activities in the general vicinity of UNFFR Project, such as other land management, development, and site-specific construction projects, will be consistent with the requirements for permitting under the federal Clean Water Act and the state Porter-Cologne Water Quality Control Act. Therefore, the incremental effects from impacts on water quality from construction activities would not be cumulatively considerable.

Implementation of Proposed Project or an alternative would reduce water temperatures along the North Fork Feather River in the Seneca and Belden reaches to varying degrees in the summer. Under Alternatives 1 and 3, this reduction would be greater and extend further downstream than under Proposed Project or Alternative 2; it would be less pronounced in the downstream reaches, but beneficial uses would experience some temperature reduction benefits as far downstream as the Poe reach. Modifications to the operation of downstream hydroelectric projects could also further reduce water temperatures in the North Fork Feather River; any modifications to other hydroelectric projects are outside the jurisdiction of FERC Project 2105. The cumulative change in water temperatures would result in benefits to the cold water fishery and would not create adverse effects on other beneficial uses of the North Fork Feather River. Therefore, the incremental effects from impacts on the water temperature of the North Fork Feather River would not be cumulatively considerable.

Fisheries (Section 5.6)

Construction activities associated with Proposed Project or alternatives could result in temporary disturbance to fish and aquatic habitat in Lake Almanor and Butt Valley reservoir and to varying degrees in the Seneca and Belden reaches of the North Fork Feather River. Other land management, development, watershed restoration, and site-specific construction projects in the North Fork Feather River watershed could indirectly affect water quality and thus aquatic habitat, but they would not be expected to affect fish and aquatic habitat within the boundary of the UNFFR Project. Therefore, the incremental effects from impacts on fish and aquatic habitat from construction activities would not be cumulatively considerable.

Implementation of Proposed Project or an alternative would affect warm water and cold water habitat in the reservoirs and North Fork Feather River to varying degrees in the summer. Reduction in water temperatures in the North Fork Feather River downstream of Belden dam would improve cold water fish habitat to varying degrees, compensating for the warming effects of hydropower diversions in the bypass reaches between dams and powerhouses. Modifications to operations of downstream hydroelectric projects could also affect aquatic habitat in the North Fork Feather River, but proposed operations are set to improve temperatures and changes would benefit the cold water fishery. Therefore, the incremental effects from impacts on fish and aquatic habitat in the North Fork Feather River would not be cumulatively considerable.

Coldwater refugia in Lake Almanor during critically dry water years would become more restricted compared to the historic and current operations of the UNFFR Project and could require increased fish stocking (see section 5.6), but no other projects are proposed in the foreseeable future that could impact lake operations and as a result impact lake habitat. The potential cumulative impacts are not considerable.

Vegetation, Wildlife, and Sensitive Biological Resources (Section 5.7)

Construction activities associated with Proposed Project and alternatives could result in adverse impacts on special-status species such as bats, western pond turtle, and ringtail cat and other sensitive biological resources such as wetlands and riparian habitat at construction locations throughout the UNFFR Project area. While more construction activities would occur in conjunction with Alternatives 1, 2, and 3 in the immediate vicinity of the activity areas and along the North Fork Feather River downstream of Canyon dam, proposed recreation and infrastructure improvements activities could also have an effect on special-status species and their habitat. Other land management, development, watershed restoration, and site-specific construction projects around Lake Almanor and Butt Valley reservoir and along the North Fork Feather River could also result in adverse impacts on special-status species known to occur in the region or other sensitive biological resources (e.g., riparian habitat, wetlands), which, when considered with the impacts associated with the alternatives, could be cumulatively significant. Each project would be responsible for mitigating adverse impacts and complying with applicable laws and regulations, including obtaining relevant permits, to ensure protection of sensitive biological resources. With implementation of UNFFR Project-specific mitigation measures to reduce adverse impacts, the incremental effects from impacts on biological resources would not be cumulatively considerable.

Recreation (Section 5.8)

Construction activities associated with Proposed Project and alternatives could temporarily disrupt recreational uses and activities in the vicinity of the activity areas. Alternatives 1 and 2 both require the installation of thermal curtains at the Prattville and Caribou intakes, which would extend the area around the intake that is off-limits to boaters and other water recreationists. Proposed Project and Alternatives 1 and 3 also require modifications to Canyon dam to ensure that the flow releases described in Chapter 3 can be provided. Additional flow modifications (pulse flows) in the Seneca and Belden reaches associated with Proposed Project or an alternative could affect the quality of the recreational fishery for short periods of time as flow releases change over the course of a water year.

Other land management, development, watershed restoration, and site-specific construction projects in the vicinity could disrupt recreational activities, but, based on the nature of the other projects, such disruptions would likely be temporary and would not substantially affect recreational uses in the area. Recreational activities would continue to be available at the numerous developed and undeveloped recreational sites at Lake Almanor and Butt Valley reservoir and along the North Fork Feather River. Changes to flows as part of the relicensing of other hydroelectric projects along the North Fork Feather River below Belden powerhouse would not affect the recreational fishery in the UNFFR Project area. Therefore, the incremental effects from impacts on recreation would not be cumulatively considerable.

Aesthetics (Section 5.9)

The Proposed Project would not substantially change the existing visual character in the vicinity of the UNFFR Project. The thermal curtains and associated structures required by Alternatives 1 and 2 would result in changes to the visual character around the Prattville and Caribou intakes on Lake Almanor and Butt Valley reservoir, respectively. Although the visual impacts have the potential to be significant, changes in visual character at Butt Valley Reservoir would not be substantial based on the extent of existing structures in the water at the intakes. The trolley system for the thermal curtain at Prattville does result in a significant and unavoidable impact because the visual impact is disharmonious with the adjacent day use area. Under Alternatives 1 and 3, minor temporary construction activities associated with modifications to the Canyon dam outlet structure would result in short-term changes to some visual assessment units. Land management, development, watershed restoration, or site-specific construction projects unrelated to the UNFFR Project around Lake Almanor or Butt Valley reservoir and along the North Fork Feather River could also result in changes to the visual character of these water bodies and surrounding viewsheds, but new structures would be required to comply with either USFS or Plumas County development standards and would be visually similar to existing structures. The combined effects would not substantially degrade the visual quality of the scenic environment. Therefore, the incremental effects from impacts on visual quality would not be cumulatively considerable.

Public Services and Utilities (Section 5.10)

When combined with one or more land management, development, or construction projects in the Lake Almanor vicinity, Proposed Project and the alternatives could increase the demand on emergency service providers. However, the expected increase in demand would be minimal and would not be cumulatively considerable. Aside from development projects on lands subject to county jurisdiction, none of the other related projects would affect public services or utilities, and the development projects would be expected to be designed with consideration for the available capacities of service providers and facilities.

Hazards and Hazardous Materials (Section 5.11)

Although Proposed Project and the alternatives along with other projects in the Lake Almanor vicinity could increase the exposure of the public or environment to hazards or hazardous materials, the increased risk would be minimal and would not be cumulatively considerable. The other related projects may also increase the potential for hazards, but the effects would be localized and spread out over time and space.

Cultural Resources (Section 5.12)

The impacts of Proposed Project and the alternatives on cultural resources would occur to varying degrees throughout the UNFFR Project boundary. Alternatives 1, 2, and 3 would result in focused construction activities within the three specific activity areas described in section 3.5. Changes in the flow regime would occur in the North Fork Feather River between Canyon dam and Belden powerhouse; however, neither Proposed Project nor any of the alternatives would result in impacts that would be cumulatively considerable. None of the other related projects are expected to affect cultural resources in these areas.

Transportation and Traffic (Section 5.13)

Construction traffic associated with Proposed Project and the alternatives would temporarily increase traffic on the local highways and roads in the vicinity of the UNFFR Project. Although the construction traffic would be minor and temporary, it would intermittently cause an incremental increase in traffic above baseline conditions. Construction traffic associated with Proposed Project and the alternatives, in conjunction with other land use or development projects around Lake Almanor and Butt Valley reservoir and along the North Fork Feather River, if they occur at the same time, would increase traffic volumes on local highways (e.g., State Route [SR] 89, SR 70, SR 36) and roads (e.g., Caribou Road). Based on the average annual daily traffic estimates for the highways, the temporary increase in construction traffic would not likely result in unacceptable levels of service, although localized congestion or delays may be experienced periodically. However, the incremental effects from impacts to traffic would not be cumulatively considerable.

Air Quality (Section 5.14)

Construction emissions associated with Proposed Project and the alternatives would contribute to the existing non-attainment status for particulate matter in Lassen and Plumas counties and could be cumulatively considerable. Other land management, development, watershed restoration, or site-specific construction projects in the vicinity of the UNFFR Project that involve particulate or vehicle emissions and that are implemented at the same time as construction activities for the alternatives would contribute to cumulative air quality impacts. Implementation of fugitive dust control measures and an emissions control plan and compliance with Northern Sierra Air

Quality Management District air quality rules and applicable permits would reduce each project's air quality impacts. Therefore, the incremental effects from impacts on air quality would not be cumulatively considerable.

Noise (Section 5.15)

The impacts of Proposed Project and the alternatives would be localized. Under Proposed Project and the alternatives, focused construction efforts associated with the specific activity areas would be limited in terms of timing and location and would not be cumulatively considerable. Other projects near the activity areas that occur at the same time could increase noise levels, but they would be conducted in a manner that complies with relevant USFS plans and/or county noise ordinances and would implement applicable noise-reduction measures.

Climate Change and Energy (Section 5.16, 5.17)

Proposed Project and the alternatives could indirectly increase reliance on greenhouse gas (GHG) emitting replacement power sources. The analysis by the California Energy Commission of potential future outcomes is the basis of the methodology used to assess reasonably expected bounding cases for changes in GHG emissions. New generation resources are expected to emit significantly less GHGs than existing coal and petroleum coke-fired generation facilities. Although foregone hydroelectric power generation under the project and alternatives could be replaced with power generated by plants with higher GHG emissions, the replacement sources would be required to comply with California Air Resources Board (CARB) programs and mandatory reporting requirements to achieve state-wide goals for GHG emissions by 2030. Other future requirements mandating compliance with AB 32 (2006), SB 32 (2015) and SB 350 (2016), or other laws and regulations, such as a cap and trade program administered by CARB, will also likely be effective through 2020, and future sources will need to comply with these as well. Because PG&E as a load-serving entity (LSE) must comply with the mandates that cap overall GHG emissions regardless of underlying changes in the operations of individual plants, any changes from the changed operations of the PG&E Project will be automatically offset by changes elsewhere in PG&E's system and generation portfolio. In other words, state laws, ordinances, regulations, and standards related to GHG emissions from the electricity system already inherently mitigate any potential cumulative impacts.

6.3 Growth-Inducing Impacts

This section evaluates the potential for growth that could be induced by implementation of Proposed Project and the alternatives and assesses the level of significance of any expected growth inducement. Under CEQA, growth itself is not assumed to be particularly beneficial, detrimental, or insignificant to the environment. If a project is determined to be growth inducing, an evaluation is made to determine whether significant impacts on the physical environment would result from that growth.

Section 15126.2(e) of the CEQA Guidelines provides guidance in determining the growth-inducing impacts of a proposed project. Specifically, a project may be growth inducing if it would foster economic or population growth, or the construction of additional housing, directly or indirectly, in the surrounding environment.

Implementation of Proposed Project or an alternative would not remove any constraints to development, create new or improved infrastructure that could support development, or otherwise create conditions that would induce growth in or near the activity areas or components of the UNFFR Project. Most of the lands within the UNFFR Project boundary are owned by PG&E or managed by the USFS. For non-PG&E-owned private lands, development applications for those parcels would in most cases require discretionary approvals from Plumas County, such as changes in zone classification and amendments to the General Plan. The parcels are located in rural, difficult-to-access areas or around Lake Almanor or Butt Valley reservoir, making approval for future development difficult. On federal lands within the UNFFR Project boundary, the Lassen and Plumas National Forests manage land uses and activities in accordance with their respective planning processes.

Any future development on private parcels within the UNFFR Project boundary would not be directly attributable to the Proposed Project or the alternatives. Proposed Project and the alternatives would improve water quality to varying degrees for a variety of beneficial uses in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River and would not include other structures or infrastructure that could support population growth, either directly or indirectly. Therefore, implementation of Proposed Project or an alternative would not induce growth in the vicinity of the UNFFR Project.

6.4 Significant Effects

CEQA establishes a duty for public agencies to avoid or minimize environmental damage where feasible (CEQA Guidelines Section 15021), and determinations of significance play a critical role in the CEQA process (CEQA Guidelines 15064). As noted at the beginning of this chapter, certain statutory considerations must be evaluated pursuant to CEQA; several of these considerations are related to significance. This section addresses several types of potentially significant effects.

Significant Environmental Effects

Potentially significant effects have been identified for:

- Air Quality;
- Geology, Geomorphology, and Soils;
- Water Quality;
- Fisheries;
- Noise;
- Vegetation, Wildlife, and Sensitive Biological Resources;
- Cultural Resources;
- Recreation;
- Transportation and Traffic;
- Hazards and Hazardous Materials; and
- Aesthetics

These potential effects are discussed in each resource section in Chapter 5. As part of the environmental impact assessment for each resource area, mitigation measures have been identified that reduce most of these impacts to less-than-significant levels, with the exception of Aesthetics and Recreation.

Significant Unavoidable Effects

CEQA (Pub. Res. Code Section 21100(b)(2)(A)) requires that an EIR include a statement that summarizes any significant effects on the environment that cannot be avoided if a proposed project is implemented. CEQA Guidelines Section 15126.2(c) states that such impacts include those that can be mitigated but not reduced to a less-than-significant level. When there are significant impacts that cannot be fully mitigated to a less-than-significant level or minimized by changing the project design, the implications of the impacts and the reasons why the project is being proposed must be described. Under Alternatives 1 and 2, impacts on Aesthetics and Recreation associated with installation of a thermal curtain around the Prattville intake were identified as significant and unavoidable, as further described in Section 5.8 and 5.9. In the localized areas around the Prattville intake, the Prattville thermal curtain has the potential to detract from the existing scenic views of the surrounding forests and mountains or the overall views of the Lake Almanor area. The Prattville thermal curtain also has the potential to reduce the quality of recreational opportunities at Lake Almanor in that area due to the closure of Marvin Alexander day use area or the construction of the thermal curtain bin and trolley system next to or within the Marvin Alexander day use area. No feasible mitigation measures were identified to adequately reduce Aesthetic and Recreation impacts to a less than significant level.

Significant Irreversible Environmental Changes

CEQA (Pub. Res. Code Section 21100(b)(2)(B)) requires that an EIR include a statement that summarizes any significant effects on the environment that would be irreversible if a proposed project is implemented. Similarly, CEQA Guidelines Section 15126.2(d) requires that an EIR address the significant irreversible changes that would be involved in a proposed project should it be implemented.

The environmental analysis conducted for Proposed Project and alternatives did not identify any significant irreversible effects. The proposed water quality measures under Alternatives 1 and 2 would involve installation of structures (thermal curtains) in a lacustrine environment, and modifications to an outlet structure below the water would occur under Alternatives 1 and 3. These changes to Lake Almanor and Butt Valley reservoir are not irreversible changes because the structures could be removed in the future. The resulting changes in water temperatures are expected to be significant beneficial effects in terms of improving water quality for the benefit of the North Fork Feather River's fisheries. Project operations also can be adjusted to reverse any impacts attributable to changes to project operations under a new FERC license, including any impacts to fishery resources in Lake Almanor attributable to cold-water withdrawals to protect fishery resources in the North Fork Feather River.

Effects Found Not to Be Significant

Implementation of Proposed Project or an alternative would result in potential effects that were determined not to be significant. Effects that are not significant would occur in the following resource areas:

1. Land Use
2. Energy
3. Public Services and Utilizes
4. Water Resources
5. Climate Change

These potential effects are discussed in each resource section in Chapter 5. Because the effects were determined to be less than significant, mitigation measures are not required.

6.5 Mitigation Measures Proposed to Minimize the Significant Effects

Under CEQA (Pub. Res. Code Section 21081.6(a) and CEQA Guidelines Section 15097), lead agencies are required to adopt a program for monitoring or reporting changes to a proposed project to mitigate or avoid significant environmental effects; the purpose of the program is to ensure that the project revisions and measures are implemented.

Mitigation measures have been identified for various resource areas in Chapter 5 of the RDEIR. These measures are presented in language that will facilitate establishment of a monitoring and reporting program. Any mitigation measures adopted by the State Water Board as a condition of project approval will be included in a Mitigation Monitoring and Reporting Program (MMRP) to verify compliance. The approval of such a program will be part of any action taken by the State Water Board with respect to the project. When other regional or state agencies subject to CEQA approve portions of Proposed Project or an alternative under their own jurisdiction or regulatory power, these “responsible agencies” will be required to adopt their own MMRPs (CEQA Guidelines, Section 15097(d)).

The MMRP will be used by the State Water Board along with PG&E staff, project contractors, cooperating and participating agencies, and monitoring personnel during project implementation. The intent of the MMRP is to ensure the effective implementation and enforcement of adopted mitigation measures and permit conditions. The MMRP will provide for monitoring of construction activities as necessary, on-site identification and correction of potential environmental problems, and proper reporting to State Water Board staff. The MMRP will be adopted along with the Final EIR.

6.6 CEQA Findings and Statements of Overriding Consideration

The CEQA Guidelines (Section 15091) state that “[n]o public agency shall approve or carry out a project for which an EIR has been certified which identifies one or more significant environmental effects of the project unless the public agency makes one or more written findings for each of those significant effects, accompanied by a brief explanation of the rationale for each finding." The State Water Board, as lead agency under CEQA, will need to make written findings for each significant impact identified in this document before approving Proposed Project or an alternative.

Section 15093(a) of the CEQA Guidelines allows the lead agency to determine whether the benefits of a proposed project outweigh the unavoidable adverse environmental impacts of implementing the project. The lead agency can approve a project with significant unavoidable impacts if it prepares a "Statement of Overriding Considerations" that sets forth the specific reasons for making such a judgment.

Chapter 7 Alternatives Analysis

7.1 Introduction

The California Environmental Quality Act (CEQA) requires that an environmental impact report (EIR) include consideration and discussion of alternatives to a proposed project. (Cal. Code Regs., tit. 14, § 15126.6.) The purpose of the alternatives analysis in this Revised draft RDEIR is to identify ways to meet project objectives and protect the designated beneficial uses of the Upper North Fork Feather River while avoiding and mitigating potentially significant adverse impacts that could result from the implementation of Proposed project or one of the three alternatives.

The CEQA Guidelines include the following provisions regarding the discussion of alternatives to a proposed Project:

> *An EIR shall describe a range of reasonable alternatives to the project which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project on the environment, and evaluate the comparative merits of the alternatives." (Section 15126.6, subd. (a) and (c));*
>
> *If there is a specific proposed project or a preferred alternative, the EIR must explain why other alternatives considered in developing the proposed project were rejected in favor of the proposal. "The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination." (Section 15126.6, subd. (c));*
>
> *The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project.... If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed." (Section 15126.6, subd. (d));*
>
> *The specific alternative of 'no project' shall be evaluated along with its impact. The purpose of describing and analyzing a 'no project' alternative is to allow decisionmakers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project." The CEQA Guidelines also provide that the "no project" analysis "shall discuss the existing conditions at the time the notice of preparation is published...as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans...." (Section 15126.6, subd. (e)); and*
>
> *The range of alternatives required in an EIR is governed by a 'rule of reason' that requires an EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that*

> *would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the Lead Agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making." (Section 15126.6, subd. (f).)*

7.2 Project Alternatives Evaluated in This RDEIR

Chapter 3 provides a detailed description of Proposed Project and the three alternatives that are analyzed in this RDEIR. Chapter 3 also provides a description of the process used to identify and screen the alternatives and a description of alternatives that were evaluated but eliminated from further consideration.

This chapter provides a comparative summary of the alternatives relative to baseline conditions, with the purpose of identifying the environmentally superior alternative that also achieves the project objectives listed in Section 1.3. Following are summary descriptions of Proposed Project and the alternatives. As explained in Chapter 3, the No Project Alternative is not included in this comparative analysis due to uncertainties regarding this alternative.

- **Proposed Project** provides for continued operation of the UNFFR Hydroelectric facilities, as summarized in Section 3.4, as further modified by the elements of PG&E's application to FERC and modifications made in accordance with the 2004 Settlement Agreement, mandatory conditions, and the FERC staff additions.
- **Alternative 1 - Thermal Curtains at Prattville Intake and Caribou Intakes with Canyon Dam releases up to 250 cfs**. Alternative 1 includes all elements described in section 3.4, including installation of a thermal curtain at the Prattville intake on Lake Almanor, operation of the Canyon dam outlet to release up to 250 cfs from June 16 to September 15, and installation of a thermal curtain at the Caribou intakes on Butt Valley reservoir.
- **Alternative 2 – Thermal Curtains at Prattville Intake and Caribou Intakes and Associated Flows to the Seneca and Belden Reaches**. Alternative 2 consists of all elements described in section 3.4, including installation of thermal curtains at the Prattville intake on Lake Almanor and at the Caribou intakes on Butt Valley reservoir as described for Alternative 1. The water temperature benefits under Alternative 2 would not be as great as under Alternative 1.
- **Alternative 3 – Canyon Dam releases up to 250 cfs.** Alternative 3 includes all elements described in section 3.4, including operation of the Canyon dam outlet to release up to 250 cfs from June 16 to September 15 to achieve temperature benefits.

The No-Project Alternative

The No-Project Alternative is evaluated in section 3.7. Under the No Project Alternative, the State Water Board would deny PG&E's application for water quality certification for the UNFFR Project pursuant to Section 401 of the Clean Water Act. In this case, evaluation of the no project alternative is difficult because the consequences of denying approval are uncertain and a myriad of possible environmental impacts could occur. Nonetheless, the reasonably foreseeable consequences of denying approval and the associated environmental impacts are discussed in section 3.7. Section 2.4 of the FERC 2005 Final Environmental Impact Statement (Final EIS) is incorporated by reference into this RDEIR to further define the No-Project Alternative. Section 2.4 of FERC's Final EIS identifies three alternatives that were considered but eliminated from detailed study: federal government takeover; issuance of a nonpower license; and project retirement. As described in section 2.4 of FERC's Final EIS, there are key uncertainties associated with alternatives that would remove or convert UNFFR facilities. Loss of a significant power generation resource coupled with or without the loss a significant recreational reservoir would introduce impacts compared to the Proposed Project. The Proposed Project would have no significant unavoidable impacts.

7.3 Comparison of Alternatives

CEQA does not provide specific direction regarding the methodology for the comparison of alternatives. Each project must be evaluated for the issues and impacts that are most important, which varies depending on the project type and the environmental setting. Issue areas that are generally given more weight in comparing alternatives are those where significant impacts would occur or where there would be long-term impacts (e.g., visual impacts and permanent loss of habitat or land use conflicts). Impacts that are easily mitigable to less-than-significant levels are generally considered to be less important.

This comparison is designed to satisfy the requirements of CEQA Guidelines Section 15126.6(d), Evaluation of Alternatives, which states that:

> *"The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. A matrix displaying the major characteristics and significant environmental effects of each alternative may be used to summarize the comparison. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the proposed project as proposed."*

Chapter 3 provides a detailed description of the Proposed Project and the three Alternatives considered in this RDEIR. The environmental impacts of the Proposed Project and alternatives are described in chapter 5. Table 7-1 summarizes the impacts from each of the impacts analyzed and shows the only significant and unavoidable impacts are to Aesthetics and Recreation from the construction of the Prattville intake thermal curtain. The impacts and mitigation should not be summed to conclude which alternative is superior as that would assign equal value to each impact. Due to the nature of the UNFFR Project, the Proposed Project and the alternatives have the largest impact on water resources, but the Proposed Project represents small changes to the current operation of the UNFFR Project and the Proposed Project changes are designed to improve the environment and improve access and enjoyment of the resources contained within the project. The alternatives evaluated are intended to further improve the temperature conditions in the North Fork Feather River beyond the Proposed Project while maintaining the cold water habitat in reservoirs.

While the combination of both thermal curtains and increased flow (Alternative 1) have the largest increase in cold water habitat downstream and the largest increase in Lake Almanor habitat under normal years, the modeling efforts also indicate that Alternative 1 results in the largest loss of suitable cold water habitat during critical dry years when habitat volumes are most limited. Overall the modeled habitat volumes changes in the reservoir are small (less than ± 10 percent), but due to limited available habitat during critical dry years the impacts are considered significant. The relative reservoir habitat changes are less than the relative changes in cold water river habitat where modeling efforts indicate unsuitable river habitat (greater than 20°C) was reduced by the alternatives from 39 to 86 percent from baseline while the proposed project resulted in 6 to 20 percent reduction. As expected, the thermal curtain and increased releases (Alternative 1) showed the most improved river habitat for all water year types, but increased flow alone showed significant improvements in river temperatures and the least impact to reservoir habitat.

The nature of the construction and operation associated with a project of the magnitude of thermal curtains also carries with it the associated impacts. The only significant and unavoidable impacts result from the Prattville thermal curtain on Aesthetics and Recreation, due to its location next to the Marvin Alexander Day Use area.

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
5.2 Land Use and Mineral Resources				
Impact LU-1: Construction activities associated with proposed project or the alternatives could disrupt other land uses in or near activity areas.	LTS	LTS	LTS	LTS
Impact LU-2: Implementation of Proposed project or the alternatives could conflict with adjacent land uses.	LTS	LTS	LTS	LTS
Impact LU-3: Proposed project or the alternatives could be inconsistent with the goals, policies, and objectives of the Plumas County General Plan, County Zoning Ordinances, or	LTS	LTS	LTS	LTS

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
the Lassen and Plumas National Forests LRMPs.				
Impact LU-4: Implementation of Proposed project or the alternatives could disrupt authorized locatable mining activities in the Seneca and Belden reaches of the North Fork Feather River.	LTS	LTS	LTS	LTS
5.3 Geology, Geomorphology, and Soils				
Impact GGS-1: Construction activities associated with Proposed Project or the alternatives would cause erosion in disturbed areas, resulting in increased sedimentation in the North Fork Feather River and reservoirs.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact GGS-2: Implementation of Proposed Project or the alternatives could increase exposure of people and structures to geologic hazards, such as erosion, landslides, or rockslides.	LTS	LTS	LTS	LTS
Impact GGS-3: Implementation of Proposed project or the alternatives could modify the channel morphology of the North Fork Feather River as a result of changes in flow.	LTS	LTS	LTS	LTS
Impact GGS-4: Implementation of the Proposed project or the alternatives could affect the location and severity of shoreline erosion along Lake Almanor.	LTS	LTS	LTS	LTS
5.4 Water Resources				

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
Impact WR-1: Construction activities associated with Proposed Project or the alternatives could require use of water from Lake Almanor or Butt Valley reservoir that is not approved under existing water rights.	LTS	LTS	LTS	LTS
Impact WR-2: Implementation of Proposed Project or the alternatives could increase the potential for flooding along the Seneca and Belden reaches as a result of modified flows in the North Fork Feather River.	LTS	LTS	LTS	LTS
Impact WR-3: Implementation of Proposed Project or the alternatives could modify water deliveries from Lake Almanor, affecting existing water uses downstream.	NI	NI	NI	NI
5.5 Water Quality				
Impact WQ-1: Implementation of Proposed Project or the alternatives could affect water temperature in Lake Almanor.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact WQ-2: Implementation of Proposed Project or the alternatives could affect water temperature in Butt Valley reservoir.	LTS	LTS	LTS	LTS
Impact WQ-3: Implementation of Proposed Project or the alternatives could affect water temperatures in the North Fork Feather River below Canyon dam and Belden dam.	NI	NI	NI	NI

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
Impact WQ-4: Implementation of Proposed Project or the alternatives could affect DO levels in water discharged from Canyon dam and Butt Valley powerhouse.	LTS	LTS	LTS	LTS
Impact WQ-5: Implementation Proposed Project or the alternatives could cause water released from Canyon dam to have an undesirable taste or odor.	LTS	LTS	LTS	LTS
Impact WQ-6: Implementation of Proposed Project or the alternatives could cause a change in the character or quantity of dissolved metal concentrations or other contaminants in Lake Almanor or the North Fork Feather River.	LTS	LTS	LTS	LTS
Impact WQ-7: Construction activities associated with Proposed Project or the alternatives could result in temporary increases in turbidity and total suspended solids in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact WQ-8: Hazardous materials spills during construction activities associated with Proposed Project or the alternatives could cause contamination of Lake Almanor, Butt Valley reservoir, and the North Fork Feather River.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
5.6 Fisheries				

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
Impact FS-1: Construction activities associated with Proposed Project or the alternatives could affect fish populations in Lake Almanor, Butt Valley reservoir, and the North Fork Feather River through direct and indirect impacts on individuals or habitat.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact FS-2: Implementation of Proposed Project or the alternatives could alter aquatic habitat conditions in Lake Almanor.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact FS-3: Implementation of Proposed Project or the alternatives could alter aquatic habitat conditions in Butt Valley reservoir.	LTS	LTS	LTS	LTS
Impact FS-4: Implementation of Proposed Project or the alternatives could alter cold freshwater habitat conditions in the North Fork Feather River over the long term.	LTS	LTS	LTS	LTS
Impact FS-5: Implementation of Proposed Project or the alternatives could adversely affect the recreational fishery of Butt Valley reservoir as a result of fewer forage fish in the reservoir.	LTS	LTS	LTS	LTS
5.7 Vegetation, Wildlife, and Sensitive Biological Resources				
Impact BR-1: Construction activities associated with Proposed Project or the alternatives could affect special-status plants or their habitat through removal of individuals,	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
habitat modification, or the spread of invasive plants.				
Impact BR-2: Construction activities associated with Proposed Project or the alternatives could affect special-status reptiles and amphibians (California red-legged frog, mountain yellow-legged frog, foothill yellow-legged frog, Cascades frog, and western pond turtle) or their habitat.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact BR-3: Construction activities associated with Proposed Project or the alternatives could affect special-status bats (pallid bat, Townsend's big-eared bat, spotted bat, western mastiff bat, western red bat, and fringed myotis) or their habitat.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact BR-4: Construction activities associated with Proposed Project or the alternatives could affect forest carnivores (Pacific fisher, Sierra Nevada red fox, ringtail cat, and American marten) or their habitat.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact BR-5: Construction activities associated with Proposed Project or the alternatives could affect nesting birds or their habitat.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact BR-6: Construction activities associated with Proposed Project or the alternatives could result in adverse impacts on wetlands	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
regulated under federal or State law.				
Impact BR-7: Implementation of Proposed Project or the alternatives could restrict movement of wildlife species through the activity areas.	LTS	LTS	LTS	LTS
5.8 Recreation				
Impact RE-1: Construction activities associated with Proposed Project or the alternatives could disrupt recreational activities at Lake Almanor and Butt Valley reservoir.	LTS	LTS	LTS	LTS
Impact RE-2: Implementation of Proposed Project or the alternatives could reduce the quality of recreational opportunities at Lake Almanor or Butt Valley reservoir and create hazards for recreationists.	LTS	SU	SU	LTS
Impact RE-3: Implementation of Proposed Project or the alternatives could affect the quality of recreational fishing opportunities in the North Fork Feather River below Canyon dam by increasing flows in the Seneca and Belden reaches.	LTS	LTS	LTS	LTS
5.9 Aesthetics				
Impact AE-1: Construction activities associated with Proposed Project or the alternatives could temporarily degrade the visual quality of Lake Almanor or Butt Valley reservoir.	LTS	LTS	LTS	LTS

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
Impact AE-2: Proposed Project or the alternatives could degrade or obstruct scenic views from VAUs.	LTS	SU	SU	LTS
Impact AE-3: Proposed Project or the alternatives could substantially change the character of, or be disharmonious with, existing land uses and aesthetic features around Lake Almanor, Butt Valley reservoir or along the North Fork Feather River.	LTS	SU	SU	LTS
Impact AE-4: Proposed Project or the alternatives could create a new source of light or glare at Lake Almanor and Butt Valley reservoir.	LTS	LTS	LTS	LTS
5.10 Public Services and Utilities				
Impact PS-1: Construction activities associated with Proposed Project or the alternatives could result in the temporary disruption of utility services in the area.	NI	NI	NI	NI
Impact PS-2: Proposed Project or the alternatives could create public safety hazards and increase the demand for emergency response services, resulting in the need for new or expanded facilities that could affect the environment.	LTS	LTS	LTS	LTS
5.11 Hazards and Hazardous Materials				
Impact HM-1: Construction activities associated with Proposed Project or the alternatives could expose people	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
and the environment to hazards associated with the use of hazardous materials.				
Impact HM-2: Implementation of Proposed Project or the alternatives could increase the potential for wildfires and expose people to hazards from wildfires.	LTS	LTS	LTS	LTS
5.12 Cultural Resources				
Impact CR-1: Construction activities associated with Proposed Project or the alternatives could disturb or damage historical or archaeological resources	LTS	LTS	LTS	LTS
Impact CR-2: Construction activities associated with Proposed Project or the alternatives could disturb or damage previously undiscovered historical or archaeological resources or human remains.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
5.13 Transportation and Traffic				
Impact TT-1: Construction activities associated with Proposed Project or the alternatives would generate a short-term increase in traffic and could affect traffic flow on local highways and roads.	LTS	LTS	LTS	LTS
Impact TT-2: Construction activities associated with Proposed Project or the alternatives could increase traffic hazards and impede emergency access.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
5.14 Air Quality				

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
Impact AQ-1: Construction activities associated with Proposed Project or the alternatives would generate fugitive dust and contribute to local violations of particulate matter standards.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact AQ-2: Construction traffic associated with Proposed Project or the alternatives would contribute to air pollution along access routes.	LTS	LTS	LTS	LTS
Impact AQ-3: Proposed Project or the alternatives could generate odors that would affect sensitive receptors at Lake Almanor and along the North Fork Feather River.	NI	LTS	NI	LTS
5.15 Noise				
Impact NO-1: Construction activities associated with Proposed Project or the alternatives could increase noise levels above acceptable standards and may expose sensitive receptors to excessive noise or ground borne vibrations.	LTS with mitigation	LTS with mitigation	LTS with mitigation	LTS with mitigation
Impact NO-2: Implementation of Proposed Project or the alternatives could increase ambient noise levels around Lake Almanor and Butt Valley reservoir or along the North Fork Feather River.	LTS	LTS	LTS	LTS
5.16 Climate Change				
Impact CC-1: Implementation of Proposed Project or the alternatives could indirectly	LTS	LTS	LTS	LTS

Table 7-1 Comparison of Potential Impacts of the Project Alternatives to Baseline Conditions

Environmental Resource	Proposed project	Alternative 1	Alternative 2	Alternative 3
increase GHG emissions and conflict with policies adopted to reduce GHG emissions.				
LTS = Less Than Significant NI = No impact SU = Significant and Unavoidable				

Consistency with State Water Board Objectives

Section 1.3 of this RDEIR outlines six objectives established by the State Water Board. As described in Chapter 3 of this RDEIR and analyzed in Chapters 5 and 6, the proposed project and three alternatives would meet all six objectives to varying degrees. As illustrated in Table 7-1, these alternatives would have a range of impacts and benefits with respect to preservation and protection of beneficial uses associated with Lake Almanor and the North Fork Feather River.

In summary, the proposed project would have the fewest significant environmental impacts relative to baseline conditions, but it would also be the least effective in achieving the State Water Board's objective of reducing water temperatures in the North Fork Feather River to protect cold freshwater habitat. All the potentially significant impacts of the Proposed Project would be less than significant with mitigation.

In contrast to the Proposed Project, Alternative 1 would have the most significant environmental impacts relative to baseline conditions, but it also would be the most effective in reducing water temperatures in the North Fork Feather River. The thermal curtain at the Prattville Intake would have potentially significant Aesthetic and Recreation impacts, and the selective withdrawal of cold water from Lake Almanor under this alternative would reduce cold water habitat in Critical Dry Years. With the exception of the Aesthetic and Recreation impacts of the thermal curtain at the Prattville Intake, all of the potentially significant impacts under Alternative 1 would be less than significant with mitigation.

The temperature benefits to the North Fork Feather River under Alternative 1 would be substantially greater than the proposed project. The temperature reduction benefits of Alternative 1 would diminish in the downstream reaches, but still remain significant.

Alternatives 2 and 3 fall in between the proposed project and Alternative 1 both in terms of significant environmental impacts relative to baseline conditions and effectiveness in reducing temperatures in the North Fork Feather River. Alternative 2 would avoid the construction-related impacts associated with modifications to the Canyon Dam Outlet structure. In addition, this alternative would avoid the foregone power generation and increased greenhouse gas emissions attributable to increased releases from Canyon Dam for purposes of temperature control. Alternative 3 would avoid the significant construction-related, Aesthetic, and Recreation impacts associated with thermal curtains at the Prattville and Caribou Intakes. The potential impacts to the cold water fishery in Lake Almanor under both Alternatives 2 and 3 would be similar to Alternative 1 but under Alternative 3 releases from Canyon Dam could be modified more easily in response to any impacts to the lake fishery.

The river temperature benefits from Belden to Poe under Alternatives 2 and 3 would be greater than the proposed project, but not as great as Alternative 1. Temperature benefits downstream under Alternative 2 would be greater than the benefits under Alternative 3. Alternative 3 strikes a balance between improved cold water habitat in the Upper North Fork Feather River and loss of cold water habitat in Lake Almanor and Butt Valley Reservoir.

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Chapter 9 Glossary

2004 Settlement Agreement — Protection, enhancement, and mitigation measures agreed to by the participants in the Project 2105 Licensing Group for inclusion in the new Federal Energy Regulatory Commission license for the Upper North Fork Feather River Hydroelectric Project. See partial settlement agreement.

2105 Collaborative — Also known as Project 2105 Licensing Group; a broad-based group of resource agencies, public entities, and non-governmental organizations formed to reach agreement on protection, mitigation, and enhancement measures for inclusion in the new Federal Energy Regulatory Commission license for the Upper North Fork Feather River Hydroelectric Project.

A-weighted decibel scale (dBA) — The dBA scale correlates to the range of sounds audible to the human ear (where 10 dBA is at the low threshold of hearing and 120–140 dBA is the threshold of pain).

Ambient noise level — The background sound level at a given location.

Anadromous — Fish that live their adult lives in the ocean but migrate up fresh-water rivers to spawn.

Ancillary services — Provision of generation capability to match system output to load.

Anoxic — Anoxic waters are depleted of dissolved oxygen.

Average daily water temperature — The average of water temperatures over the course of a 24-hour day. The average daily temperature is the limit of resolution of the temperature model used to estimate river temperatures

Bankfull — The water level, or stage, at which a stream, river, or lake is at the top of its banks and any further rise would result in water moving onto the floodplain.

Base flow — Streamflow that results from precipitation that infiltrates into the soil and eventually moves through the soil to the stream channel. Also referred to as groundwater flow or dry-weather flow. Base flow is contrasted with flow that results from a rainstorm or other precipitation event.

Basin — Geographic land area draining into a lake or river; also referred to as drainage basin or watershed.

Basin Plan — Water Quality Control Plan for the Sacramento and San Joaquin River Basins prepared by the Central Valley Regional Water Quality Control Board. Basin plans designate the beneficial uses of waters to be protected and establish the water quality objectives necessary to protect those uses, as required under Section 303 of the Clean Water Act and Sections 13240 and 13241 of the California Water Code.

Beneficial uses — State law defines the beneficial uses of California's waters that may be protected against water quality degradation to include "domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves."

Bioaccumulation — The increasing concentration of a pollutant such as mercury or PCBs in the food chain.

Biological study area — Lands within the UNFFR Project boundary and surrounding plant and wildlife communities.

Biostimulatory substances — Chemicals or elements that have an effect, whether positive, negative, or neutral, on living tissue.

Community noise equivalent level — A 24-hour, single number, equivalent noise level, usually calculated from measured hourly equivalent noise levels.

Controllable water quality factors — As defined in the Basin Plan, "those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, that are subject to the authority of the State Water Board or the Regional Water Board, and that may be reasonably controlled."

Cultural resources — Archaeological, traditional, and built environment resources, including buildings, structures, objects, districts, and sites.

Cumulative impacts — The impacts of a project along with other past, present, and reasonably foreseeable future projects.

Degree-d-km — The product of temperature, number of days, and kilometers. This report use the temperature of 20°C and averages the days to create a an average daily degree-d-km.

Diel — A 24-hour period of time.

Discretionary action — An action for which an agency can use its judgment in deciding whether and how to carry out or approve a project.

Dissolved oxygen — The concentration of free (not chemically combined) molecular oxygen (a gas) dissolved in water, usually expressed in milligrams per liter, parts per million, or percent of saturation. Adequate concentrations of dissolved oxygen are necessary for the life of fish and other aquatic organisms and the prevention of offensive odors.

Distinct population segment — A distinct population segment is a vertebrate population or group of populations that is separated from other populations of the species and significant in relation to the entire species. The Endangered Species Act provides for listing species, subspecies, or distinct population segments of vertebrate species.

Environmental baseline — The conditions that existed at the time the Notice of Preparation was released in August 2005, including operation of the UNFFR Project under its existing FERC license. Same as environmental setting.

Environmental setting — See “environmental baseline.”

Epilimnion — The upper, wind-mixed layer of a thermally stratified lake.

Evolutionarily significant unit — An evolutionarily significant unit is a Pacific salmon population or group of populations that is substantially reproductively isolated from other conspecific populations and that represents an important component of the evolutionary legacy of the species.

Geographical scope — For the cumulative impact analysis, the geographic scope is the North Fork Feather River watershed.

Greenhouse gases — Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include carbon dioxide, methane, nitrous oxide, ozone, and chlorofluorocarbons.

Hibernaculum — A shelter in which animals hibernate or overwinter.

Historic properties — As defined by the National Historic Preservation Act, historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places.

Hydromodification — An alteration in a river, stream, or lake.

Hypolimnion — The bottom, and most dense, layer of a stratified lake. It is typically the coldest layer in the summer and warmest in the winter. It is isolated from wind mixing and typically too dark for much plant photosynthesis to occur.

Hypoxic — Refers to waters that have dissolved oxygen concentrations of less than 2 to 3 parts per million.

Incidental take — An unintentional, but not unexpected, taking. See “take.”

Intrastate waters — Waters, such as lakes or rivers, that are only found in one state.

Lacustrine — Having to do with a lake environment.

Lead agency — The public agency that has the principal responsibility for carrying out or approving a project. The lead agency decides whether an environmental impact report or Negative Declaration is required for a project, and causes the appropriate document to be prepared.

Lentic — Refers to standing water habitats, such as lakes, ponds, and swamps.

Mass wasting — Loss of soil or geologic material through landslides or erosion.

Mesotrophic — Moderately productive; relating to the moderate fertility of a lake in terms of its algal biomass.

Metalimnion — The middle or transitional zone between the well-mixed epilimnion and the colder hypolimnion layers in a stratified lake.

MWAT — maximum weekly average temperture

Nameplate capacity — The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.

Nephelometric turbidity unit — Unit of measure for the turbidity of water. Essentially, a measure of the cloudiness of water as measured by a nephelometer. Turbidity is based on the amount of light that is reflected off particles in the water.

Notice of Preparation — A notice issued by the lead agency to responsible and trustee agencies and the State Clearinghouse advising them of the preparation of a draft environmental document and requesting comments on the project.

Palustrine — Having to do with a wetland environment.

Partial settlement agreement — The State Water Resources Control Board participated in the discussions of the Project 2105 Licensing Group (2105 Collaborative) but was not a signatory to the 2004 Settlement Agreement because it did not resolve water quality issues related to the Upper North Feather River Project. The State Water Board therefore considers the agreement to be a partial settlement agreement.

Peak capacity — The maximum electrical output of a generator or power plant.

Project — A project is defined under CEQA as “the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment” and that requires a discretionary approval from a public agency.

Pulse flow — Flows used periodically to meet specific objectives such as gravel mobility or whitewater recreation.

Ramping flows — Stream flows that are increasing in amount and speed.

Receiving water — A water body, such as a river or lake, that an outlet or creek empties into.

Redd — A fish nest. Redds are usually made in clear gravel along river and stream beds.

Refugia — Areas used by animals for hiding, resting, aestivating, or hibernating.

Related project — A project that occurs in the same geographic area as the proposed project, would be implemented in the same general time period as the proposed project, and would result in similar types of impacts as those described for the proposed project.

Responsible and trustee agencies — Agencies, other than the lead agency, that will issue permits or other approvals for a project. They act after the lead agency has completed its CEQA process.

Riparian — Streamside vegetation such as willows and cottonwoods. This vegetation is important habitat for many species and helps to cool water temperatures.

Sensitive noise receptors — Specific geographic points, such as schools, hospitals, convalescent homes, residences, or parks, where people could be exposed to unacceptable levels of noise that affect daily activities or that result in health effects, like hearing loss or reduced sleep.

Special-status species — For the purposes of this Draft EIR, special-status plant and wildlife species are those that are: (1) listed as threatened or endangered under the federal or California endangered species acts; (2) proposed for listing as threatened or endangered; (3) candidates for listing as threatened or endangered; (4) designated as rare by the California Department of Fish and Wildlife; (5) ranked on the California rare plant ranking system as 1B or 2; or (5) designated by the Regional Forester of the United States Forest Service as sensitive pursuant to the National Forest Management Act.

Substantial adverse change — "…Physical demolition, destruction, relocation, or alteration of [a historical] resource or its immediate surroundings such that the significance of … [the] resource would be materially impaired."

Take — Under the federal Endangered Species Act, take of a species is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb." Section 86 of the California Fish and Game Code defines take as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Temporal scope — For the cumulative impact analysis, the temporal scope is 30 to 50 years into the future, which correlates to the period of time requested by PG&E for a new FERC license for the UNFFR Project.

Thermal stratification — The physical process in a water body when warming of surface water creates a sufficient gradient in the relative densities between the surface and deeper waters, which ultimately limits the depth to which wind can mix the warm surface with the deeper colder water.

Thermocline — The depth at which the temperature gradient in a lake or water body is steepest during the summer. The transitional zone between the two layers that exhibits the greatest rate of temperature change is referred to as the thermocline, or metalimnion.

Thresholds of significance — Standards that judge the potential impact that an action may result in. These standards are compiled in the CEQA Guidelines; agency standards; legislative or regulatory requirements, as applicable; and professional judgment. The thresholds provide a means to identify the level at which an impact becomes significant. Most thresholds are qualitative, but quantitative thresholds are provided for some resource topics.

Traditional cultural property — A particular place or property that reflects the beliefs, customs, and practices of a living human community, typically reflecting the heritage of Native American tribes.

Turbidity — A measure of the degree to which light is scattered by suspended particulate material and soluble colored compounds in the water. It provides an estimate of the muddiness or cloudiness of the water due to clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, plankton, and microscopic organisms.

Typical meteorological year — A collection of meteorological data that gives the expected temperature and precipitation for a given date.

UNFFR Project — Upper North Fork Feather River Hydroelectric Project. FERC project No. 2105

Upper incipient lethal temperature — The highest temperature to which a species can be acclimated; above this temperature, all temperatures are lethal, regardless of previous thermal exposure

Varial Zone — The zone at the edge of a water body between high and low tide.

Viewer exposure — The visibility of resources in the landscape, the proximity of the vantage point to the view, the elevation of the viewer relative to the view, the frequency and duration of the viewing, the number of observers, and preconceived expectations of individual viewers or groups.

Viewer sensitivity — The extent of the public's concern for particular landscapes.

Viewshed — Viewshed is defined by the Federal Highway Administration as all of the surface area visible from a particular location (such as a vista point) or a sequence of points (such as a highway or trail).

Water neutral — No decreases or increases in annual storage.

Water quality limited segment — Any segment of a river or stream where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by sections 301(b) and 306 of the Clean Water Act.

Water quality objectives — Water quality objectives are "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

Water year — A 12-month period during which a complete annual hydrologic cycle normally occurs. The water year used by the U.S. Geological Survey runs from October 1 through September 30, and is designated by the year in which it ends.

Water year types — A means of assessing the amount of water originating in a basin. For the North Fork Feather River, the water year types are based on inflow into Lake Oroville. The water year types are as follows: (1) wet: greater than or equal to 5,679 thousand acre-feet (TAF) inflow to Oroville; (2) normal: less than 5,679 TAF but greater than or equal to 3,228 TAF inflow to Oroville; (3) dry: less than 3,228 TAF but greater than or equal to 2,505 TAF inflow to Oroville; and (4) less than 2,505 TAF inflow to Oroville.

Waters of the United States — Water bodies subject to regulation by the United States Army Corps of Engineers.

Chapter 10 List of Preparers

10.1 State Water Resources Control Board

Name and Title	Project Role
Jordan Smith, PE Water Resource Control Engineer Water Quality Certification Program	Project Manager
Jeff Wetzel, PE Senior Water Resource Control Engineer Water Quality Certification Program	Sr. Project Manager
Ann Marie Ore Environmental Program Manager I Water Quality Certification Program	Program Manager
Dana Heinrich Attorney IV Office of Chief Counsel	Legal Review

10.2 North State Resources, Inc.

Name and Title	Project Role
Paul Uncapher Earth Sciences Program Manager	Project Manager, Geology, Water Resources, Water Quality
Leslie Perry Senior Environmental Analyst	Vegetation and Wildlife, Mitigation Monitoring and Reporting Plan
Keith Marine Principal Aquatic Ecologist	Fisheries, Water Quality
Mike Mercer Fisheries Biologist	Fisheries
Tom Koler, PhD, RG Geologist	Geology
Len Lindstrand Wildlife Biologist	Vegetation and Wildlife
Allison Loveless Environmental Analyst	Vegetation and Wildlife
Jed McLaughlin Environmental Analyst	Land Use, Hazards and Hazardous Materials, Cultural Resources, Recreation, Transportation and Traffic, Public Services and Utilities
Connie Carpenter Senior Environmental Analyst	Aesthetics
Charles Shoemaker GIS Program Manager	Geographic Information Systems
Kathryn McDonald Senior Writer/Editor	Technical Editing
Brooke McDonald Editor	Glossary, Administrative Record, References, Proofreading
Sylvia Langford Desktop Publisher	Word Processing

10.3 Stetson Engineers

Name and Title	Project Role
James Reilly, MS, PE Supervising Water Resources Engineer	Water Quality and Levels 1 and 2 Report and Level 3 Report
Xiaoqing Zeng, Ph.D., PE Water Resources Engineer	Water Quality and Levels 1 and 2 Report and Level 3 Report
Guoyuan Li, Ph.D., PE Water Resources Engineer	Water Quality and Levels 1 and 2 Report and Level 3 Report

10.4 M.Cubed

Name and Title	Project Role
Richard McCann Principal	Climate Change, Air Quality, Power Loss