COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

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

TABLE OF CONTENTS

PAGES vii to xviii

FEIS
# TABLE OF CONTENTS

LIST OF FIGURES ............................................................................................................ xi

LIST OF TABLES ............................................................................................................... xiii

ACRONYMS AND ABBREVIATIONS ........................................................................... xiii

SUMMARY ...................................................................................................................... xix

1.0 PURPOSE OF ACTION AND NEED FOR POWER ........................................... 1-1

1.1 PURPOSE OF ACTION ............................................................................ 1-1

1.2 NEED FOR POWER .................................................................................. 1-3

1.3 INTERVENTIONS .................................................................................... 1-6

1.4 SCOPING PROCESS .............................................................................. 1-7

1.5 AGENCY CONSULTATION ................................................................... 1-8

1.6 SETTLEMENT AGREEMENT ................................................................ 1-9

1.7 COMMENTS ON THE DRAFT EIS ....................................................... 1-11

2.0 PROPOSED ACTION AND ALTERNATIVES .................................................. 2-1

2.1 APPLICANT’S PROPOSAL ..................................................................... 2-1

2.1.1 Project Description and Operation ................................................. 2-1

2.1.1.1 Project Description ................................................................. 2-1

2.1.1.2 Project Boundary .................................................................. 2-3

2.1.1.3 Project Operation .................................................................. 2-3

2.1.2 Proposed Environmental Measures ................................................ 2-4

2.2 MODIFICATIONS TO APPLICANT’S PROPOSAL ................................ 2-11

2.2.1 Mandatory Conditions .................................................................. 2-11

2.2.1.1 Section 18 of the Federal Power Act—Authority to

Require Fishways .................................................................................. 2-11

2.2.1.2 Section 4(e) Conditions ...................................................... 2-11

2.2.2 Staff’s Alternative ........................................................................... 2-12

2.3 NO-ACTION ALTERNATIVE .................................................................. 2-14

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM

DETAILED STUDY .................................................................................. 2-14

2.4.1 Federal Government Takeover of the Project .............................. 2-14

2.4.2 Issuing a Nonpower License .......................................................... 2-15

2.4.3 Retiring the Project ..................................................................... 2-15

3.0 ENVIRONMENTAL ANALYSIS........................................................................ 3-1

3.1 GENERAL DESCRIPTION OF THE UPPER NORTH

FORK FEATHER RIVER BASIN ........................................................................ 3-1

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS .................................... 3-3

3.2.1 Geographic Scope........................................................................... 3-3
3.2.2 Temporal Scope .............................................................................. 3-4

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES .................... 3-4

3.3.1 Water Resources ........................................................................ 3-4
  3.3.1.1 Affected Environment ................................................ ....3-4
  3.3.1.2 Environmental Effects ................................................ ....3-47
  3.3.1.3 Cumulative Effects on Water Resources ....................... 3-89
  3.3.1.4 Unavoidable Adverse Effects. None. .......................... 3-90

3.3.2 Aquatic Resources ..................................................................... 3-90
  3.3.2.1 Affected Environment ................................................ ..3-90
  3.3.2.2 Environmental Effects ................................................ ...3-101
  3.3.2.3 Cumulative Effects on Aquatic Resources ................... 3-153
  3.3.2.4 Unavoidable Adverse Effects ..................................... 3-154

3.3.3 Terrestrial Resources .................................................................. 3-154
  3.3.3.1 Affected Environment ................................................ ...3-154
  3.3.3.2 Environmental Effects ................................................ ...3-169
  3.3.3.3 Unavoidable Adverse Effects ..................................... 3-184

3.3.4 Threatened and Endangered Species ........................................ 3-184
  3.3.4.1 Affected Environment ................................................ ...3-184
  3.3.4.2 Environmental Effects ................................................ ...3-190
  3.3.4.3 Cumulative Effects on Bald Eagles ............................. 3-199
  3.3.4.4 Unavoidable Adverse Effects ..................................... 3-199

3.3.5 Recreational Resources ............................................................. 3-199
  3.3.5.1 Affected Environment ................................................ ...3-199
  3.3.5.2 Environmental Effects ................................................ ...3-219
  3.3.5.3 Unavoidable Adverse Effects ..................................... 3-258

3.3.6 Land Use and Aesthetic Resources ........................................... 3-258
  3.3.6.1 Affected Environment ................................................ ...3-258
  3.3.6.2 Environmental Effects ................................................ ...3-275
  3.3.6.3 Unavoidable Adverse Effects ..................................... 3-289

3.3.7 Cultural Resources .................................................................... 3-289
  3.3.7.1 Affected Environment ................................................ ...3-289
  3.3.7.2 Environmental Effects ................................................ ...3-316
  3.3.7.3 Unavoidable Adverse Effects ..................................... 3-324

3.3.8 Socioeconomic Resources ......................................................... 3-324
  3.3.8.1 Affected Environment ................................................ ...3-324
  3.3.8.2 Environmental Effects ................................................ ...3-327
  3.3.8.3 Unavoidable Adverse Effects ..................................... 3-329

3.4 NO-ACTION ALTERNATIVE ........................................................... 3-329

3.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES ........................................ 3-329

3.6 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY ................................................... 3-330
APPENDIX B  UNFFR PROJECT—FOREST SERVICE FINAL SECTION 4(E) CONDITIONS

APPENDIX C  STAFF RESPONSES TO COMMENTS ON THE UPPER NORTH FORK FEATHER RIVER HYDROELECTRIC PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT ...

APPENDIX D  ADVANTAGES AND DISADVANTAGES OF POTENTIAL MEASURES TO CONTROL WATER TEMPERATURE IN THE NORTH FORK FEATHER RIVER

APPENDIX E  BASIS FOR FURTHER EVALUATION OF THE EFFECTS OF POTENTIAL CONTROL MEASURES ON WATER TEMPERATURE IN THE NORTH FORK FEATHER RIVER BASIN
LIST OF FIGURES

Figure 1-1. General site location of the Upper North Fork Feather River Hydroelectric Project ................................................................. 1-2

Figure 1-2. Feather River basin map ......................................................................................................................... 1-4

Figure 3-1. North Fork Feather River hydroelectric projects ................................................................. 3-2

Figure 3-2. Lake Almanor (NF1) end-of-day water surface elevation and storage, water years 1970–2003 ...................................................... 3-11

Figure 3-3. Water quality and water temperature monitoring sampling stations for the Upper North Fork Feather River Project area .......................... 3-22

Figure 3-4. Vertical profiles of water temperature for Lake Almanor near Canyon dam along with schematics of gate elevations and general bed profiles of Prattville intake and Canyon dam outlet, mid-July and September/October ......................................................................... 3-29

Figure 3-5. Schematic of summer water temperatures displaying relative flows and water storage in the North Fork Feather River Basin under typical existing conditions ........................................................................ 3-63

Figure 3-6. Representative Prattville intake and discharge-weighted Caribou powerhouse modeled water temperatures for normal, reasonable extreme, and extreme hydrological and meteorological conditions 3-67

Figure 3-7. Representative modeled water temperatures for normal hydrological and meteorological conditions with Rock Creek-Cresta Project required first 5-year minimum flows and Poe reach required minimum flows .................................................................................. 3-68

Figure 3-8. Representative modeled water temperatures for dry hydrological and reasonable extreme meteorological conditions with Rock Creek-Cresta Project required first 5-year minimum flows and Poe reach required minimum flows .................................................................................. 3-69

Figure 3-9. Representative modeled water temperatures for critically dry hydrological and extreme meteorological conditions with Rock Creek-Cresta Project required first 5-year minimum flows and Poe reach required minimum flows. .................................................................................. 3-70

Figure 3-10. Total WUA values for species and life stages evaluated (one velocity calibration method) in the Seneca reach ........................................ 3-106
Figure 3-11. Total WUA values for species and life stages evaluated (one velocity calibration method) in the upper Belden reach. .......................................................... 3-107

Figure 3-12. Total WUA values for rainbow trout spawning as evaluated (one velocity calibration method) in the Seneca reach...................................................... 3-108

Figure 3-13. Total WUA values for rainbow trout spawning as evaluated (one velocity calibration method) in the upper Belden reach ................. 3-109

Figure 3-14. Total WUA values for species and life stages evaluated (one velocity calibration method) in lower Butt Creek................................. 3-114

Figure 3-15. PG&E and FS public recreation sites in the UNFFR Project vicinity...................................................................................................................... 3-202

Figure 3-16. Proposed recreation facility improvements and key viewing points in the UNFFR Project area. .......................................................... 3-223
# LIST OF TABLES

Table 1-1. Actual and projected generation resources in the California-Mexico Power Area ........................................................................................................1-5

Table 1-2. Actual and forecasted generation, demand, and reserve capability for CA/MX and WECC ........................................................................1-6

Table 3-1. Meteorological summary for Chester, California ........................................3-5

Table 3-2. Summary of daily average flow discharge (cfs) data, by month and overall, for the project vicinity .................................................................3-6

Table 3-3. Summary of Lake Almanor end-of-day water surface elevations, water years 1970-2003 ........................................................................3-12

Table 3-4. PG&E water rights for the UNFFR Project ..............................................3-15

Table 3-5. Water quality criteria for the UNFFR Project .........................................3-19

Table 3-6. Range of general water quality parameters measured in project waters by PG&E in 2000, 2002, and 2003 ...............................................3-23

Table 3-7. Monitoring locations for Commission-approved Rock Creek-Cresta water temperature monitoring plan and summary of daily average water temperatures for continuous monitoring in June through September of 1999 through 2004 .................................................................3-26

Table 3-8. Summary of dissolved oxygen concentrations monitored by PG&E during 2000 ...................................................................................3-33

Table 3-9. Summary of total coliform and fecal coliform densities monitored by PG&E during 2000 to 2002 .................................................................3-36

Table 3-10. Fish and crayfish tissue analysis results for silver, mercury, and PCBs in Butt Valley reservoir, Belden forebay and Belden reach, 2001–2003 ..................................................................................................3-42

Table 3-11. Fish tissue bioaccumulation screening-sampling protocols .................3-53

Table 3-12. Sulfide and dissolved iron and manganese concentrations in Lake Almanor and the Seneca reach, August to November, 2001 ..........3-81

Table 3-13. Fish species identified in recent surveys (1996-2002) of waters in the UNFFR Project ...............................................................................3-91
Table 3-14. Species composition and relative abundance in Seneca reach, Belden reach, upper Butt Creek, and lower Butt Creek, 2000–2002 ..........................3-95

Table 3-15. Total number of trout (rainbow and brown) caught by anglers in project waters surveyed in 2000, by size range..................................................3-96

Table 3-16. Recommended minimum flow releases from Canyon dam (Seneca reach) as measured at gage NF-2.........................................................3-102

Table 3-17. Recommended minimum flow releases from Belden dam (Belden reach) as measured at gage NF-70.........................................................3-102

Table 3-18. Recommended pulse-flow releases for the Seneca and Belden reaches........................................................................................3-116

Table 3-19. Recommended Belden reach recreational flow schedule.................3-126

Table 3-20. Naming convention matrix for modeled scenarios in Lake Almanor........................................................................................3-137

Table 3-21. Vegetation series mapped within the UNFFR Project boundary ....3-155

Table 3-22. Special-status plant species that are known to occur within the UNFFR Project area..................................................................................3-158

Table 3-23. Noxious and invasive weeds documented in the UNFFR Project area.................................................................................................3-160

Table 3-24. Special-status species that could occur or are documented to occur in the project vicinity .................................................................3-162

Table 3-25. Reproduction in 14 bald eagle nesting territories in the UNFFR Project vicinity, 1988-2001 .................................................................3-188

Table 3-26. Public recreation sites on UNFFR Project reservoirs.......................3-201

Table 3-27. Recreation visits to campgrounds at the project reservoirs in 2001 ........................................................................................................3-210

Table 3-28. Average daily boating use on Lake Almanor between May 12 and October 13, 2001 .............................................................................3-211

Table 3-29. Public recreation sites on UNFFR Project River reaches...............3-212

Table 3-30. Recreation visits to campgrounds in the project reaches in 2001 ....3-214
Table 3-31. Summary of the accessibility of existing public, FS, and licensee recreation facilities ..............................................................3-217
Table 3-32. Belden reach recreation river flow schedule ........................................3-252
Table 3-33. Project-related roads ........................................................................3-266
Table 3-34. Project recreation roads ....................................................................3-268
Table 3-35. Key viewing points in the UNFFR Project area ....................................3-270
Table 3-36. VQO classifications and guidelines ......................................................3-273
Table 3-37. ROS classifications and guidelines ......................................................3-274
Table 3-38. Prehistoric or multicomponent sites identified within the APE ............3-292
Table 3-39. Potential TCPs identified by PG&E’s ethnographic study in the APE ........3-300
Table 3-40. Ethnohistoric Maidu villages in the UNFFR Project vicinity .............3-303
Table 3-41. Historic archaeological sites and structures identified in the APE .......3-307
Table 3-42. Race and poverty in UNFFR Project area ...........................................3-326
Table 4-1. Staff assumptions for economic analysis of the UNFFR Project ..........4-2
Table 4-2. Summary of the annual net benefits for PG&E’s proposed action, PG&E’s proposed action with additional staff-adopted measures, PG&E’s proposed action with additional staff-adopted measures and mandatory measures, the no-action alternative, and project retirement for the UNFFR Project ..............................................................4-3
Table 4-3. Summary of capital and one-time costs, annual costs, annual energy costs, and total annualized costs of environmental measures proposed by PG&E and recommended by staff and others for the UNFFR Project ........................................................................4-4
Table 5-1. Fish and wildlife agency recommendations for the Upper North Fork Feather River Project .........................................................5-43
ACRONYMS AND ABBREVIATIONS

°C  degrees Celsius
ADA  Americans with Disabilities Act
Albion  Albion Environmental, Inc.
APE  area of potential effects
AW  American Whitewater
Basin Plan  Central Valley Regional Water Quality Control Board Basin Plan
BIA  U.S. Bureau of Indian Affairs
BMP  best management practice
BRM  bedrock mortars
CalEPPC  California Exotic Pest Plant Council
CA/MX  California-Mexico Power Area
CARB1  Caribou No. 1 powerhouse
CARB2  Caribou No. 2 powerhouse
CCC  California Coastal Commission
CDFA  California Department of Food and Agriculture
CDFG  California Department of Fish and Game
CDPR  California Department of Parks and Recreation
CDWR  California Department of Water Resources
CEQA  California Environmental Quality Act
cfs  cubic feet per second
CNPS  California Native Plant Society
COEHHA  California Office of Environmental Health Hazard Assessment Commission
FERC Project No. 1962
CRLF  California red-legged frog
CRMP  Cultural Resources Management Plan
CSC  state species of concern
CSUCRF  California State University Chico Research Foundation
CTR-FALP  California Toxics Rule, Freshwater Aquatic Life Protection
CVRWQCB  Central Valley Regional Water Quality Control Board
DO  dissolved oxygen
EBNFFR  East Branch of the North Fork Feather River
EIR  environmental impact report
EIS  environmental impact statement
EPA  U.S. Environmental Protection Agency
ERC  Ecological Resources Committee (for the Rock Creek-Cresta Project, FERC Project No. 1962)
ESA  Endangered Species Act
FDA  U.S. Food and Drug Administration
FERC  Federal Energy Regulatory Commission
FPA  Federal Power Act
FS  U.S. Department of Agriculture, Forest Service
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSS</td>
<td>FS sensitive species</td>
</tr>
<tr>
<td>FWS</td>
<td>Fish and Wildlife Service</td>
</tr>
<tr>
<td>HPMP</td>
<td>Historic Properties Management Plan</td>
</tr>
<tr>
<td>HSC</td>
<td>habitat suitability criteria</td>
</tr>
<tr>
<td>HSP</td>
<td>hazardous substances plan</td>
</tr>
<tr>
<td>I&amp;E</td>
<td>interpretation and education</td>
</tr>
<tr>
<td>IFIM</td>
<td>Instream Flow Incremental Methodology</td>
</tr>
<tr>
<td>IIHR</td>
<td>Iowa Institute of Hydraulic Research</td>
</tr>
<tr>
<td>Interior</td>
<td>U.S. Department of the Interior</td>
</tr>
<tr>
<td>KVP</td>
<td>key viewing point</td>
</tr>
<tr>
<td>kWh</td>
<td>kilowatt-hours</td>
</tr>
<tr>
<td>LAC</td>
<td>limits-of-acceptable change</td>
</tr>
<tr>
<td>LACSP</td>
<td>Lake Almanor Cloud Seeding Project</td>
</tr>
<tr>
<td>LART</td>
<td>Lake Almanor Recreation Trail</td>
</tr>
<tr>
<td>LRMP</td>
<td>Land and Resource Management Plan</td>
</tr>
<tr>
<td>LWD</td>
<td>large woody debris</td>
</tr>
<tr>
<td>µmhos/cm</td>
<td>micromhos per centimeter</td>
</tr>
<tr>
<td>MCDG</td>
<td>Maidu Cultural and Development Group</td>
</tr>
<tr>
<td>mg/l</td>
<td>milligram(s) per liter</td>
</tr>
<tr>
<td>MIF</td>
<td>minimum instream flow</td>
</tr>
<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>MTBE</td>
<td>methyl-tert-butyl ether</td>
</tr>
<tr>
<td>MW</td>
<td>megawatt</td>
</tr>
<tr>
<td>MYLF</td>
<td>mountain yellow-legged frog</td>
</tr>
<tr>
<td>National Register</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NERC</td>
<td>North American Electric Reliability Council</td>
</tr>
<tr>
<td>NFFR</td>
<td>North Fork Feather River</td>
</tr>
<tr>
<td>NFS</td>
<td>National Forest System</td>
</tr>
<tr>
<td>NGO</td>
<td>non-governmental organization</td>
</tr>
<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
</tr>
<tr>
<td>NOAA Fisheries</td>
<td>National Oceanographic and Atmospheric Administration, National Marine Fisheries Service</td>
</tr>
<tr>
<td>NPS</td>
<td>U.S. National Park Service</td>
</tr>
<tr>
<td>NTU</td>
<td>nephelometric turbidity unit(s)</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>operations and maintenance</td>
</tr>
<tr>
<td>ORV</td>
<td>off-road vehicle</td>
</tr>
<tr>
<td>PA</td>
<td>Programmatic Agreement</td>
</tr>
<tr>
<td>PAR</td>
<td>PAR Environmental Services, Inc.</td>
</tr>
<tr>
<td>PCB</td>
<td>polychlorinated biphenyl</td>
</tr>
<tr>
<td>PG&amp;E</td>
<td>Pacific Gas and Electric Company</td>
</tr>
<tr>
<td>pH</td>
<td>potential hydrogen (a measure for acidity and alkalinity)</td>
</tr>
<tr>
<td>PHABSIM</td>
<td>Physical Habitat Simulation</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>QA/QC</td>
<td>quality assurance/quality control</td>
</tr>
<tr>
<td>REA</td>
<td>ready for environmental analysis</td>
</tr>
<tr>
<td>RFIP</td>
<td>recreation flow implementation plan</td>
</tr>
<tr>
<td>RRMP</td>
<td>recreation resource management plan</td>
</tr>
<tr>
<td>SA</td>
<td>Settlement Agreement</td>
</tr>
<tr>
<td>SHPO</td>
<td>State Historic Preservation Officer</td>
</tr>
<tr>
<td>SMP</td>
<td>shoreline management plan</td>
</tr>
<tr>
<td>SWRCB</td>
<td>State Water Resources Control Board</td>
</tr>
<tr>
<td>TAF</td>
<td>thousand acre-feet</td>
</tr>
<tr>
<td>TCP</td>
<td>traditional cultural properties</td>
</tr>
<tr>
<td>TON</td>
<td>threshold odor number</td>
</tr>
<tr>
<td>TPZ</td>
<td>timberland production zone</td>
</tr>
<tr>
<td>TRG</td>
<td>technical review group</td>
</tr>
<tr>
<td>UNFFR</td>
<td>Upper North Fork Feather River</td>
</tr>
<tr>
<td>USDA</td>
<td>U.S. Department of Agriculture</td>
</tr>
<tr>
<td>USGS</td>
<td>United States Geological Survey</td>
</tr>
<tr>
<td>VELB</td>
<td>valley elderberry longhorn beetle</td>
</tr>
<tr>
<td>WECC</td>
<td>Western Electricity Coordinating Council</td>
</tr>
<tr>
<td>WQC</td>
<td>water quality certification</td>
</tr>
<tr>
<td>WQMP</td>
<td>water quality monitoring program</td>
</tr>
<tr>
<td>WUA</td>
<td>weighted useable area</td>
</tr>
<tr>
<td>WY</td>
<td>water year</td>
</tr>
</tbody>
</table>