

**FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR HYDROPOWER LICENSE**

El Dorado Project No. 184-065

**Federal Energy Regulatory Commission
Office of Energy Projects
Division of Environmental and Engineering Review
888 First Street, NE
Washington, D.C. 20426**

July 2003

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

TO THE PARTY ADDRESSED

Attached is the final environmental impact statement (EIS) for the El Dorado Project, located on the South Fork of the American River in the counties of El Dorado, Alpine, and Amador, California, and partially within the boundaries of the Eldorado National Forest.

The final EIS documents the views of the staff of the Federal Energy Regulatory Commission (Commission) regarding the proposed hydroelectric project. Before the Commission makes a decision on the proposal, it will take into account all concerns relevant to the public interest. The final EIS will be part of the record from which the Commission will make its decision. The final EIS was sent to the U.S. Environmental Protection Agency and made available to the public on or about July ____, 2003.

Copies of the final EIS are available for review in the Commission's Public Reference Branch, Room 2A, located at 888 First Street, NE, Washington, D.C. 20426. The final EIS may also be viewed on the Internet at <http://www.ferc.gov> under the FERRIS link. For further information, please contact Susan O'Brien at (202) 502-8449.

Attachment: Final Environmental Impact Statement

COVER SHEET

- a. Title: Relicensing the El Dorado Project in the South Fork of the American River Basin and the Truckee River Basin, Federal Energy Regulatory Commission (FERC or Commission) Project No. 184-065
- b. Subject: Final Environmental Impact Statement
- c. Lead Agency: Federal Energy Regulatory Commission
- d. Abstract: El Dorado Irrigation District (EID) filed an application for a new license for the existing El Dorado Project, which is located on the South Fork of the American River and its tributaries in El Dorado, Alpine, and Amador counties, California, and occupies private lands and federally owned lands administered by the Eldorado National Forest and the Lake Tahoe Basin Management Unit.
- The final environmental impact statement (EIS) presents the staff's evaluation of the developmental and nondevelopmental consequences of EID's proposal, alternatives to the proposed action, and the no-action alternative.
- e. Contact: Susan O'Brien
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(202) 502-8449
- f. Transmittal: This final EIS prepared by the Commission's staff on the hydroelectric license application filed by EID for the existing El Dorado Project (FERC No. 184-065) is being made available to the public on or about July ____, 2003, as required by the National Environmental Policy Act of 1969¹ and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR Part 380).

¹ National Environmental Policy Act of 1969, as amended (Pub. L. 91-190.42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, §4(b), September 13, 1982).

FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)¹ and the U.S. Department of Energy Organization Act² is authorized to issue licenses for up to 50 years for the construction and operation of non-federal hydroelectric developments subject to its jurisdiction, on the necessary conditions:

That the project adopted ...shall be such as in the judgement of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in Section 4(e)...³

The Commission may require such other conditions not inconsistent with the FPA as may be found necessary to provide for the various public interests to be served by the project.⁴ Compliance with such conditions during the licensing period is required. The Commission's Rules of Practice and Procedure allow any person objecting to a licensee's compliance or noncompliance with such conditions to file a complaint noting the basis for such objection for the Commission's consideration.⁵

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

² Public Law 95-91, 91 Stat. 556 (1977).

³ 16 U.S.C. §803(a).

⁴ 16 U.S.C. §803(g).

⁵ 18 C.F.R. §385.206 (1987).

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ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
Advisory Council	Advisory Council on Historic Preservation
AIR	additional information request
afa	acre-feet per annum
APE	Area of Potential Effects
AW	American Whitewater Affiliation
Basin Plan	Central Valley Region Basin Plan for the Sacramento and San Joaquin River Basins
BLM	Bureau of Land Management
BMI	benthic macroinvertebrate
BMP	best management practice
BP	before present
CalTrans	California Department of Transportation
CDFG	California Department of Fish and Game
CDWR	California Department of Water Resources
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CMP	California-Mexico Power
CVRWQCB	Central Valley Region, California Water Quality Control Board
CSBP	California Stream Bioassessment Procedure
DO	dissolved oxygen
EID	El Dorado Irrigation District
EIS	environmental impact statement
EPT	Ephemeroptera, Plecoptera, and Trichoptera
ERC	Ecological Resources Committee
ESA	Endangered Species Act
F	Fahrenheit
FERC	Federal Energy Regulatory Commission
FOR	Friends of the River
FPA	Federal Power Act
FS	U.S. Forest Service
FWS	U.S. Fish and Wildlife Service
GPS	global positioning system
GWh	gigawatt-hours
HPMP	Historic Properties Management Plan
IFIM	Instream Flow Incremental Methodology
IHA	Indicators of Hydrologic Alteration
kW	kilowatt

kWh	kilowatt-hour
LHMP	Land and Habitat Management Plan
LOD	large organic debris
LRMP	Land and Resource Management Plan
LTBMU	Lake Tahoe Basin Management Unit
mills/kWh	mills per kilowatt-hour
mg/L	milligrams per liter
MPN	maximum probable number
MW	megawatt
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NGO	non-governmental organization
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NPS	National Park Service
NTU	nephelometric turbidity unit
O&M	operation and maintenance
PA	programmatic agreement
PCT	Pacific Crest Trail
PG&E	Pacific Gas and Electric Company
PM&E	protection, mitigation, and enhancement
REA	ready for environmental analysis
ROS	Recreation Opportunity Spectrum
RPLTB	Regional Plan for the Lake Tahoe Basin
RV	recreational vehicle
RVD	recreation visitor day
SD	scoping document
SFAR	South Fork of the American River
SHPO	State Historic Preservation Officer
Silver Fork	Silver Fork of the American River
SMUD	Sacramento Municipal Utility District
SNTEMP	Stream Network Temperature
SPCCP	spill prevention, control, and counter-measure plan
SWRCB	State of California, State Water Resources Control Board
TDS	total dissolved solids
TRPA	Tahoe Regional Planning Agency
USGS	U.S. Geological Survey
VQO	visual quality objective
WQC	water quality certification
WSCC	Western Systems Coordinating Council

WUA

weighted usable area

EXECUTIVE SUMMARY

In this final environmental impact statement (EIS), we, the Federal Energy Regulatory Commission's (Commission's) staff (staff), evaluate the potential effects on the environment associated with relicensing the El Dorado Hydroelectric Project on the South Fork of the American River (SFAR) and its tributaries in El Dorado, Alpine, and Amador counties, California, including the beneficial and adverse effects on natural, cultural, recreational, developmental, and economic resources. The project occupies private lands and federally owned lands administered by the Eldorado National Forest and the Lake Tahoe Basin Management Unit.

Specifically, issues that we address in this EIS are the potential effects of relicensing the El Dorado Project on: (1) water quantity and quality; (2) aquatic biota; (3) terrestrial resources; (4) threatened and endangered species; (5) recreational resources; (6) land use and aesthetic resources; and (7) cultural resources. We also analyze the cumulative effects of the project on water quality, water quantity, and coldwater fishery resources (primarily rainbow trout).

In this EIS, we evaluate the effects of four major alternatives: (1) operating the project as proposed (the proposed action) by El Dorado Irrigation District (EID); (2) operating the project as proposed by EID with additional or modified measures, including measures to further protect, enhance, or mitigate adverse effects on environmental resources (the staff's alternative); (3) project decommissioning; and (4) continuing to operate the project with no changes or enhancements (the no-action alternative). After extensive negotiations with stakeholders, EID filed the "El Dorado Settlement Agreement" (Settlement) with the Commission by letter dated April 28, 2003. This Settlement addresses the environmental issues associated with this project, and we consider it to represent EID's current proposed action.

EID proposes to provide the following operational and environmental measures: (1) maintain specified minimum streamflows; (2) maintain specified target and minimum water levels in the four project storage reservoirs; (3) maintain existing ramping rates for streamflow releases below Lake Aloha, and Echo, Caples, and Silver lakes; (4) prevent spill at Lake Aloha and monitor pools downgradient of the auxiliary dams 1 through 7 for trout and remove, as appropriate, to protect mountain yellow-legged frog; (5) provide Caples Lake spring flow releases and flow release limitations year-round in the spillway channel and during the fall in the natural channel; (6) survey and develop a stabilization plan for Oyster Creek and Esmeralda Creek channels; (7) implement a monitoring program to include monitoring for rainbow trout and hardhead, macroinvertebrates, foothill-yellow-legged frog, mountain yellow-legged frog, riparian vegetation, fluvial geomorphology, water temperature, water quality, and flow fluctuations; (8) implement an ecological

resources adaptive management program; (9) prepare a plan for screening Carpenter and Alder creeks; (10) develop a streamflow and reservoir storage gaging plan; (11) develop a plan to designate preferred canal drainage structure and release points; (12) provide measures to protect wildlife from hazards of open canals and project facilities; (13) prepare a biological evaluation prior to any new construction or maintenance on National Forest System lands that may affect sensitive species; (14) ensure that a biological assessment is prepared, as appropriate, prior to commencing activities to construct, operate, or maintain the project that may affect a species listed or proposed for federal listing; (15) finalize and implement a noxious weed plan; (16) conduct annual meetings with the FS, California Department of Fish and Game (CDFG) and State of California, State Water Resources Control Board (SWRCB) to review ecological conditions; (17) develop a recreation implementation plan; (18) conduct a recreational survey and report every 6 years from date of license issuance; (19) provide a liaison to the FS; (20) meet with the FS every 6 years to review recreational facilities and areas; (21) include certain recreational facilities within the project boundary; (22) provide recreational facility enhancements; (23) provide recreational facility operation and maintenance measures; (24) provide public information services; (25) implement visual resources protection measures; (26) prepare a historic properties management plan; (27) provide measures for cultural resource protection; (28) prepare a transportation system management plan; (29) develop a trails system management plan; (30) develop a facility management plan; (31) assess potential effects of additional commercial service or exclusive uses at Silver, Caples, and Echo lakes on adjacent National Forest System lands; and (32) develop a land adjustment proposal.

After evaluating EID's proposal and recommendations from resource agencies and other interested parties, we considered what, if any, additional mitigation, protection, or enhancement measures would be necessary or appropriate with continued operation of the project. In addition to, or in lieu of, EID's proposed measures, we recommend the following additional environmental measures: (1) develop a plan if any structural modifications are proposed to enable implementation of the proposed ramping rates; (2) develop a plan for survey and trout removal at Lake Aloha; (3) develop a study plan for the detailed investigation of fluvial geomorphic properties at the Caples Lake spillway channel and Oyster Creek; (4) develop a stabilization plan for the Caples Lake spillway channel within 180 days of the completion of the fluvial geomorphic study, instead of 2 years from license issuance; (5) provide documentation that releases of 150 cfs to the Caples Creek channel from Caples Lake approximate 7/10 bankfull conditions (6) consult with the FS regarding insect and rodent pesticide use; (7) include additional components in the recreation implementation plan; (8) develop a recreation monitoring plan; (9) include additional components in the recreational survey report conducted every 6 years from date of license issuance; (10) include additional components in the public information plan; (11) develop a visual resource management plan; (12) include additional components in the trail system management plan; and (13) consolidate several resource management plans

into an overall land and habitat management plan.

Section 10(j) of the Federal Power Act (FPA) requires the Commission to include license conditions based on recommendations provided by federal and state fish and wildlife agencies. The CDFG is the only such agency that made 10(j) recommendations for the El Dorado Project. In the draft EIS, we made a preliminary determination that four of the CDFG's recommendations conflict with the substantial evidence standard of Section 313(b) or with the public interest standard of Section 4(e) and the comprehensive planning standard of Section 10(a) of the FPA. CDFG states that the Settlement resolves the four inconsistencies that we identified in the draft EIS and that if the Commission incorporates license conditions substantially similar to the Settlement, it would consider the Section 10(j) process complete. The four inconsistencies pertain to: (1) releasing pulsed flows to Caples Creek during the spring; (2) restricting flows to Caples Creek to no more than 150 cfs in the fall; (3) increasing the duration or magnitude of Caples Creek pulsed flows, if bedload is not effectively transported; and (4) screening diversions of flow from streams that feed the El Dorado canal. In this final EIS, we agree with the provisions of the Settlement that address items (2) and (4), and we would not object to the implementation of the other two items in accordance with the Settlement. We therefore consider the 10(j) inconsistencies to be resolved.

Under the no-action alternative, the El Dorado Project would have a net annual benefit of \$512,330 (4.83 mills per kilowatt-hour [mills/kWh]). As proposed by EID, the El Dorado Project would result in a net annual benefit of -\$505,020 (-5.53 mills/kWh). As recommended by staff, the El Dorado Project would result in a net annual benefit of -\$444,630 (-4.86 mills/kWh).

Based on our independent review and evaluation of the proposed action and alternatives under Sections 4(e) and 10(a) of the FPA, we recommend the staff's alternative because: (1) issuing a new license would allow EID to operate the project as a beneficial and dependable source of electric energy; (2) the environmental measures that would be implemented would result in improvements to the existing human environment; and (3) our alternative would be best adapted to a comprehensive plan for the proper use, conservation, and development of the SFAR. Based on our findings, we recommend that a new license be issued for continued operation of the El Dorado Hydroelectric Project.

1.0 PURPOSE OF ACTION AND NEED FOR POWER

1.1 Application and Purpose of Action

On February 22, 2000, El Dorado Irrigation District (EID) filed an application for a new license with the Federal Energy Regulatory Commission (FERC or Commission) for the continued operation and maintenance of the existing 21-megawatt (MW) El Dorado Project. The project is located on the South Fork of the American River (SFAR) and its tributaries in El Dorado, Alpine, and Amador counties, California, and occupies private lands and federally owned lands administered by the Eldorado National Forest and the Lake Tahoe Basin Management Unit.

The Commission must decide if it is going to issue a new license for the continued operation of this project and, if so, what conditions it would impose in any license issued. Issuing a new license for the El Dorado Project would allow EID to generate electricity for the duration of the new license term.

In deciding whether or not to issue any license, the Commission must determine that the project would be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which the license is issued, the Commission must give equal consideration to the purposes of energy conservation; the protection of, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat); the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

1.2 Need for Power

The EID is a water and wastewater utility, does not have retail or wholesale electric customers, and does not use power from the project at any of its facilities. Power from the project is sold on the open market in California, and EID uses revenues from the sale of project power to offset operation, maintenance, and capital costs associated with the project.

Portions of the project were built from 1860 to 1876 for gold mining operations. After 1884, water from the project was used for industrial, irrigation, and domestic purposes in the Placerville area. Although the project was initially constructed to provide irrigation water, hydroelectric generation capability was added from 1922 to 1924. Hydroelectric operations began in 1924. Currently, EID has about 29,800 treated-water accounts, 12,850 wastewater accounts, and over 40 reclaimed water accounts. EID draws up to 15,080 acre-feet per year from the SFAR via the El Dorado Project.

To see how the demand for electricity is expected to change in the future in the region, we looked at the regional need for power as reported by the North American Electric Reliability Council (NERC) for its Western Systems Coordinating Council (WSCC) region (NERC, 2001). The El Dorado Project is located in the California-Mexico Power (CMP) area of the WSCC region. The CMP area encompasses most of California and a portion of Baja California in Mexico. The CMP area has a significant summer peak demand. For the period from 2001 through 2010, WSCC anticipates that peak demand and annual energy requirements in the area will grow at annual compound rates of 2.6 and 2.8 percent, respectively. Severe weather conditions in 1998 and 2000 have affected the area, resulting in numerous curtailments of service to interruptible customers. Even with assumptions about future generation and transmission extension projects, statewide and local reliability problems exist in the short term. WSCC anticipates that 66,849 MW of new capacity will come online within the next 10 years in the WSCC region. We conclude that the region has a need for power over the near term and the project could continue to help meet that need.

If licensed, the power from the project would continue to be useful in meeting part of the local and regional need for power. The project displaces fossil-fueled electric power generation that the region now uses, thereby conserving non-renewable fossil fuels and reducing the emission of noxious byproducts caused by fossil fuel combustion. If the electric output of the project was replaced with fossil-fueled generation, greenhouse gas emissions could potentially increase by 14,082 metric tons of carbon per year.

1.3 Interventions

On February 13, 2001, the Commission issued a public notice of application accepted and soliciting motions to intervene and protest within 60 days (April 14, 2001). In response, the following entities filed motions to intervene in this proceeding:

<u>Entity</u>	<u>Date of Letter</u>
California Department of Fish & Game	March 30, 2000
County of Amador	March 30, 2000
State Water Resources Control Board Alpine County et al. ¹	March 30, 2000 April 4, 2000

¹ Filing represents: Alpine County, League to Save Sierra Lakes, El Dorado County Taxpayers for Quality Growth, Greater Yosemite Council of the Boy Scouts of

Center for Sierra Nevada Conservation	April 14, 2000
Trout Unlimited and Friends of the River	April 20, 2000
Maidu Group of the Mother Lode Chapter of the Sierra Club	May 8, 2000
U.S. Forest Service	March 7, 2001
El Dorado County Citizens for Water	March 27, 2001
Sacramento Municipal Utility District	April 6, 2001
El Dorado County Water Agency	April 11, 2001
U.S. Department of the Interior	April 16, 2001
California Trout	November 5, 2001
American Whitewater Affiliation	April 12, 2002
Chris Shackleton, Dreamflows	October 31, 2002

1.4 Scoping

Based on our preliminary analysis of the project and comments from agencies, interested parties, and the public, we issued a notice on August 17, 2000, of our intent to

America, Plasse Homestead Homeowners' Association, Kit Carson Lodge, Caples Lake Resort, Kirkwood Meadows Public Utilities District, Northern Sierra Summer Homeowners' Association, East Silver Lake Improvement Association, South Silver Lake Homeowners' Association, Lake Kirkwood Association, Plasse's Resort, California Sportfishing Protection Alliance, Environmental Planning and Information Council of Western El Dorado County, Inc., Kirkwood Meadows Association, East Meadows Homeowners' Association, The Lodge at Kirkwood Association, The Center for Sierra Nevada Conservation, Safegrow, California Native Plant Society, Caples Lake Homeowners' Association, Sorensen's Resort, and Sierra Club.

prepare an environmental impact statement (EIS) for the El Dorado Hydroelectric Project, concurrent with Scoping Document 1 (SD1), which identified potential issues to be addressed in the EIS. The notice also scheduled scoping meetings and a site visit.

The Commission's staff (staff) prepared SD1 to aid federal, state, and local resource agencies; Indian Tribes; non-governmental organizations (NGOs); and other interested parties in their understanding of the proposed project. The staff also prepared SD1, as well as held the scoping meetings, to encourage participation in the scoping process and to solicit comments on the scope of the EIS.

We visited the project site on September 19 and 20, 2000, and again on August 15 and 16, 2002, and held two public scoping meetings in Placerville, California, on September 20, 2000 and Sacramento, California, on September 21, 2000. The following entities filed written comments in response to our August 17, 2000, notice:

<u>Entity</u>	<u>Date of Letter</u>
County of Amador	September 29, 2000
California Department of Fish & Game	October 18, 2002
El Dorado County Citizens for Water	October 18, 2000
American Whitewater Affiliation and Friends of the River	October 18, 2000
Center for Sierra Nevada Conservation	October 19, 2000
California State Water Resources Control Board	October 19, 2000
Sierra Club & El Dorado County Taxpayers for Quality Growth	October 19, 2000
U.S. Forest Service	October 20, 2000
El Dorado Irrigation District	October 20, 2000
Trout Unlimited	October 20, 2000
Alpine County et al.	October 23, 2000

El Dorado County Water Agency

October 23, 2000

Center for Sierra Nevada Conservation

October 25, 2000

The staff reviewed public and agency comments filed with the Commission, and on December 8, 2000, we issued SD2, which defined the scope of issues that we intended to analyze in the EIS. SD2 identified issues to be addressed in the EIS. These issues include potential effects on: (1) water quantity and quality; (2) aquatic biota; (3) terrestrial resources; (4) threatened and endangered species; (5) recreational resources; (6) land use and aesthetic resources; and (7) cultural resources. We discuss issues and comments received from interested parties in section 3.3, *Proposed Action and Alternatives*. We did not include geology and soils because the proposed project entails only minor ground-disturbing activities, and erosion and sedimentation is addressed in our discussion of water resources. We did not include socioeconomics because we conclude that the proposed project would have minimal effects on this resource, with the exception of potential effects on EID's customers (which we address in our water resources cumulative effects discussion).

1.5 Recommendations, Terms, and Conditions

On July 31, 2002 we issued a Ready for Environmental Analysis (REA) Notice and requested comments, recommendations, and terms and conditions (subject to Sections 10(j) and 18 of the Federal Power Act [FPA]) with a filing deadline of October 31, 2002. The entities who commented and the dates of their comments are listed below.

<u>Entity</u>	<u>Date of Letter</u>
American Whitewater Affiliation	October 17, 2002
U.S. Department of the Interior, National Park Service	October 18, 2002
U.S. Forest Service	October 29, 2002
California Department of Fish & Game	October 29, 2002
Chris Shutes	October 29, 2002
Trout Unlimited	October 30, 2002
Friends of the River	October 30, 2002

League to Save Sierra Lakes	October 30, 2002
Chris Shackleton, Dreamflows	October 31, 2002
Kit Carson Lodge	October 31, 2002
Paul Creger	October 31, 2002
Robert Payne	October 31, 2002

EID filed reply comments with the Commission by letter dated November 27, 2002. All comments become part of the record and are considered during our analysis of the proposed action. We discuss their comments and recommendations in section 3.3, *Proposed Action and Alternatives*.

1.6 Settlement Agreement

On June 26, 2001, various parties agreed to engage in a public, collaborative process with the goal of executing a Settlement Agreement that would resolve outstanding issues for the project relicensing. On April 29, 2003, EID filed with the Commission the El Dorado Project, FERC Project No. 184, El Dorado Relicensing Settlement Agreement (Settlement) that contains recommended protection, mitigation, and enhancement (PM&E) measures as proposed by the Settlement parties (Appendix A).² The purpose of the Settlement was to develop PM&E measures to recommend as final Section 4(e) conditions, Section 401 certification conditions, and other mandatory license conditions to be included in a new license for the project. The Settlement addresses the following issues: flow regimes and lake levels of project-affected waters, channel stabilization, monitoring of project-affected waters, fish protective measures, wildlife and sensitive plant protective measures, noxious weed control, public information services, recreational enhancements, visual resource protection, road and trail access, and facility management. For the purposes of this final EIS, we consider the proposed measures contained in the Settlement to supersede the proposed measures

² The parties to the Settlement include: EID; U.S. Forest Service (FS); U.S. Department of the Interior, National Park Service (NPS); California Department of Fish and Game (CDFG); Alpine County; Amador County; Eldorado County Water Agency; Eldorado Citizens for Water; Friends of the River (FOR); Trout Unlimited; Sierra Club; American Whitewater Affiliation (AW); Citizens for Water; AKT Development; Chris Shutes; Richard Wentzel; Alice Howard; and Paul Creger. Although expected, the Commission has not received a signature page from the Sierra Club.

provided by EID in the license application and subsequent filings prior to issuance of the Settlement, and, accordingly, the measures contained in the Settlement are incorporated as the proposed action in this final EIS. This approach is consistent with EID's letter to the Commission dated May 16, 2003. In the final EIS, we also consider the comments in response to the REA notice that were filed by signatory parties to the Settlement to be superseded by the conditions of the Settlement.

In addition to the proposed PM&E measures to be included in the new license, the Settlement also includes measures agreed to among the parties but specifically requested not to be included in any license issued for the project. These measures include: definition of resource management objectives; definition of the role and responsibilities of the Ecological Resource Committee (ERC); access improvements along the SFAR that are located outside of the project area; periodic review of potential gaging improvements to monitor and gage flows in the system; and no alteration or elimination of the Oyster Creek leakage from Silver Lake, except for reasons of dam safety. For the purposes of this final EIS, we consider these measures to be outside the scope of this proceeding and do not include these measures as part of our environmental analysis. However, if EID proposes to alter any Commission-approved flow monitoring plan, the Commission would first need to approve the alteration prior to its implementation.

1.7 Draft Environmental Impact Statement

The Commission sent the draft EIS to the U.S. Environmental Protection Agency and made the draft EIS available to the public on or about March 7, 2003. The Commission requested that any comments on the draft EIS be filed by May 13, 2003. However, on April 30, 2003, in response to the filing of the Settlement, the Commission issued a notice of Settlement, requested comments on the Settlement, and extended the comment period for the draft EIS to May 19, 2003. Letters commenting on the Settlement and draft EIS were filed with the Commission. We modified the text of the EIS in response to these comments, as appropriate. Appendix B summarizes the comments that were filed.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Applicant's Proposed Action

EID proposes various operational and nonoperational environmental protection and enhancement measures. In the following sections, we describe the project, its current operation, and EID's proposed environmental measures.

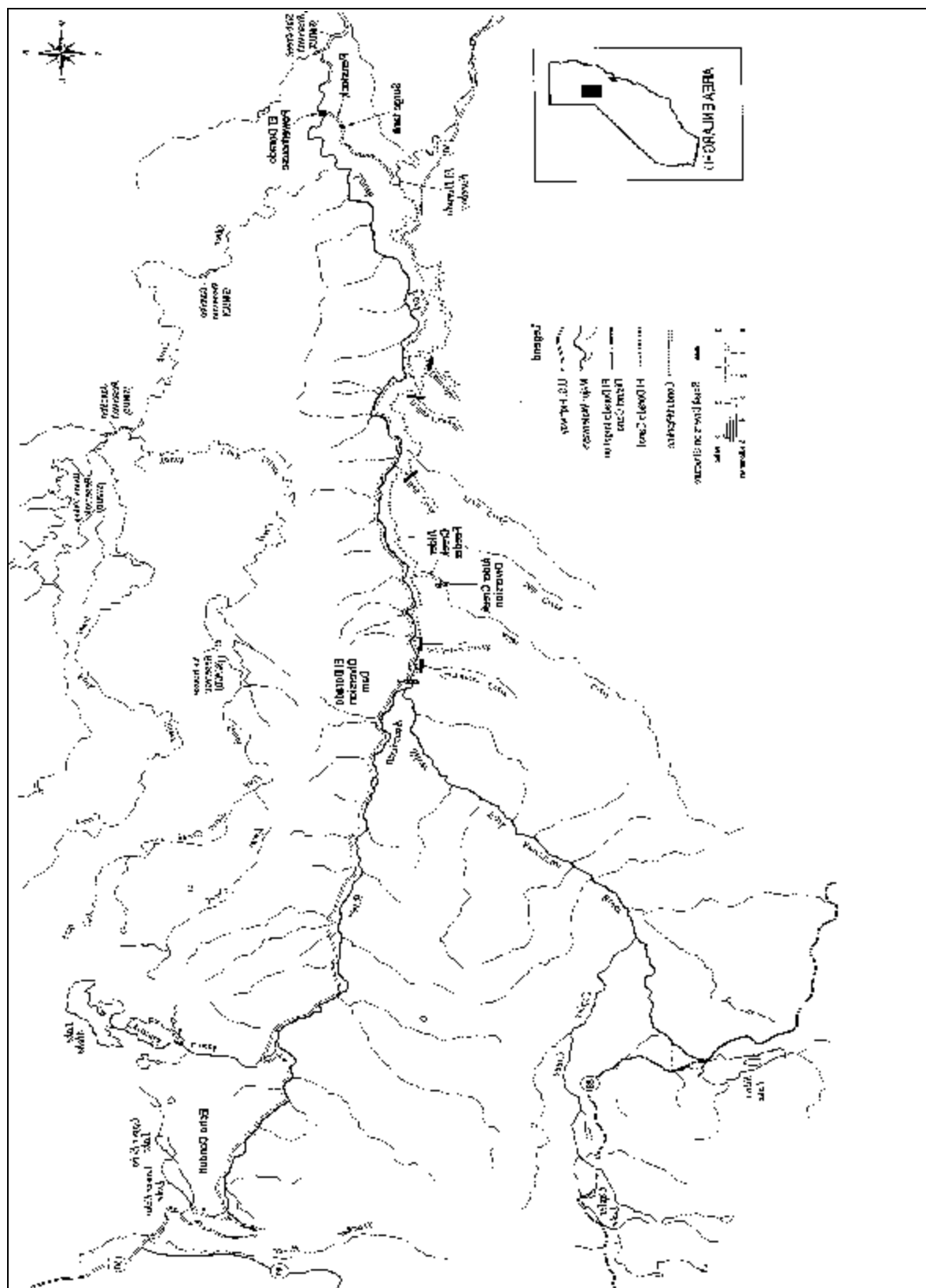
2.1.1 Project Description and Operation

The El Dorado Project is located on the SFAR, and project components occupy both private land and land administered by the Eldorado National Forest (figure 2-1). A total of 2,237.02 acres of federally owned lands are enclosed within the project boundary. Of this total, 1,334.03 acres are administered by the Eldorado National Forest. No transmission lines are included within the project.

The project is not currently operational because of damage caused by high flows and land slides that occurred in January 1997. By order issued August 15, 2000, the Commission authorized the licensee's repairs to the diversion dam. Reconstruction of the diversion dam was completed during the fall of 2001. EID replaced the damaged and unstable section of the El Dorado canal by constructing a 10,300-foot-long bypass tunnel from Mill Creek to Bull Creek. The Commission authorized the construction of this tunnel by order dated February 8, 2001, and the tunnel was completed during the fall of 2002. The tunnel is 8 feet and 8 inches in diameter and is scheduled to be ready to pass full project flows during the summer of 2003 (letter from A. Deister, General Manager, EID, Placerville, CA, to the Commission, dated May 5, 2003).

The 21-MW project consists of the following existing facilities:

- Lake Aloha main dam, a 113-foot-long, 20-foot-high rubble and masonry main dam with a crest elevation of 8,114.27 feet National Geodetic Vertical Datum (NGVD) and a 32-inch by 32-inch discharge conduit controlled by a 30-inch by 30-inch steel slide gate that releases flows to Pyramid Creek, a tributary of the SFAR;
- Eleven auxiliary dams along Lake Aloha, composed of rock or rock with earthfill, that range from 1.3 to 8.5 feet high and from 9 to 140 feet in length with crest elevations that range from elevation 8,114.07 feet (Dam No. 6) to 8,119.67 feet NGVD (Dam No. 10);



- Lake Aloha, a reservoir that covers 590 acres (at full pond elevation of 8,114.07 feet NGVD) with usable storage of 5,179 acre-feet;
- Echo Lake dam, a 320-foot-long, 14-foot-high roller-compacted concrete dam with a crest elevation of 7,413.0 feet NGVD, which includes a 30-foot-long spillway and an intake structure that regulates flow through the Echo Lake conduit;
- Echo Lake, a reservoir that covers 335 acres (at full pond elevation of 7,411.5 feet NGVD) with a usable storage of 1,943 acre-feet;
- Echo Lake conduit, a 6,125-foot-long conduit, consisting of 0.46 mile of 36-inch-diameter pipe, 0.49 mile of open ditch, and 0.21 mile of tunnel, from Echo Lake to the SFAR;
- Caples Lake dam, a 1,200-foot-long, 84.5-foot-high gunite-core, earthfill main dam with a crest elevation of 7,804.4 feet NGVD and a 403-foot-long, 4.5-foot horseshoe-shaped discharge tunnel controlled by three 2.5-foot by 2.5-foot slide gates at different elevations in a gate shaft that releases flows to Caples Creek, then the Silver Fork of the American River (Silver Fork) and ultimately to the SFAR;
- One auxiliary dam on Caples Lake consisting of a concrete gravity and arch section that is 164 feet long with a fixed crest elevation of 7,800.9 feet NGVD and 1-foot-high wooden flashboards, a 131.5-foot-long concrete arch spillway with a fixed crest elevation of 7,797.9 feet NGVD and 3-foot-high wooden flashboards, and an earthfill section with a concrete core that is 291.5 feet long and has a crest elevation of 7,803.9 feet NGVD and a 2-foot-high gunite wave coping;
- Caples Lake, a reservoir that covers 624 acres (at full pond elevation 7,797.7 feet NGVD) with an active usable storage of 20,338 acre-feet;
- Silver Lake dam, a 280-foot-long, 30-foot-high rock and earthfill dam with a crest elevation of 7,261.07 feet NGVD that includes a 55-foot-wide spillway structure with two 14-foot, 9-inch by 11-foot, 3-inch radial gates and two 6-foot-wide flashboard bays and an intake structure with a 36-inch gate, which controls flows through 26-inch-diameter pipe that discharges to the Silver Fork;
- Silver Lake, a reservoir that covers 502 acres (at full pond elevation of 7,261.07 feet NGVD) with a usable storage of 8,640 acre-feet;
- El Dorado diversion dam, a 165-foot-long, 12-foot-high steel crib dam structure composed of steel bins filled with rock and gravel, with a crest elevation of

3,910.58 feet NGVD impounding approximately 200 acre-feet of the SFAR, and a fish ladder and an intake structure with fish screens on the entrance;

- El Dorado canal, a 22-mile-long conveyance from the El Dorado diversion dam to the El Dorado forebay consisting of unlined and lined, open canal; lined and unlined tunnels; a flume; and steel pipe sections;
- Alder Creek diversion dam, a 70-foot-long, 9.5 foot-high concrete dam with a crest elevation of 3,997.8 feet NGVD, which diverts flows via the Alder Creek feeder, which is a 0.87-mile-long, 18-inch-diameter steel pipe to the El Dorado canal;
- Mill Creek diversion dam, a 30-foot-long, 3-foot-high concrete dam that diverts flows via a 150-foot-long, 14-inch-diameter steel pipe to the El Dorado canal;
- Bull Creek diversion dam, a 22-foot-long, 26-inch-high concrete dam that diverts flows via a 117-foot-long, 2-foot-wide by 1-foot-deep wooden flume to the El Dorado canal;
- Carpenter Creek diversion dam, a 16-foot-long, 38-inch-high concrete dam that diverts flows via a 88-foot-long, 2-foot-wide by 2-foot-deep wooden flume to the El Dorado canal;
- Ogilby Creek diversion dam, a 9-foot-long, 2.5-foot-high rock rubble dam that diverts flows via a 250-foot-long earthen ditch about 4 feet wide by 20 inches deep that transitions to a 31-foot-long, 24-inch-wide by 28-inch-deep wooden flume to the El Dorado canal;
- Esmeralda Creek diversion dam, a 50-foot-long, 4-foot-high concrete dam that diverts flows via a 196-foot-long, 5-foot-diameter Lennon flume (semi-circular steel) to the El Dorado canal;
- No Name Creek diversion dam, a 24-foot-long, 3-foot-high concrete dam that diverts flows via a 27-inch-diameter, semi-circular open steel flume to the El Dorado canal;
- El Dorado forebay dam, a 836-foot-long, 91-foot-high earthfill dam with a crest elevation of 3,794.63 feet NGVD, with a 60-inch-diameter intake conduit through the dam connecting to the El Dorado powerhouse conveyance, and an emergency spillway with a 299-foot-long, 20-foot-wide by 6.6-foot-deep, gunite-lined flume leading to a 72-inch-diameter steel pipe that discharges to Long Canyon Creek,

which feeds into the Slab Creek Reservoir on the SFAR downstream of the El Dorado powerhouse;

- El Dorado forebay, a reservoir that covers 23 acres (at full pond elevation 3,792.23 feet NGVD) with a usable storage of 356 acre-feet;
- A 2.8-mile-long combination pipeline and penstock conveyance, consisting of 11,487 feet of steel pipeline from the forebay to a 124-foot-tall, 18-foot-diameter surge chamber on a 109-foot-high riser platform, and 3,443 feet of 54-inch-diameter steel penstock extending from the surge chamber to the powerhouse;
- A 110-foot-long by 40-foot-wide steel frame powerhouse with reinforced concrete walls that houses two single impulse turbines that are directly connected to two 11,500-kilowatt (kW) generators, producing about 106 gigawatt-hours (GWh) annually when operational; and
- Appurtenant facilities.

A 36-inch-diameter cast iron outlet pipe through the El Dorado forebay dam is used to provide water to the EID irrigation canal. The pipe and irrigation canal are not part of the licensed project.

The El Dorado Project consists of four storage reservoirs and seven diversions that provide water to the El Dorado canal. The canal provides water to the El Dorado powerhouse and to downstream water users via EID's irrigation canal. Water is stored in Lake Aloha, Echo Lake, Caples Lake, and Silver Lake for release after the spring runoff. Water from these lakes flows either directly into the SFAR or via tributaries of the SFAR. Water flow in the SFAR is diverted by the El Dorado diversion dam into the El Dorado canal. Seven smaller streams that are tributaries of the SFAR (Alder Creek, Mill Creek, Bull Creek, Carpenter Creek, Ogilby Creek, Esmeralda Creek, No Name Creek) are each diverted into the El Dorado canal. Up to 15 cubic feet per second (cfs) are diverted from Alder Creek from December 1 through June 15 and 10 cfs are diverted from each of the remaining six creeks. Flows from these creeks in excess of that diverted to the El Dorado canal are returned to the creeks downstream of the diversions. Flows of up to about 165 cfs, which is the hydraulic capacity of the canal, are diverted from the SFAR, depending on the available inflow to the canal from the seven creeks. At the El Dorado forebay, flows are divided between the El Dorado powerhouse and the intake for EID's irrigation canal. Flows that pass through the powerhouse are returned to the SFAR. EID withdraws up to 15,080 acre-feet of water annually for irrigation supplies. The area served by EID is shown in figure 2-2.

Water is drafted from the storage lakes beginning in July from Lake Aloha. Once Lake Aloha has been drawn down, it becomes necessary to draw from Caples Lake. Water is drawn from Caples Lake until after Labor Day, when it becomes necessary to draw from Echo Lake and Silver Lake. Although exceptions have occurred, Silver Lake is maintained as high as possible until after Labor Day. Silver Lake must be fully drawn down, due to California Department of Water Resources (CDWR) requirements, by October 31 and all spillway flashboards must be removed and the spillway gates fully opened. Echo Lake must be fully drawn down, due to CDWR requirements, by November 15 and all spillway flashboards must be removed and the spillway gates fully opened. The purpose of these flashboard and spillway gate requirements at Silver and Echo lakes is to enable the dams to safely pass winter flood flows without restriction or risk of overtopping. The two lakes cannot be used to store water until the flashboards are replaced the following spring on or about April 1.

To protect aquatic habitat, EID is required to maintain minimum flows from Lake Aloha and Silver and Caples lakes and the bypassed reach on the SFAR and adhere to ramping rate restrictions for Silver and Caples lakes. These operational restrictions are described in detail in section 3.3.2, *Aquatic Resources*.

EID is required to maintain a minimum of 2,000 acre-feet of storage in Caples Lake at all times. There are no minimum storage requirements for the other reservoirs.

2.1.2 Proposed Environmental Measures

As stipulated in the Settlement, EID proposes to provide the following operational and environmental measures:

- maintain minimum streamflows in project-affected reaches according to month and water year, as appropriate within 90 days of license issuance (as specified in Section 1 of the Settlement);

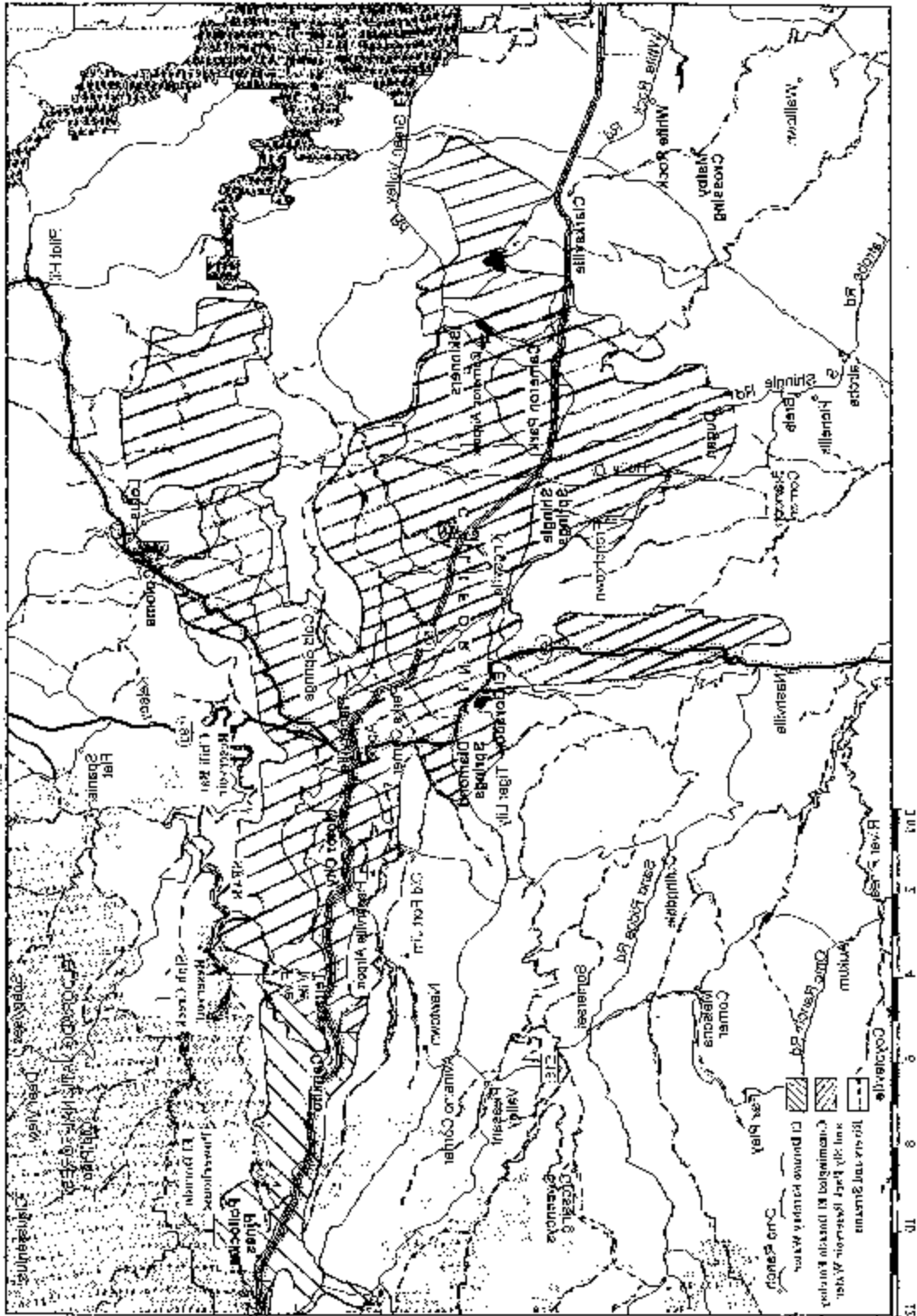


Figure 2-2. Approximate boundary of EID's service area that uses El Dorado Project waters. (Source: EID, 2000, as modified by staff)

- maintain target and minimum water levels in the four project storage reservoirs (as specified in Section 22 of the Settlement)”;
- maintain the following ramping rates for EID-controlled streamflow releases from Caples and Silver lakes as early as reasonably practicable within 90 days of license issuance (as specified in Section 2 of the Settlement):

Ramping Rate (feet/hour)	Flow Range (cfs)
1.00	1 to 75
0.50	75 to 175
0.55	>175

- maintain the following ramping rates for EID-controlled streamflow releases from Lake Aloha and Echo Lake as early as reasonably practicable within 90 days of license issuance (as specified in Section 2 of the Settlement):

Ramping Rate (feet/hour)	Flow Range (cfs)
0.5	1 to 75
1.0	75 to 75
1.5	>175

If facility modification is required to provide the specified ramping rates, EID would complete such modifications as soon as reasonably practicable and no later than 3 years after license issuance.

- operate and maintain Lake Aloha as follows (as specified in Section 3 of the Settlement):
 - S** attempt to prevent water in the reservoir from spilling over auxiliary dams 1 through 7 during spring runoff and while the reservoir is filling; if spill occurs, submit a plan for removal of trout from downgradient pools within 14 days and initiate removal within 30 days of spillage; and produce an annual report documenting whether spill occurred and whether trout were found and removed from downgradient pools; and

- S within 1 year of license issuance, survey and monitor the pools and ponds downgradient of the auxiliary dams to determine if trout are present and, if so, implement a removal program;
- provide Caples Lake flow releases and flow release limitations (as specified in Section 4 of the Settlement), including:
 - S annual pulse flow releases of 150 cfs (dry years), 210 cfs (below normal years), 300 cfs (above normal years), and 345 cfs (wet years) for 5 continuous days timed to correspond with annual spring peak runoff in Caples Creek channel below Caples Lake dam; beginning within 90 days of license issuance but not prior to the implementation of the new minimum streamflows; where facility modification is required to provide the specified pulse flows, EID would make such modification as soon as practicable and no later than 3 years after license issuance;
 - S flows released to Caples Creek channel during September, October, and November would not be greater than 150 cfs; and
 - S no more than 60 cfs would be released into the Caples Lake spillway channel;
- survey and develop a plan approved by the FS within 2 years of license issuance for stabilization of the Oyster Creek channel and implement project-related portions of the plan within 5 years of license issuance (as specified in Section 5 of the Settlement);
- survey and develop a plan approved by the FS within 2 years of license issuance for stabilization of the Esmeralda Creek channel on National Forest System lands and implement the plan within 5 years of license issuance (as specified in Section 6 of the Settlement);
- implement a monitoring program in coordination with the FS, ERC, and State of California, State Water Resources Control Board (SWRCB) (as specified in Section 7 of the Settlement) to include the following:
 - S monitor specified reaches for rainbow trout and hardhead to determine habitat quality and to assess the potential effects of changes in the streamflow regime;
 - S monitor macroinvertebrates at specified locations to determine habitat quality and to assess the potential effects of changes in the streamflow regime;
 - S monitor foothill yellow-legged frog at specified locations along the SFAR and conduct surveys related to flow fluctuations in specified reaches to determine presence and distribution of the species and identification of

- breeding and larval periods to assess potential effects and appropriate rates of flow fluctuation downstream of the Kyburz diversion dam;
 - S monitor mountain yellow-legged frog at specified locations to determine presence and distribution of the species to assess potential effects of changes in project operations;
 - S monitor riparian vegetation species composition in representative habitat types at specified transect locations to assess riparian conditions and response to changes in the streamflow regime;
 - S monitor riparian vegetation conditions and responses to changes in the streamflow regime in the Caples Creek area;
 - S conduct a detailed investigation of fluvial geomorphic properties of specified reaches to assess the need for and most effective method of stabilization;
 - S monitor permanent cross-section transects, longitudinal profiles, and channel properties at representative channel areas to assess changes in channel condition relative to changes in the streamflow regime;
 - S monitor water temperature at locations specified in a plan to be developed within 1 year of license issuance (as specified in Section 12 of the Settlement) to confirm that streamflow changes result in water temperatures that are consistent with designated beneficial uses of project waters;
 - S monitor selected water quality parameters at specified locations to confirm that project-related changes result in water quality that is consistent with applicable state standards;
 - S monitor flow fluctuations in the SFAR between the Kyburz diversion dam and Silver Creek from June through September so that when flow is 100 cfs or less and the diversion into the El Dorado canal causes the flow downstream of the diversion dam to change 50 cfs or more in 1 day, the previously mentioned monitoring of foothill yellow-legged frog response to flow fluctuations can occur;
- implement an ecological resources adaptive management program within 90 days of license issuance that includes specific management measures that would be considered if monitoring indicates that applicable ecological resource objectives are not being met (as specified in Section 8 of the Settlement), including the following:
 - S adaptive management measures associated with minimum streamflow releases from project reservoirs;
 - S adaptive management measures for modifying the maximum flow in Caples dam spillway channel;
 - S adaptive management measures for modifying pulse flows in Caples Creek, including the following: (1) within 2 years of license issuance, development of a feasibility study to determine if the Caples Lake

- auxiliary dam spillway could be modified to release flows of up to 250 cfs and if the main dam outlet works could be modified to release up to 600 cfs to the natural channel of Caples Creek; and (2) within 2 years of license issuance, development of a stabilization plan for the spillway channel in consultation with the FS, SWRCB, and ERC;
 - S** adaptive management measures for modifying the project-related flow fluctuations in the SFAR reach between Kyburz diversion dam and Silver Creek; and
 - S** invitations to the Settlement signatory parties to participate in an ERC.
- within 180 days of license issuance, develop a plan, in consultation with the SWRCB and ERC, for screening Carpenter and Alder creeks for all life stages of trout and submit the plan for approval by the FS and CDFG prior to implementation (as specified in Section 9 of the Settlement);
- develop and file for Commission approval, a streamflow and reservoir storage gaging plan within 1 year of license issuance, in consultation with the FS, ERC, and SWRCB (as specified in Section 10 of the Settlement); EID also proposes as part of this plan to conduct an investigation to determine whether telemetry equipment can be installed at Lake Aloha to monitor conditions and/or control operations. If EID, SWRCB and FS concur that such equipment is economically and technological feasible and can be installed consistent with law, regulations and policies, applicable to Desolation Wilderness, EID would install such equipment.
- develop, in consultation with the ERC, a plan to designate preferred canal drainage structures and release points to be used in the event of an emergency and for maintenance and file the plan, that is approved by the FS and SWRCB, for Commission approval within 1 year of license issuance (as specified in Section 11 of the Settlement);
- provide measures to protect wildlife from the hazards of open canals and other project facilities (as specified in Section 13, Number 1 of the Settlement), including:
 - S** inspect the fencing, canal crossing and approaches at least twice per year and repair or replace fencing as necessary;
 - S** provide an annual report to the FS and ERC describing the date, location, and species of wildlife found in the El Dorado canal; and
 - S** within 180 days of license issuance, reconstruct portions of the canal fence that do not meet deer fencing specifications or develop a

schedule for completing the work that is agreed upon by the FS and CDFG;

- C prepare a biological evaluation prior to any new construction or maintenance (including but not limited to proposed recreation developments) authorized by license on National Forest System lands that may affect FS sensitive species or special-status species and their habitat; prior to commencing activities to construct, operate, or maintain the project that may affect a species listed or proposed for listing under the federal Endangered Species Act (ESA), or critical habitat for such a species, EID would ensure that a biological assessment is prepared (as specified in Section 13, Number 2, of the Settlement);
- C if occurrences of FS sensitive species are detected prior to or during construction, operation, or maintenance of the project or during project operations, immediately notify the FS and implement protective measures, as appropriate (as specified in Section 13, Number 3, of the Settlement);
- finalize and implement the noxious weed plan for the prevention and control of project-related noxious weeds, and comply with the Eldorado National Forest and Lake Tahoe Basin Management Unit (LTBMU) prescriptions for seed, mulch, and fertilizer for restoration or erosion control purposes (as specified in Section 14 of the Settlement);
- schedule and facilitate an annual meeting with the FS, CDFG, and SWRCB to review and discuss the results of implementing ecological conditions and to discuss other issues related to preserving and protecting ecological values affected by the project (as specified in Section 15 of the Settlement);
- develop a recreation implementation plan in coordination with the FS within 180 days of license issuance that includes preliminary design drawings, potential funding sources, and a construction schedule for the proposed recreational facilities, as well as other details related to recreational resources such as signing and sign placement, and consideration of measures to improve efficiency (i.e., areas with joint operation or operation of adjacent facilities) (as specified in Section 16 of the Settlement);
- conduct a recreational survey and prepare a report on recreational resources that is approved by the FS every 6 years from the date of the license issuance; within 1 year of the report, the FS, ERC, and other interested parties would review the report and make recommendations to address the findings; EID would not be required to construct additional recreational improvements as the remedy for a FS determination that carrying capacity is being exceeded in the project area; however,

EID may be required to address resource effects associated with project-related recreational use (as specified in Section 17 of the Settlement);

- provide a liaison to the FS for the planning or construction of recreational facilities, other major project improvements, and maintenance activities taking place within the Eldorado National Forest (as specified in Section 18 of the Settlement);
- meet with the FS at least every 6 years to review all recreational facilities and areas associated with the project to agree upon necessary maintenance, rehabilitation, construction, and reconstruction work needed and its timing; following the review, EID would develop a 6-year schedule for maintenance, rehabilitation, and construction, approved by the FS, prior to filing the schedule with the Commission (as specified in Section 19 of the Settlement);
- the following recreational facilities would remain inside the project boundary: Silver Lake East Campground, Caples Lake Campground, Caples Lake dam parking area, Caples Lake boat ramp and picnic facility (once constructed), Echo Lake trailhead and upper parking facility, and the Pacific Crest Trail (PCT) crossing of the Echo Lake conduit, and if these facilities are not currently within the license boundary, the boundary shall be adjusted to include them (as specified in Section 19 of the Settlement);
- provide the following recreational enhancements (as specified in Section 20 of the Settlement):
 - S** reconstruct the paved surfaces, toilets, and water system and upgrade the facility to meet current FS design standards and accessibility requirements at Silver Lake East Campground within 5 years of license issuance;
 - S** reconstruct the paved surfaces, toilets, and water system and upgrade the facility to meet current FS design standards and accessibility requirements at Caples Lake Campground within 10 years of license issuance;
 - S** reconstruct and upgrade Caples Lake dam parking area to meet current FS design standards and accessibility requirements within 5 years of license issuance;
 - S** construct a new boat launching ramp, parking lot, toilet facilities, access road and picnic area at Caples Lake on land designated by the FS on the northeast end of the lake within 7 years of license issuance;
 - S** construct an information kiosk to FS specifications at a location agreed to by the FS within 5 years of license issuance;

- S install barrier rocks to restrict uncontrolled vehicle travel at Martin Meadows overflow camping area within 5 years of license issuance;
 - S provide one-half the cost of resurfacing the Echo Lake upper parking area within 10 years of license issuance, unless EID is unable to acquire a grant to build the Caples Lake boat launching facility, in which case EID would not be responsible for one half the cost; and
 - S within 5 years of license issuance, construct a crossing for PCT across the Echo Conduit that meets FS design standards;
- provide the following operation and maintenance measures associated with recreational facilities (as specified in Section 21 of the Settlement):
 - S provide one-half the annual maintenance costs of Caples Lake dam parking area;
 - S operate and maintain the Caples Lake boat launching facility once the facilities are constructed;
 - S maintain Echo Lake trailhead, unless EID is unable to acquire a grant to build the Caples Lake boat launching facility in which case EID would not be responsible for maintenance;
 - S pay \$4,800 annually to the FS for performing monitoring and permit compliance assurance for the campground concessionaire special-use permits at Caples Lake Campground and Silver Lake East Campground;
 - S provide necessary heavy maintenance, rehabilitation, and reconstruction as determined through the recreational review for the following recreational developments: Silver Lake East and Caples Lake campgrounds (unless EID is unable to acquire a grant to build the Caples Lake boat launching facility, in which case EID would not be responsible for maintenance after the initial resurfacing of the paved areas); Caples Lake boat launching facility; Highway 88 information kiosk; 50 percent of the cost for Caples Lake dam trailhead; and 18 percent of the cost for Pyramid Creek trailhead;
 - S pay \$25,000 annually to the FS for patrol and operation of non-concessionaire developed and dispersed recreational facilities within and adjacent to the project boundary;
 - S annually provide a boat and operator at least twice each season to police Caples Lake and Silver Lake; and
 - S bring the Ferguson Point, Sandy Cove, Woods Creek fishing access and Silver Lake West recreational facility into compliance with Americans with Disabilities Act (ADA) accessibility standards within 10 years of license issuance;

- provide public information services (as specified in Section 23 of the Settlement), to include the following:
 - S develop a plan, within 1 year of license issuance, for measures to provide information about lake levels, real-time streamflows, simple staff gages, forecasting, and operations projections to the public via toll-free telephone and Internet of streamflows for gages on the SFAR below Kyburz diversion dam and the Silver Fork (including provisions to post hourly average flows within 4 hours on the Internet for the current and prior 7 days);
 - S provide public information relating to recreational opportunities, restrictions, and responsibilities associated with project-related recreational facilities at a level approved by the FS;
 - S develop, within 5 years of license issuance, print, and make available free of charge to the public a brochure and map that describe the recreational opportunities, facilities, rules and responsibilities for the project area and update the brochure and map as needed over the term of the new license; and
 - S install prominent signs at Caples Lake, Silver Lake, and Echo Lake during the winter season that warn visitors of unstable snow and ice conditions;
- implement the following measures for visual resources protection within the project area (as specified in Section 24 of the Settlement):
 - S during planning and prior to any new construction or maintenance of project facilities, including recreational facilities, file a plan approved by the FS for the protection and rehabilitation of National Forest System visual resources affected by the project; and
 - S paint the metal components of the walkway across the lower Echo Lake spillway, the stairway to the Caples Lake auxiliary dam and walkway across the dam, and metal components of the stairway, ramps, and handrail associated with the west side of Silver Lake dam a non-reflective black color within 2 years of license issuance and inspect each of these project features every 2 years, and repaint as necessary;
- prepare within 180 days of license issuance, in consultation with the FS, a heritage properties management plan that takes into account project effects on prehistoric and historic resources, Native American traditional cultural values, direct and indirect effects to heritage resources within the area of potential effects (APE), ethnographic studies, historic archaeological studies, project-related recreation effects on archaeological properties affecting National Forest System lands, and provide measures to mitigate identified effects, a monitoring program, and

management protocols for the ongoing protection of archaeological properties (as specified in Section 25 of the Settlement);

- in the event that items of potential cultural, historical, archaeological, or paleontological value are reported or discovered as a result of project operations or during ground-disturbing activities, EID would notify the FS and not resume work until it receives written approval from the FS (as specified in Section 26 of the Settlement);
- prepare a transportation system management plan, in consultation with the FS (as specified in Section 27 of the Settlement), within 1 year of license issuance, to include the following:
 - S** a map showing all roads, both FS system roads and non-FS system roads, associated with the project;
 - S** identification of project-related uses of project roads, including an estimate of the amount of use by season of the year;
 - S** identification of the condition of the project roads that are determined to be the responsibility of EID, including length and width of road, location and size of culverts, grade, slope position, hydrologic connectivity, surfacing, and jurisdiction;
 - S** a traffic and safety signage plan for roads determined to be the responsibility of EID, including safety and destination/distance information signs at major road intersections and features, an inventory and photographs of all signs, and a map showing sign locations;
 - S** a map of all drainage crossing of bridges and culverts for roads that are determined to be the responsibility of EID;
 - S** measures to control erosion related to project facilities on or affecting National Forest System lands;
 - S** identification of helispots routinely used to access project facilities on National Forest System lands, including notification standards for the FS;
 - S** provisions to develop a 5-year plan to identify the maintenance and reconstruction needs for project roads at 5-year intervals;
 - S** provisions to construct, operate, and maintain project facilities, including roads, parking and storage lots, reservoir shorelines, bridges, and culverts to maintain natural fluvial and colluvial sediment transport to the project reaches, to the extent feasible;
 - S** provisions to ensure all road maintenance and construction meet FS specifications and best management practices (BMP); and
 - S** provisions to replace the gate at the road to Caples Lake dam within 5 years of license issuance;

- prepare a trails system management plan that is approved by the FS within 1 year of license issuance (as specified in Section 28 of the Settlement) that includes the following:
 - S a map of all trails, including both FS system and non-FS system trails, associated with the project, with trail locations established using a global positioning system (GPS);
 - S identification of the season(s) of use and the amount of use by EID for each trail annually;
 - S identification of the condition of the trails, including any construction or maintenance needs; and
 - S provisions to prepare a 5-year plan to identify the maintenance and reconstruction needs for trails required for project operations at 5 year intervals;
- within 1 year of license issuance, prepare a facility management plan that is approved by the FS (as specified in Section 29 of the Settlement) that includes the following:
 - S a map showing all project facilities, including structures on or affecting National Forest System lands, above and below ground storage tanks;
 - S identification of the type and season of use of each structure;
 - S identification of the condition of each structure and the planned maintenance or removal; and
 - S provisions to prepare a 5-year plan to identify the maintenance, reconstruction and removal needs for project facilities at 5 year intervals;
- prior to approving, developing, or providing for additional commercial services or exclusive uses at Silver, Caples and Echo lakes, beyond those that exist as of the date of license issuance, complete an analysis that displays the effect of proposed development on adjacent National Forest System lands (as specified in Section 30 of the Settlement); and
- develop a land adjustment proposal within 2 years of license issuance, that addresses possible land exchanges or other management actions that would result in more efficient land management, including consideration of land exchanges between the FS and EID at Silver Lake East and West campgrounds, Oyster Creek Roadside Rest, and in the Sly Park/Pollock Pines area (as specified in Section 31 of the Settlement).

2.2 Proposed Action with Additional Staff-Recommended Measures

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

- in the event structural modifications are proposed to better enable the ramping rate criteria to be implemented, develop a plan, in consultation with the FS, ERC, and SWRCB, that would specify any structural changes that are proposed, the advantages of the proposed modifications over existing ramping rate control measures, the costs of implementing the structural changes, any alternatives that may be more cost-effective (while achieving the objective of minimizing downramping effects), and a schedule for implementing the proposed structural change;
- develop a plan for survey and trout removal at Lake Aloha, in consultation with FS and CDFG, that includes identification of specific pools to be covered, an initial survey and removal effort within 1 year of license issuance, determination of when additional survey and removal would be conducted, specific survey and removal protocols that minimize potential adverse effects, and reporting requirements. If installation of telemetry equipment (as proposed in Section 10 of the Settlement) does not occur, the final plan should address how spill events would be identified in a timely manner;
- develop a study plan for the detailed investigation of fluvial geomorphic properties at the Caples Lake spillway channel, Caples Creek downstream of the confluence of the spillway channel, and Oyster Creek, in consultation with the FS, SWRCB, and ERC, and file it with the Commission for approval;
- develop a stabilization plan for the Caples Lake spillway channel within 180 days of the completion of the detailed fluvial geomorphic study (instead of 2 years from license issuance, as specified in Section 8, Number 4.b of the Settlement), so that the results of this study could be incorporated into the stabilization plan. The plan should include a proposed implementation schedule, the alternatives that were considered for stabilization along with associated estimated costs, and the recommended stabilization alternative;
- provide documentation in the proposed streamflow and reservoir storage gaging plan that releases of 150 cfs to the Caples Creek channel from Caples Lake approximate 7/10 bankfull conditions;

- if EID plans to use pesticides to control undesirable insects or rodents on National Forest System lands, which are not covered by its noxious weed control plan, EID should first submit a request for approval to the FS that provides details of the need for the use of such pesticides and protective measures to ensure that non-target species are protected. EID should not apply any such pesticide until it receives written approval from the FS, which would ensure that its use is justified;
- as part of the recreation implementation plan, identify specific procedures that would be used to maintain and update the implementation plan in conjunction with the review of recreational developments, estimated costs for the new or enhanced facilities that would be implemented during the 6-year period following license issuance, identify how the needs of the physically disabled are considered in the design and construction of the proposed recreational enhancements or facilities, and identify the entity responsible for constructing specific recreational enhancements and conducting operation and maintenance of project-related recreational facilities, if other than EID;
- develop a recreation monitoring plan, in consultation with the FS, and file it with the Commission for approval within 180 days of license issuance. The recommended plan would include the following components:
 - S The specific methodology that would be used to assess changes in types of use and use patterns, levels of use, user preferences in recreational activities, types and sizes of recreational vehicles, preference for day use versus overnight use, carrying capacity information sufficient to indicate changes in capacity, and recreational-user trends in the project area.
 - S The seasonal and annual frequency of proposed recreational monitoring.
 - S A clear statement of how the proposed recreational monitoring report review, which would include EID, the FS, the ERC, and other interested parties, as specified in Section 17 of the Settlement, would relate to the review of recreational developments, which would include EID and the FS, as specified in Section 19 of the Settlement. Also, a description of how “other interested parties” would be determined prior to the monitoring report review; and
- include in the recreational survey report a summary of the items required by the SWRCB, per Decision 1635, as modified, which requires a qualitative analysis of the recreational effects associated with the end-of-the-month lake levels for the preceding year, including whether the end-of-the-month lake levels affected the following: the usability of boat ramps and docks; swimming access, beaches and

angler locations; campgrounds, picnic areas, recreational residences, organized camps, resorts, and marinas; and aesthetic values;

- incorporate into the public information plan measures to hold annual spring meetings with the FS and local representatives, as appropriate, to discuss the schedule of drawdowns associated with any needed repairs at the four storage reservoirs, to minimize effects on recreational interests, including how such meetings would be publicized, how the results of any such meetings would be reported to the Commission, and how the input from such meetings would be incorporated into EID's annual operation plans;
- develop a visual resource management plan within 1 year of license issuance that defines the process for visual resource protection, such as when a visual resource protection plan would be needed (i.e., new construction and type of maintenance activities), consultation process with the FS in the development and review of the plan, and components to be included in the visual resources protection plans;
- as part of the trail system management plan and the 5-year maintenance and reconstruction plan, identify the party responsible for, and estimated cost of, maintenance and reconstruction of each project-related trail segment; and
- consolidate several resource plans into an overall land and habitat management plan (LHMP). The LHMP would include, at a minimum, the following:
 - S an overview and discussion of general land management measures within the project area. This section would include a discussion of key land management objectives and how the various components of the LHMP would be implemented and coordinated;
 - S ecological resources adaptive management program that includes water temperature, general water quality (as appropriate), geomorphology, fish, invertebrate, amphibian, intake canal, and riparian vegetation monitoring plans and provisions to recommend adjustments in project operations to the Commission based on the results of the monitoring;
 - S noxious weed prevention and control plan;
 - S identification of special status species that occur or could occur in the project area, provisions for updating this listing, maps of known occurrences of the special status species, and specific activities (construction, operation, and maintenance) that would require preparation of a biological evaluation or biological assessment prior to implementation;
 - S mountain yellow-legged frog protection procedures (trout removal at pools near Lake Aloha);

- S recreation implementation plan;
- S recreation monitoring plan;
- S public information plan;
- S transportation system management plan;
- S trail system management plan; and
- S visual management plan.

2.3 Project Decommissioning

The project decommissioning alternative could be accomplished with or without removing the project's dam and related project works. We assume that those features that are necessary to provide water for consumptive use to EID's customers would remain in place. This would include the new SFAR diversion dam and intake structure, the canal, and the forebay with its dam. We based our analysis of this alternative on existing information.

2.4 No Action

Under the no-action alternative, the project would continue to operate as required by the original project license. The no-action alternative would result in no change to the existing environment. If the project is allowed to operate as in the past, there would be continued energy production and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental and economic conditions for comparison with the proposed action and other alternatives.

2.5 Alternatives Considered but Eliminated from Detailed Study

We also considered other alternatives to EID's proposal, but eliminated them from detailed study because they are not reasonable in the circumstances of this case.

2.5.1 Federal Government Takeover

We do not consider federal takeover to be a reasonable alternative. Federal takeover of the El Dorado Project would require congressional approval. Although that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that a federal takeover should be recommended to Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed an interest in operating the El Dorado Project.

2.5.2 Nonpower License

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

3.0 ENVIRONMENTAL CONSEQUENCES³

3.1 General Description of the South Fork of the American River Basin

The climate of the project area is characterized by cool, wet winters and warm, dry summers. Average daily minimum and maximum air temperatures at Placerville (elevation 1,900 feet NGVD) are 31 degrees Fahrenheit (F) and 53 degrees F in January, and 56 degrees F and 90 degrees F in July. In the upper portion of the Caples Lake watershed (elevation 7,950 feet NGVD), average minimum and maximum air temperatures are 17 degrees F and 39 degrees F in January, and 43 degrees F and 69 degrees F in July. Average annual precipitation in the SFAR watershed varies from about 30 inches at Placerville to 48 inches at Caples Lake. Approximately 90 percent of the precipitation falls during October through April. At the higher elevations, the majority of the precipitation falls as snow from late fall to early spring.

The four project storage reservoirs are located at elevations that range from 7,261 to 8,114 feet NGVD. Lake Aloha is located at the highest elevation in Desolation Valley, part of the Desolation Wilderness Area, in a glaciated basin just west of the Sierra Nevada crest. Steep granitic slopes that ascend to elevations 1,000 to 1,800 feet higher than the lake water surface surround much of the lake. Pyramid Creek is the outlet for the lake and descends a total of about 1,200 feet before joining the SFAR.

Echo Lake, east of the Sierra Nevada crest, is also surrounded by steep slopes on the northern and southern shores. These heavily wooded slopes are similar in height to those at Lake Aloha. Echo Creek, the natural outlet of Echo Lake, descends a total of about 1,200 feet where it joins the upper Truckee River, which flows into Lake Tahoe.

Caples Lake is located in a broad, glaciated saddle, west of the Sierra Nevada crest. Steep slopes from 1,000 to 2,000 feet rise from the southern and western portions of the

³ Unless otherwise indicated, all information is taken from the license application for this project (EID, 2000a).

lake. Caples Creek is the outlet from Caples Lake and passes to the northwest through a flat-bottomed, U-shaped glaciated valley before entering the Silver Fork.

Silver Lake is the southernmost lake and at the lowest elevation. Slopes around the lake are not quite as high or steep compared to the other three lakes, with a maximum surrounding relief of about 1,000 feet. The outlet from Silver Lake flows into the Silver Fork, which passes through a narrow canyon before joining the SFAR.

The SFAR in the vicinity of the bypassed reach passes through what are called oversteepened inner gorge slopes, which have a characteristic V-shaped profile caused from stream incision. Other than narrow terraces at some locations, there are few defined floodplains adjacent to project waterways. Slope failures have occurred throughout the project area, which has caused tongues of debris to protrude into the SFAR canyon, causing the channel to continuously shift within the canyon.

3.2 Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) (50 CFR § 1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in space and/or time with the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on staff's preliminary review of EID's license application, we have outlined the geographic and temporal scope of cumulative effects for the resources that could be cumulatively affected by hydroelectric development and non-hydro activities in the SFAR Basin. We will address these effects in the EIS.

3.2.1 Resources That Could Be Cumulatively Affected

Based on information in the license application, agency comments, the scoping process, other filings related to the project, and preliminary staff analysis, we identified the following resources that have the potential to be cumulatively affected. Resources that could be cumulatively affected by the continued operation of the El Dorado Project in combination with other activities in the SFAR Basin include: (1) water quality (temperature, dissolved oxygen [DO], and sedimentation); (2) water quantity; and (3) coldwater fishery resources (primarily rainbow trout).

3.2.2 Geographic Scope

The geographic scope of the analysis defines the physical limits or boundaries of the proposed action's effects on the resources. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary.

In this case, the overall scope of analysis for all three potentially cumulatively affected resources is proposed to encompass the drainage basin of the SFAR upstream of the Slab Creek Reservoir dam. Project operations in conjunction with operation of the Sacramento Municipal Utility District's (SMUD) Upper American River Project (FERC No. 2101), including the Slab Creek reservoir and Camino powerhouse on the SFAR, and the Camino Reservoir, Jaybird powerhouse, and several other facilities on Silver Creek (see figure 2-1), could interact in a cumulative manner. For water quantity, we will expand our geographic scope, based on comments received, to include Jenkinson Lake (of the Sly Park Unit) because it may serve as an alternative storage site for consumptively used project water, thus providing additional options for storage and diversion of project water.

3.2.3 Temporal Scope

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

We continue to seek further information from federal, state, and other agencies and any other sources pertaining to past, present, and future actions and their effects on the aforementioned resources (in the form of previous studies; present plans; and future plans, goals, or forecasts) in the SFAR Basin.

3.3 Proposed Action and Alternatives

3.3.1 Water Resources

3.3.1.1 Affected Environment

Water Quantity

The highest river flows typically occur from mid-March through mid-July, and are fed by snowmelt. During this period, water is captured in the four upper reservoirs and releases are restricted to Pyramid and Caples creeks, the Silver Fork, and the Echo Lake conduit. Flows from the Echo Creek watershed are partially stored in Echo Lake, for

interbasin diversion to the SFAR, diminishing natural flows in the upper Truckee watershed. As the snow pack recedes, river flows are substantially diminished during late July, August, September, and October. The four upper reservoirs store water when it is abundant to ensure continued availability for use during the low-flow periods of late summer and early fall, when both water and electricity are in high demand in California.

Project Reservoirs

During most years, by the beginning of July, the amount of streamflow in the SFAR at the El Dorado diversion dam is not sufficient to meet the needs of the project, the consumptive water demands of EID's customers, and required minimum flow releases in the SFAR below Kyburz to protect aquatic habitat (discussed further in section 3.3.2, *Aquatic Resources*). Consequently, water is released from the upstream reservoirs to augment flows in the SFAR. Draft from storage begins at Lake Aloha, continues at Caples Lake until after Labor Day, and ends with releases from Echo and Silver lakes (see section 2.1.1, *Project Description and Operation*). Beginning in November, releases from Caples and Silver lakes, plus increased natural streamflow, typically provide water to the El Dorado canal throughout the winter period. EID is required to operate the reservoirs in accordance with specific minimum flows, reservoir summertime water levels, reservoir minimum pool elevations, and seasonal operation criteria to protect aquatic and riparian habitat and recreational opportunities at each of the reservoirs (discussed further in sections 3.3.2, *Aquatic Resources*, and 3.3.5, *Recreational Resources*).

The CDWR issues Certificates of Approval for each dam that specify when spillway gates and flashboards may be in place for impounding water. Table 3-1 shows the CDWR requirements for the project reservoirs.

Table 3-1. Flashboard and usable storage limitations for project reservoirs. (Source: EID, 2000a)

Reservoir	With Flashboards	Usable Storage (acre-feet)	Remove Flashboards	Usable Storage (acre-feet)
Lake Aloha	No flashboards	5,179	No flashboards	--
Echo Lake ^a	4/2–10/31	1,943	11/1–4/1	0
Caples Lake	4/2–9/30	22,338	10/1–4/1	20,494
Silver Lake	4/2–10/31	8,640	11/1–4/1	3,756
Total		38,100		24,250

- ^a Two feet of flashboard storage may be retained through November 15.

Lake Aloha

Lake Aloha is located in the Desolation Wilderness Area. The drainage area for Lake Aloha is 3.4 square miles, and it is fed by several unnamed perennial creeks. The gross storage capacity is 10,900 acre-feet, with a surface area of 590 acres at an elevation of 8,114.07 feet NGVD. The lake has a usable storage capacity of 5,179 acre-feet. Lake Aloha and its surrounding watershed deliver an average of 28,250 acre-feet/year to the SFAR. The maximum depth is about 79 feet. The usable storage volume is 14 percent of the project's total available storage volume.

Lake Aloha typically begins filling during late March or early April. The reservoir normally reaches its maximum level for the year in late June or early July, at which time drawdown begins. The reservoir usually reaches its minimum level by late August to mid-September. After usable storage has been depleted, which results in a vertical drawdown of 20 feet, the lake has a remaining surface area of about 48 acres. Occasionally, the reservoir will partially fill during the winter storm period, in which case it will be drawn down prior to the start of the spring runoff period.

Echo Lake

Echo Lake consists of lower and upper Echo lakes, located in the upper Truckee River drainage basin. Lower Echo Lake is fed by several perennial creeks. Originally a natural lake, its storage capacity was initially increased in 1876. In 1923, 1,900 acre-feet of storage were added, and an outlet was built to divert water to the SFAR.

The Echo Lake conduit diverts water from lower Echo Lake into the SFAR near Phillips. The conduit has a maximum capacity of 30 cfs. Gross storage capacity in Echo Lake is 15,749 acre-feet, with a surface area of 335 acres at an elevation of 7,411.5 feet NGVD. The lake has a usable storage capacity of 1,943 acre-feet. The usable storage volume is 5 percent of the total storage volume available to the project. The maximum depth is about 150 feet, but usable storage occurs only in the top 6 feet, the height of the flashboards. There is substantial spill over the dam into Echo Creek during the spring, after the reservoir is filled to the top of the flashboards. Draft from storage for power production and water supply usually occurs from September through November. After the usable storage is depleted, which results in a vertical drawdown of about 6 feet, the lake has a remaining surface area of 311 acres.

Caples Lake

Caples Lake is located in Alpine County near Kirkwood. It is within the SFAR drainage, fed by Woods and Emigrant creeks. The lake was constructed in 1922 by increasing the capacity of two small, natural 100-acre-foot lakes. Two dams were built that combined the two smaller lakes into one large lake with a usable capacity of 22,338 acre-feet and a surface area of 624 acres at an elevation of 7,797.7 feet NGVD. Caples Lake provides 58 percent of the project's usable storage capacity. Caples Lake and its surrounding watershed deliver an average of 26,050 acre-feet/year to the SFAR via Caples Creek and the Silver Fork. The maximum depth is about 68 feet. Draft from storage for power production normally occurs from late summer (usually August) through winter (early March). After the usable storage is depleted, Caples Lake has a remaining surface area of about 266 acres.

Silver Lake

Silver Lake is located in Amador County near Kirkwood, about 7 miles west of Caples Lake in the Silver Fork drainage. The catchment area for Silver Lake is 15.2 square miles, and the lake is fed by several unnamed creeks. The lake has a usable storage capacity of 8,640 acre-feet with a surface area of 502 acres at an elevation of 7,261.07 feet NGVD. When the usable storage is depleted, the original lake's natural pool of 250 surface acres and 4,640 acre-feet remains. Silver Lake and its surrounding watershed deliver an average of 25,350 acre-feet/year to the SFAR via the Silver Fork. The maximum depth is about 71 feet. Silver Lake provides 22 percent of the project's usable storage capacity.

Widespread leakage occurs along the north rim of the lake and drains into Oyster Creek, a 2.5-mile-long tributary to the Silver Fork. Based on existing gage data, the leakage rate varies according to lake level from approximately 1 cfs when the usable storage is depleted to about 17 cfs (or about 1,000 acre-feet/month) when the lake is full. EID has estimated leakage from Silver Lake based on available gaging records (table 3-2). The topography at the outlet of Silver Lake indicates that leakage can occur to either the Silver Fork main stem or to Oyster Lake, where it enters Oyster Creek.

El Dorado Forebay

The forebay has a usable storage volume of 262 acre-feet and occupies 23 acres at full pond. It regulates flow from the El Dorado canal into the powerhouse and the EID irrigation canal.

Table 3-2. Estimated leakage from Silver Lake into Oyster Creek. (Source: EID, 2000a)

Silver Lake Stage ^a (feet)	Flow at Oyster Creek Gage		Estimated Total Leakage	
	(acre-feet/month)	(cfs)	(acre-feet/month)	(cfs)
5	0	0	71	1.2
7	0	0	100	1.7
10	0	0	171	2.9
13	0	0	295	5.0
15	90	1.5	430	7.2
18	280	4.7	652	11.0
20	460	7.7	800	13.4
22.7	800	13.4	1,000	16.8

^a Silver Lake stage is relative to the invert of the discharge pipe; when Silver Lake is at full pond, the water is 22.7 feet above the invert.

Stream and River Reaches

Flow in the SFAR and its tributaries varies greatly on a short-term basis and from year to year. Variability is primarily dependent on total volume and timing of precipitation, there being little variability due to groundwater intake or evaporation. Highest flows typically occur during snowmelt in April through June. Low-flow periods occur during the fall and winter when temperatures are low and precipitation at higher elevations is in the form of snowpack. Discharge in project streams has historically been measured at nine U.S. Geological Survey (USGS) gaging stations (table 3-3 and marked by a triangle on figure 3-1). Monthly and annual flow characteristics at each of these gages are summarized in table 3-4.

Table 3-3. USGS gaging stations throughout the project area. (Source: EID, 2000a)

USGS Station No.	Station Name	Data	Period of Record
11435100	Pyramid Creek at Twin Bridges	Releases from Lake Aloha	1970–2000

USGS Station No.	Station Name	Data	Period of Record
11434500	Echo Lake conduit near Phillips	Releases from Echo Lake	1923–2000
11436000	Silver Lake outlet near Kirkwood	Releases from Silver Lake	1922–2000
11436500	Silver Lake leakage no. 1 near Kirkwood	Leakage from Silver Lake into Oyster Creek	1986–2000
11437000	Caples Lake outlet near Kirkwood	Releases from Caples Lake	1922–1992
11437500	Caples Lake spillway near Kirkwood (located at the spillway of the auxiliary dam)	Spill from Caples Lake	1969–1992
11439501	SFAR near Kyburz (total flow)	Total flow in the SFAR upstream of diversion dam	1922–2000
11439500	SFAR near Kyburz (river only)	Flow in the SFAR, downstream of diversion dam	1922–2000
11439000	El Dorado canal near Kyburz	Flow diverted from the SFAR into El Dorado canal	1922–2000

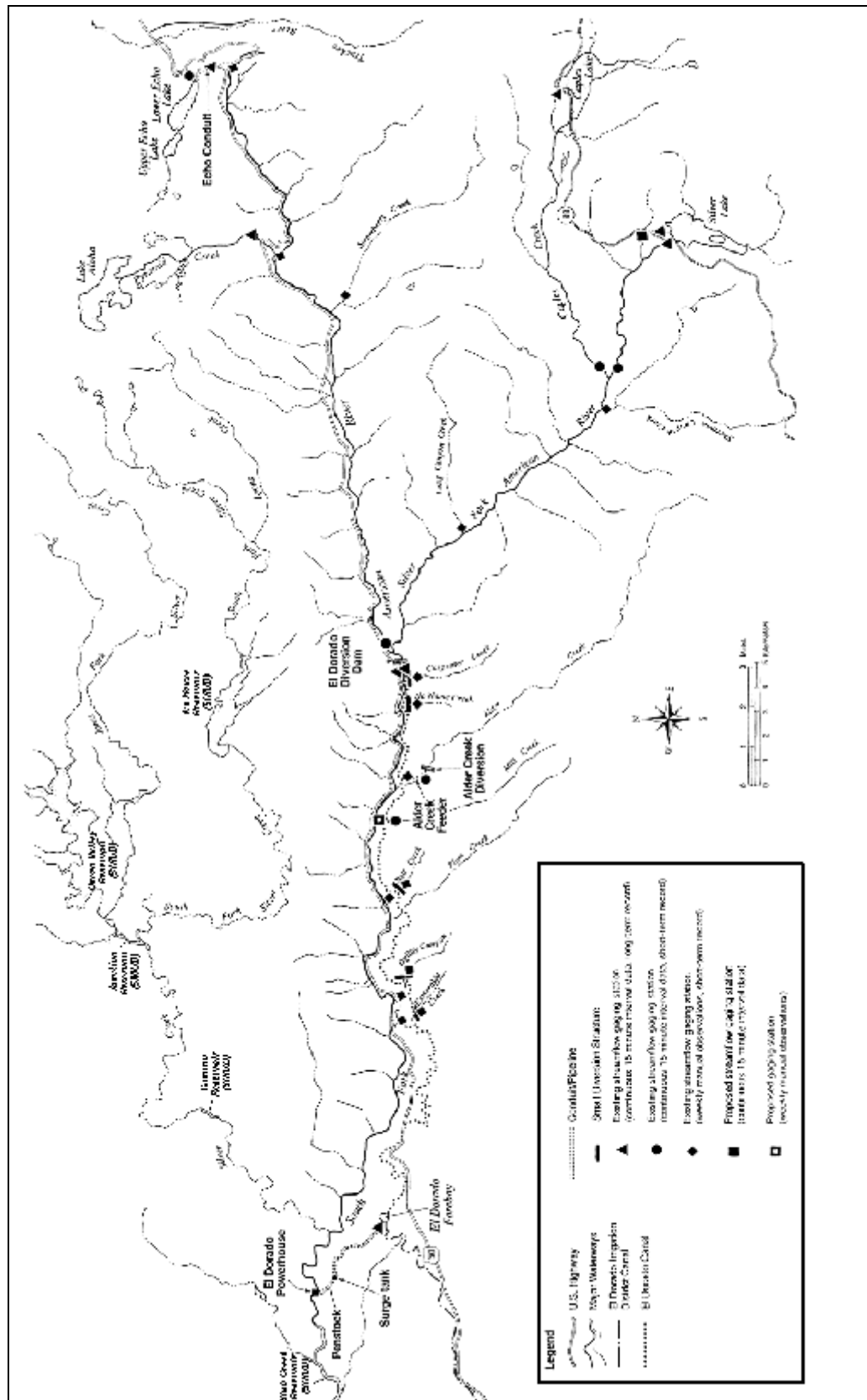


Table 3-4. Summary of monthly and annual USGS discharge data (cfs) for gages within the project area. (Source: USGS, 2002)

Gage	Daily	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Echo Lake conduit														
Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	2	0	0	0	0	0	0	0	1	13	9	4	1	3
Max	33	6	6	8	11	0	11	17	30	33	29	26	24	9
Pyramid Creek at Twin Bridges														
Min	0	1	2	4	7	16	6	5	1	0	0	0	1	15
Mean	40	20	18	25	41	97	103	70	45	19	12	18	16	40
Max	1,570	1,570	283	210	267	605	386	295	131	181	263	455	375	69
Silver Lake outlet														
Min	0	0	0	0	0	1	0	0	0	0	0	0	0	7
Mean	36	15	14	16	44	127	89	20	8	37	25	18	16	36
Max	1,940	1,940	543	405	497	544	467	411	100	146	117	606	570	88
Silver Lake leakage														
Min	0	0	0	0	0	0	0	5	0	0	0	0	0	2
Mean	3	0	0	0	1	6	11	10	6	2	0	0	0	3
Max	16	7	0	0	14	16	16	14	14	8	2	0	0	4
Caples Lake outlet														
Min	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Mean	36	26	18	11	13	32	84	47	48	35	36	41	41	37
Max	669	132	145	138	258	445	669	482	295	176	132	336	405	79
Caples Lake spillway														
Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	1	0	0	0	0	1	8	4	0	0	0	0	0	1
Max	310	0	0	0	0	180	172	310	1	6	4	0	0	7

Gage	Daily	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
SFAR near Kyburz (total flow)														
Min	10	21	28	36	53	98	63	60	39	14	10	11	12	99
Mean	420	242	273	382	744	1,329	981	311	148	133	110	160	219	420
Max	18,000	18,000	9,670	6,280	5,410	8,180	4,930	3,240	862	892	1,720	8,640	12,400	1,062
SFAR near Kyburz (river only)														
Min	0	0	1	1	1	1	1	1	0	0	0	0	0	21
Mean	316	156	177	278	640	1,209	852	186	27	26	37	78	130	316
Max	18,000	18,000	9,550	6,210	5,360	8,140	4,920	3,230	696	883	1,580	8,620	12,300	1,023
El Dorado canal near Kyburz														
Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	98	83	90	96	96	115	124	121	117	101	71	74	86	100
Max	207	195	207	164	165	167	173	172	169	171	170	168	172	144

Pyramid Creek

Pyramid Creek drains Lake Aloha and flows 2.3 miles connecting a series of small lakes before reaching Horsetail Falls. The mean gradient of this reach is 266 feet per mile. The falls are almost 1,000 feet high and cover about 0.6 mile. From the base of the falls, the creek runs about 2 miles to its confluence with the South Fork. Flows released from Lake Aloha into Pyramid Creek are shown in table 3-4. Based on USGS records from 1970 through 2000, the annual mean flow measured in Pyramid Creek was 40 cfs (table 3-4). Mean monthly flows ranged from 12 cfs during October to 103 cfs in June. The daily means ranged from 0 cfs (several occasions) to 1,570 cfs. A continuous minimum flow of 2 cfs, or inflow if less, is released to Pyramid Creek.

Echo Creek

From Echo Lake, Echo Creek runs about 550 feet as a moderately low-gradient stream before falling approximately 800 vertical feet in a series of cataracts⁴ to the Lake Tahoe valley floor. The creek flows about 1 mile from the base of the falls near Highway 50 to its confluence with the upper Truckee River. Echo Creek flows were not measured prior to October 1999, when EID initiated its ongoing monitoring program. Consequently,

⁴ A cataract is a large waterfall.

EID provided a simulation of flows in Echo Creek based on a proration of flows in Pyramid Creek to the Echo Lake catchment area (table 3-5).

Table 3-5. Simulated Echo Creek flow for a typical dry (1977), normal (1980), and wet (1983) water year.^a (Source: EID, 2000a)

Flow	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept
1977												
Min	0	1.8	0.2	1.0	1.3	0.3	0	0	5.7	2.9	2.2	0
Max	4.1	3.2	1.2	2.0	4.0	2.4	11.7	42.6	64	7.4	2.9	0
1980												
Min	5.1	0	0	4.1	4.7	10.5	10.3	21.0	18.6	15.9	5.0	3.3
Max	46.3	26.5	11.4	224.7	40.4	12.8	99.2	100.5	54.6	86.9	16.3	5.2
1983												
Min	0	19.9	4.1	6.6	7.1	4.8	14.5	9.3	83.7	33.6	20.5	13.4
Max	296.2	64.9	13.5	8.0	15.7	24.8	27.3	163.2	153.9	120.6	67.8	84.8

^a A USGS water year begins in October and ends in September; for example, water year 1977 began with data collected during October 1976.

Echo Lake Conduit

Outflow from Echo Lake to the SFAR via the Echo Lake conduit is shown in table 3-4. The annual mean flow in the conduit for the period of record was 2 cfs. Mean monthly flows ranged from around 0 cfs (most of the year) to 13 cfs during October. The daily mean flows ranged from 0 to 33 cfs.

Caples Creek

Caples Creek originates below the main dam at Caples Lake and flows into the Silver Fork, a distance of 8.3 miles. The annual mean outflow from Caples Creek was 36 cfs for the period of record (table 3-4). Mean monthly flows ranged from 11 cfs during March to 84 cfs in June. The daily means ranged from 0 cfs (several occasions) to 669 cfs. A continuous minimum flow of 5 cfs, or inflow if less, is now released from Caples Lake to Caples Creek for the protection of aquatic habitat.

Occasionally, when inflow to Caples Lake exceeds the capacity of the Caples Lake outlet, flow is released from a spillway at the auxiliary dam. Such releases normally occur during May, June, and July (table 3-4). Flow from this auxiliary spillway has eroded portions of the intermittent stream channel that carries this flow to Caples Creek.

Silver Fork of the American River

The Silver Fork runs 14.6 miles from Silver Lake to the SFAR. Its confluence with the SFAR is about 0.25 mile above the El Dorado diversion. The drainage area of the Silver Fork at its confluence with the SFAR is 107 square miles. Flow in the Silver Fork is largely influenced by the operation of Silver and Caples lakes. Outflow from Silver Lake into the Silver Fork is shown in table 3-4. The annual mean outflow from Silver Lake was 36 cfs for the period of record. Mean monthly flows ranged from 8 cfs during August to 127 cfs in May. The daily mean flow ranged from 0 cfs (several occasions) to 1,940 cfs. It is likely that much of the leakage flow from Silver Lake contributes to the flow in the Silver Fork. A continuous minimum flow of 2 cfs, or inflow if less, is now released from Silver Lake into the Silver Fork for the protection of aquatic habitat.

SFAR Upstream of Diversion Dam

Total river flows in the SFAR upstream of the diversion dam are calculated by combining the USGS gage reading downstream of the diversion dam with the USGS gage readings of the flow in the El Dorado canal. The annual mean flow for the period of record is 420 cfs (table 3-4). Mean monthly flows ranged from 110 cfs in October to 1,329 cfs in May. Daily flows ranged from 99 cfs to 1,062 cfs. The operation of the project, in general, has reduced natural flows in the SFAR upstream of the diversion dam during the spring and increased natural flows during the late summer and fall.

SFAR below Diversion Dam

At the diversion dam, up to 165 cfs of the SFAR is diverted into the 22-mile-long El Dorado canal to the project forebay. The bypassed reach is about 22 miles long. The annual mean flow in the bypassed reach was 316 cfs for the period of record (table 3-4). Mean monthly flows ranged from 26 cfs in September to 1,209 cfs in May. Mean daily flows at this station ranged from 0 cfs in January 1978 to 18,000 cfs on January 2, 1997. Minimum flow requirements were established downstream of the diversion dam to protect aquatic habitat, and are discussed further in section 3.3.2, *Aquatic Resources*. The lower 2.4 miles of the bypassed reach receive substantial inflow from Silver Creek (table 3-6), a major tributary, which carries water released from the SMUD's Upper American River Hydroelectric Project (FERC No. 2101).

Table 3-6. Flow summary for USGS gage no. 11441900 at Silver Creek below Camino diversion dam from 1960–2000 record. (Source: USGS, 2002)

Flow	Daily	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Avg
Min	1	5	5	2	3	3	3	3	3	3	3	1	3	4
Mean	96	201	127	115	116	186	145	66	32	26	28	44	72	95

El Dorado Canal

The SFAR flows diverted at the diversion dam and the tributary flows diverted directly into the El Dorado canal are used for water supply and power generation. The capacity of the canal at the forebay is 175 cfs. The annual mean flow in the canal was 100 cfs for the period of record (table 3-4). Mean monthly flows ranged from 71 cfs in October to 124 cfs in June. Mean daily flows in the canal have ranged from 0 cfs (several periods) to 207 cfs (February 8, 1951). EID withdraws a total of 15,080 acre-feet of water per year from the canal for consumptive use at rates up to 40 cfs from April through October; up to 20 cfs in November, December, and March; and up to 10 cfs in January and February. Water not used for consumptive purposes is used for power generation.

SFAR Tributaries Downstream of Kyburz

Several smaller tributaries are diverted into the canal, typically in the winter and spring, between the diversion dam and the forebay. During the late summer and fall, these tributaries become nearly dry and do not contribute to the project. These tributaries include Carpenter Creek, No Name Creek, Alder Creek, Mill Creek, Bull Creek, Ogilby Creek, and Esmeralda Creek. Flows of up to 15 cfs are diverted from Alder Creek, and flows of up to 10 cfs are diverted from each of the other six creeks (EID, 2000b). Alder Creek is by far the largest of these tributaries, with the mean annual flows ranging from 5.6 cfs in 1924 to 85 cfs in 1950. The total flow at Alder Creek was recorded by USGS gage no. 11440000 during water years 1923 through 1981. The remaining tributaries diverted into the canal are smaller than Alder Creek. EID used the actual mean monthly flow data for the period of record from the Alder Creek USGS gage to simulate the mean monthly flows at the remaining six streams that have flow diverted into the El Dorado intake canal.

EID's basis for its flow simulation was a proration of the watershed area of each stream compared to the watershed area of Alder Creek. Table 3-7 summarizes the actual Alder Creek mean monthly flows and simulated monthly flows for the other streams.

From 1999 to 2000, EID established recording gages at Alder Creek below the diversion into the canal and at Mill Creek above the diversion into the canal. In addition to the recording gages, EID has installed staff gages at the following locations at the SFAR tributaries downstream of the diversion dam: Esmeralda Creek above Highway 50, Esmeralda above diversion, Esmeralda Creek below the canal, Ogilby Creek above confluence, Ogilby diversion flume, Ogilby Creek above diversion, Bull Creek above confluence, Bull Creek above diversion, No Name Creek above diversion, Carpenter Creek above diversion, Mill Creek above confluence, Bull Creek diversion flume, Mill Creek

above canal, No Name feeder, and Carpenter Creek feeder. These gages are non-recording and are read once a week. Data collected from the recording and staff gages were used to assess the hydrology of each creek. Results of this analysis are presented along with the areal flow simulations in table 3-7. Maximum flows simulated with regressions based on measurements in the creeks were generally about one-half of the levels based on areal ratios. The exception to this case was Bull Creek, which had a level of about one-tenth of the value based on the areal ratio. Currently, there are no minimum flow requirements for any of these tributaries.

SFAR Downstream of El Dorado Powerhouse

Up to 40 cfs of the water diverted into the El Dorado canal are taken by EID at the forebay for consumptive uses, and the balance of water enters the penstock and powerhouse. The consumptive water (that which EID diverts into its irrigation canal) is not returned to the SFAR, although some may return after use by EID's customers (figure 2-2). The remaining water, peaking at up to about 175 cfs, flows from the forebay into the penstock, through the powerhouse, and is returned to the SFAR immediately downstream of the powerhouse.

Table 3-7. Mean monthly flows at seven tributaries to the El Dorado canal and SFAR. (Source: EID, 2000a; Hydrologics, 2002a)

Creek	Drainage Area (sq. mi.)	Mean Monthly Flows ^a (cfs)		EID Areal Estimate ^b		Hydrologic Regression Estimate ^c	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Alder	22.1	0.7	111	--	--	--	--
Carpenter	2.17	--	--	0.1	11	0.3	6
No Name	0.45	--	--	0.0	2	0.1	1
Mill	3.26	--	--	0.1	16	0.5	7.7
Bull	0.90	--	--	0.0	5	0.0	0.5
Ogilby	1.22	--	--	0.0	6	0.1	2.4
Esmeralda	0.74	--	--	0.0	4	0.1	2.1

^a Actual flow data from the USGS gage for the period 1923 through 1981.

^b Simulated flow based on watershed area proration of actual flow measured at Alder Creek.

^c Simulated flow data based on regressions of flow measurements.

Water Quality

The project is situated in the Sierra Nevadas in a high-altitude environment where there is low population density and limited development has occurred. Consequently, the overall water quality of project waters typically meets applicable water quality standards.

The SFAR Basin lies in the Sacramento River Basin; consequently, the applicable water quality standards are those of the Central Valley Region Basin Plan (Basin Plan) for the Sacramento and San Joaquin River Basins (CVRWQCB, 1998) (table 3-8). According to the Basin Plan, the designated beneficial uses for project streams in the SFAR Basin include the following: municipal water supply, power production, contact recreation, non-contact recreation, canoeing and rafting, warmwater fish habitat (potentially), coldwater fish habitat, coldwater fish spawning, and wildlife habitat. The designated beneficial uses for Aloha Lake, Silver Lake, and Caples Lake include: municipal water supply, irrigation, stock watering, industrial process supply, power production, contact recreation, non-contact recreation, warmwater and coldwater fish habitat, coldwater fish spawning, and wildlife habitat.

Echo Lake and Echo Creek are within the Lahontan Region. The designated beneficial uses of Echo Lake and Echo Creek include: municipal water supply, groundwater recharge, navigation, recreation, commercial and sport fishing, coldwater fisheries, wild trout, and fish spawning (LRWQCB, 1995).

EID collected water quality data during November 1998 and in June and August 1999. These sampling dates cover the main seasonal basin operation conditions consisting of fall low-flow periods, early summer high-flow periods, and summer releases from the project reservoirs. Thirteen sampling stations were established along the SFAR and its tributaries, as well as 10 stations on high-elevation storage reservoirs.

Table 3-8. Applicable state water quality criteria for parameters potentially influenced by project operation. (Source: CVRWQCB, 1998; LRWQCB, 1995)

Parameter	Criteria
Temperature	At no time or place shall the temperature of cold or warm interstate waters be increased by more than 5 degrees F above natural receiving water temperatures.
DO (milligrams per liter [mg/L])	≥7.0 (Echo Creek and Echo Lake: ≥8.0)
pH (units)	6.5–8.5

Parameter	Criteria
Fecal coliform (maximum probable number [MPN]/100 mL)	<100 (Echo Creek and Echo Lake: < 20/100 mL log mean over 30 days, with no more than 10% >40/100 mL)
Turbidity (nephelometric turbidity unit [NTU])	0–50 NTUs (#20% increase) 50–100 NTUs (#10 NTU increase) >100 NTUs (#10% increase) (Echo Creek and Echo Lake [#10% increase])
Total dissolved solids (mg/L)	125 (Echo Creek and Echo Lake: 75)

Temperature

The streamflow characteristics of the watersheds in the project area exhibit large flow variations due to the variability of rainfall. This, together with a wide annual temperature range, produces significant variations in water temperature. Existing water temperature characteristics that pertain to defining habitat for resident coldwater fish populations are discussed in section 3.3.2, *Aquatic Resources*.

The temperature of project waters varies by season and elevation (table 3-9). During August and November, the dominant release from storage would be from Caples Lake.

Table 3-9. Spot water temperature data for project waters in 1998 and 1999. (Source: EID, 2000a)

Location	November 1998 (°F)	June 1999 (°F)	August 1999 (°F)
Lake Aloha, ^a surface	NA	NA	58.8
Lake Aloha, ^a bottom	NA	NA	51.3
Upper Echo Lake, ^a surface	NA	48.2	63.0
Upper Echo Lake, ^a bottom	NA	40.5	40.8
Lower Echo Lake, ^a surface	NA	55.2	61.9
Lower Echo Lake, ^a bottom	NA	41.0	43.3
Caples Lake, ^a surface	NA	51.8	61.5
Caples Lake, ^a bottom	NA	39.9	48.0

Location	November 1998 (^NF)	June 1999 (^NF)	August 1999 (^NF)
Silver Lake, ^a surface	NA	57.4	64.4
Silver Lake, ^a bottom	NA	43.5	46.0
SFAR above Echo conduit	34.2	54.1	53.4
Pyramid Creek at SFAR	36.7	43.9	61.9
SFAR upstream of Silver Fork	39.0	53.4	68.0
Silver Fork upstream of Caples Lake	38.5	57.2	57.6
Silver Fork upstream of SFAR	39.6	47.3	60.8
SFAR at diversion dam	39.1	49.5	63.1
SFAR upstream of Alder Creek	39.9	58.6	61.9
SFAR downstream of powerhouse	41.9	56.8	66.0

Note: NA - No data were available.

^a Surface reservoir temperature measurements were taken from the top 3 feet of water, and bottom reservoir temperature measurements were taken from the bottom 3 feet of the water.

EID began collecting continuous water temperature data in 1998 at 55 locations. EID included 70 graphs showing the daily mean, maximum, and minimum temperatures in Appendix H of the license application. These graphs are useful in assessing trends in specific streams, but the scale of the graphs is not such that specific values can accurately be reported. We used these graphs to assess the suitability of stream reaches for trout, in section 3.3.2, *Aquatic Resources*. However, because EID's water temperature data collection is ongoing, it has not yet summarized the temperature data.

A gradual increase in water temperature is evident from upstream to downstream on the SFAR in the November data. The low value occurs at a point upstream of the Echo Lake conduit where the catchment of the SFAR is very small. The temperature increase reflects the warmer air temperatures and warmer inflows that occur from tributaries at lower elevations. In June and August, the effect of releases from the reservoirs can be discerned. Temperatures can increase rapidly in June when the flow is low and the effect of warmer air temperatures and long daylight hours is expected.

EID has initiated much more thorough temperature data collection by installing continuously recording thermographs throughout the project area (figure 3-2). This should enable a much more comprehensive water temperature characterization of project streams. This information has not yet been provided to the Commission.

Dissolved Oxygen

Generally, the DO concentrations within project waters meet applicable state water quality standards (table 3-10). Reservoir DO concentrations are generally lower than those found in river reaches. All DO concentrations except six met applicable state water quality standards. Four of these exceptions were measured close to the bottom of Echo, Caples, and Silver lakes during August. The three lakes were vertically stratified in August, and these relatively low DO concentrations could reflect sediment oxygen demand. Two surface DO values in Echo Lake also did not meet the more restrictive DO criteria for the Upper Truckee River during August (≥ 8.0 mg/L), but there is no evidence that these relatively low DO values (7.1 and 7.4 mg/L) are related to project operations.

pH

Most pH concentrations throughout the project area fell within the applicable CRWQCB water quality standard. The highest recorded value in the 1998–1999 sampling program was 7.8 at Alder Creek. Five pH values measured during August 1999 in Echo Lake and Lake Aloha were below the state standard; the values ranged from 6.1 to 6.4. The pH measured in Pyramid Creek, the outfall of Lake Aloha, was 6.1,

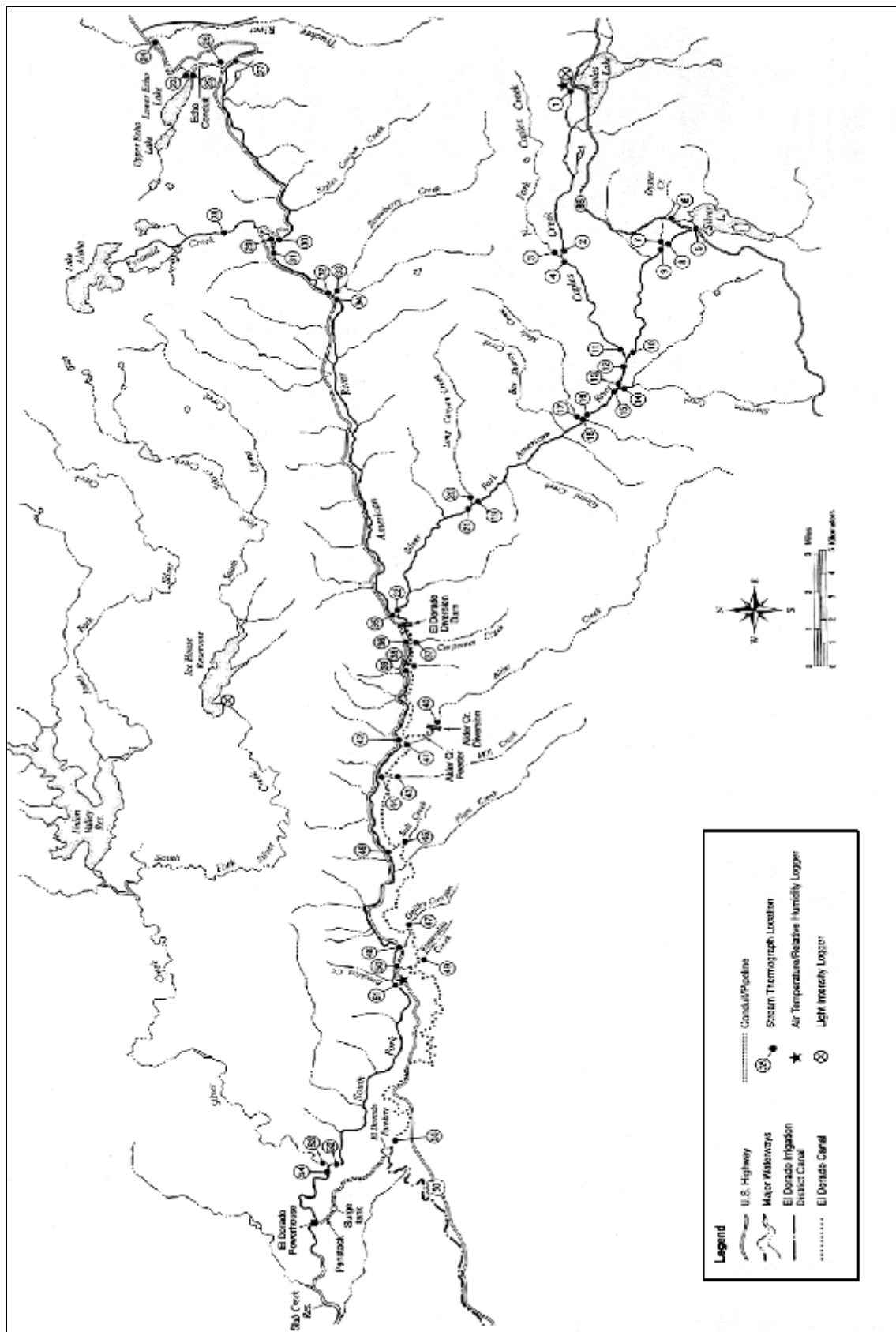


Figure 3-2. Stream thermograph locations. (Source: EID, 2000a)

and also below the state standards. These acidic values are most likely due to natural or non-project related factors.

Table 3-10. Spot DO concentrations in project waters in 1998 and 1999. (Source: EID, 2000a)

Location	November 1998	June 1999	August 1999
Lake Aloha, ^a surface	NA	NA	7.8
Lake Aloha, ^a bottom	NA	NA	10.2
Upper Echo Lake, ^a surface	NA	9.5	7.1
Upper Echo Lake, ^a bottom	NA	9.5	6.0
Lower Echo Lake, ^a surface	NA	8.7	7.4
Lower Echo Lake, ^a bottom	NA	8.9	7.4
Caples Lake, ^a surface	NA	10.1	7.0
Caples Lake, ^a bottom	NA	9.9	6.1
Silver Lake, ^a surface	NA	8.8	7.5
Silver Lake, ^a bottom	NA	8.8	6.6
SFAR above Echo conduit	10.8	11.2	9.2
Pyramid Creek at SFAR	10.6	11.0	8.8
SFAR upstream of Silver Fork	8.7	10.6	9.0
Silver Fork upstream of Caples Lake	7.8	10.0	8.6
Silver Fork above SFAR	8.6	11.5	9.0
SFAR at EID diversion	9.1	11.4	9.6
SFAR above Alder Creek	8.4	11.1	9.0
SFAR below EID powerhouse	9.0	11.1	9.3

Note: NA - No data were available.

^a Surface reservoir DO measurements were taken from the top 3 feet of water, and bottom reservoir DO measurements were taken from the bottom 3 feet of the water.

Total Dissolved Solids

Total dissolved solids (TDS) measured throughout the project area ranged from non-detectable to 420 mg/L. Nearly all values were less than 50 mg/L. However, three values exceeded applicable water quality standards. Two of these values were measured upstream of the Echo Lake conduit; the first, 320 mg/L, was measured in November 1998 and the second, 260 mg/L, was measured in August 1999. Because this sampling station is on the SFAR upstream of water that is influenced by project operations, the cause of these high values is not due to project operations. The third high TDS value, 420 mg/L, was measured in August at the SFAR in the bypassed reach, upstream of the confluence of Silver Creek.

Turbidity

Turbidity in project waters ranged from 0 to 515 NTUs, although most values measured were less than 20 NTUs. A series of five relatively high turbidity readings ranging from 115 to 515 NTUs occurred in the SFAR during the November 1998 sampling. These high values occurred at the following stations: upstream of the Echo Lake conduit (where the highest value occurred), upstream of the Silver Fork confluence, upstream of the diversion dam, in the bypassed reach upstream of the confluence of Silver Creek, and downstream of the powerhouse. The highest value occurred in waters that are not influenced by project operations (above the confluence of the Echo Lake conduit), which suggests that these elevated turbidity values are not related to project operations.

Fecal Coliform Bacteria

Elevated fecal coliform counts can be an indication of human waste entering surface waters; however, it may also be caused from wildlife. Nearly all fecal coliform counts were less than 2 MPN/100 mL. Only one count exceeded the applicable state standard—a count of 220 MPN/100 mL from the SFAR upstream of the confluence of the Echo Lake conduit. It is, therefore, not a result of project operations.

3.3.1.2 Environmental Effects and Recommendations

Lake Operations

Operation of the four El Dorado Project lakes is closely linked to the quantity and quality of recreation experienced at the lakes, downstream consumptive water demands, and instream flows below the lakes. In October 1996, the SWRCB adopted Decision 1635, which authorized diversion of water to storage in Caples Lake, Silver Lake, and Lake Aloha and redirection of stored water into Folsom reservoir while maintaining high lake levels for recreation uses and providing protection of water quality in the Sacramento-San Joaquin

Delta and San Francisco Bay. Decision 1635 was modified in August 2001 under Order WR 2001-22 (SWRCB, 2001) to incorporate a modification of EID's 1999 Lake Level Operational Commitment. This new order includes the following requirements specifically related to lake levels:

- make up to 200 acre-feet per annum (afa) of storage available in Caples and Silver lakes for existing and future uses in the immediate vicinity of the lakes in the counties of origin, without cost to applicants in the counties of origin;
- limit the quantity of water to be diverted to storage at Caples Lake, Silver Lake, and Lake Aloha to 21,581 afa, 6,000 afa, and 5,350 afa, respectively (a total of 32,931 afa) to be collected during the months of November to July;
- redivert stored water and directly divert a total of 17,000 afa at Folsom reservoir, located downstream of the lakes;
- directly divert up to 15,000 afa from the SFAR upstream of a point near Kyburz;
- limit water levels and discretionary water releases from Lake Aloha, Caples Lake, and Silver Lake; and
- monitor and report lake storage and flows. Reporting requirements include annual operating plans to be made available on EID's website, and both annual and 5-year reports to evaluate compliance with the order.

The water surface levels and storage of the four lakes used by the El Dorado Project are controlled by natural inflow, instream flow releases, spills over the dams, and leakage (particularly at Silver Lake). In the following section, we discuss the effects of operating the project as proposed and recommended on water surface elevations of the four lakes.

EID proposes to implement the provisions for target lake levels and minimum pool described in the Settlement. Under the Settlement, EID would operate the project so that, for each water-year type, lake levels would remain at or above the range of lake levels defined in Decision 1635, except for circumstances beyond its control, or if meeting proposed minimum flow requirements (discussed in section 3.3.2.2, *Environmental Effects and Recommendations*, in *Aquatic Resources*), EID would cause water levels to decrease below specified minimum target elevations. Water-year types are determined based on forecasts of pre-project inflow to Folsom reservoir for the period of April through July, as set forth by the CDWR in Bulletin 120. The water-year types are defined as:

- WET (Wet) = >125 % of average

- AN (Above Normal) = $<125\%$ but $\geq 100\%$ of average
- BN (Below Normal) = $<100\%$ but $\geq 75\%$ of average
- DRY (Dry) = $<75\%$ but $\geq 50\%$ of average
- CD (Critically Dry) = $<50\%$ of average

A separate forecasting method and associated operating plan would be developed within 1 year of license issuance. This alternative method would be used to re-assess the water-year type and adjust minimum flows from the Caples Lake and Kyburz diversion dams during January and February to address lake level issues at Caples Lake. Once this alternative forecasting method is approved by the Commission, EID proposes to operate the Caples Lake and Kyburz dams, beginning on the fifth day of January and February, based on the approved forecasting method and operating plan.

EID proposes to operate Echo Lake such that the channel between the upper and lower lake is navigable by motorized water craft between July 1 and Labor Day, while complying with minimum flow and other conditions. If EID anticipates that the lake would not meet this target level for reasons other than non-discretionary releases, the FS, ERC, SWRCB, and the Commission would be notified within 10 days of this determination and provided with an explanation of why the target level would not be attained.

EID proposes to operate Caples Lake to achieve the target water levels that correspond to the storage values specified in table 3-11. If EID cannot achieve the target level during any month from June through September, EID would not make, or would stop making as soon as such a determination is made, discretionary releases from the lake in that month. If EID anticipates that the lake would not meet these target levels, EID would notify the FS, ERC, and SWRCB within 5 days of this determination and would explain the changes in operation or factors beyond its control that has rendered it unable to meet the target levels. Members of the ERC or the FS may request a meeting of the ERC to review the circumstances of non-attainment. The Commission would be notified within 30 days of the non-attainment determination. EID proposes to operate Caples Lake in the fall and winter in a manner that would ensure, to the extent possible, that target levels would be met during the following summer. Specific operational measures proposed by EID include: maintaining adequate storage in early winter and maintaining a minimum target pool storage of 10,000 acre-feet (unless drawing the lake to a lower level would reduce the chance of spillage at the auxiliary dam, in which case, EID would notify the FS, ERC, and SWRCB and would provide an explanation within 5 days of this determination).

Table 3-11. Caples Lake end-of-month target storage requirements in acre-feet, by water

year. (Source: Settlement, 2003)

Month	CD	DRY	BN	AN	WET
June	18,704	18,704	22,338	22,338	22,338
July	18,413	18,646	22,089	22,338	22,338
August	14,376	14,376	18,006	18,006	18,006
Sept	14,376	14,376	18,006	18,006	18,006

Silver Lake water levels would remain as high as possible in the summer months before Labor Day. EID would not release water from Silver Lake for consumptive use, power production, rediversion, or other purposes prior to Labor Day, excluding non-discretionary releases required by the Commission or the State Division of Safety of Dams. EID would not make discretionary releases between Labor Day and September 15, unless an energy emergency alert is issued. In such cases, the lake would not be drawn down lower than a stage of 12 feet, as measured at the gage at the outlet works on September 15. After September 15, EID could make discretionary releases, unless the El Dorado Canal was inoperable. In either case, the lake would not be drawn down lower than a stage of 12 feet by September 30. Provisions are also made for scheduled canal and powerhouse maintenance to begin no later than October 3 of each year. During outages associated with such maintenance, releases from Silver Lake would meet minimum flow requirements in the Silver Fork and downstream of the Kyburz diversion dam (where they are not being met from other sources). When the canal is operable, but the powerhouse is not (between September 15 and September 30), EID would make discretionary releases for consumptive use at the forebay and minimum flows from the Kyburz diversion dam in accordance with the following priorities: (1) accretion between the storage reservoirs and the diversion dam; (2) required minimum flows from Caples Lake dam, Lake Aloha dam, Silver Lake dam and leakage from Silver Lake; (3) maximum available releases from Echo Lake; and (4) releases from Silver Lake, provided that the lake elevation does not drop below 12 feet by September 30. Releases from Silver Lake may be increased after October 15 if necessary to reach the 12-foot stage by October 25. However, the lake stage would not be less than 7.4 feet on November 1 of any year.

EID proposes to operate Lake Aloha to comply with the SWRCB's Decision 1635, as modified. Decision 1635 includes restrictions on allowable levels for Lake Aloha that do not allow rediverting water for consumptive use, excluding nondiscretionary releases required by the project's license or the State Division of Safety of Dams, unless the following requirements are met: (1) end-of-month lake levels must remain above historical minimum levels; and (2) average end-of-month lake levels, as reviewed every 5 years, must remain at or above historic average levels. Minimum and average end-of-month

levels for water-year types are presented for Lake Aloha in table 3-12. Pursuant to the Settlement Agreement, if EID anticipates that it would not be able to meet these target levels, EID would notify the FS, ERC, SWRCB, and the Commission in writing within 10 days of this determination and explain why the target levels could not be achieved.

Table 3-12. Lake Aloha end-of-month requirements. (Source: SWRCB Decision 1635, modified)

Lake Level (feet) Operational Requirements by Water-year Type					
Month	CD	DRY	BN	AN	WET
Average					
June	18.3	19.6	19.5	19.5	18.1
July	11.0	15.2	17.1	18.8	19.2
August	6.6	7.6	9.9	12.2	14.2
Sept	6.0	5.7	6.8	7.6	8.1
Minimum					
June	16.2	18.1	18.2	17.2	14.3
July	5.0	10.1	15.3	16.6	14.6
August	5.0	5.0	5.2	7.3	8.4
Sept	5.0	5.0	5.0	5.0	5.0

Note: Stage of 20.0 feet is equivalent to elevation 8,114.3 feet NGVD, full pool.

Kit Carson Lodge recommends that EID maintain Silver Lake at a high level through the end of September and subsequently reduce the lake's level during the month of October. It recommends that Silver Lake not be drawn down to a level lower than the natural lake level prior to construction of the project. It also recommends that EID hold annual spring meetings with local representatives to schedule repairs in a manner that would have the least effect on project-influenced lakes and their users.

The League to Save Sierra Lakes requests that EID maintain high lake levels for all four project lakes to maximize recreational potential through October.

Our Analysis

We base the following analysis on output from EID's daily time step operations model, which simulates conditions for the 25-year period of 1972–1996 (Hydrologics, 2002b). This evaluation simulated conditions that would occur under three operating scenarios: (1) EID's proposal at that time (as described in the license application); (2) preliminary 4(e) conditions filed by the FS in its letter to the Commission dated October

29, 2002; and (3) the October 29, 2002, preliminary Section 4(e) conditions along with Alpine County's then-recommended storage targets for Caples Lake (letter from C.H. Gansberg Jr., Chair, Alpine County Board of Supervisors, Markleeville, CA, to the Commission, dated October 15, 2002). Since the EID originally proposed continuation of ongoing operations, modeled results for its proposal also represent the no-action alternative. In the following analysis of operational effects on lake levels, we use model results for the initial preliminary Section 4(e) conditions along with Alpine County's pre-Settlement storage targets, to represent conditions expected under the Settlement. The conditions of the modeled scenario and the Settlement are very similar. The primary difference is that Alpine County's earlier recommendation included a minimum end-of-February Caples Lake target storage level of 10,048 acre-feet, whereas the Settlement sets a minimum target level of 10,000 acre-feet without linking it to any specific period. As expected, the model predicted that operating the project to meet the FS's preliminary Section 4(e) flow conditions and Alpine County's target lake levels would increase lake levels as compared with the no-action alternative. Our recommendations pertaining to lake-level management are primarily based on recreation-related issues and discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.5, *Recreational Resources*. The following discussion addresses our analysis of the influence of lake-level management on water resources.

Echo Lake

We base our evaluation of operational effects on Echo Lake levels on EID's time series analysis of lake levels for the 1975 through 1979 period. This analysis indicates that Echo Lake's water surface would vary from full pool to a level 6 feet below full pool. Generally, the lowest levels would occur during fall to early spring. End-of-June lake levels would be at nearly full pool if the project is operated as proposed by EID in accordance with the Settlement.

Operating the project under the conditions of the Settlement would result in virtually no change in the water quality of Echo Lake compared with existing conditions. The granitic nature of the lake's shoreline would continue to prevent erosion from occurring under the proposed operating regime. Thermal stratification would also be similar to existing conditions in both upper and lower Echo Lake with summer surface temperatures being in the low 60s (degrees F) and bottom temperatures in the low 40s (degrees F).

Caples Lake

Model results indicate that Caples Lake levels would generally be higher and experience less seasonal variability under the Settlement than under current conditions. Based on modeling results for 1975 through 1979, minimum Caples Lake levels following

drought conditions, such as occurred in 1977, would reach as low as 35 feet below full pool under existing conditions. In contrast, operating the project under the Settlement would result in minimum lake levels following a drought similar to 1977's that would reach about 25 feet below full pool. The lake's end-of-June level would be lower than full pool in about 40 to 45 percent of years if the project were operated under either the Settlement or under existing conditions. End-of-June Caples Lake levels would be 10 feet below full pool or lower in about 15 percent of years under the Settlement, in comparison with about 25 percent of years under existing conditions.

Operating the project to meet the specified minimum flows without implementing the "natural flow" clause, as the Settlement specifies for Caples Creek at the dam during critically dry years, would result in drawing the lake down at a faster rate during periods when inflows are less than the designated minimum flows. This would result in somewhat lower lake levels during late summer and fall of critically dry years, although these differences are expected to be relatively small.

Operating the project as proposed in the Settlement would have little effect on the water quality of Caples Lake. Reducing the extent of drawdown may slightly reduce any shoreline erosion, particularly during the drawdown and refill periods; however, we expect these changes to be minimal when compared to existing conditions and considering that most of the shoreline is armored by rock and not susceptible to erosion. The lake's water level would be higher during much of the summer of drought years, which should slightly increase the volume of cooler, hypolimnetic water beneath the thermocline. Lake levels during other periods would be relatively similar to existing conditions and are not expected to result in substantial changes to the thermal regime of the lake.

Silver Lake

Operating the project under the Settlement would increase variability of Silver Lake water surface levels. Based on model predictions for 1975 through 1979, minimum annual pool elevations would generally be approximately 4 feet lower under the Settlement than under existing conditions (approximately 23 feet below full pool under the Settlement versus approximately 19 feet below full pool under existing conditions). The model predicts that maximum lake levels for drought years would be about 3 to 4 feet lower under the Settlement than under existing conditions; a maximum lake level of approximately 7 feet below full pool was predicted for the summer of 1977. Model results indicate that end-of-June Silver Lake levels would be lower than full pool in about 35 to 40 percent of the years for both operational scenarios. However, end-of-June lake levels would only be 2 feet below full pool or lower in about 15 to 20 percent of the years, regardless of which of the alternative operational scenarios were implemented. In 10 percent of the years, end-of-June Silver Lake levels would be approximately 4 feet below full pool or lower under the Settlement as compared with 1.5 feet below full pool under existing conditions.

Operating the project under the conditions of the Settlement could slightly increase the potential for erosion, because the full pool water level would not be attained as frequently during the summer, thus exposing the shoreline at lower elevations to wave action. We consider this potential to be only minimal, since much of the shoreline of Silver Lake is granitic rock. Mud flats are present along the shore of the south end of the lake; but during both our September 2000 and August 2002 site visits to this area, we noted that these mud flats were heavily vegetated at and above the waters edge. Such vegetation should serve to reduce the potential for erosion due to wave action. If the prevailing water surface elevation is slightly lower during the summer, this could serve to reduce the volume of cooler, hypolimnetic water in the deeper portions of the lake, although we expect any such differences to be barely discernable.

Lake Aloha

Results of the model (Hydrologics, 2002b) indicate that Lake Aloha would be somewhat lower under the Settlement operations than compared with existing conditions, primarily due to changes in the minimum flow requirements below Lake Aloha and below the diversion dam near Kyburz. There would be a decrease in the frequency that Lake Aloha would reach full pool by the end-of-June by approximately 18 percent. Operating the project under the Settlement would result in end-of-June Lake Aloha levels of about 2.5 feet below full pool or lower about 41 percent of the time, in comparison with 26 percent of the time under existing conditions.

We recommend the target and minimum allowable lake levels, which are set for Lake Aloha in Decision 1635. The minimum Lake Aloha pool level allowed under Decision 1635 (and the Settlement) during July, August, and September during a critically dry year is 5 feet on the staff gage used to monitor water levels (see table 3-12).

Operating the project under the conditions of the Settlement would result in virtually identical effects on water quality as operating under existing conditions. Little shoreline erosion would occur around the lake due to the granitic nature of the area. The lake would continue to experience minor thermal stratification during the summer, resulting in a difference of about 5 to 10 degrees F between water at the surface of the lake and the bottom of the lake.

Channel Maintenance, Erosion, and Sediment Transport

Caples Lake Auxiliary Dam Spill Channel

Operation of Caples Lake dam affects flows in both Caples Creek and the auxiliary spillway channel downstream of the lake. Occasionally, when inflow to Caples Lake exceeds the capacity of the Caples Lake outlet, flow is released from a spillway at the

auxiliary dam. These flow releases have resulted in bank erosion, incision, and local aggradation (Entrix, 2002). This channel was substantially influenced by high flows in January 1997 (Entrix, 2002). Reducing the frequency and magnitude of the spill events could reduce erosion in the spill channel; reduce associated sedimentation in Caples Creek; and, consequently, improve aquatic habitat conditions in upper Caples Creek.

EID proposes to limit releases into the existing Caples Lake spillway channel to no more than 60 cfs, except in the event of law enforcement or search and rescue activities, Division of Safety and Dams compliance requirements, equipment malfunction or failure directly related to providing the specified ramping rates (discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*), or a large storm event, pursuant to Section 4 of the Settlement. If the flow to the spillway channel is modified, EID would notify the FS, ERC, and SWRCB as soon as possible, but no later than 10 days, after such incident. EID could modify spillway channel flows temporarily for short periods in non-emergency situations upon approval of the FS.

The rationale for selecting a maximum flow of 60 cfs for the auxiliary dam spillway channel is described in the FS rationale report, submitted to the Commission by letter dated October 29, 2002. Based on its review of the existing fluvial geomorphology data collected at this channel, the hydrological data for this channel, and literature pertaining to measures that can be implemented to stabilize channel degradation from high flows, and the resultant incision on the stream channel bed elevation, the FS concluded that maintaining a flow of less than 7/10 bankfull, which the FS estimates to be 60 cfs in this channel, would achieve this objective.

EID agrees in the Settlement to conduct a detailed investigation of fluvial geomorphic properties of the Caples Lake spillway channel, as well as in Caples Creek from the confluence of the spillway channel downstream to the Jake Schneider Meadow during the first 2 years after license issuance. In addition, the spillway channel and Caples Creek would be included in a continuing EID evaluation of representative channel areas (to be conducted at 5-year intervals). This evaluation would entail monitoring at permanent cross-section transects, longitudinal profiles, and channel properties at the representative areas. Finally, within 2 years of license issuance, EID would develop a stabilization plan for the spillway channel in consultation with the FS, SWRCB, and ERC and, upon approval, implement the plan. In addition, the Settlement provides for the FS to adjust the maximum allowable flow into the Caples spillway channel.

Our Analysis

Although we agree that channel degradation and erosion are problems at the Caples Lake auxiliary dam spill channel and that this issue needs to be addressed, we did not conclude in the draft EIS that limiting the flow to a maximum of 60 cfs would be the best

solution. When inflow to Caples Lake exceeds the capacity of the outlet valve (which is 350 cfs), EID currently has limited control over the flows that are released to the auxiliary spill channel. When inflow to Caples Lake is less than 350 cfs and the outlet valve is set to release less than 350 cfs, EID could prevent spill to the auxiliary dam spill channel by adjusting the gate setting to release additional flows up to its maximum capacity. However, in situations of increasing inflow during which gate adjustments could be made to prevent spillage, an operator would have to be onsite for an extended amount of time because this gate is manually operated. If the crest of the auxiliary dam is raised, EID could store additional water and thus control the outflow to the spill channel for an additional limited amount of time. However, such a modification to the auxiliary dam would subject shoreline structures, in particular those associated with Caples Resort, to periodic flooding. Consequently, we did not recommend this measure.

In an ideal world, to prevent additional erosion in the lower portions of this channel, everything possible should be done to ensure that there is little, if any, flow to the auxiliary dam spillway channel when EID has control of the flows entering Caples Lake. However, in order to make adjustments to the outlet valve, if it is not already set for maximum discharge, EID would need to send an operator from its nearest maintenance center. Under certain high-discharge scenarios (such as a cloudburst coupled with warm temperatures that could add snowmelt to the rainwater inflow to the lake), the operator may not be able to get to Caples Lake to adjust the valve before some spillage occurs at the auxiliary dam. We estimate that at a depth of only about 1 inch of water over the crest of the auxiliary dam, 60 cfs would be spilled into the spillway channel. By providing a maximum release of 60 cfs, we recognize that under certain circumstances, an operator may not be able to get to the dam in time to prevent all spillage from occurring (assuming that such spillage is within the control of EID).

The FS has determined that restricting flows to less than 60 cfs should minimize future channel degradation, although based on our observations, we conclude that the less flow that is provided to the channel the more likely that erosion could be stabilized without substantial human intervention. We also point out that EID proposes to develop and implement a channel stabilization plan for the auxiliary spillway channel, which would be expected to better allow this channel to accommodate flows when EID has control of inflow as well as when inflows exceed 350 cfs.

With the specific exceptions to this 60-cfs spill channel limitation provided in the Settlement and the notification procedures if the 60-cfs limitation is exceeded, we now agree that the 60-cfs flow limitation is reasonable and recommend that it be included in any license that would be issued for this project. We also recommend that in addition to the parties that would be notified as in the Settlement, that the Commission also be notified when the flow restriction in the spillway channel is exceeded.

In the draft EIS, rather than limit flow releases to 60 cfs, we recommended that EID consult with the FS and CDFG and develop a spill channel monitoring plan. The primary purpose of the monitoring plan would be to determine whether or not the existing eroded portions of the channel are reaching equilibrium and stabilizing as a result of natural processes. The plan would be completed and filed with the Commission within 180 days of license issuance and include any FS and CDFG comments received on the plan. If the spill channel did not stabilize substantially within 5 years of license issuance, EID would develop a channel restoration plan, in consultation with the FS and CDFG, and implement the plan to meet ecological resource objectives.

The detailed investigation of fluvial geomorphic properties of the Caples Lake spillway channel that EID now proposes to conduct would most likely be similar to the spill channel monitoring plan that we originally recommended. However, it would be conducted during a more limited period (2 years versus our envisioned 5 years). There is also no indication in the Settlement that a study plan would be developed by EID prior to implementing this detailed investigation. Without a common understanding of how this study would be conducted, the objectives of EID, the FS, the SWRCB, and the ERC may not be achieved. We consider it likely that a well-designed study plan, along with the results of EID's geomorphology study conducted from 1998 through 2002, could provide a basis for developing an appropriate stabilization plan for the spillway channel. Therefore, we recommend that EID first develop a study plan for the detailed investigation of fluvial geomorphic properties, in consultation with the FS, SWRCB, and ERC, and file it with the Commission for approval.

EID's proposal to develop a spillway channel stabilization plan within 2 years of license issuance would enable the currently eroding portions of the channel to be remediated, if necessary. However, since the detailed fluvial geomorphic study that EID also proposes to implement would not be completed until 2 years from license issuance, the stabilization plan would not be able to take full advantage of EID's study. We recommend that the spillway channel stabilization plan be developed within 180 days of the completion of the detailed fluvial geomorphic study, rather than within 2 years of license issuance. Details of what would be included in the channel stabilization plan are not provided in the Settlement. We recommend that, at a minimum, the stabilization plan include a proposed implementation schedule, the alternatives that were considered for stabilization along with associated estimated costs, and the recommended stabilization alternative. We agree with EID that this plan should be developed in consultation with the FS, SWRCB, and ERC (including CDFG), prior to submittal to the Commission for approval.

South Fork of the American River

EID proposes to continue to monitor the channel of the SFAR downstream of the

Kyburz diversion dam at 5-year intervals to provide an index of changes in channel condition relative to proposed changes in the streamflow regime. EID's proposed monitoring plan would entail establishment and monitoring of permanent cross sections, longitudinal profiles, and channel properties in representative channel areas. Substrate composition would be characterized at each of the established transects.

EID proposes to develop a plan to designate preferred canal drainage structures and release points to be used for maintenance and in emergencies to minimize adverse effects on water quality. The plan would be developed in consultation with the FS, SWRCB, and ERC, and submitted to the Commission for approval within 1 year of license issuance.

Our Analysis

The SFAR diversion dam near Kyburz was damaged by the floods in late December 1996 and January 1997. The restored diversion dam, completed in the fall of 2001, was designed to pass the river bedload through a 36-inch diameter bypass pipe with flows up to the 100-year flood event, thereby preventing deposition upstream of the dam (letter from Ane Deister, General Manager, EID, Placerville, CA, to the Commission, dated December 5, 2002). The Commission approved EID's sediment management plan for the diversion dam by letter dated December 17, 2002.

EID agreed to survey the river channel in the vicinity of the diversion dam prior to reconstruction of the dam and in the 3 years following construction. It has surveyed and reported the results of bed levels monitored before construction in 2000 and after construction in 2000, 2001, and 2002 (letter from Scott Shewbridge, Head-EID Hydroelectric and Watershed Management Division, EID, Placerville, CA, to John Berry, Forest Supervisor, El Dorado National Forest, Placerville, CA, dated December 4, 2002). Results of monitoring do not indicate any problems with bed load transport past the restored dam. However, the project has not been operated for hydroelectric generation since well before the diversion dam was rebuilt (although this is scheduled to occur during 2003). Therefore, we recommend that EID conduct additional bed profile monitoring at the diversion dam and at additional downstream locations (if deemed appropriate). This recommendation is supported by the Settlement.

The instability of the slopes downgradient of the El Dorado canal, especially from the diversion dam to Riverton, is well documented. Erosion of areas downslope of the canal is directly related to water releases, either intentional or accidental, and the substrate over which such releases flows. The canal has numerous release points that are intended to allow the canal to be drained for maintenance purposes or that would serve to divert water from the canal in the event of an emergency (failure or blockage of a section of the canal). Use of certain release points would allow water to be drained from the canal in existing channels that are well armored and therefore would not be likely to erode and result in

sedimentation in the SFAR or its tributaries. Use of other release points could result in erosion and possibly contribute to additional slope instability, which could result in degradation of project waters and possibly, under certain circumstances, mass wasting events similar to those that have been documented in the past. We conclude that it would be prudent to develop a plan that would enable identification of preferred canal drainage structures so that when canal dewatering is within the control of EID, environmental effects can be minimized. Therefore, we make a recommendation that EID develop, in consultation with the FS, SWRCB, and ERC, a preferred canal drainage and release point plan. The plan should not only identify preferred release points, but address the optimal timing for scheduling routine canal maintenance that requires dewatering, so that effects on aquatic biota can be minimized.

Oyster Creek

Oyster Creek is a relatively small, 2.5-mile-long tributary to the Silver Fork (see figure 2-1). Although there are no diversion structures on Oyster Creek, streamflows in this stream are directly related to the water surface elevation of Silver Lake (most likely due to infiltration from the lake). In a typical year, flows in Oyster Creek range from a low of about 2 cfs, to a high of 17 cfs when Silver Lake is at its normal maximum level. These flows are somewhat higher than what would occur naturally. Downstream of State Highway 88, the Oyster Creek stream channel is degraded, with some eroding banks and only fair channel stability. This reach of Oyster Creek is also highly incised; at EID's geomorphology study site at this location, the active channel is about 10 to 15 feet below the meadow surface (Entrix, 2002).

EID proposes to survey Oyster Creek and develop a plan that is approved by the FS for the restoration of the stream channel within 2 years of license issuance. EID would be responsible for implementing, within 5 years of license issuance, those portions of the plan that the FS, in cooperation with EID, and the Commission determine to be project-related.

Our Analysis

Oyster Creek upstream of State Highway 88 exhibits very low bank erosion hazard potential and good channel stability, although the channel is larger than what would be expected for the small watershed area (Entrix, 2002). In addition, the channel appears to be transporting gravel and sand efficiently, but does not appear to be actively downcutting or widening in this vicinity, even after the 1997 flood.

Downstream of Highway 88, there is little doubt that Oyster Creek could benefit from channel restoration efforts. Although we agree that leakage from Silver Lake has a substantial effect on base flows in Oyster Creek, we have no basis to conclude that the leakage has substantially increased peak flows in the Oyster Creek channel. If the degraded

channel conditions in Oyster Creek downstream of State Highway 88 were solely the result of project operations, it would be reasonable to expect similar degraded conditions in the channel upstream of State Highway 88. Our review of existing information indicates that this is clearly not the case. According to Entrix (2002), present non-project effects downstream of the highway 88 culvert include runoff and sediment loading, and associated hydraulics from the upstream culvert. The highway drainage system collects all of the runoff generated upslope of the highway and concentrates it into one channel by discharging water from a culvert under State Highway 88. This collection system can increase flows considerably during high runoff events. We conclude that the highway's drainage system is most likely the primary cause of the degraded channel conditions in Oyster Creek. However, we agree that if further investigation reveals that some of the channel degradation downstream of Highway 88 is related to project operations, then EID should be responsible for an appropriate portion of the restoration costs. Therefore, we agree with EID's proposed measures for conducting additional surveys of Oyster Creek, developing a stabilization plan, and implementing project-related restoration measures, as presented in the Settlement, and recommend that any license for this project include this measure. Any restoration efforts that would occur pursuant to this recommendation should first receive Commission approval and would be most efficiently implemented if coordinated with related restoration efforts that can be attributed to other landowners in the area.

Monitoring

Flows and Lake Levels

EID proposes to prepare a project operation and maintenance plan and make the plan available to the FS and SWRCB 2 weeks prior to an annual meeting with the FS, SWRCB, and CDFG to discuss the implementation of measures specified in the Settlement and other issues related to preserving and protecting ecological values affected by the project. This meeting would occur by April 1 of each year (Section 15 of the Settlement, discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*). Monitoring of flows and lake levels would depend on the water-year type, as discussed previously in this section under *Lake Operations*. Several entities recommended the establishment of a system to provide real time project related flow and lake level information to the public via Internet or phone. In addition, several entities request the placement of staff gage at various public accessible locations to help anglers and whitewater boaters estimate current flow conditions. This information would primarily serve recreationists who use project streams and lakes and, therefore, is discussed in section 3.3.5, *Recreational Resources*.

EID proposes to develop a streamflow and reservoir storage gaging plan, in consultation with the USGS, FS, ERC, and SWRCB, that addresses compliance at the

following 13 locations: (1) Echo Creek below Echo Lake dam; (2) Pyramid Creek below Lake Aloha dam; (3) Caples Creek below Caples Lake dam; (4) Silver Fork below Silver Lake dam; (5) Silver Fork below Oyster Creek; (6) SFAR below Kyburz diversion dam; (7) Carpenter Creek below Carpenter Creek diversion dam; (8) No Name Creek below No Name Creek diversion dam; (9) Alder Creek below Alder Creek diversion dam; (10) Mill Creek below Mill Creek diversion dam; (11) Bull Creek below Bull Creek diversion dam; (12) Ogilby Creek below Ogilby Creek diversion dam; and (13) Esmeralda Creek below Esmeralda Creek diversion dam (Section 10 of the Settlement). EID also agrees to investigate whether telemetry equipment could be installed at Lake Aloha to monitor conditions and control operations. If EID, SWRCB, and FS concur that such equipment is economically and technically feasible and could be installed consistent with the law, regulations, and policies applicable to the Desolation Wilderness, EID would seek the necessary approvals for such installation.

EID proposes to prepare a report within 5 years of license issuance, and every 5 years thereafter, describing whether the target lake levels are achieved, and if not, the reasons and time periods that target lake levels were not achieved. EID would provide a copy of the report to the FS, ERC, SWRCB, and the Commission (Section 22 of the Settlement).

Kit Carson Lodge requests that EID strictly account for water releases from Silver Lake on a daily basis and provide this information on the Internet. A representative of the lodge requests that the daily data include how much water is released, for what purposes (i.e., consumptive water rights, non-consumptive water rights, minimum flows), and for what destination it is released.

Our Analysis

The SWRCB's Decision 1635, as modified, addresses monitoring that the state considers necessary to verify compliance with applicable water rights. It requires EID to do the following:

- annually, prepare and make available on EID's website and at EID's offices an annual operating plan consistent with EID's Lake Level Operational Commitment;
- annually, report on lake level impacts on recreational uses of Lake Aloha, Caples Lake, and Silver Lake; and
- once every 5 years, prepare a compliance report that demonstrates compliance with lake level requirements set for Lake Aloha, Caples Lake, and Silver Lake in Decision 1635.

The Commission is responsible for verifying compliance of a licensee with the terms and conditions that are established in any license that may be issued for a project. However, some of the monitoring that is required to document flows and lake levels under Decision 1635 should also serve to verify compliance with the flows and lake levels that are included as conditions of a license that may be issued for this project. We have reviewed EID's proposed stream gaging locations and agree that they represent reasonable sites to verify compliance with the flow regime that is specified in the Settlement. Because we consider flows in the project reaches to be primarily related to aquatic biota and riparian habitat, we discuss instream flows in sections 3.3.2, *Aquatic Resources*, and 3.3.3, *Terrestrial Resources*.

We recommend that EID develop a streamflow and reservoir water surface elevation monitoring plan, in consultation with the FS, ERC, SWRCB, and USGS, to verify compliance with any flow and lake level measure that may be included in a new license for this project. Many existing gages should be able to be used to help verify compliance with project flows and lake levels. Measures to implement this plan should be coordinated with the monitoring requirements specified in Decision 1635 and the plans that we recommend in section 3.3.5, *Recreational Resources*, for providing flow and lake level information to the public. The plan should include: the location of all flow and lake level gages (both new and existing), procedures for ensuring that the gages are calibrated, and proposed reporting procedures. Measures to avoid redundancy with reporting requirements of Decision 1635 should be addressed in the plan.

We address the cost of monitoring lake and flow levels in section 4, *Developmental Analysis*, and make our final recommendation in section 5.2, *Comprehensive Development and Recommended Alternative*.

Water Temperature and Water Quality Monitoring

EID proposes to develop, within 1 year of license issuance, a water temperature monitoring plan, in consultation the FS, ERC, and SWRCB. Continuous temperature recorders would be deployed at existing or selected stream gaging sites or specific stream segments to be identified during development of the plan. Monitoring would occur during the spring to aid in the assessment of breeding conditions for amphibians and during the summer to document whether the coldwater beneficial uses of project waters are achieved. Monitoring would occur annually until such time as the FS, ERC, and SWRCB determine that sufficient data have been collected and no temperature issue exists for the relevant area. Temperature profiles in the four project storage reservoirs may also be added to the monitoring program if the FS, ERC, and SWRCB determine that reservoir temperatures are a controllable factor and a temperature problem is identified.

EID also proposes to monitor selected water quality parameters (total suspended

sediments, turbidity, temperature, DO, pH, alkalinity, hardness, nitrate, copper, total coliform, and fecal coliform) using standard methods. Monitoring during the first, third, and fifth year from license issuance would occur during March, May, June, July, August, September, the first storm of the season, and December, except for fecal coliform, which would be sampled from May through September and would require repetitive sampling during a 30-day period. If subsequent monitoring is needed, as determined by the SWRCB, FS, and ERC, it would occur during March, June, September, and December. Monitoring would occur at the following stations: Echo Creek below Echo Lake dam; Pyramid Creek below Lake Aloha dam; Caples Creek below Caples Lake dam; Silver Fork below Silver Lake dam; SFAR upstream and downstream of Kyburz diversion dam; Carpenter Creek above and below Carpenter Creek diversion dam; No Name Creek above and below No Name Creek diversion dam; Alder Creek above and below Alder Creek diversion dam; Mill Creek above and below Mill Creek diversion dam; Bull Creek above and below Bull Creek diversion dam; Ogilby Creek above and below Ogilby Creek diversion dam; and Esmeralda Creek above and below Esmeralda Creek diversion dam.

Trout Unlimited, in its October 30, 2002, letter to the Commission, requested that specific water temperature limits for each project reach and reservoir be set in the future license conditions. Because Trout Unlimited is a signatory party to the Settlement, which does not include this specific measure, we consider this recommendation to be moot.

Our Analysis

EID used the Stream Network Temperature (SNTMP) model to evaluate the effects of various potential flow releases from the El Dorado diversion dam at Kyburz. SNTMP is a one-dimensional physical process model that was designed by the U.S. Fish and Wildlife Service (FWS) to predict daily mean stream temperatures (Theurer et al., 1984). The model was calibrated with data collected in 1998 and tested with data collected in 1999. Subsequently, the model was used to predict SFAR daily mean temperatures that would occur between the diversion dam and Silver Creek, which is 2.5 miles upstream of the lower end of the bypass reach, with instream flow releases of 25 to 150 cfs. Although the model provides insight into temperatures that would result from varied releases at the SFAR diversion dam, predicted water temperatures could deviate from actual water temperatures under a modified flow regime for the following reasons:

- Modeling results filed to date cannot be used to evaluate the effects of changing operations upstream of the SFAR diversion dam (i.e., lake levels and minimum flow releases).
- The model was not used to predict daily maximum temperatures. Daily maximum temperatures would likely increase more than daily mean temperatures in the bypassed reach.

- The model was not used to predict flow releases of less than 25 cfs, which could occur during Dry and Critically Dry years under the terms of the Settlement and are expected to result in the highest water temperatures.
- The model did not address warming in the reach between the diversion dam and Alder Creek confluence during 1998.
- The model was based on hydrologic and climatic conditions that occurred in 1998 and 1999. Flows were relatively high in 1998 and 1999, which would lead to higher accretion rates than would occur during dryer years. Therefore, the model may have predicted cooler conditions than would occur in dryer periods.

Monitoring water temperatures would enable EID and resource agencies to quantify water temperature responses to changes in project operations (i.e., lake levels and instream flows). It would also allow EID and resource agencies to access seasonal variations that may occur in the reaches monitored and assess potential project changes that could be implemented if resource objectives are not met under the terms of a new license. The water temperature monitoring results could help to explain some of the results of the biological monitoring, discussed in sections 3.3.2, *Aquatic Resources*, and 3.3.3, *Terrestrial Resources*. Therefore, we conclude that EID should consult with the SWRCB, ERC, and FS to develop a water temperature monitoring plan. Monitoring should occur for a long enough period to confirm that the new flow regime is in compliance with applicable standards and to allow correlation with the results of fish, invertebrate, and amphibian monitoring, discussed later. The plan should identify locations to be monitored, instrumentation and methods to be used, data analysis to be performed, reporting procedures, and the duration of the temperature monitoring. Within 1 year of license issuance, the plan should be filed with the Commission along with comments provided by the resource agencies. Following approval of the plan by the Commission, EID should implement the plan.

Setting water temperature limits in specific stream reaches and lakes, as Trout Unlimited recommends, is the responsibility of the California Regional Water Quality Control Board. In general, the basin plans that pertain to project waters establish the framework for water temperature compliance (the applicable standards apply to coldwater fisheries). Conditions that could exceed any set limits may be caused from a variety of non-project-related factors (both natural and human related). We do not consider it appropriate for the Commission to set water temperature limits. However, we do consider it appropriate for the Commission to ensure that project operations are in compliance with applicable water quality standards. Because Trout Unlimited endorsed the terms of the Settlement, we consider this issue resolved.

Unlike water temperature, we do not expect other water quality constituents to be altered substantially by proposed or recommended changes in project operations. Therefore, we do not agree with EID's and the Settlement's proposal to implement a separate Water Quality Monitoring Program. No evidence has been provided that documents that project operations have resulted in degraded water conditions. However, we acknowledge that there is potential that construction and maintenance of recreational facilities and maintenance of the roadway and canal systems conducted by EID could adversely affect water quality if appropriate BMPs are not in place. Therefore, we recommend that EID include site-specific measures to control erosion and monitor sedimentation associated with construction and operation and maintenance (O&M) to confirm that protective measures are operating as planned in its recreation management plan (see section 3.3.5, *Recreational Resources*). We also recommend that EID include site-specific measures to minimize adverse effects of roadway maintenance, including erosion control measures, on project lands and waters in our recommended road management plan (see section 3.3.6, *Land Use and Aesthetic Resources*). A separate plan to monitor water quality parameters other than temperature should not be needed. However, we recognize the conditions of the Settlement represent the product of substantial negotiations between the stakeholders, and we would therefore not object to the implementation of the water quality monitoring plan as provided for in the Settlement.

We discuss the cost of monitoring water temperature and water quality in section 4.0, *Developmental Analysis*, and make our final recommendation in section 5.2, *Comprehensive Development and Recommended Alternative*.

Project Decommissioning

Decommissioning of the hydroelectric project could occur with or without removal of project facilities. If the project were decommissioned and project facilities were left in place, operation of the project would continue to be very similar to existing conditions in all of the project-affected reaches above the Kyburz diversion dam. At the diversion dam, flows of up to 40 cfs would be diverted for consumptive uses. However, diversions would no longer occur for the production of electricity, and, consequently, higher flows would occur in the SFAR between the Kyburz diversion dam and the powerhouse. These increased flows would somewhat reduce water temperatures in the reach. Similar effects would occur in this reach if hydroelectric project facilities were removed.

In contrast, decommissioning of the hydroelectric project with removal of project facilities would result in substantial changes to lake levels and flows in some stream reaches above the Kyburz diversion dam that are currently affected by the project. Deconstruction activities would likely result in short-term increases in turbidity and increased potential of contamination of the surface and ground water by fuels and other hazardous materials needed to accomplish deconstruction. These adverse effects on water

quality could be limited by implementing BMPs. Following removal of the dams that impound the lakes, the lakes would become much smaller, as they were prior to inundation, and would be bordered by uplands that had been previously inundated. Depending on restoration activities and management of these lands, surface flow could contribute substantial turbidity and sediment loads to the lakes, particularly in the first few years following removal of the dams. This risk would be reduced as vegetation becomes established in the previously inundated border areas.

Removal of the dam impounding Echo Lake would revert conditions to pre-impoundment characteristics. The lake would become two separate lakes, and it would no longer be possible to boat between the two lakes. The existing interbasin transfer of an average of 2.0 cfs annually from the Truckee River Basin to the SFAR Basin would no longer occur. Instead, water would exit the lake into Echo Creek, which would increase flows in the Truckee River and decrease flows in the SFAR, from the headwaters on down.

Due to the groundwater linkage between Silver Lake and numerous springs that contribute to Oyster Creek, the lower Silver Lake levels would substantially reduce spring flows to Oyster Creek and consequently flows through Oyster Lake.

3.3.1.3 Cumulative Effects on Water Quality and Water Quantity

Flow alteration is primarily a result of using the project's dams to store water in high mountain lakes and divert water from the SFAR so that it can be used for consumptive purposes, including irrigation and domestic water supply, along with the production of electricity. The project transfers an average annual flow of approximately 2 cfs from Echo Creek headwaters, which naturally flows into the Truckee River Basin, into the headwaters of the SFAR. Dam operations at the four El Dorado Project lakes, which are located in the basin headwaters, are used to shift the seasonal timing of runoff. These operations reduce peak flow events and augment low flows. In some cases, this results in positive effects, such as slightly reducing the magnitude of flood events and providing more water to stream reaches during the recreational season. In other cases, the flow shift alters the natural flows to which the pre-project ecosystem had adapted. EID diverts water out of the SFAR at the diversion dam near Kyburz resulting in reduced flows from this point. EID discharges some of the diverted water back into the SFAR at the powerhouse, although a flow of up to 40 cfs is supplied to users for consumptive purposes and is not returned to the river. Flows in Silver Creek and consequently the SFAR below the Silver Creek confluence are regulated by SMUD, which operates the Ice House and Union Valley reservoirs.

Perhaps the most substantial potential cumulative effect of continued project operations would be on EID's consumptive water-use customers. EID obtained water for its customers previously from Pacific Gas and Electric Company (PG&E), the former

owner of the El Dorado Project, under a contract that was established in the early part of the last century. This very favorable cost of water allowed agricultural operations served by EID to expand in a cost-effective manner and remain competitive with comparable markets. EID intends to offset the cost of water to its customers with revenue from the sale of electricity from the El Dorado Project. This should allow the existing commercial customers to remain competitive, depending on the amount of energy revenue EID is able to generate. Without this revenue, EID would need to increase the cost of water sold to its customers, which could have a substantial effect on agricultural operations and EID's other consumptive water users. Farmers with a narrow profit margin may be forced out of business, unless an alternative low-cost source of water could be found (which we consider unlikely). The immediate area that could be influenced by substantial increases in the cost of water is shown in figure 2-2. However, if commercial operations are forced out of business, the economic effect would extend beyond the area serviced by EID.

Technically, continued project operation could serve as a potential buffer against severe drought, because water could be transferred from the project forebay, through the Hazel Tunnel, to Jenkinson Lake. The Hazel Tunnel was constructed in the 1980's as a drought protection measure. However, the tunnel was used only once before being badly damaged in 1997 and is currently inoperable. If this tunnel is repaired in the future, water diverted into the El Dorado Canal could serve to provide a measure of emergency drought protection to EID's customers. Based on the fact that when the tunnel was operational, it was only used once, we conclude that use of this tunnel in the future, if restored, would be infrequent.

Altering the timing and amount of water in stream reaches along with slowing the water and increasing stream widths above diversion dams may adversely affect water quality. Cumulative changes that may occur because of these actions include increasing temperatures, reducing DO, increasing bank erosion, and altering sediment transport. Land-use practices related to forest and livestock management, management of the Kirkwood Mountain Resort, and roadway and trail management may also reduce stream bank stability and consequently contribute to increased bank erosion and turbidity.

Continued operation of the El Dorado Hydroelectric Project, in combination with other water resource projects in the basin, and the continuation of current land-use practices would likely result in no substantial changes in water quality in the SFAR Basin from existing conditions.

3.3.1.4 Unavoidable Adverse Effects: None.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

The fish species present in rivers and streams located within the project area include rainbow trout, brook trout, brown trout, cutthroat trout, hardhead, Sacramento pikeminnow, Sacramento sucker, California roach, speckled dace, and sculpin (table 3-13). Kokanee salmon, lake trout, Tui chub, and Lahontan redbase have also been captured in the project area reservoirs. All are native to the SFAR, except brook trout, brown trout, cutthroat trout, kokanee, lake trout, Tui chub, and Lahontan redbase.

Table 3-13. Common and scientific names of fish species occurring in project waters.
(Source: EID, 2000a)

Common Name	Scientific Name
Hardhead	<i>Mylopharodon conocephalus</i>
Sacramento pikeminnow	<i>Ptychocheilus grandis</i>
Speckled dace	<i>Rhinichthys osculus</i>
California roach	<i>Hesperoleucus symmetricus</i>
Sacramento sucker	<i>Catostomus occidentalis</i>
Rainbow trout	<i>Oncorhynchus mykiss</i>
Brook trout ^a	<i>Salvelinus fontinalis</i>
Brown trout ^a	<i>Salmo trutta</i>
Cutthroat trout ^a	<i>Oncorhynchus clarki</i>
Kokanee salmon ^a	<i>Oncorhynchus nerka</i>
Lake trout (locally called Makinaw) ^a	<i>Salvelinus namaycush</i>
Tui chub ^a	<i>Gila bicolor</i>
Lahontan redbase ^a	<i>Richardsonius egregius</i>
Sculpin	<i>Cottus</i> sp.

^a Non-native species.

Rainbow trout, brown trout, and brook trout are FS management indicator species for the Eldorado National Forest and are important game species of the SFAR Basin. Hardhead is a FS sensitive fish species known to occur in the SFAR downstream of the Silver Creek confluence. Upstream movement of this species beyond this location is precluded by a low waterfall. No state-listed fish species are known to be present in project waters. However, hardhead is listed as a California species of special concern.

Water bodies in the El Dorado Project area also support an abundance of macroinvertebrate fauna. Some of the more abundant and larger macroinvertebrates found in the project area include chironomids (gnats), mayflies (Ephemeroptera), stoneflies

(Plecoptera), and caddisflies (Trichoptera). Aquatic macroinvertebrates are a major food source for trout and many other fish in streams, and their diversity and abundance is an important indicator of water quality and aquatic ecosystem health. The values associated with macroinvertebrate population metrics, such as taxonomic richness; ephemeroptera, plecoptera, and trichoptera (EPT); and Sensitive EPT indices; and the Shannon-Weiner Diversity index tend to decrease in response to impairment (i.e., habitat disturbance).

Stream and River Reaches

The stream and river reaches in the SFAR Basin that the project affects include the SFAR, the Silver Fork, Caples Creek, Oyster Creek, Pyramid Creek, Carpenter Creek, No Name Creek, Alder Creek, Mill Creek, Bull Creek, Ogilby Creek, and Esmeralda Creek (figure 3-3). The project also affects Echo Creek, a tributary to the upper Truckee River in the Lake Tahoe Basin. Descriptions of the physical features, instream habitat, and aquatic biota in each of these streams were developed by EID during relicensing studies conducted from 1998 through 2001.

South Fork of the American River

The project-affected portion of the SFAR originates a few miles upstream from the town of Phillips where the Echo Lake conduit typically discharges water into the SFAR stream channel beginning after Labor Day. The existing maximum ramping rates downstream of Echo Lake, which primarily pertain to releases through the conduit, are shown in table 3-14. From the Echo Lake conduit, the SFAR flows approximately 16 miles to the diversion dam. Downstream of the diversion dam, the bypassed reach of the SFAR extends about 22 miles to the El Dorado powerhouse (figure 3-3).

Table 3-14. Existing maximum ramping rates of EID-controlled flows below Echo Lake and Lake Aloha. (Source: letter from T. D. Cumpston, General Counsel for EID, to the Commission, dated May 16, 2003)

Change in Water Level of Stream (feet/hour)	Flow Range (cfs)
0.5	1 to 75
1.0	75 to 175
1.5	Above 175

The stream channel in the bypassed reach is confined, with gradients ranging from 1.6 to 2.2 percent. Instream habitat largely consists of bedrock and large boulder-dominated pools, cascades, and deep fast runs. Riffle habitat is lacking. Wildfire, high rainfall, and road building have contributed to localized areas of mass wasting along the

bypassed reach, occasionally adversely affecting water quality due to sedimentation. Upstream from the diversion dam, reach gradients increase, ranging from 2.9 to 15.5 percent. Boulder and cobble dominated pools, cascades, and pocket water are the prevailing habitat types. Again, low gradient riffle habitat is relatively rare. Flows in the SFAR, like all project area streams, are highly variable. The highest flows in the SFAR typically occur during snowmelt in April through June. Low flows occur during the fall and winter (see section 3.3.1, *Water Resources*). In 1998 and 1999, summer water temperatures in the SFAR both above and below the diversion dam frequently exceeded the preferred temperature range for rainbow trout, cutthroat trout, brook trout, and brown trout (table 3-15), particularly in the lower portion of the bypassed reach. The upper lethal limit for rainbow trout and cutthroat trout was also exceeded at several sites below the diversion dam.

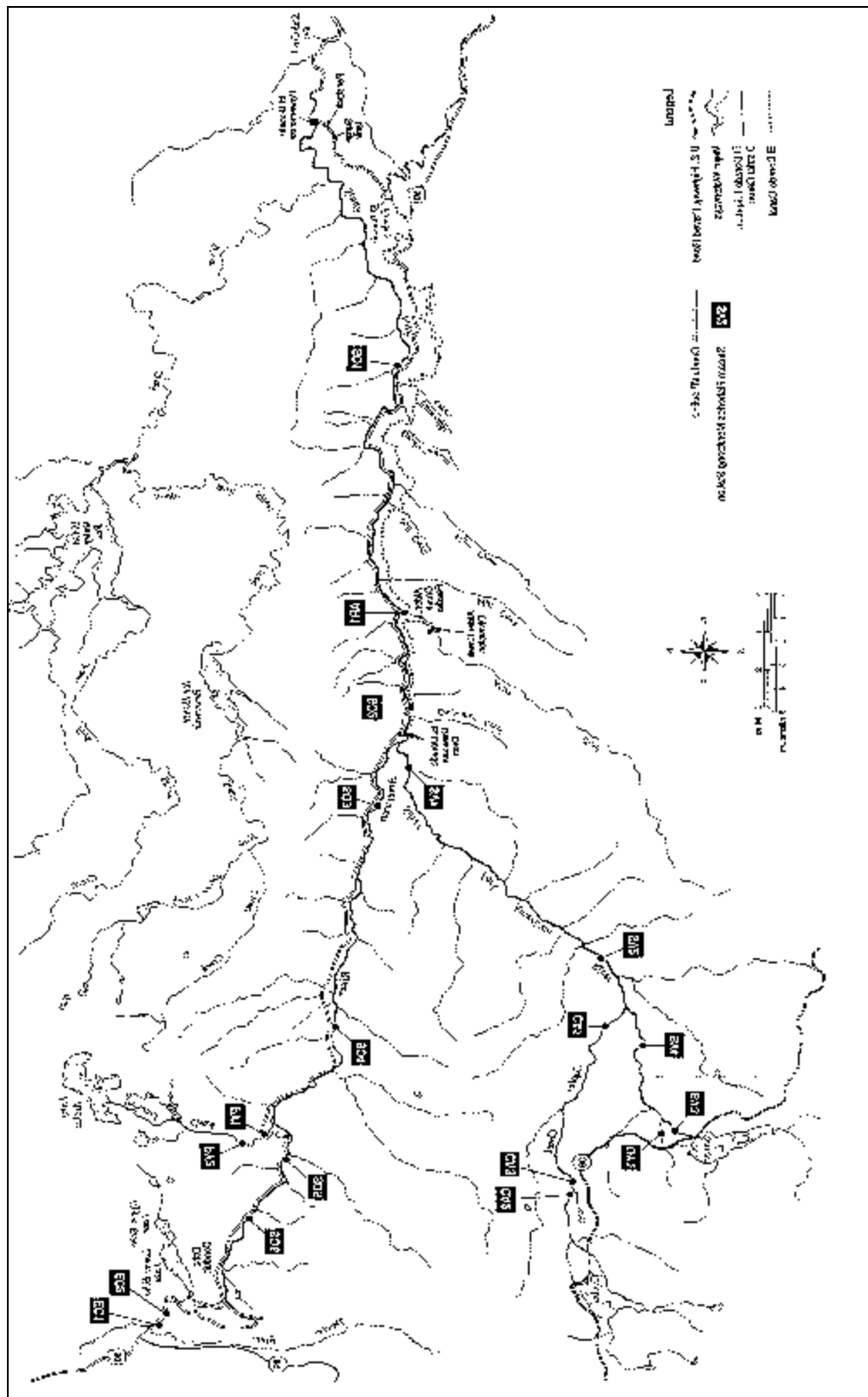


Figure 3-3. Stream fisheries and macroinvertebrate sampling stations. (Source: EID, 2000a)

Table 3-15. Preferred and upper lethal temperatures for rainbow trout, cutthroat trout, brook trout, and brown trout. (Source: Bjornn and Reiser, 1991; Reiser and Bjornn, 1979)

Species	Preferred Temperature Range (^NF)	Upper Lethal Temperature (^NF)
Rainbow trout	45.1 to 58.3	75.4
Cutthroat trout	49.1 to 55.2	73.4
Brook trout	57.2 to 60.8	78.4
Brown trout	39.0 to 70.3	80.1

Current required minimum flow releases to the bypassed reach from the diversion dam range from 10 to 50 cfs depending on season and projected annual runoff (table 3-16). The lower 2.5 miles of the bypassed reach also receive substantial inflow from Silver Creek. When SMUD's Camino dam is storing water, Silver Creek inflows to the SFAR bypass reach range from 5 to 20 cfs depending on season (minimum instream flow requirements) (SMUD, 2001). However, during periods of spill, flows in Silver Creek have ranged from 277 to 32,900 cfs (see table 3-6). Prior to 1984, there were no minimum flow release requirements at the El Dorado diversion dam.

Table 3-16. Existing minimum flow requirements to the bypassed reach from the diversion dam. (Source: EID, 2000a)

Period	Normal Year^a	Dry Year^a
November through August	50 cfs	18 cfs
September	38 cfs	10 cfs
October	43 cfs	15 cfs

^a A normal year is defined as any year when the SFAR annual runoff at the inflow to Folsom Reservoir, as forecasted on April 1 and corrected on May 1 by the CDWR, is greater than 50 percent of the 50 year average. All other years are defined as dry.

Before the diversion dam was damaged by floods in late 1996 and early 1997, it was equipped with an antiquated fish ladder that did not meet current design criteria. The reconstructed diversion dam includes a newly designed fish ladder and fish screen, designed, in consultation with the CDFG, to protect fishery resources.

Fish species present in the SFAR include rainbow trout, brown trout, brook trout,

Sacramento sucker, and California roach. In 1998, 1999, and 2000, the rainbow trout was the dominant fish species collected in the bypassed reach (stations SO1 and SO2) and in the sampling station located just upstream from the confluence with the Silver Fork (SO3) (figure 3-3). Average trout density at these three stations ranged from 3,191 to 11,179 fish per mile (table 3-17). Sacramento sucker were common at station SO1 and relatively rare at stations SO2 and SO3. California roach were only captured at station SO1. Upstream from the Pyramid Creek confluence (stations SO5 and SO6), the SFAR contained primarily brown trout (figure 3-3, table 3-17).

Table 3-17. Number of trout per mile and percent species composition in the SFAR in 1998, 1999, and 2000. (Source: Staff; EID, 2002b)

Sampling Location	Trout per Mile ^a	Species Composition, All Sampling Years Combined (%)		
		Rainbow	Brown	Brook
Behind Pacific House (SO1)	3,549	99	1	0
Below Carpenter Creek (SO2)	11,179	99	1	0
33-Mile Tract (SO3)	3,191	100	0	0
Forni Tract (SO4)	4,347	98	1	1
Sales Canyon (SO5)	1,818	0	98	2
Phillips (SO6)	1,490	1	92	7

^a Average of 1998, 1999, and 2000 data.

EID sampled benthic macroinvertebrates (BMIs) in October 1998 using kick samples collected at selected fish sampling locations (figure 3-3). In 1999, 2000, and 2001, EID sampled BMIs using California Stream Bioassessment Procedure (CSBP) protocols at stations that were, for the most part, different from those sampled in 1998 (figure 3-4). In all years, biological metrics, including total taxa richness, the number of EPT taxa, EPT index,⁵ and tolerance values (in addition to other metrics) were used to describe the benthic macroinvertebrate (BMI) samples.

In October 1998, BMIs were sampled at two stations in the SFAR downstream of the diversion dam (stations SO1 and SO2) (figure 3-3). Both had similar numbers of total organisms (near the 50th percentile for all 21 stations sampled in the project area during

⁵ Percent composition of EPT taxa relative to all taxa in a sample.

1998); however, the upper of the two stations (SO2) had a greater number of taxa than the lower station. The upper station also ranked a little higher than the lower station for the EPT index. The total number of BMIs, number of taxa, and EPT index for samples collected upstream of the El Dorado diversion dam varied depending on location. Stations SO3 and SO4 had similar numbers of organisms (near the 50th percentile for all 21 stations sampled in the project area during 1998), but the lower station (SO3) had a greater number of taxa and a higher rating in the EPT index. Station SO5 was in the top 10th percentile of all stations sampled in the project area for both numbers of organisms and numbers of taxa, and just below the 50th percentile for the EPT index. Station SO6 ranked substantially below the median value (50th percentile) for all stations regarding number of organisms and taxa; however, this station was in the top 10th percentile of the 21 stations sampled in 1998 for the EPT index.

In 1999, 2000, and 2001, BMIs were sampled at stations SOB1 through SOB5 (figure 3-4). Preliminary results for 1999 and 2001⁶ indicate that taxonomic richness is similar among mainstem SFAR sites, with a slight decrease in taxonomic richness below the El Dorado diversion dam (EID, 2002c). The EPT indices at stations downstream of the diversion dam are higher and tend to decline with distance upstream. The percentage of tolerant organisms is generally similar at the three upstream stations but is the lowest at the two stations immediately upstream and downstream of the diversion dam (EID, 2002c).

Silver Fork

From its source above Silver Lake, the Silver Fork runs approximately 14.6 miles to its confluence with the SFAR, about 0.25 mile upstream of the diversion dam (figure 3-3). Downstream of the Caples Creek confluence, the Silver Fork stream channel is deeply incised. Channel gradients range from about 1.2 to 5.0 percent. Habitat comprises large boulder and bedrock dominated falls, cascades, pocket water, and deep plunge pools, although some sand/gravel/cobble bars and deep runs exist in the reach just upstream from the China Flat Campground. Upstream from the Caples Creek confluence, channel gradients range from 5.6 to 6.3 percent. Habitat in this reach also comprises bedrock and boulder-dominated cascades, falls, pocket water, and deep plunge pools.

⁶ Data collected at all project area streams in 2000 are still being processed. Year 2000 samples will be integrated and analyzed with the 1999 and 2001 data sets and will be presented in the final BMI report (EID, 2002c).

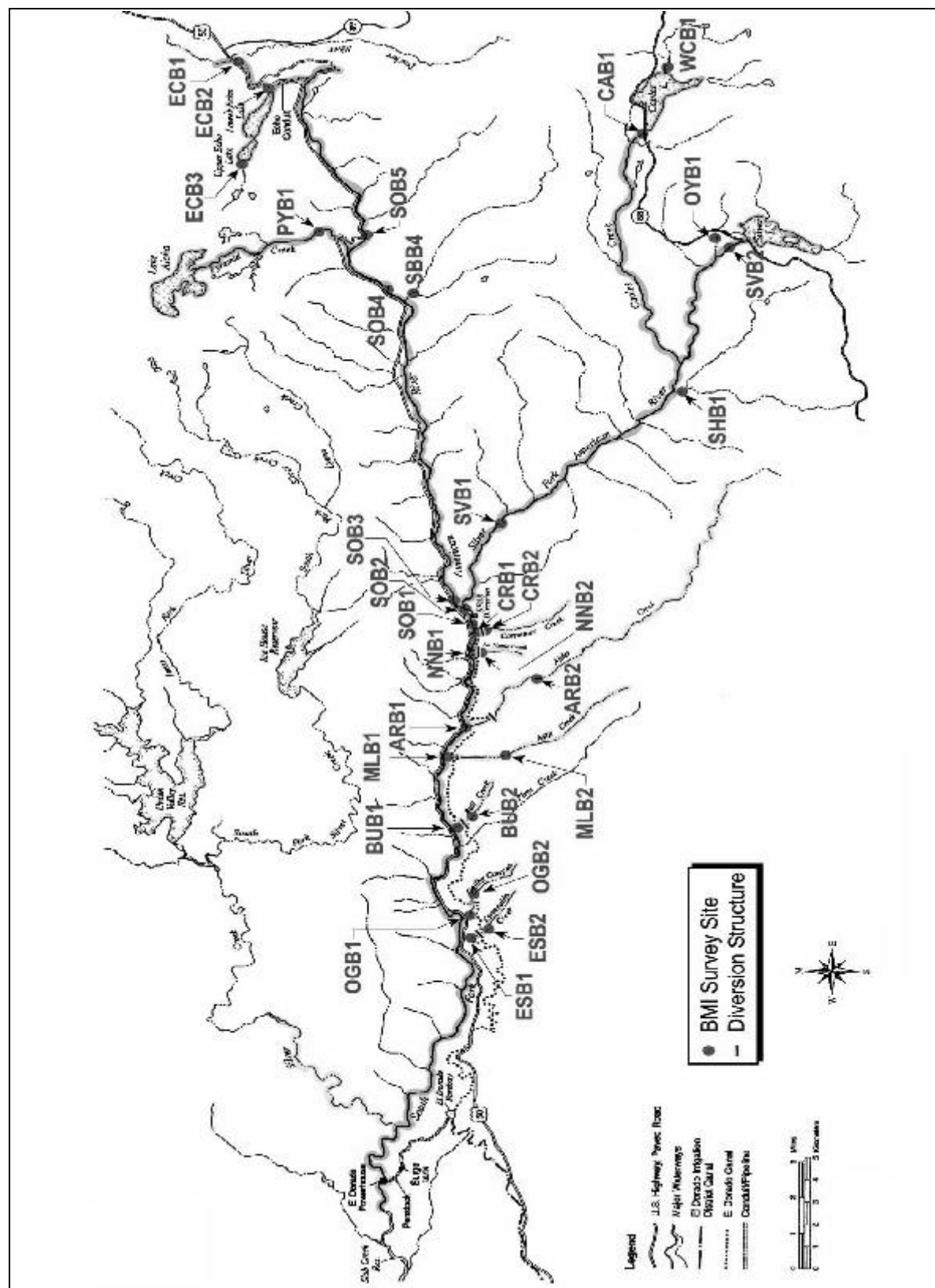


Figure 3-4. Stream macroinvertebrate sampling sites (1999, 2000, 2001). (Source: EID, 2002c)

The operation of Silver Lake has a pronounced effect on the magnitude and timing of flows in the Silver Fork, reducing flows in the spring and increasing flows in the late summer and fall. Based on USGS records (1922 through 2000 data) for the gaging station in the Silver Fork just below Silver Lake dam, mean monthly flows ranged from 8 cfs in August to 127 cfs in May. Currently, there is a minimum flow requirement of 2 cfs or natural flow, whichever is less, as measured immediately downstream of the Silver Lake dam, to protect aquatic resources. These releases are from Silver Lake dam. The existing maximum ramping rates downstream of the Silver Lake dam range from 0.50 to 1.00 foot per hour depending on flow (table 3-18).

Table 3-18. Existing maximum ramping rates of EID-controlled flows below Silver Lake and Caples Lake. (Source: EID, 2000a)

Change in Water Level of Stream (feet/hour)	Flow Range (cfs)
1.00	1 to 75
0.50	75 to 175
0.55	Above 175

In 1998 and 1999, maximum and mean daily summer water temperatures in the Silver Fork often exceeded the preferred range for rainbow trout, cutthroat trout, brown trout, and brook trout (table 3-15). In general, higher summer water temperatures occurred at the monitoring stations located closer to the Silver Lake dam (see section 3.3.1, *Water Resources*).

Fish species present in the Silver Fork include rainbow trout, brown trout, Sacramento sucker, and speckled dace. Rainbow trout are abundant and the dominant fish species in the lower portion of the SFAR (station SV1), with Sacramento sucker comprising less than 3 percent of the total fish numbers (figure 3-3, table 3-19). Farther upstream of station SV1, the relative abundance of brown trout increases. Overall, average trout densities in the Silver Fork ranged from 1,390 to 7,765 fish per mile, with the highest densities located in the lower reaches of the stream (table 3-19). Only a few speckled dace were captured in the Silver Fork.

The BMI community in the Silver Fork was sampled at three locations (stations SV1, SV2, and SV3) in October 1998 (figure 3-3). The most organisms and taxa were observed higher in the watershed at stations SV2 and SV3. The number of individuals and taxa of BMIs collected at the lower end of the Silver Fork (SV1) was very low relative to the other 21 stations sampled in 1998 due to a heavily scoured stream channel, but very high for the EPT index due to an abundance of caddisflies. Stations SV2 and SV3 also had a relatively high EPT index.

Table 3-19. The number of trout per mile and percent species composition in the Silver Fork in 1998, 1999, and 2000. (Source: Staff; EID, 2002b)

Sampling Location	Trout per Mile ^a	Trout Species Composition, All Sampling Years Combined (%)	
		Rainbow	Brown
Below Beanville Creek (SV1) (not sampled in 1999)	7,765	99	1
Above Silver Fork Campground (SV2)	3,405	88	12
Below Silver Lake Campground (SV3)	1,390	3	97
Forgotten Flat (SV4) (not sampled in 1998)	2,652	66	34

^a Average of 1998, 1999, and 2000.

BMI's were collected at two Silver Fork locations (SVB1 and SVB2) in 1999, 2000, and 2001 (figure 3-4). In 1999 and 2001, Taxonomic Richness and SDI were fairly similar among the two Silver Fork sites, and were comparable to the control site at Sherman Canyon Creek (SHB1). The EPT and Sensitive EPT Indices for the Silver Fork were relatively low compared to other project area sites, and were lowest downstream of the dam. In fact, the Silver Fork (SVB2) and Caples Creek (CAB1) had the lowest EPT and Sensitive EPT values.

Caples Creek

Caples Creek flows approximately 9.5 miles from Caples Lake to its confluence with the Silver Fork (figure 3-3). Habitat in the lowermost 0.25 mile of Caples Creek is high gradient and characterized by bedrock plunge pools and cascades. Above this point, Caples Creek flows thorough a relatively wide, open valley. The average channel gradient is 2.5 percent. Bedrock- and boulder-dominated pools, runs, pocket waters, and cascades are prevailing habitat types, and some gravel bars are scattered throughout the lower gradient portions of the channel. Upstream from the North Fork, habitat comprises a mixture of high-gradient bedrock plunge pools and falls, runs, and riffles, followed by a low-gradient meadow habitat with a meandering stream channel and gravel substrate.

Operation of Caples Lake affects flows in Caples Creek by reducing instream flows in the spring and increasing flows in the summer. Based on USGS records for the gaging station in Caples Creek just below Caples dam, mean monthly flows in Caples Creek ranged from 11 cfs during March to 84 cfs in June (1922 to 2000 data). Currently, there is a

minimum flow requirement of 5 cfs, or natural flow, whichever is less, as measured immediately downstream of the Caples Lake dam. Releases are from Caples Lake dam. The existing maximum ramping rates below Caples Lake range from 0.50 to 1.00 foot per hour, depending on flow (table 3-18).

In 1998 and 1999, mean daily water temperatures in upper Caples Creek (near the dam) were often below the preferred range for rainbow trout, cutthroat trout, and brook trout during the summer. However, near its confluence with the SFAR, summer water temperatures occasionally exceeded the preferred temperature range for rainbow trout and cutthroat trout. The lower water temperatures in Caples Creek near the dam are largely the result of water being drafted from the lower strata of Caples Lake.

Rainbow trout, brown trout, brook trout, and speckled dace were captured in Caples Creek in 1998, 1999, and 2000. The lowermost sampling station (CA1), near the confluence with the Silver Fork, contained approximately equal numbers of rainbow and brown trout (figure 3-3, table 3-20). The upper two sampling stations (CA2 and CA3) contained mostly brook trout, followed by brown trout, then rainbow trout. Trout abundance estimates for Caples Creek ranged from 1,459 to 3,195 fish per mile, with the highest densities in the upper portion of the sampling area. Speckled dace, all of which were collected at station CA2, comprised less than 1 percent of the sampled population.

Table 3-20. Number of trout per mile and percent species composition in Caples Creek in 1998, 1999, and 2000. (Source: Staff; EID, 2002b)

Stream/Sampling Location	Trout per Mile ^a	Trout Species Composition, All Sampling Years Combined (%)		
		Rainbow	Brown	Brook
Lower Caples Creek (CA1)	1,459	52	48	0
Above Kirkwood Creek (CA2)	1,787	15	40	45
Below Kirkwood Creek (CA3) (not sampled in 1998)	3,195	10	34	56

^a Average of 1998, 1999, and 2000 data.

BMI populations in Caples Creek were sampled at two locations in 1998 (CA1 and CA2) (figure 3-3). Station CA1 ranked in the middle and upper percentiles of the 21 stations sampled in 1998 for total number of organisms, number of taxa, and EPT index, while CA2 consistently ranked in the lower percentiles.

One station (CA-B1) was sampled in Caples Creek during 1999, 2000, and 2001 (figure 3-4). Taxonomic richness, number of EPT taxa, and the EPT index were all

relatively low at this station, located immediately downstream of the Caples Lake dam, compared to other project area sampling stations (EID, 2002c).

Pyramid Creek

Pyramid Creek drains Lake Aloha and flows approximately 2.3 miles before reaching the 800-foot-high Horsetail Falls. From the base of Horsetail Falls, it flows another 2.3 miles to its confluence with the SFAR. Near the confluence with the SFAR, Pyramid Creek is relatively low gradient and braided; however, the channel gradient increases upstream from Highway 50 (figure 3-3). The overall channel gradient for this 2.3 mile-long reach is 6.7 percent. Bedrock-dominated pools and cascades are the prevailing habitat types. Low-gradient riffle habitat is relatively limited. Riparian vegetation is abundant, and the stream is clear and cold. Instream habitat was not mapped in Pyramid Creek above Horsetail Falls.

Like other project reservoirs, Lake Aloha stores spring runoff and releases water in the summer. As a result, reservoir operation affects flows in Pyramid Creek. Based on USGS records from 1970 through 1996, mean monthly flows in Pyramid Creek ranged from 12 cfs during October to 103 cfs in June. Currently, there is a minimum flow requirement of 2 cfs or natural flow, whichever is less, as measured at the USGS gage near Twin Bridges. The existing maximum ramping rates downstream of Lake Aloha into Pyramid Creek range from 0.5 to 1.5 feet per hour, depending on flow, as shown in table 3-14. In 1998 and 1999, maximum and mean daily summer water temperatures in Pyramid Creek often exceeded the preferred range for rainbow trout, cutthroat trout, and brook trout (see section 3.3.1, *Water Resources*).

Fish sampling conducted in Pyramid Creek in 1998, 1999, and 2000 found rainbow trout and brown trout. Rainbow trout was the dominant species collected at the sampling site located below Highway 50 (PY1) and brown trout was the dominant species above Highway 50 (PY2) (figure 3-3, table 3-21). Average trout per mile estimates at PY1 and PY2 were 422 and 153 fish per mile, respectively, the lowest trout per mile estimates of all the project area stations. EID concludes that wide variations in flow, low recruitment, or low primary productivity and food supply may restrict the number of trout this stream can support.

Table 3-21. Number of trout per mile and species composition in Pyramid Creek in 1998, 1999, and 2000. (Source: EID, 2002b)

Sampling Location	Trout per Mile ^a	Trout Species Composition, All Sampling Years Combined (%)	
		Rainbow	Brown
Below Highway 50 (PY1)	296	96.5	3.5
Above Highway 50 (PY2)	122	30	70

^a Average of 1998, 1999, and 2000 data.

Both of the Pyramid Creek stations (PY1 and PY2; figure 3-3) in October 1998 were relatively low in BMI numbers and taxa. The EPT index ranking for PY1 was the lowest of the 21 stations sampled in the project area during 1998. Station PY2 had an EPT index rating just over the 50th percentile.

The BMI community in Pyramid Creek was sampled at a single station (PYB1) upstream of Highway 50 during 1999, 2000, and 2001 (figure 3-4). Taxonomic richness at this station was relatively low compared to other SFAR tributaries, and the EPT index ranking was the third lowest of the samples collected in the project area (EID, 2002c).

Echo Creek

Unlike the other project area study streams, which are part of the American River Basin, Echo Creek is in the Lake Tahoe Basin and enters the upper Truckee River. Most of the natural flow from Echo Lake is diverted by the project into the SFAR above Phillips. There is no minimum flow requirement from Echo Lake, although EID currently voluntarily releases about 0.25 cfs to Echo Creek.⁷ From Echo Lake, Echo Creek flows about 550 feet as a moderately low-gradient stream before falling about 800 feet in a series of cataracts to the Lake Tahoe Valley floor. These cataracts would serve as a barrier to upstream fish movement. The creek flows about 1 mile from the base of the cataracts near Highway 50 to its confluence with the upper Truckee River. Habitat mapping was conducted by EID only in this lower reach, which has a gradient of 5 percent. Pools and cascades are the prevailing habitat types, followed by run and pocket water habitat. Low-gradient riffles comprise 14 percent of the habitat.

There are no flow data for Echo Creek; however, water temperature data were

⁷ Comments of R. McDonald, Principal, Resource Insights, Sacramento, CA, consultant to EID, during September 20, 2000, scoping meeting in Placerville, CA, p. 15 of transcript.

collected in 1998 and 1999. During this monitoring period, the mean daily summer water temperatures never exceeded 63.7 degrees F; however, the maximum daily temperatures exceeded 68 degrees F on several occasions in late August 1998 (see section 3.3.1, *Water Resources*).

The 1998, 1999, and 2000, fish sampling in Echo Creek included two stations located just above its confluence with the upper Truckee River (EC1 and EC2) (figure 3-3). Averaging the 3 years of data, brown trout comprised 48 and 63 percent of the trout captured, with most of the remainder being rainbow trout. Brook trout comprised 1 percent of the population. Cutthroat trout were also captured at EC2 in 1999 and 2000. Average trout per mile estimates were 2,647 and 1,153 fish per mile for the area near upper Truckee Road (EC1) and downstream of the Highway 50 crossing (EC2), respectively (table 3-22). Trout captured at the lower station were almost all young-of-the-year, while the upper station included several larger fish. Sculpin were also captured at the lowermost station.

Table 3-22. Number of trout per mile and percent species composition in Echo Creek in 1998, 1999, and 2000. (Source: Staff; EID, 2002b)

Sampling Location	Trout per Mile ^a	Trout Species Composition, All Sampling Years Combined (%)			
		Rainbow	Brown	Brook	Cutthroat
Near upper Truckee Road (EC1)	2,647	51	48	<1	0
Downstream of the Highway 50 crossing (EC2)	1,153	35	64	<1	1

^a Average of 1998, 1999, and 2000 data.

BMI's were abundant in Echo Creek in October 1998. The two Echo Creek sampling stations (figure 3-3) were both well above average for numbers of organisms and just above and below average for number of taxa. The EPT index rating for EC1 was slightly below average, and the EPT rating for EC2 was well above average.

All three of the stations sampled in Echo Creek during 1999, 2000, and 2001 (figure 3-4) were well below average for taxonomic richness (based on 1999 and 2001 results). The EPT index rating for station ECB1 was slightly below average and the EPT index rating for stations ECB2 and ECB3 was about average when compared to other stations sampled during this 3-year time frame (EID, 2002c).

Oyster Creek

Oyster Creek does not receive releases of storage water from Silver Lake; however, seepage from the lake when the lake is full affect its flow (figure 3-3). Even with these supplemental flows, Oyster Creek is relatively shallow and has an average depth of 11 feet. Shallow, fast runs are the prevailing habitat type, followed by riffles, short pools, and cascades. Abundant spawning gravel exists throughout Oyster Creek. During water temperature monitoring in Oyster Creek in 1999, the mean daily water temperatures at both sites were about 54.5 degrees F during July and August.

In 1999, 2000, and 2001, only brown trout were found in Oyster Creek. Of the fish captured, approximately one-half were young-of-the-year. Average trout density was 2,937 fish per mile for all 3 years of trout data.

Oyster Creek was not sampled for BMIs in 1998, but one station (OYB1) was sampled during 1999, 2000, and 2001 (figure 3-4). In 1999 and 2001, the total taxonomic richness and the EPT indices were about average compared to the other stations sampled in the project area during this time frame (EID, 2002c).

SFAR Tributaries Diverted into the El Dorado Canal

In addition to the streams described above, seven small tributaries to the SFAR are affected by project operations. Structures that divert water into the El Dorado canal are located on Esmeralda, Ogilby, Bull, Mill, Alder, No Name, and Carpenter creeks (figure 3-3). There are no screens on the diversion structures that would prevent fish from entering the El Dorado canal. Except for Alder and Carpenter Creek, the lower portions of each of these streams have steep gradients and waterfalls that may prevent the upstream migration of trout from the SFAR into all but the lower reaches of these streams.

Alder Creek is relatively low gradient near its confluence with the SFAR; however, the gradient increases near the diversion dam. Cascades and pools are the prevailing habitat types. The first 2,000 feet of Carpenter Creek upstream of its confluence are about 40 percent shallow pools and 60 percent riffle with substrate composed mostly of cobbles and small boulders. About 5 to 10 percent of the substrate is gravel, and EID observed two spawning rainbow trout over this substrate during a May survey.

Based on 59 years of USGS gaging records (1923 through 1981), the mean monthly flows in Alder Creek ranged from 0.7 cfs during September to 111 cfs in April. Flows up to 15 cfs are diverted from Alder Creek into the El Dorado canal from October 1 through June 15 of each year. There are no flow records available for Esmeralda, Ogilby, Bull, Mill, Alder, No Name, and Carpenter creeks.

During the summer sampling, maximum daily water temperatures in all of these streams exceeded the preferred temperature ranges for rainbow trout and cutthroat trout

both upstream and downstream from the project diversions, with the exception of Esmeralda Creek upstream from the diversion. Maximum daily summer water temperatures also exceeded the preferred range for brook trout in Alder, Mill, and Ogilby creeks upstream from the project diversions and in Alder, No Name, Mill, and Esmeralda creeks downstream from the diversions. The only streams exceeding the preferred range for brown trout were Alder Creek and Mill Creek downstream from the diversions.

EID sampled a reach of Alder Creek below the diversion for fish in 1998, 1999, 2000, 2001, and 2002, and a reach above the diversion in 2001 and 2002. The other six small diverted tributaries were sampled for fish presence or absence in 1998, and sampled again, both above and below each diversion, in 2001 and 2002. EID reports that only the lower 1,800 feet of Alder Creek is accessible to upstream migrating trout (the diversion is located approximately 4,000 feet upstream of the mouth of the creek).

In all 5 years of sampling, rainbow trout and Sacramento sucker were captured in Alder Creek below the diversion. Rainbow trout was the only species captured above the Alder Creek diversion in 1998, 1999, 2000, and 2001; however, in 2002, brown trout were captured both above and below the diversion (one brown trout was captured below the diversion and 13 were captured above the diversion). In 2001 and 2002, estimates of trout biomass per acre were relatively high at both Alder Creek sampling locations (table 3-23).

Table 3-23. Average trout biomass (all species) per site at the SFAR tributaries, fall 2001 and summer 2002 (average of 2001 and 2002 data). (Source: EID, 2002d)

Stream Name	Site Location	Average Trout Biomass (pounds per acre)
Esmeralda Creek	Below diversion	6
	Above diversion	23
Ogilby Creek	Below diversion	15
	Above diversion	35
Bull Creek	Below diversion	17
	Above Diversion	0
Mill Creek	Below diversion	10
	Above diversion	29
Alder Creek	Below diversion	20 ^a
	Above diversion	15 ^a

Stream Name	Site Location	Average Trout Biomass (pounds per acre)
No Name Creek	Below diversion	0
	Above diversion	0
Carpenter Creek	Below diversion	30
	Above diversion	51 ^a

^a Includes rainbow trout and brown trout.

Except for 3 brown trout collected above the diversion in Carpenter Creek in 2002, rainbow trout was only fish species captured in the remaining diverted tributaries. Rainbow trout were relatively abundant both above and below the diversions in Carpenter Creek, Esmeralda Creek, Ogilby Creek, and Mill Creek. Rainbow trout was the only fish species collected below the diversions in Bull Creek and No Name Creek (only one rainbow trout was collected in No Name Creek), although trout access into No Name Creek may be restricted by a 20- to 24-inch vertical drop from a culvert located approximately 30 feet upstream from the confluence with the SFAR. In Mill Creek, a 30-foot-high waterfall occurs immediately above the diversion. Barriers to upstream trout migration also exist throughout Esmeralda Creek. The first barrier to trout migration in Bull Creek occurs approximately 30 feet above the SFAR. The mouth of Ogilby Creek has an 8-foot-vertical drop. The trout in Mill, Esmeralda, Ogilby, and No Name creeks may be resident populations or may have entered the creeks from the El Dorado canal.

BMI samples were also collected in these diverted stream reaches in 1999, 2000, and 2001. In 1999 and 2001 (years for which the data have been analyzed), taxa richness at the larger tributaries (Alder, Carpenter and Mill creeks) was generally lower below the diversion structures. The smaller tributaries (No-Name, Bull, Ogilby and Esmeralda creeks) generally had higher taxa richness values below the diversion structures (figure 3-4). The EPT indices were generally higher below the diversion structures, except Bull Creek and Esmeralda Creek. Tolerance values varied substantially.

Project Reservoirs

The project's 4 high-elevation storage reservoirs—Lake Aloha, Echo Lake, Caples Lake, and Silver Lake—provide cold, relatively deep, and nutrient-poor fish habitat. Because of their low nutrient content, they are considered highly unproductive. Descriptions of the physical features, aquatic habitat, and fish populations in each of the four reservoirs are provided below.

Lake Aloha

Lake Aloha is a 560-acre storage reservoir with a maximum depth of 79 feet. Draft from storage for power production normally occurs during the months of July and August. During this period, the water level drops about 15 feet. When storage is depleted, the remaining water is contained in two to four deep pools and numerous potholes. Many of these freeze solid during winter. The dam forming Lake Aloha prevents fish from moving into the reservoir from the upper reaches of Pyramid Creek, and Horsetail Falls prevents fish from moving from the lower reaches of Pyramid Creek to the upper reaches.

Lake Aloha is thermally stratified in the summer and winter and fully mixes in the spring and fall. During the summer of 1999 (late August), water temperatures ranged from 60.5 degrees F at the surface to 51 degrees F at the bottom (approximately 62 feet deep). DO concentrations ranged from about 8 mg/L between the surface and 35 feet to about 10 mg/L in the hypolimnion (water layer below the thermocline). During the summer of 1999, water released from Lake Aloha to Pyramid Creek was 58 degrees F. The water at the time of this measurement was withdrawn from 13.8 feet below the surface of the lake, within the epilimnion.

Known fish populations in Lake Aloha are limited to brook trout. The brook trout collected in gill nets in October 1998 ranged from 6 to 15 inches in length. In 1997 and 1998, the CDFG stocked the lake with brook trout fingerlings. Before 1997, the CDFG had not stocked the lake since 1987. Rainbow trout and Lahontan cutthroat trout were stocked in the lake in the past, but there is no evidence that these species still occur in the lake.

Echo Lake

Echo Lake consists of two basins (upper Echo Lake and lower Echo Lake) connected by a narrow channel about 300 feet in length. Both lakes have a combined surface area of 335 acres at elevation 7,412 feet NGVD. The lower basin has a maximum depth of 150 feet and the upper basin has a maximum depth of 70 feet. Echo Lake is drawn down about 6 feet to zero usable capacity after Labor Day of each year. Water is released from Echo Lake through the Echo Lake conduit to the SFAR near Phillips. The intake to the conduit is screened by a trashrack with 4-inch clear spacing. The dam creating Echo Lake is a barrier to upstream fish migration from the upper reaches of Echo Creek. The steep rock face over which Echo Creek cascades is a barrier to upstream fish passage from the lower reaches of Echo Creek and is likely a barrier to most downstream fish passage from Echo Lake and the upper reaches of Echo Creek.

Like Lake Aloha, both basins of Echo Lake are thermally stratified in the summer and winter and fully mixed in the spring and fall. During August 1999, surface water temperatures in both lakes were near 63 degrees F. The lower basin had a major thermocline between depths of 35 and 50 feet and a secondary thermocline between 70 and

80 feet. Upper Echo Lake had a major thermocline between 25 and 35 feet. In both lakes, DO concentrations ranged from 7 mg/L to 9 mg/L. When the lake is stratified, water is drafted from the epilimnion, because the outlet is no more than 6 feet below the surface.

The fish species found in Echo Lake include brook trout, rainbow trout, kokanee salmon, Tui chub, Sacramento sucker, and Lahontan redbreast. The brook trout captured during sampling ranged from about 7 to 15 inches in length, the rainbow trout ranged from about 7 to 14 inches, the kokanee ranged from about 8 to 11 inches, and the Tui chub ranged from about 6 to 10 inches. The CDFG has stocked Echo Lake almost every year since 1950. In recent years, only rainbow trout have been stocked in the upper basin and Lahontan cutthroat trout have been stocked in the lower basin. Brook trout were last stocked in 1992 and kokanee were last stocked in 1964, so populations of both these species are maintained by natural production.

Caples Lake

Caples Lake has a surface area of approximately 624 acres at elevation 7,798 feet NGVD. The maximum depth is about 68 feet. Draft from storage usually occurs from August through early March. During this period, the water level drops as much as 42 feet. EID is currently required to maintain a minimum pool volume of 2,000 acre-feet (about 266 acres) to protect fishery resources in Caples Lake.

Like other project reservoirs, Caples Lake thermally stratifies in the summer and winter and fully mixes in the spring and fall. In the late summer of 1999, it was strongly stratified with a sharp thermocline located between 35 and 40 feet below the surface. Water temperatures ranged from 62 degrees F at the surface to about 47.5 degrees F near the bottom. The water temperature at the lake outlet (located about 59 feet below the surface) was 48 degrees F during late summer 1999. DO concentrations during the summer survey ranged from 6.0 to 7.3 mg/L. Caples Lake is different from the other high-elevation reservoirs because water is drafted from the hypolimnion rather than from the epilimnion (i.e., the dam outlet is located at the bottom of the lake rather than near the surface).

The fish species found in Caples Lake include brook trout, brown trout, rainbow trout, and Sacramento sucker. Brook trout was the most common species captured during fish sampling. The brook trout ranged from about 10 to 15 inches, the brown trout ranged from 12 to 16 inches, the rainbow trout ranged from 10 to 13 inches, and the Sacramento suckers ranged from 7 to 9 inches. In 1997 and 1998, the CDFG stocked Caples Lake with rainbow trout, brook trout, brown trout, and lake trout. All of these species have been planted in the lake in several years during the past decade.

Silver Lake

Silver Lake has a surface area of 502 acres at elevation 7,261 feet NGVD. The reservoir has a maximum depth of 71 feet. Draft from storage occurs after Labor Day each year and continues through November, but leakage from the dam and fish flow releases usually result in visible water-level reductions before Labor Day. When usable storage is depleted, the remaining natural pool (which existed before the dam was constructed) has a surface area of about 250 acres. A fish ladder was constructed at Silver Lake dam to give fish in the Silver Fork access to Silver Lake, but this facility was decommissioned in 1994.

Silver Lake thermally stratifies in the summer and winter and fully mixes in the spring and fall. In late August 1999, a thermocline was located between depths of 25 feet and 35 feet below the surface. Surface water temperature was 64.5 degrees F and changed very little above 25 feet. From 25 to 35 feet, water temperatures dropped about 16 degrees F. DO concentrations ranged from 7.5 mg/L to 9.6 mg/L. Water releases from Silver Lake enter the Silver Fork. During the summer of 1999, water released from Silver Lake to the Silver Fork was 64.5 degrees F. The water at the time of this measurement was withdrawn from 18 feet below the surface of the lake, within the epilimnion.

The October 1998 fish survey in Silver Lake found brown trout, rainbow trout, lake trout, and Tui chub. The brown trout ranged from 7 to 18 inches, the rainbow trout ranged from 8 to 12 inches, and the Tui chub ranged from 5 to 8 inches. The two lake trout captured were 21 and 25 inches. The CDFG has stocked Silver Lake with rainbow trout in every year since 1950 and has stocked the lake with brown trout in every year since 1992. Lake trout were planted in the lake in 1990 and several years in the 1980's. Brook trout and cutthroat trout have also been planted occasionally.

3.3.2.2 Environmental Effects and Recommendations

Instream Flows

The timing and magnitude of the flow regimes in project-affected stream reaches are altered from natural conditions. Generally, the project is operated by storing snowmelt runoff in Echo, Caples, Silver, and Aloha lakes in the spring and then releasing water to augment low summer and fall flows in downstream stream reaches. The project also diverts water from seven small tributaries to the SFAR, including Alder Creek, resulting in reduced flows downstream of these diversions. These modified flow regimes can affect the quantity and quality of aquatic habitat for native rainbow trout, brown trout, and other aquatic biota.

During project relicensing, EID conducted an instream flow study using the Instream Flow Incremental Methodology (IFIM) to determine how available habitat for rainbow and brown trout in the project area stream reaches varies with streamflow (Thomas R. Payne & Associates, 2000). The IFIM incorporates data on river channel characteristics, flow, and

fish and life-stage habitat suitability to assess the relationship between streamflow and fish habitat. The basic unit of fish habitat calculated by the model is weighted usable area (WUA). The WUA index can be interpreted in the context of stream hydrology and species life history to evaluate project effect and can serve as a basis for determining project alternative flow regimes.

EID and other stakeholders, in the collaborative process to reach settlement on key project issues, conducted an evaluation of regulated streamflow data for a number of licensee and USGS gages in the basin. EID and the stakeholders also evaluated pre-project and existing mean daily streamflow data for water years for the period of record (Hydrologics, 2002a), output from an Indicators of Hydrologic Alteration (IHA) analysis, and the results of other studies conducted during relicensing. In addition, EID and the stakeholders reviewed the results of the OASIS project operations model to evaluate the effects of the recommended flow regimes on lake levels. Together, the agencies used this information to derive the preliminary recommended minimum flows presented in the FS' preliminary Section 4(e) conditions and the CDFG's Section 10(j) recommendations.

EID proposed in its license application to continue to implement the minimum flow regimes for project reaches that were established as conditions of the existing license. Since filing its license application, one of the key issues that EID has been working collaboratively with the resource agencies and other stakeholders to resolve is the minimum flows that should be provided to project-affected reaches. The only specific flow regime that pertains to all project waters filed with the Commission in response to the REA notice came from the FS and CDFG (letters to the Commission dated October 29, 2002). The minimum flow recommendations of both agencies are identical. In its response to REA comments, EID states that the flow regimes recommended by the FS and CDFG would meet or exceed resource protection objectives, and therefore enhance natural conditions (letter to the Commission dated November 27, 2002). EID also indicates that the recommended flow regime would allow the continued delivery of consumptive water and generation of electricity. Finally, EID states "...that project operations should be able to comply with the required flow regimes." The minimum flows specified in the Settlement (Section 1) are identical to those recommended by the FS and CDFG, and EID proposes to implement the specified minimum flow regime. Where facility modifications are required to maintain the specified minimum flows, EID would complete such modifications as soon as reasonably practicable and no later than 3 years after license issuance. Prior to any such modifications, EID would make a good faith effort to provide the specified minimum streamflows within the capabilities of the existing facilities. Environmental conditions that are reflective of flows under the current license, as EID originally proposed for the new license, are described in the affected environment section. We address the potential effects of minimum flows separately by reach.

South Fork American River

EID proposes to provide minimum flows of between 15 and 240 cfs in the SFAR downstream of the El Dorado diversion dam depending on month and water-year type (table 3-24).

Table 3-24. Proposed minimum flows for the SFAR downstream of the El Dorado diversion dam. (Source: Settlement, 2003)

Month	Minimum Streamflow (cfs) by Water-Year Type				
	CD	DRY	BN	AN	WET
Oct.	15	15	40	50	50
Nov.	15	18	40	50	50
Dec.	15	25	40	50	50
Jan.	15	25	40	50	50
Feb.	20	30	40	50	50
Mar.	30	60	110	110	110
Apr.	60	120	180	180	180
May	60	120	180	240	240
June	60	120	180	240	240
July	40	85	125	160	160
Aug.	18	18	65	65	65
Sept.	15	15	50	50	50

Our Analysis

Under the current project license, the SFAR downstream of the El Dorado diversion dam has minimum flow requirements of between 10 and 50 cfs, depending on the month and water-year type (see table 3-16). Existing minimum flow requirements are lowest for the month of September, a little higher for the month of October, and higher yet for the months of November through August.

Both the operation of the project's four upstream lakes and diversion into the project's canal affect SFAR instream flows downstream of the El Dorado diversion dam near Kyburz. We discuss the effect of different operational scenarios on the lake levels in

the *Environmental Effects and Recommendations* subsection in section 3.3.1, *Water Resources*. Those discussions include the effects of operating the project to meet proposed and recommended minimum flows in the SFAR below the El Dorado diversion dam along with other flow and lake level proposals and recommendations.

EID conducted IFIM analyses for seven project-affected reaches of the SFAR. Four study reaches were located upstream of the El Dorado diversion dam, and three study reaches were located downstream of the diversion dam. IFIM analyses were conducted for rainbow trout between the project's powerhouse and Camp Sacramento, brown trout between Pyramid Creek and the Echo conduit, and hardhead (a FS sensitive species) between the project's powerhouse and Silver Creek.

Downstream of the El Dorado diversion dam, accretion plays an increasingly important role in SFAR flows. There are two primary tributaries to the project's bypassed reach that influence the quantity of water in the reach. Alder Creek, which is partially diverted by the project, enters the reach near its upper end. Silver Creek enters the SFAR near the lower end of the reach.

Results of habitat simulations for the study reach between the powerhouse and Silver Creek were considerably different than for the other two study reaches below the diversion dam (figures 3-5 and 3-6). WUA for rainbow trout juveniles remained relatively stable in the lowermost study reach (powerhouse to Silver Creek) in comparison to the other two reaches. Predictions of adult rainbow trout habitat were much more consistent between the three reaches below the diversion dam. In the upper two reaches, adult rainbow trout WUA increased at a rapid rate up to flows of about 150 cfs, remained relatively stable from 150 to 300 cfs, and then decreased. Adult rainbow trout WUA followed the same general pattern in the lower reach, although the rapid increase extended to a flow of about 225 cfs, and then remained relatively stable at higher flows. Adult hardhead habitat in the lowermost reach steadily increased between 50 and 150 cfs, plateaued between 150 and 250 cfs, and then decreased.

EID conducted a time-series analysis to evaluate the effects of existing hydrology in comparison to expected natural (pre-project) conditions for the months of July through November. EID did not conduct this analysis for the powerhouse to Silver Creek reach due to the lack of necessary hydrologic information. Comparisons of total WUA for adult rainbow trout are similar for both of the reaches evaluated. Results indicate that existing project operations decrease WUA in July and increase WUA during the months of August, September, and October. WUA remains nearly the same in November. Differences between the existing and pre-project total WUA for juvenile rainbow trout vary less than for adult rainbow trout. Model results of existing and pre-project conditions for the Silver Creek to Riverton reach were virtually identical for the months of August, September, and October, and were a little higher for July and November under existing

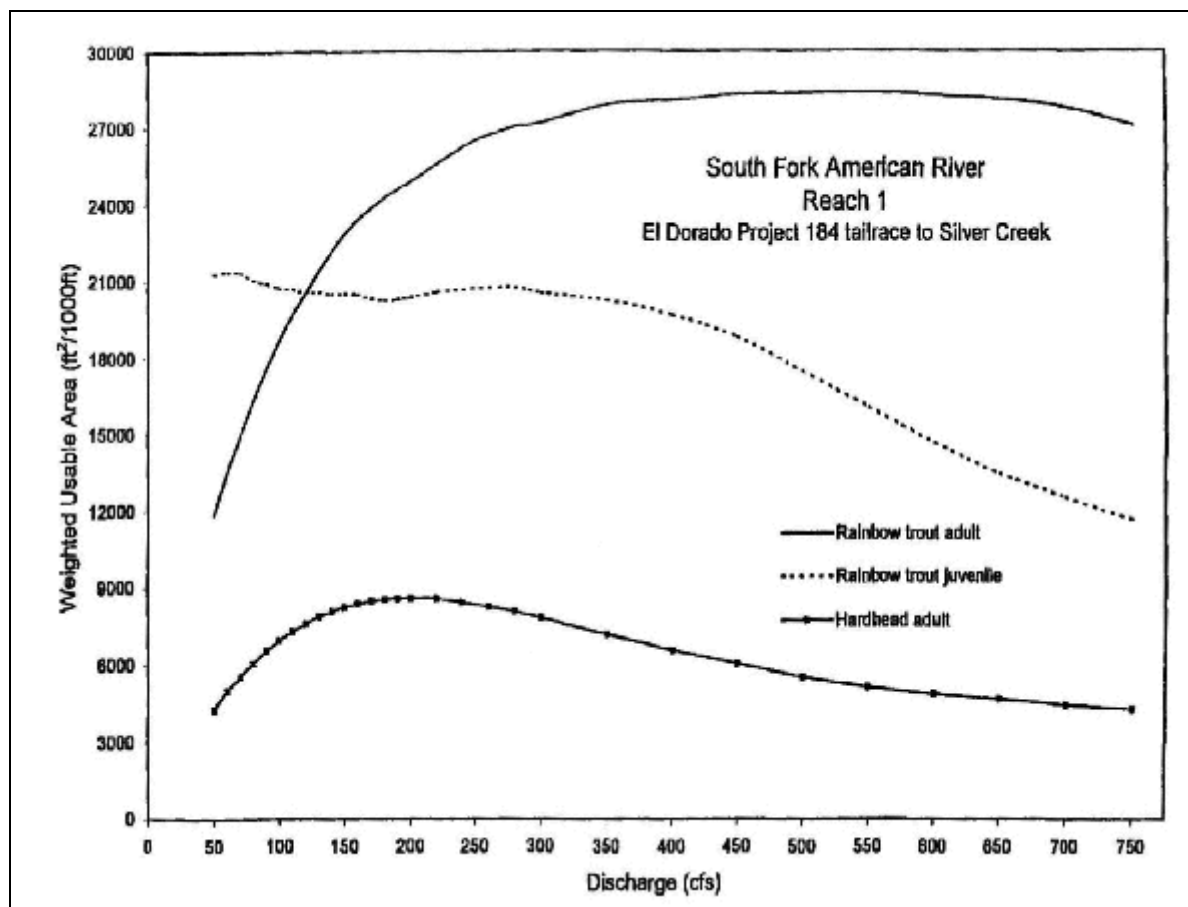


Figure 3-5. WUA for rainbow trout and adult hardhead in the SFAR bypassed reach from the powerhouse to Silver Creek. (Source: Thomas Payne and Associates, 2000)

operations. Total WUA for juvenile rainbow trout was higher for existing than pre-project operations in the Riverton to diversion dam reach during August, September, and October and nearly the same during July and November.

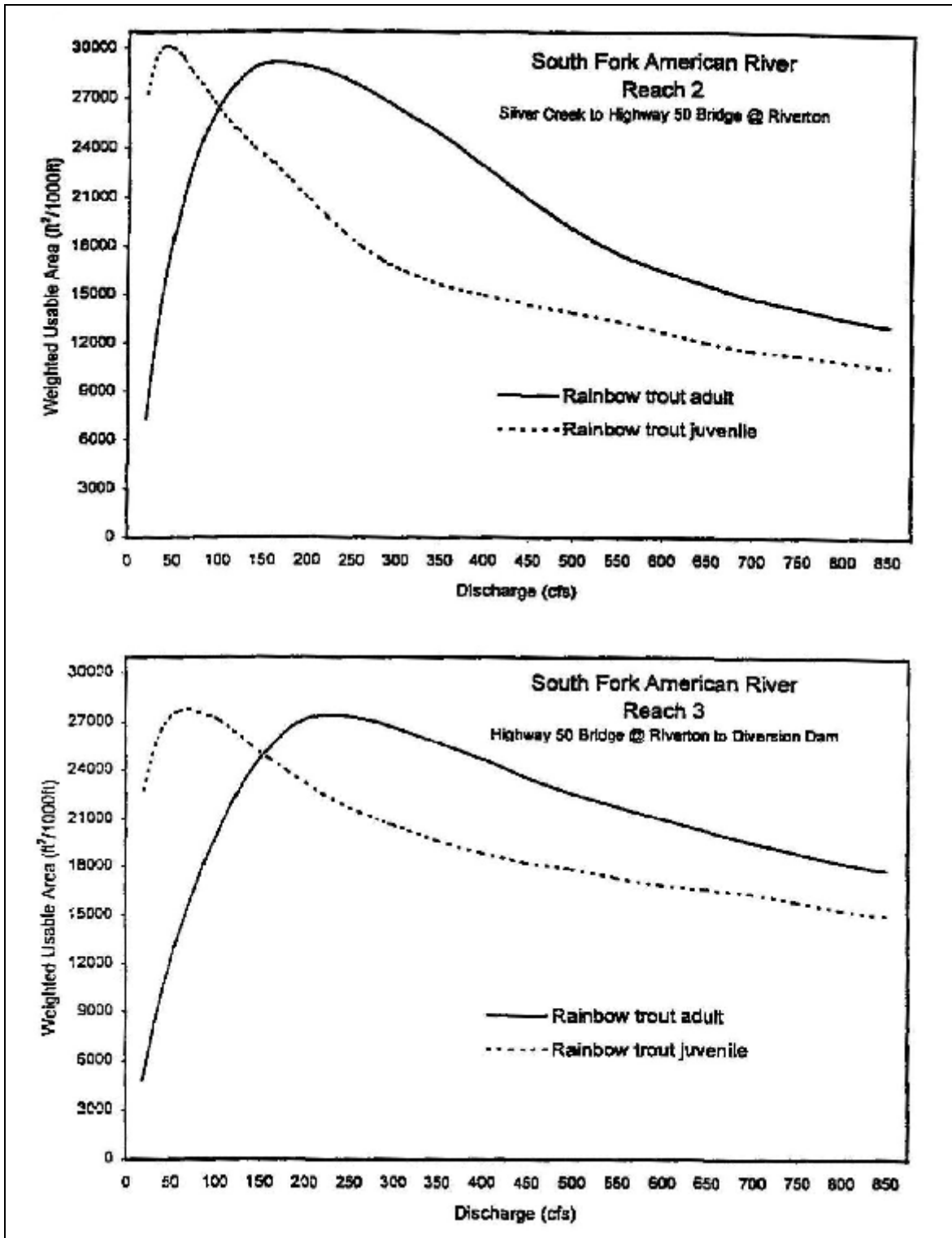


Figure 3-6. WUA for rainbow trout in two segments of the SFAR bypassed reach upstream of Silver Creek. (Source: Thomas Payne and Associates, 2000)

The FS and CDFG conducted a habitat time-series analysis to evaluate the effects of their recommended minimum flows in comparison to existing minimum flow requirements. Their analysis focused on habitat conditions in the bypassed reach of the SFAR, although it is not clear whether their analysis was based on adult or juvenile rainbow trout habitat. This analysis indicates that their recommended minimum flows would increase WUA in comparison to existing conditions during the months of March through August of all water-year types. For the months of November through February, the increased recommended minimum flows indicative of the natural hydrograph would decrease WUA.

EID-modeled water temperatures in the bypassed reach of the SFAR and the results indicate that increasing flow released at the diversion dam generally reduces summer and early fall temperatures in the SFAR at the Silver Creek confluence. However, modeling results suggest that increasing flow releases at the El Dorado diversion dam as proposed by EID would reduce the SFAR's temperature by less than 2 degrees C at the Silver Creek confluence. Increasing minimum flows in the upper basin project-affected reaches may result in further reductions in temperatures at the SFAR bypassed reach. However, no water temperature model results for the upper basin are available.

We conclude that the minimum flows proposed by EID would enhance existing habitat conditions (WUA) for rainbow trout. Implementation of the proposed minimum flows should reduce temperatures in the SFAR downstream of the diversion dam. The combination of increased habitat quantity and quality may increase the adult rainbow trout population. Therefore, we make a recommendation to implement the minimum flows proposed by EID, as specified in the Settlement.

Streams Downstream of Project Lakes (Echo, Pyramid, Caples, and Silver Fork)

EID proposes to maintain monthly minimum flows in Echo Creek, Pyramid Creek, Caples Creek, and the Silver Fork according to the schedules presented in tables 3-25, 3-26, 3-27, and 3-28. EID proposes to retain Silver Lake leakage into Oyster Creek to maintain fish habitat, except for reasons of dam safety. However, this measure, although specified in Appendix B of the Settlement, would not be included as a condition in a new project license.

Table 3-25. Proposed minimum flows for Echo Creek downstream of the Echo Lake dam. (Source: Settlement, 2003)

Month	Minimum Streamflow (cfs) by Water-Year Type				
	CD	DRY	BN	AN	WET
Oct.	6 or NF	6 or NF	6 or NF	6 or NF	6 or NF
Nov.	6 or NF	6 or NF	6 or NF	6 or NF	6 or NF
Dec.	6 or NF	6 or NF	6 or NF	6 or NF	6 or NF
Jan.	6 or NF	6 or NF	6 or NF	6 or NF	6 or NF
Feb.	6 or NF	6 or NF	6 or NF	10 or NF	10 or NF
Mar.	6 or NF	6 or NF	6 or NF	15 or NF	15 or NF
Apr.	6 or NF	10 or NF	15 or NF	25 or NF	25 or NF
May	6 or NF	15 or NF	30 or NF	45 or NF	45 or NF
June	6 or NF	15 or NF	30 or NF	40 or NF	40 or NF
July	6 or NF	10 or NF	15 or NF	20 or NF	20 or NF
Aug.	6 or NF	6 or NF	6 or NF	6 or NF	6 or NF
Sept.	6 or NF	6 or NF	6 or NF	6 or NF	6 or NF

Note: NF = natural flow

Table 3-26. Proposed minimum flows for Pyramid Creek downstream of Lake Aloha dam. (Source: Settlement, 2003)

Month	Minimum Streamflow (cfs) by Water-Year Type				
	CD	DRY	BN	AN	WET
Oct.	1 or NF	1 or NF	2 or NF	3 or NF	3 or NF
Nov.	1 or NF	3 or NF	4 or NF	5 or NF	5 or NF
Dec.	2 or NF	3 or NF	5 or NF	6 or NF	6 or NF
Jan.	2 or NF	3 or NF	5 or NF	6 or NF	6 or NF
Feb.	2 or NF	4 or NF	6 or NF	8 or NF	8 or NF
Mar.	2 or NF	5 or NF	7 or NF	10 or NF	10 or NF
Apr.	3 or NF	5 or NF	8 or NF	11 or NF	11 or NF
May	5 or NF	10 or NF	15 or NF	20 or NF	20 or NF

Month	Minimum Streamflow (cfs) by Water-Year Type				
	CD	DRY	BN	AN	WET
June	5 or NF	10 or NF	14 or NF	19 or NF	19 or NF
July	2 or NF	4 or NF	6 or NF	8 or NF	8 or NF
Aug.	1 or NF	2 or NF	3 or NF	4 or NF	4 or NF
Sept.	1 or NF	1 or NF	2 or NF	2 or NF	2 or NF

Note: NF = natural flow

Table 3-27. Proposed minimum flows for Caples Creek downstream of Caples Lake dam.
(Source: Settlement, 2003)

Month	Minimum Streamflow (cfs) by Water-Year Type				
	CD	DRY	BN	AN	WET
Oct.	5	5	5	5	5
Nov.	5	6 or NF	8 or NF	10 or NF	10 or NF
Dec.	5	7 or NF	10 or NF	10 or NF	10 or NF
Jan.	5	7 or NF	10 or NF	15 or NF	15 or NF
Feb.	5	7 or NF	10 or NF	15 or NF	15 or NF
Mar.	5	10 or NF	15 or NF	20 or NF	20 or NF
Apr.	10	12 or NF	18 or NF	25 or NF	25 or NF
May	14	27 or NF	40 or NF	55 or NF	55 or NF
June	14	28 or NF	42 or NF	55 or NF	55 or NF
July	12	25 or NF	35 or NF	50 or NF	50 or NF
Aug.	5	5	6 or NF	8 or NF	8 or NF
Sept.	5	5	5	5	5

Note: NF = natural flow

Table 3-28. Proposed minimum flows for the SFAR downstream of Silver Lake dam and downstream of Oyster Creek. (Source: Settlement, 2003)

Month	Below Silver Lake Dam	Below Oyster Creek by Water-Year Type				
	All	CD	DRY	BN	AN	WET
Oct.	4 or NF	8 or NF	8 or NF	8 or NF	8 or NF	8 or NF
Nov.	4 or NF	8 or NF	8 or NF	10 or NF	16 or NF	16 or NF
Dec.	4 or NF	8 or NF	8 or NF	10 or NF	16 or NF	16 or NF
Jan.	4 or NF	8 or NF	8 or NF	12 or NF	16 or NF	16 or NF
Feb.	4 or NF	8 or NF	10 or NF	17 or NF	23 or NF	23 or NF
Mar.	4 or NF	8 or NF	15 or NF	26 or NF	35 or NF	35 or NF
Apr.	4 or NF	8 or NF	18 or NF	50 or NF	50 or NF	50 or NF
May	4 or NF	10 or	20 or NF	90 or NF	100 or NF	100 or NF
June	4 or NF	8 or NF	10 or NF	60 or NF	60 or NF	60 or NF
July	4 or NF	8 or NF	8 or NF	18 or NF	20 or NF	25 or NF
Aug.	4 or NF	8 or NF	8 or NF	8 or NF	8 or NF	8 or NF
Sept.	4 or NF	8 or NF	8 or NF	8 or NF	8 or NF	8 or NF

Note: NF = natural flow

Our Analysis

Echo Creek

EID currently voluntarily releases about 0.25 cfs into the stream channel. This existing flow release may not be sufficient to maintain the quality and quantity of habitat for aquatic biota in Echo Creek.

IFIM habitat simulations for both juvenile rainbow and brown trout in Echo Creek suggest that habitat gains would be most rapid as streamflows approach the 6- to 7-cfs range, then slow (rainbow trout) or decrease (brown trout) above these flows (figure 3-7). Habitat simulations for adult trout of both species show habitat rapidly increases as

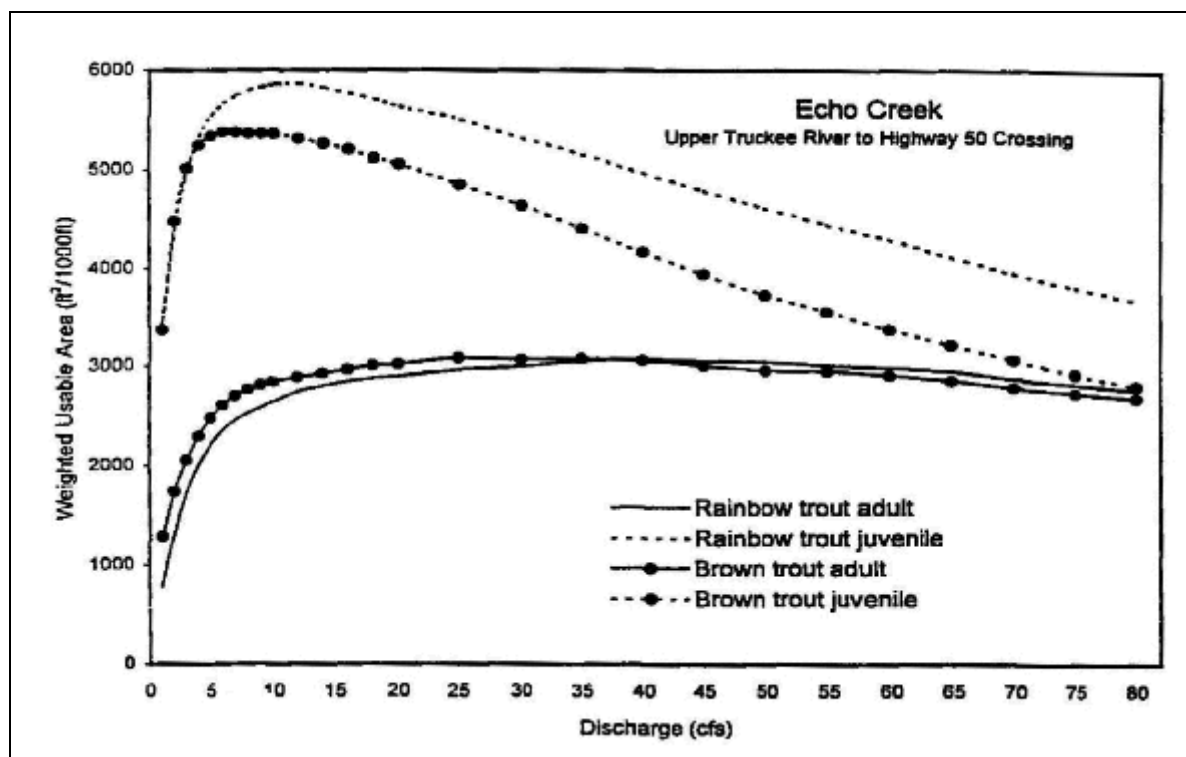


Figure 3-7. WUA for rainbow and brown trout in Echo Creek. (Source: Thomas Payne and Associates, 2000)

streamflows approach 8 cfs, and remains relatively unchanged throughout the balance of the modeled flows. The habitat time series analysis completed by FS and CDFG shows that with existing flows, the WUA is slightly greater than with flows under pre-project conditions in July and August, is similar in September and October, and is lower in November. The FS and CDFG habitat time series analysis comparing the agency-recommended minimum flow to existing conditions shows a substantial increase in WUA for the proposed minimum flow. Plots comparing the proposed minimum flow with existing conditions indicate that the proposed minimum flow would not substantially affect lake levels during the summer months.

We make a recommendation to adopt the proposed minimum flow regime for Echo Creek. Increasing minimum flows in Echo Creek would substantially increase the WUA available to rainbow trout and brown trout compared to existing conditions and is consistent with the FS and CDFG fishery resource objectives. In addition, implementation of these flows would still allow boat passage from lower Echo Lake to Upper Echo Lake from Memorial Day through Labor Day.

Pyramid Creek

Currently, Pyramid Creek has a minimum flow requirement of 2 cfs or natural flow.

EID proposes minimum flows that range from the lesser of 1 cfs or inflow to 20 cfs depending on month and water-year type (see table 3-26). Instream flows released into Pyramid Creek directly affect Lake Aloha water levels. Similarly, operation of Lake Aloha can affect flows released into Pyramid Creek. We discuss the effects of proposed and recommended minimum flows for Pyramid Creek on Lake Aloha water levels in section 3.3.1, *Water Resources*.

The WUA curves for the juvenile and adult stages of both rainbow trout and brown trout in Pyramid Creek all show rapid gains in habitat as streamflow approaches 15 cfs (figure 3-8). Juvenile trout habitat peaks at 20 to 25 cfs, before declining at higher flows. The adult trout WUA curves show very gradual habitat gains until 50 to 55 cfs, then slowly decline at higher simulation flows. The time series analysis completed by the FS and CDFG shows that more adult rainbow and brown trout habitat occurs under existing flows than pre-project flows during the months of July through October. More juvenile trout habitat also exists for existing than for pre-project conditions, although these differences are much smaller than for adult trout habitat and only occur during the months of September and October for brown trout.

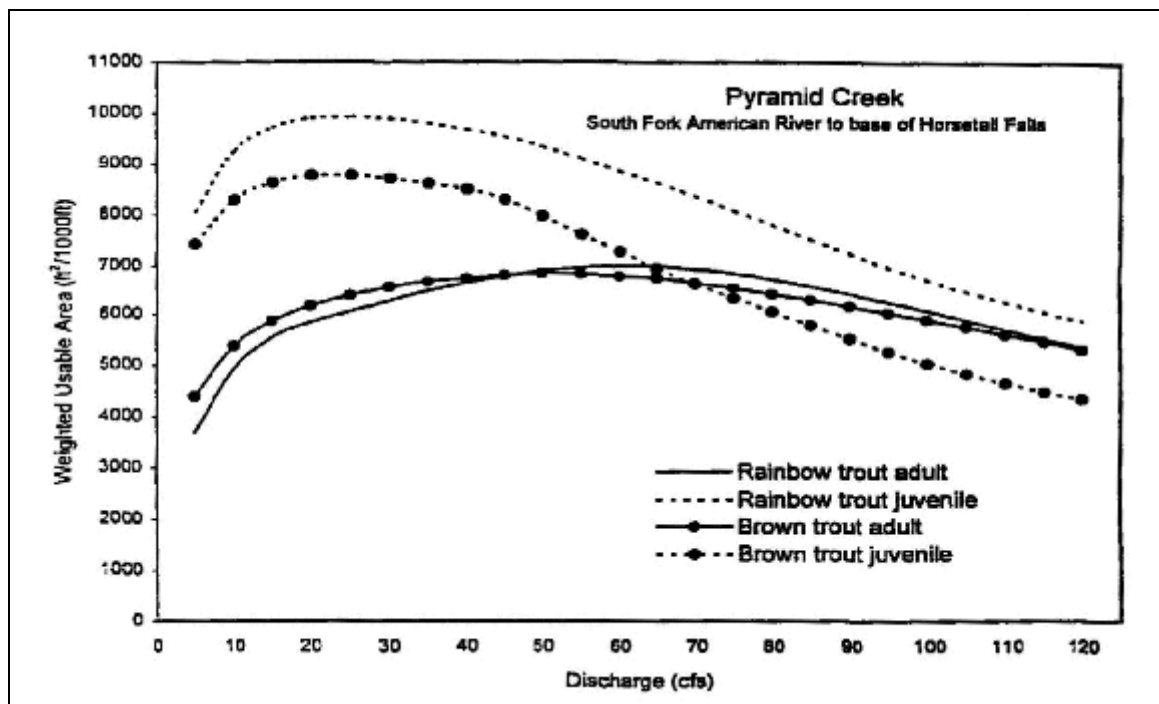


Figure 3-8. WUA for rainbow and brown trout in Pyramid Creek. (Source: Thomas Payne and Associates, 2000)

We conclude that the minimum flows proposed by EID would enhance existing habitat conditions (WUA) for rainbow trout and brown trout in Pyramid Creek. These enhanced habitat conditions would likely increase the adult and juvenile trout population. Therefore, we make a recommendation that EID implement its proposed minimum flows.

Caples Creek

Flows released from Caples Lake to Caples Creek affect the amount and quality of available spawning and rearing habitat for both rainbow trout and brown trout. EID's IFIM analysis was conducted in two project-affected reaches of Caples Creek to determine how available habitat for rainbow trout and brown trout varies with streamflow. Results of habitat simulations for juvenile rainbow trout in lower Caples Creek (Silver Fork confluence to North Fork confluence) have a steep, positive slope for flows approaching 15 cfs, becoming more gradual through the 25-cfs level, followed by a rapid decline at flows greater than 25 cfs (figure 3-9). The juvenile brown trout simulation shows increasing habitat through 10 cfs, then virtually no change through 20 cfs, with a decline at higher discharges. The habitat simulations for the adult stages of both trout species show a similar pattern (i.e., rapid gains through streamflows of 25 cfs, with little change in habitat until flows exceed 50 cfs, at which point habitat steadily declines). In upper Caples Creek (North Fork confluence to the gaging station below Caples dam) WUA peaks for both species of juvenile trout at streamflows of 10 cfs, then declines rapidly (figure 3-9). Habitat for adult trout increases rapidly as streamflows approach 10 cfs, with slower increases through 15 cfs for brown trout and 25 cfs for rainbow trout.

According to the FS and CDFG's habitat time series analysis for July through November, flows under existing project operations produced higher WUA values than did the pre-project scenario for adult brown trout and rainbow trout. For juveniles, WUA with existing flows was lower than pre-project WUA in most months, especially in August. The Caples Creek habitat time series analysis conducted by the FS and CDFG indicates an increase in WUA for the proposed flow regime (compared to the existing flow regime) except during low-flow fall and winter periods (October through February) in CD, DRY and BN water years. The proposed flow regime also meets or exceeds 80 percent of the maximum WUA for adult rainbow trout for all months in all water-year types.

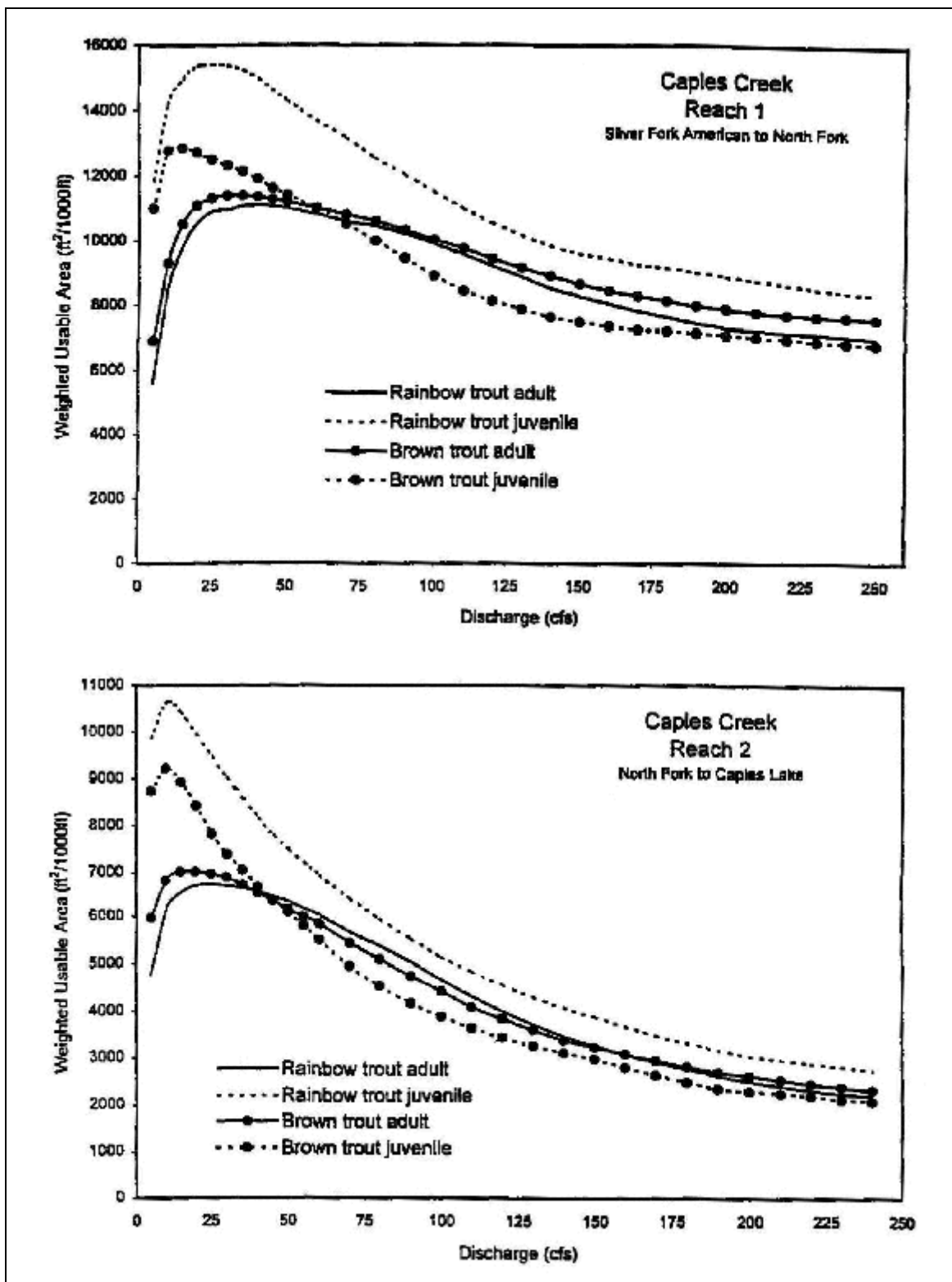


Figure 3-9. WUA for rainbow and brown trout in two reaches of Caples Creek.
(Source: Thomas Payne and Associates, 2000)

Increased minimum flows are also expected to reduce summer temperatures in Caples Creek somewhat (although under current conditions, the water temperature is suitable for sustaining trout). If the project were operated to meet the proposed minimum flows, summertime flows would increase from the lesser of 5 cfs or inflow to as much as 50 to 55 cfs in June and July of AN and WET years. During DRY years, June and July flows would increase up to 28 cfs. These increases in minimum flows are expected to result in measurable temperature reduction. Temperature reductions resulting from the relatively small increases in August proposed minimum flows (i.e. 5 to 8 cfs) are expected to be minimal. The unavailability of temperature modeling results for Caples Creek limits our ability to quantify this effect.

We conclude that the flows proposed by EID for Caples Creek below the dam would increase the amount of physical habitat (WUA) available to adult rainbow trout, would enhance existing habitat conditions, and would potentially increase the abundance of this species. According to the FS and CDFG, the proposed flow regime would also allow Caples Lake to fill in all but CD water years, and thus protect recreational interests at Caples Lake. However, modeling results reported in November 2002 (Hydrologics, 2002b) indicate that end-of-June Caples Lake levels would be lower under the proposed flow regimes than under existing conditions. Due to the increase in physical habitat, we make a recommendation that EID implement its proposed flow regime in Caples Creek.

Silver Fork

The operation of Silver Lake affects the magnitude and duration of flows in the Silver Fork, reducing natural flows in the spring and increasing flows in the late summer and fall. Under existing conditions, a continuous minimum flow of 2 cfs, or inflow if less, is released from Silver Lake into the Silver Fork. In addition, Silver Lake water surface levels are directly linked to groundwater inflow to Oyster Creek, a tributary of the Silver Fork. Maintaining Silver Lake at full pool results in base flows of about 17 cfs in Oyster Creek. Important fish species present in the Silver Fork include rainbow trout and brown trout.

IFIM habitat simulations were performed for adult and juvenile rainbow trout and brown trout in four reaches of the Silver Fork (reaches 2 through 5). The resulting WUA curves are shown in figures 3-10 through 3-12. In Reach 2 (China Flat Campground to 1,500 feet upstream of Girard Creek Road Bridge), the WUA curve for adult rainbow trout shows a steep increase as flows advance toward 60 cfs, followed by a slower gain in habitat as flows approach 120 cfs (figure 3-10). The habitat simulation

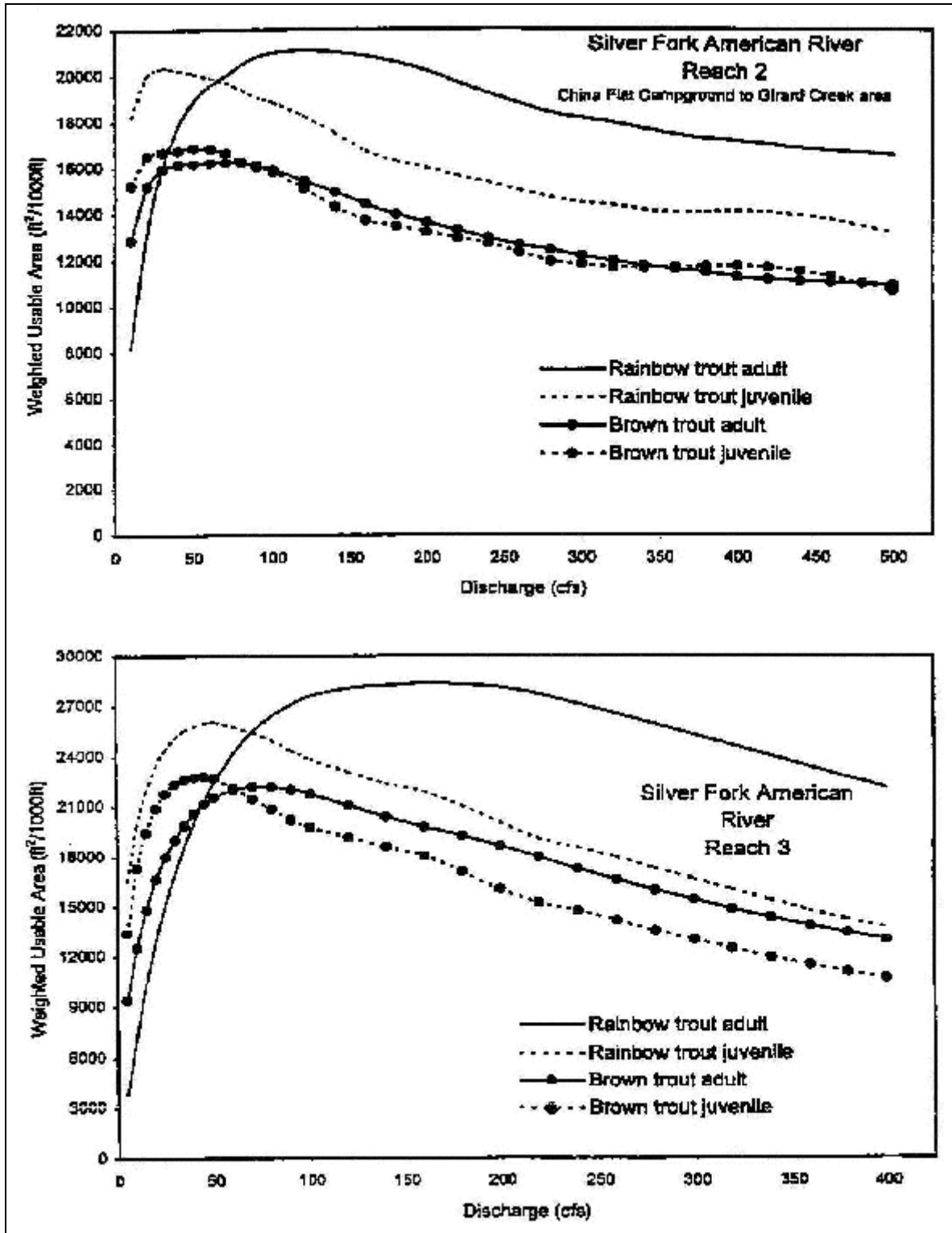


Figure 3-10. WUA for rainbow and brown trout in Reach 2 and Reach 3 of the Silver Fork American River. (Source: Thomas Payne and Associates, 2000)

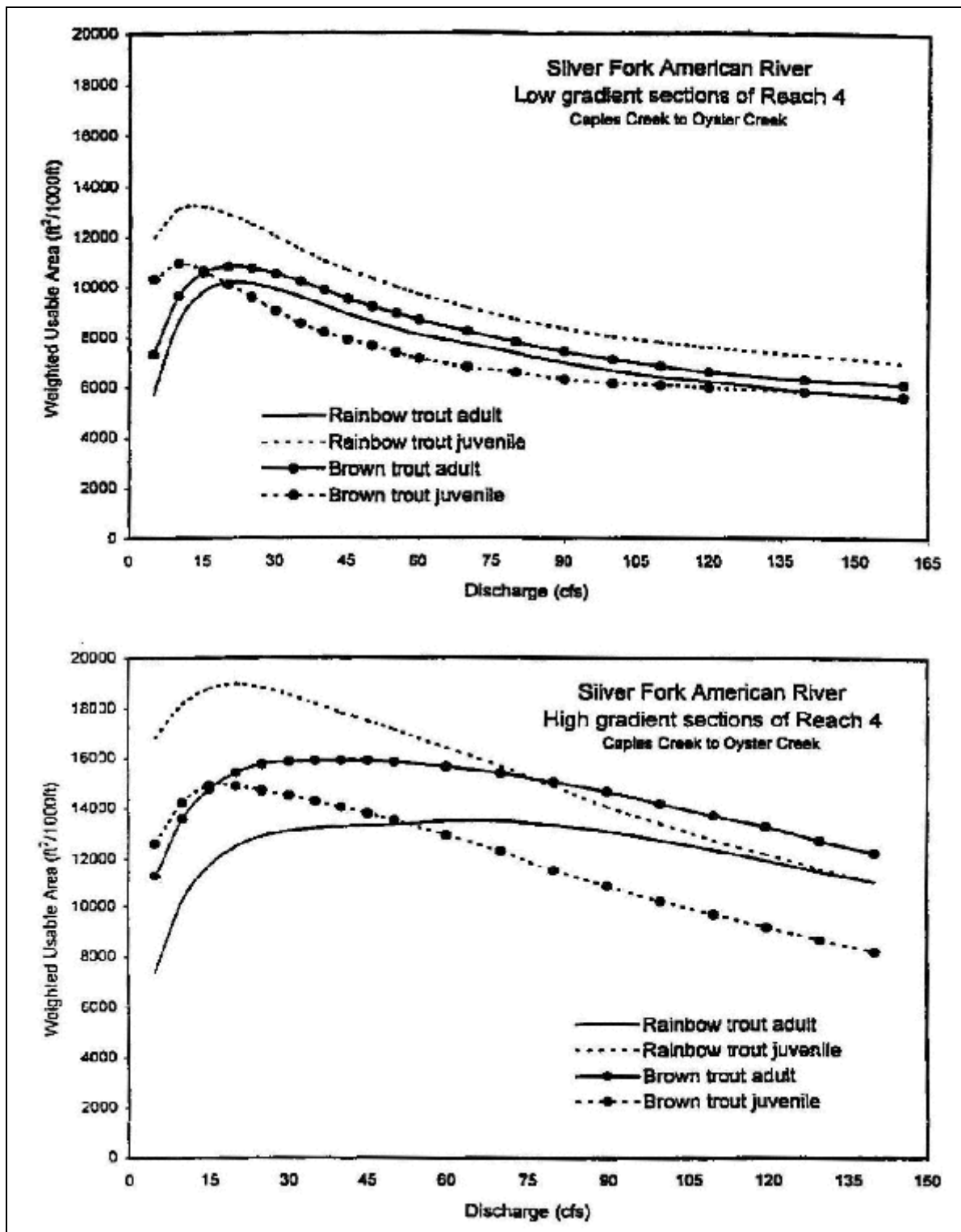


Figure 3-11. WUA for rainbow and brown trout in low and high gradient segments of Reach 4 of the Silver Fork American River. (Source: Thomas Payne and Associates, 2000)

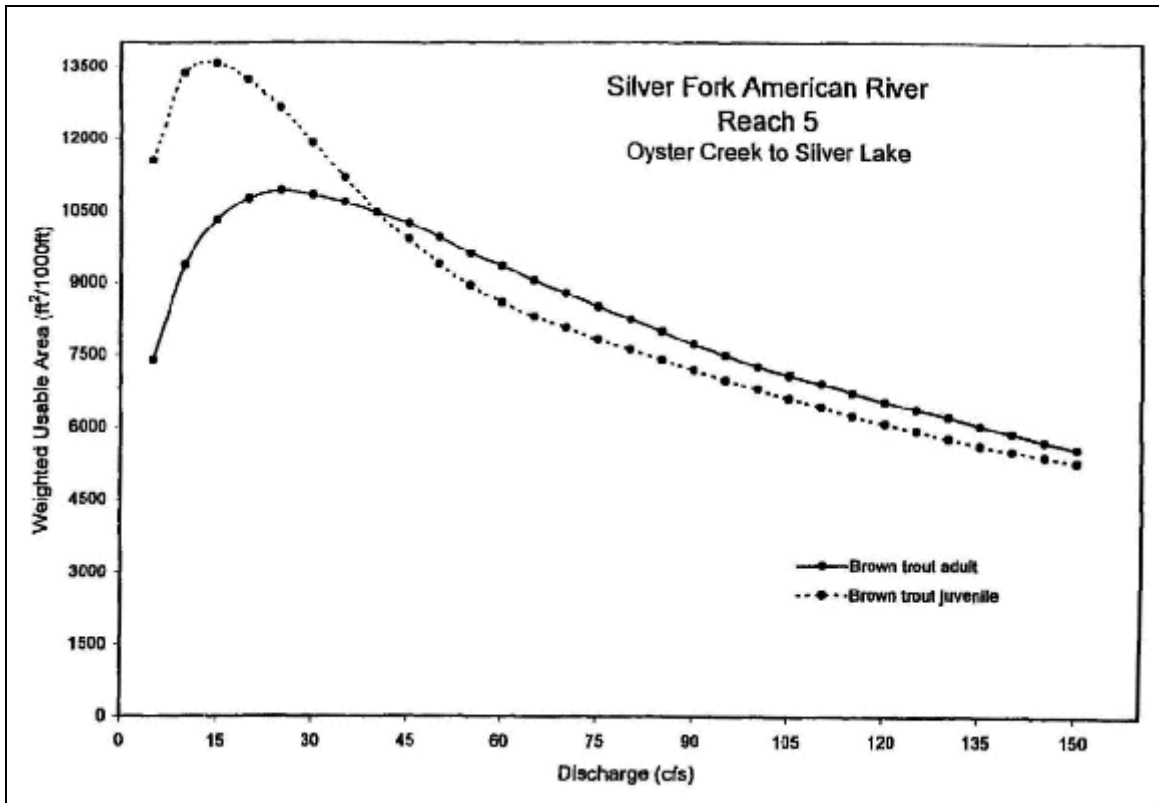


Figure 3-12. WUA for brown trout in Reach 5 of the Silver Fork American River.
(Source: Thomas Payne and Associates, 2000)

for juvenile rainbow trout showed a rapid increase in WUA as streamflows approach 30 cfs, followed by a steady decline beyond this flow. The juvenile and adult brown trout WUA curves in Reach 2 are nearly identical, showing a steep increase in habitat as flows approach 20 to 30 cfs, then almost no increases through 60 to 70 cfs. In Reach 3 of the Silver Fork (1,500 feet upstream of Girard Creek Road Bridge to Caples Creek confluence), the habitat simulations for rainbow trout show that WUA maximizes at higher flows than in Reach 2 (figure 3-10). Juvenile rainbow trout and brown trout WUA increases rapidly as flows increase to 35 cfs and peak at 45 to 50 cfs. Adult rainbow trout WUA increases rapidly to 90 cfs, followed by slower gains to 160 cfs. Adult brown trout WUA increases rapidly as discharge approaches 45 cfs, then slows as it maximizes at 70 cfs. In Reach 4 (Caples Creek confluence to Oyster Creek confluence), juvenile trout habitat maximizes at discharges of 10 to 20 cfs, then declines rapidly. Adult trout WUA in Reach 4 maximizes at about 20 cfs before declining (figure 3-11). In Reach 5 (Oyster Creek confluence to Silver Lake), juvenile brown trout WUA maximizes at streamflows between 10 and 15 cfs, while the peak of the adult habitat curve occurs at a streamflow of 25 cfs (figure 3-12).

In Reach 2 of the Silver Fork, the differences in existing and pre-project WUA values for juvenile rainbow and brown trout and for adult brown trout are relatively minor; however, the WUA under existing flow conditions is much greater than would be expected under pre-project conditions for adult rainbow trout. In Reaches 3 and 4, existing flows result in greater WUA than under pre-project conditions for both species and life stages. In Reach 5, time series WUA was lower under existing conditions than under pre-project flows for the month of July, but in most other comparisons, existing flows resulted in the highest WUA values.

The habitat time series completed for the Silver Fork by the FS and CDFG for the proposed flow regime versus the existing flow regime shows that the proposed flow regime meets or exceeds 80 to 100 percent of the maximum WUA levels for adult rainbow trout for all months in all water-year types. Based on FS and CDFG review of the OASIS model output, Silver Lake would fill by Memorial Day and would maintain a similar lake level throughout the entire recreation season in all but CD years. In addition, the proposed flow regime would not eliminate Silver Lake leakage into Oyster Creek.

Increasing the minimum flow releases to the Silver Fork would likely result in somewhat cooler summer temperatures, although results of temperature modeling are not currently available to quantify these reductions.

We make a recommendation to adopt the EID proposed minimum flow regime for the Silver Fork. Increasing minimum flows in the Silver Fork would substantially increase the WUA available to rainbow trout compared to existing conditions and is consistent with the FS and CDFG fishery resource objectives.

Small Tributaries to the SFAR Downstream of the El Dorado Diversion Dam

EID proposes to maintain specific minimum flows below EID's diversion dams on each of the seven tributaries that are diverted into the El Dorado canal. The schedule for Alder Creek specifies minimum streamflows by month and water-year type (table 3-29). In contrast, the proposed minimum flows for Carpenter, No Name, Mill, Bull, Ogilby, and Esmeralda creeks are the same regardless of the water-year type (table 3-30).

Table 3-29. Proposed minimum flows for Alder Creek downstream of the Alder Creek diversion dam. (Source: Settlement, 2003)

Month	Minimum Streamflow (cfs) by Water-Year Type				
	CD	DRY	BN	AN	WET
Oct.	25 or NF	25 or NF	25 or NF	25 or NF	25 or NF
Nov.	5 or NF	5 or NF	5 or NF	5 or NF	5 or NF
Dec.	5 or NF	5 or NF	5 or NF	10 or NF	10 or NF
Jan.	5 or NF	5 or NF	10 or NF	10 or NF	10 or NF
Feb.	5 or NF	5 or NF	10 or NF	10 or NF	10 or NF
Mar.	25 or NF	25 or NF	45 or NF	45 or NF	45 or NF
Apr.	25 or NF	35 or NF	65 or NF	90 or NF	90 or NF
May	25 or NF	30 or NF	55 or NF	75 or NF	75 or NF
June	25 or NF	25 or NF	25 or NF	25 or NF	25 or NF
July	25 or NF	25 or NF	25 or NF	25 or NF	25 or NF
Aug.	25 or NF	25 or NF	25 or NF	25 or NF	25 or NF
Sept.	25 or NF	25 or NF	25 or NF	25 or NF	25 or NF

Note: NF = natural flow

Table 3-30. Proposed minimum flows for SFAR tributaries (other than Alder Creek) downstream of the El Dorado diversion dam, all water-year types.
(Source: Settlement, 2003)

Month	Stream Name and Minimum Streamflow (cfs)					
	Carpenter	No Name	Mill	Bull	Ogilby	Esmeralda
Oct.	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF
Nov.	1 or NF	1 or NF	2 or NF	1 or NF	1 or NF	1 or NF
Dec.	2 or NF	1 or NF	3 or NF	1 or NF	1 or NF	1 or NF
Jan.	2 or NF	1 or NF	4 or NF	1 or NF	1 or NF	1 or NF
Feb.	3 or NF	1 or NF	6 or NF	1 or NF	2 or NF	1 or NF
Mar.	4 or NF	1 or NF	7 or NF	1 or NF	2 or NF	2 or NF
Apr.	5 or NF	1 or NF	6 or NF	1 or NF	2 or NF	2 or NF
May	4 or NF	1 or NF	4 or NF	1 or NF	2 or NF	2 or NF
June	2 or NF	1 or NF	2 or NF	1 or NF	1 or NF	1 or NF
July	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF
Aug.	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF
Sept.	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF	1 or NF

Note: NF = natural flow

Our Analysis

Currently, there are no minimum flow requirements for Alder, Carpenter, No Name, Mill, Bull, Ogilby, or Esmeralda creeks. In Alder Creek, flows of up to 15 cfs are diverted from the stream channel into the El Dorado canal from December 1 through June 15. Flows of up to 10 cfs may be diverted year-round from the remaining tributaries. Flows from these creeks in excess of that diverted to the El Dorado canal are returned to the stream channels located downstream of the diversions.

The lack of a minimum flow release in Alder Creek downstream from the diversion limits the amount and quality of available spawning and rearing habitat for native rainbow trout, the dominant fish species in Alder Creek. In addition, the lack of minimum flow releases downstream from the diversions in Carpenter, No Name, Mill, Bull, Ogilby, and Esmeralda creeks reduces the amount and quality of trout rearing habitat, and, in some

cases, may limit trout and amphibian access into and out of these streams from the SFAR. Alder Creek serves as an important rainbow trout nursery for the SFAR. Most of the smaller diverted tributaries support adult and juvenile rainbow trout and brown trout and are a source of trout recruitment to the SFAR downstream of the Kyburz diversion dam. All of them are a source of BMIs, which serve as food for trout in the tributaries and downstream project reaches. Aquatic habitat in these diverted tributaries could be enhanced by maintaining minimum flows downstream of the El Dorado canal.

IFIM study results for juvenile and adult rainbow trout habitat downstream of the Alder Creek diversion dam show steady gains in WUA as streamflows approach 15 cfs, then moderate (adult) or minor gains with higher flows (figure 3-13).

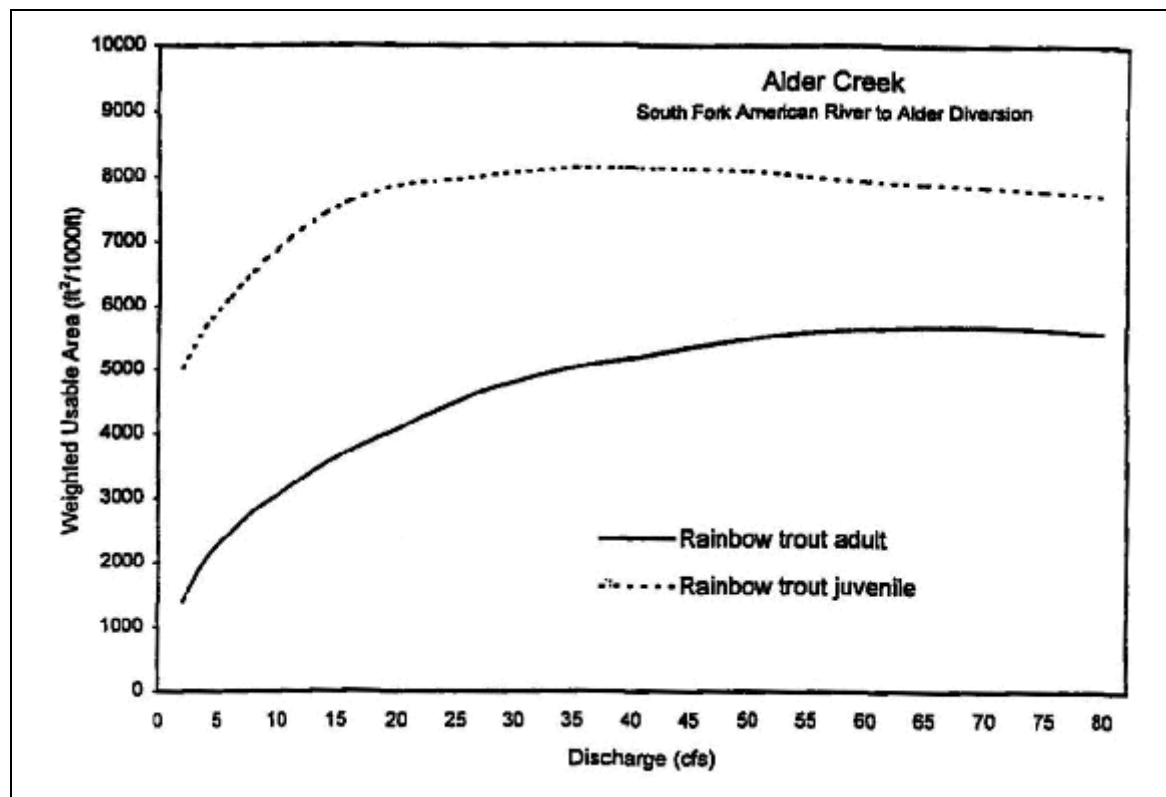


Figure 3-13. WUA for rainbow trout in Alder Creek. (Source: Thomas Payne and Associates, 2000)

The FS and CDFG conducted an evaluation of existing ecosystem conditions, existing and expected pre-project streamflows, and potential limiting factors for aquatic biota in Alder Creek. The results of these and other investigations were used to derive the proposed minimum flows presented in table 3-29. IFIM studies were not conducted for Carpenter, No Name, Mill, Bull, Ogilby, or Esmeralda creeks; however, the FS and CDFG used similar ecological criteria to develop their recommended flows for these streams, which are included in the Settlement.

Based on our review of EID's instream flow study results and of the rationale presented by the agencies, we conclude that the flows proposed for Alder Creek downstream of the diversion would substantially increase the amount of physical habitat (WUA) available to adult and juvenile rainbow trout. Average water temperatures would also likely become more favorable for rainbow trout under the proposed flow regime. We make a recommendation to adopt the proposed flows in Alder Creek. We also recommend the implementation of the proposed flows for Carpenter, No Name, Mill, Bull, Ogilby, and Esmeralda creeks. These minimum flows would enhance physical habitat conditions (including reduction of summer water temperatures) in the stream channel downstream of the diversion structures and would likely increase rearing habitat for both rainbow and brown trout and increase BMI production.

Because changes in minimum flow levels would affect project economics, we present our economic analysis in section 4.0, *Developmental Analysis*, and make our final recommendation pertaining to minimum flows in section 5.2, *Comprehensive Development and Recommended Alternative*.

Ramping Rates

Relatively rapid decreases in streamflow associated with hydroelectric project operations (e.g., changes in generation, diversions from the bypassed reach to the intake canal following powerhouse shutdowns associated with maintenance or unscheduled outages, or annual termination of flows from storage reservoirs) could adversely affect aquatic resources. If water recedes in project-affected reaches faster than what would occur naturally, potential effects can include fish stranding in shallow, low-gradient areas and off-channel habitat (resulting in immediate or delayed mortality); temporary loss of habitat or loss of habitat access; and dewatering of fish redds, amphibians, aquatic insects, and plant life (Hunter, 1992). Relatively rapid changes in streamflow can also affect fish behavior which could reduce survival or growth. In most cases, the faster the reduction in water surface elevation (or stage), the more likely fish and other aquatic organisms are to be stranded or adversely affected. Limits governing the rate and timing of project-induced river stage changes (ramping rates) are often established to protect aquatic organisms from these project-related effects. These ramping rates should be gradual enough to allow fish to move into and out of shallow rearing zones without becoming stranded when flows

decrease.

EID proposes to maintain the existing ramping rates (see tables 3-24 and 3-18), as specified in the Settlement (Section 2). Where facility modifications would be required to provide the specified ramping rates, EID proposes to complete such modifications as soon as reasonably practicable and no later than 3 years after license issuance. EID also proposes to make available to the FS, ERC, and the SWRCB the streamflow records related to implementation of the ramping rates specified in any new license. If the ramping rate criteria are not met, presumably due to factors outside of EID's control, EID proposes to provide notice to the FS, ERC, and SWRCB with 10 days after such an event occurs and a report documenting the reason that ramping rates were not followed within 30 days after such an event occurs.

Our Analysis

Although we have no data about the potential for fish stranding in the project-affected reaches, it is reasonable to assume that fish stranding may occur at the El Dorado Project because it has been documented at numerous hydroelectric projects in the region. Ramping rates, such as those proposed by EID, are often implemented to protect aquatic organisms from rapid, project-induced flow fluctuations.

We agree that the proposed ramping rate criteria would likely continue to protect aquatic resources from project-induced flow fluctuations. We therefore recommend that EID implement the proposed ramping rate criteria for streamflow releases at Echo Lake, Lake Aloha, Caples Lake, and Silver Lake. Because these criteria represent a continuation of existing conditions, development of a plan that specifies how the criteria would be implemented should not be necessary. However, if any structural modifications are proposed to better enable the ramping rate criteria to be implemented, we recommend that EID develop a plan for such modifications prior to modifying any project features. The plan should specify any structural changes that are proposed, the advantages of the proposed modifications over existing ramping rate control measures, the costs of implementing the structural changes, any alternatives that may be more cost-effective (while achieving the objective of minimizing downramping effects), and a schedule for implementing the proposed structural changes. We also recommend that EID make available to the FS, ERC, and SWRCB the streamflow records related to ramping rates and provide notice of any violations of the Commission-approved criteria within 30 days after such a violation occurs. EID should allow a minimum of 30 days for the FS, ERC, and SWRCB to comment on a structural modification plan, if such a plan is deemed necessary, and to make recommendations before filing the plan with the Commission for approval. If EID disagrees with the comments, it should document the rationale behind its alternative using existing literature or site-specific studies. The completed plan should include documentation of agency consultation and any comments on the complete plan.

We present the cost of this measure in section 4.0, *Developmental Analysis*. We discuss our recommendation pertaining to ramping rates in section 5.2, *Comprehensive Development and Recommended Alternative*.

Caples Creek Channel Maintenance, Erosion, and Sediment Transport

Operation of Caples Lake dam affects flows in Caples Creek by reducing stream flows in the spring and increasing stream flows in the summer. It also affects flows to the auxiliary dam spill channel discussed in section 3.3.1, *Water Resources*. This altered flow regime may affect the natural sediment transport characteristics of Caples Creek stream channel downstream of the dam and contribute to the accumulation of fine sediments and, in turn, affect the quality of aquatic habitat. Flushing flows (periodic controlled high flow releases) are often implemented at hydroelectric projects to restore or improve aquatic habitat by removing fine sediment and facilitating spawning gravel transport. However, we only recommend flushing flows in cases where project effects are clearly identifiable.

EID proposes to provide annual 5-day continuous pulsed flows in the natural Caples Creek channel downstream of the Caples Lake dam, timed to correspond to the period of annual peak runoff (Section 4 of the Settlement). The proposed pulsed flows would depend on water-year type, as follows: critically dry, 0 cfs; dry, 150 cfs; below normal, 210 cfs; above normal, 300 cfs; and wet, 345 cfs. If facility modification is needed to provide the specified pulsed flows, EID would make such modifications as soon as reasonably practicable and not later than 3 years from license issuance. Prior to any such modifications, EID would make a good faith effort to provide the specified pulsed flows within the capabilities of the existing facilities.

If after 5 years, the pulsed flows released to Caples Creek are not effectively providing for sediment and bedload transport, the pulsed flows could be increased up to a maximum of 600 cfs or the duration of the releases could be increased to a maximum of 10 days (Section 8 of the Settlement). The effectiveness of the pulsed flows would be assessed based on the fluvial geomorphology monitoring, discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.1, *Water Resources*, and Section 7 of the Settlement. According to the Settlement, the FS, in consultation with the ERC and SWRCB, would make the determination as to whether the pulsed flows should be increased or decreased, or whether the duration should be lengthened. EID proposes to conduct a feasibility study, in consultation with the FS, ERC, and SWRCB, within 2 years of license issuance to determine if the Caples auxiliary dam spillway could be re-designed to convey flows of up to 250 cfs (the difference between the maximum capacity of the existing main dam outlet works, 350 cfs, and the maximum pulsed flow amount, 600 cfs). This study would include a cost estimate for re-designing the auxiliary dam spillway and a cost estimate for re-designing the existing outlet works such that flows of up to 600 cfs could be released directly into the Caples Creek natural channel. Depending on the results of this

feasibility study and the Caples spillway channel stabilization plan, discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.1, *Water Resources*, if additional pulsed flow volume is determined to be needed after 5 years, it could be released to the spillway channel.

EID also proposes to avoid releasing flows greater than 150 cfs into the Caples Creek channel during September through November to avoid harming macroinvertebrates and riparian vegetation (Section 4 of the Settlement). This flow limitation is linked to 7/10 bankfull discharge. If a storm event should prevent EID from meeting this limitation during this period, EID would notify the FS, ERC, and SWRCB within 10 days of such an event, and provide a report documenting the reasons within 30 days of the event. In addition, EID proposes to limit flow releases into the existing Caples Creek spillway channel to no more than 60 cfs (see our discussion in the *Environmental Effects and Recommendations* subsection in section 3.3.1, *Water Resources*).

Our Analysis

Increases in the amount of sediment delivered to a stream channel, in conjunction with decreases in the frequency, magnitude, or duration of peak flow events can greatly impair, or even eliminate, fish and macroinvertebrate habitat and alter the structure and width of the streambanks and adjacent riparian zone. The deposition of finer bedload materials (silt and sand) has also been shown to adversely affect gravel permeability and the suitability of the gravel for spawning salmonids (Everest et al., 1987). Even a resultant small decline in intergravel DO can severely affect the survival of salmonid eggs, salmonid fry (prior to emergence from gravel), and BMIs (Bjornn and Reiser, 1991). Conversely, unseasonably high increases in the frequency, magnitude, and duration of peak flow events (in excess of bankfull) could scour the stream channel, increase channel erosion, and damage aquatic and riparian habitats.

The pulsed flow regime proposed by EID in accordance with the Settlement is designed to mimic the natural hydrograph in Caples Creek and to provide for bedload transport downstream of the Caples Lake dam. The objective of this pulsed flow regime is to maintain or restore “natural” channel conditions and ultimately enhance aquatic and riparian habitat in Caples Creek.

The results of hydrologic modeling for Caples Creek under “Pre-Project” flows (flows in the absence of project facilities), “Existing Project Operations,” and “FS 4(e) conditions (which also represent the terms of the Settlement),” indicate that existing project operations already closely mimic the hydrographs based on simulated, pre-project (natural) flows. In fact, under existing conditions, the project does not eliminate or substantially reduce the frequency and magnitude of peak flows in this reach. In addition, aquatic habitat conditions downstream of the Caples Lake dam do not appear to be adverse

for trout and other aquatic organisms. The stream channel is relatively stable (Entrix, 2002), spawning substrate is abundant and not embedded, and the reach supports a relatively healthy population of adult and juvenile salmonids. Although the existing BMI community in this reach is less diverse than that found in higher gradient stream reaches, this result is not unexpected for a lower gradient depositional reach with relatively low water temperatures.

For these reasons, we do not consider 5-day pulsed flows in this reach to be warranted. We would generally only recommend implementation of flushing flows beyond those that already occur if project-related effects are clearly identifiable. However, we recognize that the terms of the Settlement represent the results of extended negotiations with appropriate stakeholders, and we would therefore not object to the implementation of scheduled pulsed flow events during other than critically dry years, if such releases would not occur under the existing operating regime. If the results of the geomorphological monitoring suggests that sediment and bedload transport could be enhanced with increased volume or duration of pulsed releases, the Commission would need to approve any such operational changes.

We conclude that EID's proposed feasibility study to assess whether the Caples Lake auxiliary dam spillway could be modified to release up to 250 cfs and whether the main dam outlet works could be re-designed to release up to 600 cfs is not needed. If EID proposes to implement such major modifications at either the main dam or the auxiliary dam, a license amendment would be needed. EID's proposed feasibility study could then serve as an appropriate support document for its application to amend its license. As discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.1, *Water Resources*, we now agree with the proposed 60 cfs restriction of flow to the spillway channel to minimize the potential for additional erosion to this channel, as specified in the Settlement. We consider it premature to consider modifications to the auxiliary dam spillway to release up to 250 cfs to the spillway channel, prior to implementing appropriate measures to stabilize the existing erosion sites. Until the need to release pulsed flows of up to 600 cfs to the Caples Creek natural channel is established, we do consider studies to determine how this could be accomplished to be warranted. However, we recognize that the Settlement represents the results of extensive negotiations among appropriate stakeholders, and therefore would not object to the completion of EID's proposed feasibility study.

Under existing operations, flow releases from Caples Lake substantially increase flows in Caples Creek during the months of September, October, and November (over "natural" pre-project conditions). As discussed above, unseasonably high flows sometimes degrade channel banks and hinder the growth and establishment of woody and herbaceous riparian species. Unseasonably high flows can also displace macroinvertebrates and juvenile fish and affect the abundance of periphyton (Hynes, 1970).

We expect that limiting fall flow releases to 150 cfs (7/10 bankfull), as proposed by EID, would maintain or enhance a healthy riparian vegetative community (see section 3.3.3, *Terrestrial Resources*) and potentially improve habitat conditions for aquatic organisms. Therefore, we make a recommendation that EID restrict its September, October, and November Caples Creek releases to 150 cfs (7/10 bankfull levels), when flows are under its control. EID's original estimation of bankfull flow did not agree with the flow restriction of 150 cfs specified in the Settlement (as articulated in EID's letter to the Commission dated November 27, 2002). EID suggested that flows of 150 cfs would overtop the banks of Caples Creek and not achieve the intended objective of creating a more stable habitat during the fall. Consequently, we also originally recommended that EID resolve the appropriate level for the restriction by consulting with the FS and CDFG if a fall flow restriction is implemented. However, although EID agreed to the terms of the Settlement, which specifies a fall flow restriction of 150 cfs, no basis is provided in the Settlement that would assure us that restricting flows to 150 cfs in the fall would not overtop the banks, as EID asserted in its November 27, 2002, letter to the Commission. Therefore, we recommend that EID provide documentation that the agreed-upon flow of 150 cfs would result in about 7/10 bankfull conditions in the Caples Creek natural channel. This documentation should be included in our recommended streamflow and water level monitoring plan (see the *Environmental Effects and Recommendations* subsection in section 3.3.1, *Water Resources*).

Fish Access to Streams

Waterfalls, diversion dams, debris jams, improperly placed culverts, low flows, and poor water quality can prevent or delay fish migration into and out of preferred habitats, including critical spawning and rearing habitat (Bjornn and Reiser, 1991). Maintaining access to these preferred habitats, if blocked by project-related obstructions, would benefit existing fish populations.

EID does not propose any measures to promote fish access into project area tributaries; however, the recently reconstructed El Dorado diversion dam includes a new fish ladder that meets CDFG criteria for upstream fish passage.

Trout Unlimited recommended in its October 30, 2002, letter to the Commission that future license conditions "promote fish access to tributaries for spawning purposes."

Our Analysis

We agree with Trout Unlimited's original recommendation to promote fish access into tributaries for spawning, to the extent that any obstructions are project-related. However, we are not aware of any such obstructions in project-influenced streams. Surveys conducted by EID have documented spawning in most of the major tributaries to the SFAR.

Without identifying specific problem areas to address, we cannot assess the potential costs and benefits associated with addressing any such problems. Because Trout Unlimited is a signatory party to the Settlement, and this measure was not directly included in the Settlement (although some of the Settlement measures, such as increased minimum flows, would indirectly facilitate fish access to tributaries), we consider this recommendation to be withdrawn.

Entrainment

Seven relatively small tributaries to the SFAR (Alder, Carpenter, Mill, Ogilby, Bull, No Name, and Esmeralda creeks) are diverted into the El Dorado canal using feeder conduits with manually operated gates. Because none of these diversion structures are equipped with screens (with the exception of the 3-inch clear-spaced trashrack at the Alder Creek diversion structure), fish in these small streams could be entrained into the canal along with the diverted flow. During our site visit on August 15 and 16, 2002, we observed numerous adult rainbow trout in the El Dorado canal between the El Dorado diversion dam intake and Carpenter Creek. These fish most likely entered the canal via the unscreened tributary feeder conduits or prior to the completion of the El Dorado diversion dam fish screen. Once in the El Dorado canal, fish either remain in the canal or forebay, move back into the tributaries, enter EID's consumptive water conduit system, or pass through the project turbines. Fish that enter the forebay could contribute to the recreational fishery (there is a small day-use area at the forebay). Fish that pass through the project turbines are either killed, injured, consumed by other fish in the tailrace, or survive and add to the fish population downstream of the powerhouse.

EID proposes to develop a plan for screening the diversion structures at Carpenter and Alder creeks to exclude all life stages of trout (Section 9 of the Settlement). The plan would be developed in consultation with the SWRCB and ERC, and approved by the FS and CDFG before being submitted to the Commission within 180 days of license issuance.

Our Analysis

Rainbow trout residing in the small diverted tributaries are vulnerable to entrainment at the unscreened diversions to the canal. Fish population surveys completed between 1998 and 2002 documented trout presence in six of the seven diverted streams (see table 3-23). In 2001 and 2002, rainbow trout were captured above the diversions in Esmeralda, Ogilby, Mill, Alder, and Carpenter creeks. In most cases, the highest densities were observed above the tributary diversion structures. Because these five streams have trout populations that may be subject to entrainment, we limit our consideration of screening to them.

Alder Creek is by far the largest of the tributaries that support trout above the project diversions, with the mean annual flows ranging from 5.6 cfs in 1924 to 85 cfs in

1950. The other four diverted tributaries are considerably smaller than Alder Creek and dry up in at least some years, even when their flows are not diverted to the canal. However, of these four streams, Carpenter Creek has by far the most average trout biomass, 51 pounds per acre (including brown trout), upstream of the diversion point (see table 3-23). EID points out in its letter to the Commission dated May 16, 2003, that of these four streams, only Carpenter Creek has a moderately high amount of spawning habitat, which apparently contributes to the good trout production upstream of the diversion point. The remaining three streams provide only a limited amount of salmonid spawning and rearing habitat. The lower reaches of Esmeralda, Ogilby, and Mill creeks also have steep gradients that limit, or may limit, the upstream migration of trout from the SFAR. Because of their relatively small size and limited amount of available habitat, entrainment at Esmeralda, Ogilby, and Mill creeks probably does not have a substantial adverse effect on fisheries resources in the SFAR basin. We therefore do not recommend screening the diversions in Esmeralda, Ogilby, or Mill creeks. However, as previously noted, any trout that should enter the intake canal from these three streams are not necessarily lost as a fisheries resource. They may contribute to the catch of anglers that fish at the recreational area at the project forebay or, if successfully passed through the project powerhouse, anglers on the SFAR downstream of the powerhouse.

Unlike Esmeralda, Ogilby, and Mill creeks, Alder and Carpenter creeks contain an appreciable amount of high-quality salmonid spawning and rearing habitat. They also support a relatively healthy population of native rainbow trout both above and below the diversion. Although spawning gravel is limited in many portions of the SFAR, gravel is plentiful in the lower gradient reaches of Alder Creek that begin about 2.5 miles upstream of the confluence with the SFAR. Based on EID's comments on the draft EIS, Carpenter Creek apparently also has a reasonable amount of available spawning gravel. Because of this, it is likely that Alder and Carpenter creeks serve as important sources of native rainbow trout to the SFAR. Screening the Alder Creek and Carpenter Creek diversions would prevent rainbow trout from entering the intake canal and allow these fish to contribute to the fishery in both lower Alder and Carpenter creeks, where they could be caught by anglers at the Alder Tract or Sand Flat Campground, and the SFAR.

To protect rainbow trout in Alder and Carpenter creeks, we make a recommendation that EID, in consultation with the FS, ERC (including the CDFG), and SWRBC, complete and submit to the Commission for approval, within 180 days of license issuance, an Alder and Carpenter creek diversion screening plan that includes: (1) functional design drawings illustrating the dimensions and operational details of the screens; (2) proposed operation and maintenance procedures for the screens, including measures to reduce the potential for trout impingement; (3) the expected cost of the facilities; and (4) a schedule for installing the screens.

We present the cost of this measure in section 4.0, *Developmental Analysis*. We

discuss our final recommendation pertaining to fish screening at the diverted streams in section 5.2, *Comprehensive Development and Recommended Alternative*.

Fish Monitoring

To sustain or restore fish populations in rivers and streams requires adequate streamflow (i.e., water depth, water velocity, and habitat space), sufficient spawning habitat (spawning gravel), sufficient rearing habitat, appropriate food sources at different life stages, and proper environmental conditions (particularly water temperature, DO, and turbidity) (Bjornn and Reiser, 1991). It is likely that a new license for the El Dorado Project would include a number of recommended measures that would change aquatic habitat conditions in the project-affected river and stream reaches. These altered habitat conditions could affect the distribution and abundance of rainbow trout, brown trout, brook trout, and hardhead. Rainbow trout, brown trout, and brook trout are FS management indicator species for the Eldorado National Forest and important game species of the SFAR basin, and hardhead is a FS sensitive fish species. Fish population monitoring is often conducted to determine if environmental measures, like those proposed in the Settlement, provide the desired level of protection and enhancement for target fish species and aid in the development of responsive management strategies. Monitoring is typically based on the presence or absence of particular species, numbers of particular species, or on community parameters (such as productivity, density, and diversity) and is usually conducted over multiple years.

EID proposes to implement a fisheries monitoring program using its 1998 through 2002 survey methodology (Section 7 of the Settlement). The program would include multi-pass depletion electrofishing (fish sampling) and, in some cases, snorkeling observations, at the following six sites during years 5, 6, 10, 11, 15, 16, 20, 21, 25, 26, 30, and 31 from license issuance:

- Echo Creek near Highway 50 (site EC1);
- Pyramid Creek near Twin Bridges (site PY1);
- Caples Creek downstream of Kirkwood Creek (site CA3);
- Silver Fork at Forgotten Flat (site SV4);
- SFAR below Carpenter Creek (site SO2); and
- Alder Creek downstream of the diversion (site AR1).

EID proposes to monitor at an additional snorkel survey and electrofishing site

located upstream of the Akin powerhouse and downstream of the confluence with Silver Creek in the reach where hardhead have been observed for 3 years. This additional monitoring would provide data for the FS, ERC, and SWRCB to derive hardhead biomass indices for determining habitat quality during subsequent monitoring (at the above listed frequency). The fisheries monitoring program would provide a means to document whether fish biomass indices for rainbow trout decreased by more than 20 percent from the means developed from sampling efforts conducted in 1998, 1999, 2000, 2001, and 2002. The target biomass indices included in Appendix B of the Settlement were developed by taking the mean biomass of rainbow trout collected from 3 years of electrofishing at each site.

EID proposes to implement an ecological adaptive management program (Section 8 of the Settlement). This program would identify measures that could be implemented if the monitoring program (which would include fish monitoring as well as the other ecological monitoring) and other scientific information indicate that applicable ecological resource objectives are unlikely to be met without adjustment of the initial streamflows and other initial conditions. EID proposes to establish an ERC, within 90 days of license issuance, in consultation with the signatory parties to the Settlement, for the purpose of assisting EID in the design of monitoring plans, review and evaluation of data, and preparation of adaptive management measures for implementation by EID. EID would provide to the FS, ERC, SWRCB, and the Commission by June 30 of each year, an annual report of the activities of the ERC. EID would also file with the Commission by June 30 of each year, a report that describes all monitoring efforts for the previous year, allowing the FS, ERC, and SWRCB at least 30 days to review and comment on the report before submitting it to the Commission. EID would provide notice to the Commission within 30 days of any decisions by the FS, ERC, or SWRCB that result in changes to project operations. The FS, ERC, and SWRCB have the flexibility to (1) alter the monitoring methods if better methods are identified and (2) reduce or terminate any monitoring (including fish monitoring) if the relevant ecological resource objective has been met or no change in resource response is expected. Finally, EID proposes to meet with the FS, CDFG, and SWRCB by April 1 of each year to review the results of implementing all license conditions that pertain to ecological resources (Section 15 of the Settlement). EID would make available to the participants, prior to these meetings, an operations and maintenance plan for the year in which the meeting occurs.

AW recommended in its letter to the Commission dated October 17, 2002, that EID gather information on the relationship between amount and timing of whitewater releases and aquatic biota, and document each scientific or other analytical method used to interpret data and reach conclusions. AW does not specify the methods or target organisms to be evaluated in its recommended monitoring program. AW is a signatory party to the Settlement, and we therefore consider the terms of the Settlement to replace AW's original recommendation.

Our Analysis

We agree that it is appropriate to conduct fish monitoring to determine if management objectives are being met because the continued operation of the El Dorado Project would alter existing aquatic habitat conditions in the project area and potentially affect the distribution and abundance of fish populations. However, we note that there are many factors, in addition to project operations, that could affect the distribution and abundance of fish populations in streams. These include, but are not limited to, abnormally high flow events, prolonged droughts, extreme temperatures, debris avalanches, biotic interactions (i.e., competition and predation), angler harvest, stocking strategies, sampling mortality, and disease. Even in relatively undisturbed watersheds the abundance of salmonids can vary dramatically from year to year (House, 1995). This annual variation is clearly evident in the baseline fish population data collected by EID in 1998, 1999, 2000, 2001, and 2002 (EID, 2002b; EID, 2002d). Therefore, we conclude that any fish monitoring plan for the project should be designed as much as possible to allow project operational effects to be identified and distinguished from non-project-related effects. This is important because to amend a project license to modify the minimum flow releases (or recommend other measures), the Commission must be able to determine whether or not project operations (in this case, lack of an adequate instream flow release) are causing an adverse effect on the monitored fish population.

Given the number of potential factors affecting fish abundance in the project area, we do not yet endorse the use of biomass indices alone to determine the success or failure of a particular enhancement measure (as the Settlement specifies). We are in agreement that sampling during the fifth and sixth year from license issuance would provide a measure of the fish communities' response to the proposed flow regime. The rationale provided in the Settlement for not sampling for more than 2 years in a row is that it would reduce electroshocking effects on individuals (which could influence the monitoring results). We agree with this rationale as long as the FS, ERC, and SWRCB take into account the potential variability that is inherent when conducting only 2 years of post-treatment monitoring to ascertain effects of the initial measures on fish populations. We do not anticipate any proposals for substantial alterations to the flow regime based on limited monitoring results. However, trends are likely to be evident in fish populations when the first 2 years of monitoring are compared with the second 2 years (during years 10 and 11) as well as baseline data already collected. The Commission would not typically recommend the adjustment of the initial recommended streamflows and other initial conditions unless there are clearly demonstrated project-related adverse effects on fish populations. We consider it unlikely that continued monitoring of fish after year 11 would yield additional meaningful data, unless a flow regime change is implemented during the first 11 years of the new project license. However, the provision in the Settlement to allow monitoring to be terminated if resource objectives are being met or no further change is expected should avoid the potential for unnecessary monitoring.

Although we agree that management of native species should be a priority, we also suggest that limiting the evaluation species to just rainbow trout and hardhead (in the reach where hardhead are located), as proposed in the Settlement, would ignore interactions with non-native species (i.e., brook trout and brown trout) or shifts in species relative abundance. Consequently, we suggest that it may be more appropriate to include all salmonid, and perhaps other species, in the criteria used to monitor achievement of management objectives.

We make a recommendation that EID develop a fish monitoring plan in consultation with the ERC, FS, and SWRCB. We agree that the seven stations specified by the CDFG should be sufficient to monitor the effects of project operations on fish populations. The plan should be developed and filed with the Commission for approval within 90 days of license issuance. A draft plan should be distributed to the consulted entities who should be allowed at least 30 days to comment on the plan. The final plan should incorporate consulted entity recommendations, or explain why they were not incorporated into the plan, and include a detailed description of the ecological resource objectives for fish populations in the project area. Following the monitoring specified in the Commission-approved plan, EID should develop a report, in accordance with the provisions of the Settlement, and file it with the Commission, documenting the results of the fish monitoring and any recommended flow release modifications or follow-up actions. The Commission would use this report as a basis to consider potential license amendments that pertain to fish populations in project-affected waters, as appropriate.

We agree that the formation of an ERC, which could include all signatory parties to the Settlement, would represent a reasonable forum for reviewing and making recommendations that pertain to adaptive management of project-related resources. These entities are familiar with the intricacies of the relationship of project operations to affected environmental resources because of their participation in the collaborative process. However, the Commission does not have the authority to require that any party other than EID participate in the ERC. Consequently, we recommend that EID invite the other signatory parties to participate in the ERC.

EID's proposed annual April 1 meetings with the FS, CDFG, and SWRCB to discuss license conditions that pertain to ecological resources would provide a forum to review whether implementation of license conditions are having the expected ecological benefits and would enhance the communication that would be necessary to implement EID's proposed adaptive approach to ecological management. However, we can envision circumstances, especially after the first 10 years of operation under the terms of a new license, where such meetings would no longer be necessary because the ecosystem that is influenced by project operations has reached equilibrium. Although we encourage EID to meet with the FS, CDFG, and SWRCB to discuss project operations as needed, we do not consider it appropriate to mandate that this meeting occur every year and therefore do not

recommend that this meeting be required as a condition of any new license that may be issued for this project.

Scheduled whitewater boating releases, like those discussed in section 3.3.5, *Recreational Resources*, can have unintended adverse effects on aquatic biota. During flow releases, fish and other aquatic organisms could be flushed from preferred habitats, or stranded along the margins of the stream (as flows recede). Release flows could also scour redds (spawning nests), affect spawning success, and alter water temperatures and water quality. We do not recommend implementation of scheduled whitewater releases. Because AW is a signatory party to the Settlement, we consider the need to conduct studies to assess the effects of scheduled whitewater releases to be resolved.

We discuss the cost of our recommended fish monitoring program in section 4.0, *Developmental Analysis*. We present our final recommendation pertaining to fish monitoring in section 5.2, *Comprehensive Development and Recommended Alternative*.

Macroinvertebrate Monitoring

The composition of the BMI community is influenced by many factors including temperature, flow, DO, nutrients, and the structure of the habitat. As is the case for fish populations, the continued operation of the El Dorado Project could alter the existing BMI community in the SFAR and its tributaries through direct effects on their habitat. A decrease in the abundance or radical change in the composition of the existing BMI community could diminish the trout and non-game fish species food base and potentially alter the composition of other components of the ecosystem (FISRWG, 1998). Conversely, an increase in abundance and diversity of BMIs could have a beneficial effect on the ecosystem.

EID proposes to implement a BMI monitoring program using the same California Rapid Bioassessment Protocol methodology described in the draft BMI sampling program (EID, 2002c). The goal of this monitoring program would be to determine if the ecological resource objectives associated with recommended measures are being met. The proposed sampling frequency would be the same as for the fish monitoring, discussed above, at the following project-affected sites:

- Echo Creek (ECB1);
- Pyramid Creek (PYB1);
- Caples Creek (CAB1);
- Silver Fork (SVB2);
- SFAR (SOB1);
- Carpenter Creek (CRB1 and 2);
- No Name Creek (NNB1 and 2);

- Alder Creek (ARB1 and 2);
- Mill Creek (MLB1 and 2);
- Bull Creek (BUB1 and 2);
- Ogilby Creek (OGB1 and 2); and
- Esmeralda Creek (ESB1 and 2).

The CDFG also recommends sampling at the following reference sites:

- Strawberry Creek (SBB1);
- Sherman Canyon Creek (SHB1); and
- Woods Creek (WCB1).

The results of the BMI would provide a basis for EID, the FS, ERC, and SWRCB to evaluate whether ecological resource objectives are being met, and if not, if corrective actions should be taken (as described under fish monitoring).

Our Analysis

BMIs have several characteristics that make them potentially useful indicators of water quality and overall stream health. They are relatively non-mobile, and thus well suited for assessing site-specific effects. They are also abundant in most streams, and sampling is relatively easy and inexpensive. Finally, the sensitivity of aquatic insects to habitat changes makes them excellent indicators of overall environmental quality. Disadvantages of monitoring BMIs include a high degree of variability within or between sites. This variability can be reduced by carefully selecting sampling methodologies and sampling sites.

A new license for the El Dorado Project would likely include a number of measures that would alter habitat for BMIs. Therefore, we agree that it is appropriate to monitor BMIs to determine if the original objectives of measures designed to enhance aquatic habitat that may be specified in a new license are being met, and provide a basis to adjust these measures, if necessary. We also agree that monitoring should be conducted for 2 consecutive years after the first 5-year period of operation under the flow regime specified in any license issued for this project, and if necessary, during subsequent 2 year periods in accordance with the schedule defined in the Settlement. Any such monitoring plan should address how potential non-project-related effects on the BMI community, such as abnormally high flows due to natural storm events, would be assessed and isolated from project-related effects. However, we conclude that, if flows are not adjusted after the initial 5-year release period (monitoring results indicate that objectives are being met), further BMI monitoring should be unnecessary, and the terms of the Settlement provide a reasonable approach for determining if further BMI monitoring is warranted.

We make a recommendation that EID develop a BMI monitoring plan in consultation with the FS, ERC, and SWRCB and in accordance with the provision of the Settlement. Implementation of the plan should be coordinated with the previously discussed fish monitoring plan. The plan should be developed and filed with the Commission within 90 days of license issuance.

We discuss the cost of our recommended monitoring program in section 4.0, *Developmental Analysis*. We present our final recommendation pertaining to BMI monitoring in section 5.2, *Comprehensive Development and Recommended Alternative*.

Esmeralda Creek Channel Restoration

Esmeralda Creek is one of seven small tributaries diverted directly into the El Dorado canal. Directly upstream of the Esmeralda Creek diversion structure, EID has modified the stream channel by creating a pool to facilitate water diversion into a corrugated metal half pipe. Water is either diverted into the canal or allowed to spill from the pipe and flow downstream from the canal. According to the FS, there is no discrete stream channel in which water from Esmeralda Creek flows, though there are remnant channels and an emergency spill channel for release from the canal.

EID proposes to survey the portion of Esmeralda Creek located on National Forest System lands and develop a plan that is approved by the FS for the restoration of the stream channel. EID would implement the plan within 5 years of license issuance.

Our Analysis

Esmeralda Creek supports a small population of rainbow trout both above and below the project diversion structure (table 3-23); however, the braided channel conditions downstream of the diversion structure may be limiting the production of trout and BMIs. We conclude that the degraded channel conditions downstream of the intake canal are project-related. Therefore, we make a recommendation that EID develop and implement a plan, in consultation with the FS, to restore a single channel downstream of the El Dorado canal. As discussed previously under *Instream Flows*, concentrating the flows into one channel and increasing the base flows in the reach would improve habitat for trout and other aquatic organisms and lead to a healthier functioning ecosystem.

We discuss the cost associated with this measure in section 4.0, *Developmental Analysis*, and make our final recommendation in section 5.2, *Comprehensive Development and Recommended Alternative*.

Project Decommissioning

Under the decommissioning with dam removal alternative, the Commission would no longer have jurisdiction over the EID facilities. All project operations would cease, and the dams located on Echo Lake, Lake Aloha, Caples Lake, Silver Lake, the SFAR, and the small diverted tributaries would be removed. All other project structures (canals, conduits, tunnels, penstocks, etc.) would remain in place.

Removing the dams on Echo Lake, Lake Aloha, Caples Lake, and Silver Lake would decrease the size of the existing reservoirs to pre-project levels, and affect the flow and water temperature regimes in Caples Creek, Pyramid Creek, Oyster Creek, and the SFAR. Immediately following dam removal, the erosion of fine sediments that have been deposited in the exposed portion of the reservoirs would increase turbidity in the project affected stream reaches and lakes. Although anticipated turbidity levels are difficult to predict, high turbidity levels (in the 25- to 50-NTU range) are known to reduce the growth of some salmonids, cause emigration, and disrupt social behavior (Bjornn and Reiser, 1991). These effects, which could extend for several years, would adversely affect existing fish habitat and fish populations. As a result, the existing recreational fishery would also be influenced. Following this initial period of instability, we anticipate that turbidity levels would return to background levels.

The reduction in lake volume associated with dam removal would decrease the total wetted habitat area for fish in Caples Lake, Lake Aloha, and Echo Lake (both upper and lower); however, as new littoral zones and aquatic macrophytes become established around the lakes, aquatic habitat conditions could improve because a more stable environment would develop after elimination of lake level fluctuations. Instream flow conditions in Caples Creek, Pyramid Creek, and the SFAR would return to pre-project levels leading to a decrease in summer flows and an increase in winter and spring flows compared to existing conditions. Stream processes such as sediment transport, large organic debris (LOD) transport and deposition, and nutrient input would also be restored to pre-project levels. The restoration of these natural ecosystem processes would likely improve habitat conditions for native fish species. The return to a pre-project water temperature regime could also benefit native fish populations.

Decommissioning the project and leaving the dams and associated project facilities in place would minimize the sediment-related effects associated with dam removal; however, these structures would continue to block fish migration and the movement of sediment, LOD, and nutrients. The water temperature regime would likely approach pre-project conditions.

Retaining only those project facilities that would be necessary to deliver water for consumptive use (i.e., the El Dorado diversion dam and canal as well as some level of reservoir storage) would continue to affect instream flows in the SFAR below the diversion dam, and in the stream reaches(s) needed to convey water to the SFAR. Fish passage in the

SFAR (habitat connectivity) would continue to depend on the diversion's existing fish screen and fish ladder; however, effects on fish populations would be minimal compared to existing conditions. Diversion of flows from tributaries into the canal for consumptive use would likely continue to occur, and fish and BMI populations would continue to experience existing effects.

3.3.2.3 Cumulative Effects on Coldwater Fishery Resources

Operation of the El Dorado Project has altered the quality and quantity of aquatic habitat in the upper SFAR basin. Depending on season, the diversion of water for hydroelectric generation and consumptive uses has substantially reduced or increased flow volumes in the project-affected reaches and altered "natural" water temperature regimes.

In addition, project operations have adversely affected channel conditions in Esmeralda Creek and have created erosion problems in the Caples Lake spill channel. Sedimentation from this spill channel erosion, combined with sedimentation that may originate from planned construction at the Kirkwood Resort and enter Caples Creek from Kirkwood Creek, could cumulatively affect trout spawning habitat if the combined sediment load settles on spawning gravel. Our recommended measures to monitor and stabilize the spill channel erosion should minimize this potential cumulative effect.

Although the fish screen at the El Dorado canal intake should prevent the entrainment of most fish into the canal, the potential for rainbow trout entrainment still exists at the unscreened diversions on Alder Creek and on several smaller tributaries. Entrainment at these diversions would be expected to occur with or without the El Dorado Project because water from the canal would continue to be used for consumptive purposes. Installation of fish screens at the Alder Creek diversion dam and at the Carpenter Creek diversion, would minimize entrainment-related losses, benefitting the Alder Creek, Carpenter Creek, and SFAR trout fisheries.

Several of the measures included in our recommended alternative are expected to provide benefits to trout, and thus increase their abundance in the project area. Modified minimum flow releases in the SFAR, Caples Creek, Alder Creek, Echo Creek, Pyramid Creek, the Silver Fork, and several small tributaries would increase the amount of physical habitat that is available to trout and enhance summer water temperatures in some reaches. Increasing the flows in Echo Creek would translate to increased flows in the Upper Truckee River, which flows through the community of South Lake Tahoe, a popular tourist destination. Therefore, if increased flows translate to increased trout production in the Upper Truckee River, they could enhance angling opportunities. Finally, monitoring fish and BMI populations in the project area would ensure that the agency's aquatic resources objectives for the project area are being met and allow the above measures to be adjusted, if necessary.

3.3.2.4 Unavoidable Adverse Effects

Even with screens in place, the diversions on the SFAR at the canal intake and on the small diverted tributaries to the SFAR have the potential to entrain rainbow trout and other fish that may occur in these streams. After entering the El Dorado canal, these fish either reside in the canal, move into the forebay, pass into EID's consumptive use flow system, or pass through the project turbines (where they are subject to turbine related injury or mortality). We conclude that the expected loss of this small number of fish from turbine mortality is not likely to have population level effects, and we conclude that the overall effect is minor.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

Vegetation

The project area's varied elevation and geological characteristics support a diversity of vegetation types. Plant communities within the project area include coniferous forest, riparian, oak woodland, chaparral, and meadow. We describe specific information on vegetation associated with the tributaries, SFAR, reservoirs, and other project features in the following section.

Pyramid Creek, Caples Creek, and the Silver Fork convey water from the reservoirs to the SFAR. Pyramid Creek is an unvegetated bedrock channel where it originates at the south end of Lake Aloha and flows through a series of lakes surrounded by barren landscape. Coniferous forest and chaparral are present along the lower portion of the creek. Caples Creek and the Silver Fork flow through a variety of habitats, including red fir forest, mixed coniferous forest, barren slopes, montane riparian, and meadow habitats.

Echo Creek flows from Echo Lake into the upper Truckee River. In the vicinity of the lake, the creek supports riparian vegetation of mountain alder, dusky willow, mountain ash, red elderberry, and dogwood.

The project-affected portion of the SFAR from the Echo Lake conduit to the diversion dam passes through red fir forest, mixed coniferous forest, and wet meadow. The channel consists of boulders and bedrock with sparse patches of riparian vegetation restricted to pockets that are not heavily scoured by high-flow events. Riparian vegetation along the SFAR is dominated by alders, willows, big-leaf maple, and dogwood.

Vegetation in the vicinity of the diversion dam consists primarily of mixed coniferous forest. This forest type is characterized by a multi-layered, mostly closed

canopy of incense cedar, Douglas fir, ponderosa pine, white fir, and black oak. Scotch broom, a noxious weed, was present on the north side of the SFAR at the diversion dam site prior to its reconstruction in 2001. EID agreed to remove scotch broom from this location after the reconstruction. The bypassed reach from the diversion dam to the powerhouse has a bedrock and boulder channel with limited riparian habitat, composed of white alder and willow, in areas protected from scouring spring flows. Vegetation along the reach is dominated by mixed coniferous forest.

Vegetation along the El Dorado canal is dominated by mixed coniferous forest and chaparral. The segment between Alder and Bull creeks burned in 1992 and is characterized by a dense cover of early successional scrub of deer brush, buck brush, mountain whitethorn, and manzanita. Tree planting has occurred over much of the area, and the Eldorado National Forest has administered herbicide applications to reduce shrub cover and promote favorable conditions for conifer seedling recruitment. The canal sections upstream of Alder Creek and downstream of Bull Creek are dominated by a multi-layered, mostly closed canopy coniferous forest of Douglas fir, white fir, ponderosa pine, sugar pine, and incense cedar. Black oak and interior live oak are also present, and the understory openings in the forest consist of deer brush, buck brush, mountain whitethorn, huckleberry oak, snow berry, serviceberry, and manzanita.

Riparian vegetation is present at the various tributary diversions along the canal. The site of the Carpenter Creek diversion supports white alder with an overstory of Douglas fir and incense cedar. Vegetation within the channel is sparse due to the steep gradient and bedrock. Riparian vegetation below the diversion to the canal has been lost, likely as a result of recreational use associated with the nearby Sand Flats Campground.

Vegetation at the Alder Creek diversion is restricted to areas protected from scouring and where sediments have collected behind bedrock and boulders. Tree cover consists of white alder, big leaf maple, and canyon live oak. Himalayan blackberry and California grape form dense thickets on the banks.

Vegetation at the Mill Creek diversion was burned in the 1992 fire, but big leaf maple and white alder are becoming established along the banks.

Vegetation at the Bull Creek diversion is dominated by dense conifers, with a sparse understory of thimbleberry, wild rose, hazelnut, and dogwood. The channel is mostly unvegetated, and high flows appear to preclude establishment of vegetation.

Vegetation at the Ogilby Creek diversion is dominated by dense tree cover of Douglas fir, dogwood, big leaf maple, and incense cedar. Understory vegetation is nearly lacking, and the channel below the diversion is very steep with a boulder and bedrock substrate, limiting the potential to support riparian vegetation.

Vegetation in the vicinity of the Esmeralda Creek diversion varies between above and below the canal. Above the canal, the channel is in a relatively broad floodplain. White alder is the dominant tree in this area, in association with incense cedar, Pacific yew, black oak, and big leaf maple. There is a dense understory of blackberry, dogwood, and hazelnut. Downstream of the canal, the channel is in a steep canyon with a dense coniferous overstory. The understory is sparse, and riparian species are limited to dogwood and big leaf maple.

The powerhouse and penstock are on steep slopes along the SFAR. Interior live oak forest occurs on the rocky slopes above the powerhouse. Interior live oak dominates, in association with black oak, canyon live oak, California buckeye, and Douglas fir. There is a shrubby understory of green leaf manzanita, buck brush, and deer brush. Herbaceous species are present where shrub cover is absent. The channel below the powerhouse is lined with bedrock and cobble, with little vegetation.

Lake Aloha is primarily surrounded by barren granite with little vegetation cover. Species present in these barren areas include scattered lodgepole pines and small isolated patches of herbaceous vegetation, including heather, lupine, and penstemon. A patch of subalpine coniferous forest, dominated by red fir, is present at the southeastern end of the lake. Other coniferous species in this forested area include mountain hemlock and lodgepole pine. Shrubby vegetation, such as huckleberry oak and spiraea, is present at forest openings.

Echo Lake is surrounded by subalpine coniferous forest, barren slopes, chaparral, and meadows. Forested areas include lodgepole pine, red fir, and mountain hemlock. Barren slopes with scattered lodgepole pines dominate the shoreline, particularly on the northern shore. Sierra juniper, red fir, and herbaceous vegetation are also scattered on these barren slopes. Chaparral, dominated by huckleberry oak, occurs on south-facing slopes where barren slopes transition into soil substrates. Other chaparral shrubs include pinemat manzanita and mountain whitethorn. Wet meadow areas are primarily on the western side of upper Echo Lake. These areas include willow/alder thickets, aspen, and rushes, sedges, and grasses.

Caples Lake is primarily surrounded by subalpine coniferous forest, with lodgepole pine dominating the shoreline and red fir on surrounding slopes. Limited riparian vegetation, including Lemmon's willow and aspen, is present along the shore and where tributaries enter the lake. Barren areas are present along the northwestern shoreline, with scattered lodgepole pine and red fir and small patches of herbaceous vegetation.

Silver Lake is primarily surrounded by subalpine coniferous forest and barren slopes. Coniferous forest is dominated by red fir, with lodgepole pines interspersed, particularly at the shoreline. A shrubby understory of spiraea, gooseberry, and serviceberry

is also present. The southern end of the lake supports a wet meadow with scattered willow thickets.

Wildlife

The varied elevation vegetation communities of the project area also support a diversity of wildlife species. Alpine habitats support a relatively low diversity and abundance of wildlife species due to the harsh conditions. However, a number of species are well adapted to this environment and many exploit it on a seasonal basis, migrating downslope to avoid harsh winters. The coniferous forest in the project area is expected to support various species of nesting birds, including blue grouse, Stellar's jay, western wood-pewee, western tanager, yellow-rumped warbler, Cassin's finch, and pine siskin. Mammals expected to occur include mule deer, black bear, Douglas squirrel, and golden-mantled ground squirrel. The project vicinity includes important habitat for a wide variety of wildlife species. Montane meadows provide particularly important habitat for nesting and migrant songbirds. Meadows in the project area are likely to support species such as yellow warbler, Wilson's warbler, song sparrow, and Lincoln's sparrow. Riparian areas typically support a high diversity of wildlife species. Hairy woodpecker, warbling vireo, Cassin's vireo, MacGillivray's warbler, and black-headed grosbeak are expected to nest in riparian habitats in the project area. Reptiles and amphibians known to occur in the vicinity of the project area include mountain yellow-legged frog, common garter snake, Pacific treefrog, common kingsnake, and California newt.

Sensitive Species

A number of sensitive wildlife and plant species are known to, or have potential to, occur in the project vicinity. In this section, we address sensitive species in the following categories: federal species of concern, FS sensitive species, and FS management indicator species (table 3-31). FS sensitive species are those that are considered rare, of limited distribution, or unique by FS but that are currently not considered for formal listing. Management indicator species are generally not rare, but FS considers them important indicators of habitat suitability and availability and overall ecosystem quality. Federal species of concern is an informal term that refers to those species that the FWS believes might be in need of concentrated conservation action. Such conservation actions vary depending on the health of the populations, as well as the degree and types of threats. At one extreme, there may only need to be periodic monitoring of populations and threats to the species and its habitat. At the other extreme, a species may need to be listed as threatened or endangered. Although such species receive no legal protection under the ESA, we consider project effects on species of concern that are known to occur in the project area and could be influenced by project operation.

We address species that are listed as threatened or endangered under the ESA in section 3.3.4, *Threatened and Endangered Species*.

Table 3-31. Species of concern, FS sensitive species, and FS management indicator species potentially occurring in the project area. (Source: EID, 2000a; FS, 2000a, 2000b, as modified by the staff)

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Plants				
Three-bracted onion (<i>Allium tribracteatum</i>)	FSC	FS	Volcanic mud flows in chaparral and lower and upper montane coniferous forest (3,000–9,500 feet)	Unlikely
Nissenan manzanita (<i>Arctostaphylos nissenana</i>)	FSC	--	Shallow shale soils often associated with closed-cone coniferous forest (1,500–3,600 feet)	Unlikely
Scalloped moonwort (<i>Botrychium crenulatum</i>)	--	FS	Marshes, meadows, stream and lake margins (above 4,800 feet)	Unlikely
Common moonwort (<i>Botrychium lunaria</i>)	--	FS	Marshes, meadows, stream and lake margins (above 4,800 feet)	Unlikely
Pleasant Valley mariposa lily (<i>Calochortus clavatus</i> var. <i>avius</i>)	FSC	FS	Open oak-pine forest (2,800–5,600 feet)	Unlikely
Sierra sedge (<i>Carex mariposana</i>)	--	FS	Montane meadows (3,800–10,000 feet)	Unlikely

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Red Hills soaproot (<i>Chlorogalum grandiflorum</i>)	FSC	--	Serpentine and gabbroic areas in chaparral, cismontane woodland, and lower montane coniferous forest (800–3,000 feet)	Documented
Mountain lady's-slipper (<i>Cypripedium montanum</i>)	--	FS	Deep, loamy soils on north-facing slopes in mature coniferous forest (4,000–6,000 feet)	Unlikely
Tahoe draba (<i>Draba asterophora</i> var. <i>asterophora</i>)	--	FS	Alpine boulder and rock fields, subalpine coniferous forest (above 8,600 feet)	Unlikely
Cup Lake draba (<i>Draba asterophora</i> var. <i>macrocarpa</i>)	FSC	FS	Rocky subalpine coniferous forest (above 8,400 feet)	Unlikely
Subalpine fireweed (<i>Epilobium howellii</i>)	--	FS	Wet meadows and mossy seeps in subalpine coniferous forest (above 6,500 feet)	Unlikely
Oregon fireweed (<i>Epilobium oreganum</i>)	FSC	--	Bogs and fens, mesic areas in lower and upper montane coniferous forest (1,500–7,000 feet)	Unlikely
Tripod buckwheat (<i>Eriogonum tripodium</i>)	--	FS	Serpentine soils in chaparral and cismontane woodland (600–5,000 feet)	Unlikely

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Parry's horkelia (<i>Horkelia parryi</i>)	FSC	--	Open chaparral and cismontane woodland (300–2,900 feet)	Unlikely
Long-petaled lewisia (<i>Lewisia longipetala</i>)	FSC	FS	Alpine boulder and rock fields, granitic areas in subalpine coniferous forest (above 8,200 feet)	Unlikely
Saw-toothed lewisia (<i>Lewisia serrata</i>)	FSC	FS	Broadleaved upland forest, lower montane coniferous forest, riparian scrub (3,500–5,000 feet)	Unlikely
Stebbins' lomatium (<i>Lomatium stebbinsii</i>)	FSC	FS	Rocky, barren ridges and spurs (4,100–5,600 feet)	Unlikely
Sierra sweet bay (<i>Myrica hartwegii</i>)	--	FS	Riparian habitats with extensive forest canopy cover (1,000–4,900 feet)	Unlikely
Yellow bur navarretia (<i>Navarretia prolifera lutea</i>)	--	FS	Dry rocky flats near drainage channels, chaparral, cismontane woodland (2,300–5,000 feet)	Documented
Stebbins' phacelia (<i>Phacelia stebbinsii</i>)	FSC	--	Dry, open, rocky slopes and ridges (2,000–6,600 feet)	Unlikely
Short-petaled campion (<i>Silene invisa</i>)	--	FS	North-facing granitic slopes in subalpine coniferous forest and upper montane coniferous forest (2,800–9,000 feet)	Documented

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Pacific yew (<i>Taxus brevifolia</i>)	--	FS	Valley and canyon bottoms and riparian corridors in moist conifer forests (below 6,600 feet)	Documented
Invertebrates				
Button's Sierra sideband snail (<i>Monadenia mormonum buttoni</i>)	FSC	--	Moist, undisturbed, riparian areas near streams, springs, and seeps; moist forest environments; basalt and limestone talus outcrops	Documented
Amphibians				
Foothill yellow-legged frog (<i>Rana boylei</i>)	FSC	FS	High gradient, shallow perennial streams with cobbles, riffles, and open areas (up to 6,000 feet)	Documented
Mountain yellow-legged frog (<i>Rana boylei</i>)	C	FS	High elevation ponds, lakes, and streams (above 5,000 feet)	Documented
Yosemite toad (<i>Bufo canorus</i>)	C	FS	Wet montane meadows surrounded by coniferous forest (above 6,400 feet)	Unlikely
Mount Lyell salamander (<i>Hydromantes platycephalus</i>)	FSC	--	Large rocky outcrops near water source (above 4,000 feet)	Possible
Reptiles				

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Northwestern pond turtle (<i>Clemmys marmorata marmorata</i>)	FSC	FS	Freshwater ponds and other aquatic habitats with slow moving water and basking sites; nest in clay or silty soils in sunny areas (up to 6,000 feet)	Documented
California horned lizard (<i>Phrynosoma coronatum frontale</i>)	FSC	--	Valley and foothill riparian forest and annual grassland, typically with sandy soils (up to 4,000 feet)	Possible
Northern sagebrush lizard (<i>Sceloporus graciosus graciosus</i>)	FSC	--	Montane chaparral and hardwood and coniferous forest (above 3,000 feet)	Possible
Birds				
Mallard (<i>Anus platyrhynchos</i>)	--	MIS	Lakes, ponds, streams, and rivers (breeds up to 10,000 feet)	Documented
Northern goshawk (<i>Accipiter gentilis</i>)	FSC	FS/MIS	Mature coniferous, mixed, and deciduous forests (above 3,000 feet)	Documented
American peregrine falcon (<i>Falco peregrinus anatum</i>)	--	FS/MIS	Nests on rocky cliffs, typically forages in wetland habitats	Unlikely
Blue grouse (<i>Dendragapus obscurus</i>)	--	MIS	Coniferous forest with shrub and grassy openings	Likely

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Mountain quail (<i>Oreortyx pictus</i>)	--	MIS	Open, brushy stands of coniferous and deciduous forest and woodland, and chaparral	Likely
Great gray owl (<i>Strix nebulosa</i>)	--	FS	Mature mixed coniferous forest surrounding large meadows (4,500–7,000 feet)	Unlikely
California Spotted owl (<i>Strix occidentalis occidentalis</i>)	FSC	FS/MIS	Dense, multi-layered mixed coniferous forest (2,000–7,600 feet)	Documented
Pileated woodpecker (<i>Dryocopus pileatus</i>)	--	MIS	Mature coniferous forest with large snags and down logs	Likely
Olive-sided flycatcher (<i>Contopus cooperi</i>)	FSC	--	Coniferous forest and woodland; prefers tall perches near open areas for foraging (up to 9,000 feet)	Likely
Willow flycatcher (<i>Empidonax traillii</i>)	--	FS/MIS	Wet montane meadows with dense willows, typically near slow moving water or ponds (up to 8,000 feet)	Unlikely
Bell's sage sparrow (<i>Amphispiza belli belli</i>)	FSC	--	Foothill chaparral habitats	Possible

Mammals

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Pallid bat (<i>Antrozous pallidus</i>)	--	FS	Oak woodland, mixed coniferous forest, and chaparral; roost in rock crevices, tree cavities, caves, mines, and human-made structures (up to 6,000 feet)	Likely
Western red bat (<i>Lasiurus blossevillii</i>)	--	FS	Riparian and other hardwood habitats; roost in rock crevices, tree cavities, caves, mines, and human-made structures (up to 3,000 feet)	Likely
Townsend's big-eared bat (<i>Corynorhinus townsendii townsendii</i>)	FSC	FS	Various habitats; prefer to roost in caves and cave-like structures (up to 10,000 feet)	Likely
Small-footed myotis (<i>Myotis ciliolabrum</i>)	FSC	--	Arid wooded and brushy habitats near water; prefer caves, buildings, mines, and crevices for roosting	Documented
Long-eared myotis (<i>Myotis evotis</i>)	FSC	--	Coniferous forest; prefer buildings, crevices, and under bark on snags for roosting (up to 9,000 feet)	Likely
Fringed myotis (<i>Myotis thysanodes</i>)	FSC	--	Woodland and coniferous forest; prefer caves, mines, and buildings for roosting	Documented

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Yuma myotis (<i>Myotis yumanensis</i>)	FSC	--	Open forest and woodland near water; prefer caves, buildings, mines, and crevices for roosting	Documented
Long-legged myotis (<i>Myotis volans</i>)	FSC	--	Woodland and forest; roost in various structures (above 4,000 feet)	Documented
Sierra Nevada snowshoe hare (<i>Lepus americanus tahoensis</i>)	FSC	--	Montane riparian with shrub thickets, young coniferous forest with chaparral openings	Possible
Pine marten (<i>Martes americana</i>)	--	FS	Dense, mature, mesic coniferous forest (above 4,000 feet)	Likely
Pacific fisher (<i>Martes pennanti</i>)	--	FS	Dense, mature, multi-storied, and multi-species coniferous forest (3,000–8,000 feet)	Likely
Sierra Nevada red fox (<i>Vulpes vulpes necator</i>)	FSC	FS	Coniferous forest interspersed with riparian and meadow habitat, and brush fields (above 5,000 feet)	Possible
Wolverine (<i>Gulo gulo luteus</i>)	--	FS	Remote areas in mixed coniferous forest, wet meadows, riparian habitat, and alpine scrub (above 4,500 feet)	Unlikely
Black bear (<i>Ursus americanus</i>)	--	MIS	Various habitats with large down logs	Documented

Species	FWS ^a	FS ^b	Habitat	Potential for Occurrence
Mule deer (<i>Odocoileus hemionus</i>)	--	MIS	Early to intermediate successional stages of most forest, woodland, and brush habitats	Documented

- ^a FWS federal listing categories:
FSC - federal species of concern
C - candidate for federal listing
- ^b FS listing:
FS - FS sensitive
MIS - management indicator species

Information about the status of these sensitive species in the project area is based on a variety of sources, including focused surveys by EID, agency comment letters, and the FS biological evaluations for the license amendment (FS, 2000a, 2000b). Focused surveys for sensitive plants were conducted by EID in 1999; focused surveys for sensitive amphibians were conducted in 2002 (ECORP, 2002a; ECORP, 2002b; ECORP, 2002c); focused surveys for sensitive birds were conducted in 2000, 2001, and 2002 (EIP, 2002a, 2002b); and focused surveys for bats were conducted in 1999 and 2000 (EIP, 2002c).

Plants

In 1999, focused botanical surveys were conducted for all but 1 of the 23 sensitive plants listed in table 3-31. Although the survey did not include the Mountain lady's-slipper, it has not been documented in the Eldorado National Forest and is not expected to occur in the project area. Four sensitive species were detected during the surveys: Red Hills soaproot, yellow-bur navarretia, short-petaled campion, and Pacific yew. We discuss these in detail below; we do not address those that were not found during surveys further in this document.

Red Hills Soaproot

Red Hills soaproot is a federal species of concern associated with serpentine and gabbroic soils in chaparral and cismontane woodland. A population of about 30 individuals was found on the rocky outcrops along the penstock.

Short-petaled Campion

Short-petaled campion is a FS sensitive species associated with north-facing slopes and granitic soils in subalpine and upper montane coniferous forest. Populations of this species have been reported from Silver and Caples lakes. The Caples Lake population is reported to occur on the slopes above the southern shoreline, and Silver Lake populations are reported to occur near Sandy Cove Campground, at Plasse's Resort, and along a FS trail. Surveys were conducted within 200 feet of project facilities at each lake, and no short-petaled campion individuals were found.

Yellow-bur Navarretia

Yellow-bur navarretia is a FS sensitive species that occurs in chaparral and cismontane woodland. Two populations of this species were found along the El Dorado canal, one in a disturbed area along the canal berm and the other upslope from the canal.

Pacific Yew

Pacific yew is a FS sensitive species that occurs in the shady understory of mixed montane forest. A population of approximately 75 trees was found along the El Dorado canal. The population is located between the Highway 50 undercrossing and the Esmeralda tunnel.

Invertebrates

Button's Sierra Sideband Snail

This snail is a federal species of concern and has been reported from a location along the right bank of the SFAR at Riverton, more than 7 miles downstream of the proposed diversion dam restoration site, based on a 1972 report (CDFG, 2000b). No specific information on exact location and number of specimens collected is available, and none have been reported upstream of this location, or more recently. Snails of this genus are considered to be land snails that occur in moist, undisturbed riparian areas near streams, springs, and seeps. They are also found in moist forest environments and on basalt and limestone talus outcrops (FS and BLM, 1999; Stillwater Sciences, Inc., 1998). The snail is known from three locations in El Dorado and Calaveras counties and is considered rare (CDFG, 2000b). The Commission required EID to survey the shoreline on both sides of the SFAR near the diversion dam site prior to any earth-disturbing activities associated with diversion dam reconstruction activities (FERC, 2000). No Button's Sierra sideband snails were found during this survey (letter from J.T. Richards, Engineer, Harza Engineering Company, to the Commission, dated September 21, 2000).

Amphibians and Reptiles

Focused amphibian surveys were conducted for foothill yellow-legged frog, mountain yellow-legged frog, and Yosemite toad. During these surveys, incidental observations of other sensitive amphibian and reptile species were also documented. The focused surveys were conducted in 2002.

Foothill Yellow-legged Frog

The foothill yellow-legged frog is a federal species of concern and a FS sensitive species. This species occurs in shallow, partly shaded streams, preferably with riffles and at least some small- to medium-sized cobble substrate. Egg laying occurs between late March and early June, following the period of high-flow discharge resulting from winter rain and snowmelt. Egg masses are deposited on the downstream side of cobbles or boulders, over which a relatively thin, gentle flow of water occurs. Metamorphosis is completed approximately 15 weeks after the eggs are laid, typically between July and September (Jennings and Hayes, 1994). Suitable habitat for foothill yellow-legged frogs is present in all perennial streams in the project area. Individuals have been observed in tributaries to the Silver Fork and SFAR as well as in the SFAR at Slab Creek Reservoir, downstream of the project area (FS, 2000b; ECORP, 2002a).

EID sponsored surveys at 29 sites that represented foothill yellow-legged frog habitat along or near the SFAR, downstream of the Kyburz diversion dam, and along portions of the Silver Fork (ECORP, 2002b). Foothill yellow-legged frogs were documented at 11 locations. Seven of the sites were along the SFAR, downstream of the confluence of Plum Creek. The remaining four sites were on Ogilby Creek, Silver Creek, Soldier Creek, and on Grays Canyon tributary. Of these four streams, Ogilby Creek is influenced by project operations. Evidence of breeding was apparent at several locations.

Mountain Yellow-legged Frog

The northern population of mountain yellow-legged frog (*Rana muscosa*) is a Candidate for federal listing as threatened or endangered and a FS sensitive species. Although the southern population of this species was federally listed as endangered in 2002, the listing does not apply to populations in the Sierra Nevada (67 FR 44382–44392). Mountain yellow-legged frogs occur in high-elevation ponds, lakes, and streams of depths great enough to avoid freezing during the winter. Eggs are laid on gently sloping, shallow shorelines, and larvae require two to three summer seasons to complete metamorphosis (Jennings and Hayes, 1994). Suitable mountain yellow-legged frog habitat primarily occurs in the project reservoirs, and the species is known to occur in Lake Aloha and downstream pools, in tributaries to Silver Fork, and near Silver Lake (ECORP, 2002a, 2002c).

EID surveyed 68 sites that represented potential mountain yellow-legged frog habitat and documented this species at 11 sites. Two of these sites, Lake Aloha and Silver

Lake, have the potential to be influenced by project operations. Second-year tadpoles were observed at Lake Aloha, which indicates that breeding occurs at this site (ECORP, 2002b).

Yosemite Toad

The Yosemite toad is a candidate for federal listing as endangered or threatened and is a FS sensitive species. These toads occur in high elevation wetlands, meadows, and moist upland habitats, such as springs and seeps. Eggs are laid in shallow water with silty bottoms, and metamorphosis is completed in approximately 6 to 7 weeks. Adults overwinter in rodent burrows. Historically, the northern extent of their range was the Blue Lakes region in Alpine County. According to recent surveys, several sites in this area, which is approximately 10 to 15 miles southeast of Caples and Silver lakes, have been confirmed as occupied since 1990 (67 FR 75834–75843). However, the species has never been documented within the project area. Small wetlands and meadows near Caples and Silver lakes may provide suitable habitat, but Yosemite toads are not expected to occur at or in the immediate vicinity of the lakes. EID surveyed 23 sites that represented potential Yosemite toad habitat, but found no Yosemite toads (ECORP, 2002b).

Mount Lyell Salamander

The Mount Lyell salamander is a federal species of concern that occurs in alpine and subalpine habitats with extensive outcrops of rocks and scattered boulders. They require free surface water, such as a permanent stream, waterfall, seep, or runoff from melting snow in the immediate vicinity (Jennings and Hayes, 1994). EID did not observe this species during its special-status amphibian surveys (ECORP, 2002b). However, there is a record of the species from 1980 at Smith Lake, approximately 3 miles southwest of Lake Aloha. This species could occur in alpine and subalpine habitats within the project area, where rocky substrate is present adjacent to water, such as at Lake Aloha and Pyramid Creek.

Western Pond Turtle

The western pond turtle is a federal species of concern and a FS sensitive species. Pond turtles occur in rivers, streams, lakes, ponds, seasonal wetlands, and intermittent streams with permanent pools and basking sites, such as logs, banks, ledges, and rocks. Terrestrial habitats are used for oviposition, over-wintering, occasional seasonal use, and overland dispersal. Eggs are deposited in a shallow nest excavated by the female, typically in substrates with high clay or silt content. Hatchlings are thought to remain in the nest until the following spring when they move to shallow water with relatively dense submergent or short-emergent vegetation. Adults move to upland overwintering sites in October and November and return to aquatic habitat in March and April (Jennings and Hayes, 1994). The gradient on the SFAR and tributaries is higher than that of optimum pond

turtle habitat. However, pond turtles occasionally occur in fast-moving streams, and observations adjacent to the Silver Fork have been reported (FS, 2000b). No western pond turtles were observed during special-status amphibian surveys sponsored by EID (ECORP, 2002b).

California Horned Lizard

The California horned lizard is a federal species of concern that occurs in riparian and grassland habitats, typically in sandy soils. EID did not observe this species during its special-status amphibian surveys (ECORP, 2002b). Grasslands are not present, but horned lizards could occur in riparian areas at and downstream of the diversion dam, where sandy areas are present in the more typical boulder and bedrock substrates.

Northern Sagebrush Lizard

The northern sagebrush lizard is a federal species of concern that occurs in montane chaparral and hardwood and coniferous forest habitats. Potentially suitable habitat is present throughout the project area. During its special-status amphibian surveys, EID reported three separate sightings of sagebrush lizards (*Sceloporus graciosus*), but did not indicate if the species observed was the northern sagebrush lizard (*Sceloporus graciosus graciosus*) (ECORP, 2002b). Two of the sightings were at small tributaries to the Silver Fork (Middle Creek and Mule Creek) and therefore not influenced by project operations. The third sighting was along the SFAR, downstream of the confluence of No Name Creek (ECORP, 2002b). Although this reach is influenced by project operations, this species is not directly dependent on aquatic habitat and therefore is not likely to be influenced by continued project operation.

Birds

Focused surveys were conducted for northern goshawk, peregrine falcon, California spotted owl, and willow flycatcher. These species and federal species of concern and FS sensitive species are discussed in more detail below.

The remaining sensitive birds are FS management indicator species—mallard, blue grouse, mountain quail, and pileated woodpecker. Suitable habitat is present for all of these species, and they are expected to occur throughout the project area in areas with appropriate habitat.

Northern Goshawk

The northern goshawk is a federal species of concern and a FS sensitive and management indicator species. Goshawks typically occur in mature montane forest with an

open understory for foraging. In 2000, FS biologists identified and mapped six patches of potential goshawk habitat in the vicinity of Silver Lake, Caples Lake, and Echo Lake. Surveys of these sites were conducted in 2000 and 2001. A successful nesting attempt was confirmed on the southeast side of Silver Lake in 2000, and occupancy was confirmed in 2001, but no goshawks were detected at Caples Lake, Caples Creek, or Echo Lake (EIP, 2002b). Suitable goshawk habitat is also present along Bull Creek and in the vicinity of Alder Creek. In 1996, a goshawk nest was located approximately 1 mile south of the Bull Creek portal (FS, 2000b).

American Peregrine Falcon

The peregrine falcon is a FS sensitive species and a management indicator species; it is a state-listed endangered species. Peregrine falcons typically nest on steep cliff faces and forage in open areas. In 2000, FS biologists identified and mapped one patch of suitable nesting habitat on the western cliff faces of Thunder Mountain, in the vicinity of Silver Lake. Surveys were conducted in 2000 and 2001, but no peregrine falcons were detected (EIP, 2002b). Therefore, this species is not expected to nest in the vicinity of the project area, and it not discussed further in this document.

Great Gray Owl

The great gray owl is a FS sensitive species and is state listed as an endangered species. Great gray owls occur in coniferous forest near meadows or other openings with herbaceous vegetation. Suitable habitat for great gray owl is present within 0.25 mile of Silver and Caples lakes (EIP, 2002d). However, all known breeding sites in California are restricted to Mariposa and Tuolumne counties (CDFG, 2000b), and the species is not expected to nest in the project area. Therefore, we do not discuss it further in this document.

California Spotted Owl

The California spotted owl is a federal species of concern and a FS sensitive species. Spotted owls occur in dense, old-growth, multi-layered, mixed coniferous forest and oak woodland habitats. Key habitat requirements for this species include blocks of mature forest with permanent water and dense, multi-layered canopy cover for roost seclusion.

In 2000, FS biologists identified and mapped one patch of suitable spotted owl habitat in the vicinity of lower Echo Lake. Surveys were conducted during the 2000 and 2001 breeding season, and occupation of the site was confirmed in both years (EIP, 2002b). A nest site was documented approximately 0.25 mile from the Bull Creek portal in 1993 and 2000. A Protected Activity Center has been established approximately 0.5

mile from the portal, but no spotted owls have been detected in this area since 1993 (FS, 2000b).

Olive-sided Flycatcher

The olive-sided flycatcher is a federal species of concern that nests in coniferous forest and typically uses tall trees or snags as foraging and singing perches. This species could occur in coniferous forest habitats throughout the project area.

Willow Flycatcher

The willow flycatcher is a FS sensitive species and a management indicator species; it is also a state-listed endangered species. Willow flycatchers prefer large meadows (i.e., over 20 acres) with willow or alder complexes. Suitable meadows and riparian areas as small as 0.5 acre may also be used for nesting. In 2000, FS biologists identified and mapped four patches of potential willow flycatcher habitat near Silver Lake and Caples Lake. Surveys were conducted during the 2001 and 2002 breeding seasons, but no willow flycatchers were detected at any of the sites (EIP, 2002a).

Bell's Sage Sparrow

The Bell's sage sparrow is a federal species of concern that occurs in chaparral and scrub habitats. No information is available regarding the status of this species in the project area, but potentially suitable habitat is present in the project area, primarily on hillsides at relatively low elevations.

Cavity-Nesting Birds

Cavity-nesting birds are FS management indicator species. A variety of cavity-nesting birds, such as the tree swallow, red-shafted flicker, red-breasted sapsucker, and mountain chickadee, are expected to occur in the project area.

Mammals

Bats

Three FS sensitive bats (i.e., pallid bat, western red bat, and Townsend's big-eared bat) may occur in the vicinity of the project. Townsend's big-eared bat is also a federal species of concern. Other bats that are federal species of concern bats and may occur, or have been documented, in the project area include the small-footed myotis, long-eared myotis, fringed myotis, Yuma myotis, and long-legged myotis. Species-specific

information on bat use of the Eldorado National Forest is limited, but the project area is within the range of all these species.

A FS bat specialist conducted habitat assessments and/or surveys at the Alder Creek tailing pile, Bull Creek portal, and the powerhouse in 1999 and 2000. Pre-construction surveys were also conducted in the tunnel between Alder Creek and Mill Creek in 2001. Foraging bats were detected at the tailing pile, but it was not determined whether these bats were roosting in the pile or traveling from other roosting sites to forage. Suitable roosting and foraging habitat is present near the Bull Creek portal. Although visual surveys of the tunnel did not indicate roosting activity, acoustic surveys documented use of the area by small-footed myotis, Yuma myotis, fringed myotis, and long-legged myotis (EIP, 2002c). Surveys of the powerhouse indicated a variety of bat species may utilize the area, including pallid bat, Townsend's big-eared bat, small-footed myotis, Yuma myotis, long-eared myotis, fringed myotis, and long-legged myotis. The abandoned house across the SFAR from the powerhouse was also surveyed. A dead western pipestrelle and guano were found, confirming that the house provides suitable roosting habitat and that bats use it.

Sierra Nevada Snowshoe Hare

The Sierra Nevada snowshoe hare is a federal species of concern that occurs in montane riparian shrub and young coniferous forest with chaparral openings. No information is available regarding the status of this species in the project area, but potentially suitable habitat is present within 0.25 mile of the project reservoirs and portions of the canal (EIP, 2002e).

Pine Marten

The pine marten is a FS sensitive species that occurs in dense fir, lodgepole pine, and mixed coniferous forest. Martens are known to occur in the Eldorado National Forest, and suitable marten habitat is present throughout the project area, particularly at the higher elevations (FS, 2000b; EIP, 2002e).

Pacific Fisher

The Pacific fisher is a FS sensitive species and is state listed as threatened. This species occurs in dense multi-storied and multi-species, late-successional coniferous forest. Fishers are known to occur in the Eldorado National Forest, and suitable fisher habitat is present throughout the project area (FS, 2000b; EIP, 2002e).

Sierra Nevada Red Fox

The Sierra Nevada red fox is a federal species of concern and a FS sensitive species. This species occurs in coniferous forest interspersed with riparian and meadow habitat and in brush fields. No information is available regarding the status of this species in the project area, but potentially suitable habitat is present within 0.25 mile of the project reservoirs and portions of the canal (EIP, 2002e).

Wolverine

The wolverine is a FS sensitive species that occurs in remote areas with mixed coniferous forest, wet meadows, riparian habitat, and alpine scrub. No information is available regarding the status of this species in the project area, but potentially suitable habitat is present within 0.25 mile of the project reservoirs and portions of the canal (EIP, 2002e).

Black Bear

The black bear is a FS management indicator species. This species occurs in a variety of habitats but requires large downed logs for denning and foraging. Black bears are expected to be present throughout the project area.

Mule Deer

Mule deer is a FS management indicator species. This species occurs in a variety of habitats and is expected to occur throughout the project area. The project area is known to be used by the Grizzly Flat, Carson River, and Pacific deer herds. Lake Aloha and Echo Lake are within the summer range for the Carson River deer herd. Most of the project area is within the range of the Grizzly Flat deer herd, with upper elevations in the summer range and lower elevations in the intermediate range used during migration to and from summer and winter ranges. Fawning habitat is present northeast of Caples Lake. The El Dorado canal is within this intermediate range and presents a migration barrier. The powerhouse is within the winter range of the Pacific deer herd.

3.3.3.2 Environmental Effects and Recommendations

Noxious Weed Control

EID has prepared a Plan for Prevention and Control of Noxious Weeds (EIP, 2002g). This plan describes preventive weed control measures and guidelines for vegetation management for operations, maintenance, and construction activities at project facilities on FS lands. In its plan, EID proposes to conduct initial field surveys in areas where repair work, reconstruction, or ground-disturbing activities are planned or have occurred. Post-construction noxious weed monitoring of construction and maintenance

sites, as well as monitoring of known populations of noxious weeds are also provided for in the plan. EID proposes to finalize its noxious weed prevention and control plan and implement it upon license issuance, and comply with the Eldorado National Forest and LBTMU prescriptions for seed, mulch, and fertilizer for restoration or erosion control purposes (as described in Section 14 of the Settlement). Implementation of FS revised preliminary 4(e) condition 15 would restrict the use of pesticides, and presumably herbicides, for the control of undesirable vegetation, insects, and rodents (letter to the Commission dated May 9, 2003). Use of such materials would not be permitted on FS lands without prior written approval of the FS. EID would be required to submit a request for approval, which must cover annual planned use and be updated as necessary. In the event of unexpected pest outbreaks not anticipated at the time the annual request was submitted, an emergency request would be required. EID notes that Section 14 of the Settlement addresses the use of herbicides, but not pesticides to control undesirable insects and rodents (letter to the Commission dated May 16, 2003). However, EID states that it “...does not disagree with this FERC staff recommendation.”

Our Analysis

Noxious weeds are invasive, nonnative species that are included on state or federal noxious weed lists. A number of federal and state laws pertain to the prevention and control of noxious weeds. Executive Order 11312 (February 3, 1999) directs all federal agencies to prevent and control introductions of invasive species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health effects. Noxious weeds are a growing threat to California’s environment due to potential effects on native plant communities and wildlife habitat. A number of species on the Eldorado National Forest Noxious Weed Species List are known to occur in the project area and were documented during floral surveys conducted at project facilities in 1998 and 1999.

We make a recommendation to adopt Section 14 of the Settlement and revised preliminary FS 4(e) condition number 15. EID’s Draft Plan for Prevention and Control of Noxious Weeds (EIP, 2002g) includes a summary of previously surveyed populations, proposed prevention measures, and an annual monitoring plan. This draft plan should be finalized in consultation with the FS and filed with the Commission for final approval. Implementation of FS 4(e) condition 15 would ensure that the justification for pesticide use to control noxious insects or rodents would be verified prior to its use. Although use of insect or rodent pesticide is not currently envisioned by EID, we consider it appropriate to have proactive procedures in place to prevent the unnecessary use of pesticides in the vicinity of project lands and waters.

Project Effects on Riparian Habitat

EID proposes to release flows as specified under Condition 1 of the Settlement and described in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*. The rationale for implementation of minimum streamflows focused on the needs of the aquatic-dependent biota, including riparian vegetation.

EID also proposes to release spring pulsed flows to the natural Caples Creek channel as described in Condition 4 of the Settlement and discussed in detail in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*. In addition, EID proposes to limit flows released to the Caples Creek natural channel during September, October, and November to no greater than 150 cfs. These recommendations are based, in part, on the objective to improve riparian vegetation along Caples Creek by facilitating flooding of the stream-side riparian community at the appropriate time of year (spring) and limiting fall release flows to amounts that mimic the normal snowmelt hydrograph.

EID proposes to conduct riparian vegetation species composition monitoring and riparian vegetation recruitment monitoring every 5 years as part of the monitoring program described in Section 7, Item 4 of the Settlement. The proposed riparian vegetation species composition monitoring would include collection of pertinent data using previously established methods along 14 existing transects at 8 study sites in representative habitat types to provide a detailed evaluation of the riparian conditions and response to changes in streamflow regime. For the riparian vegetation recruitment monitoring, EID would collect information at 24 existing sites at 2 study reaches on Caples Creek and Kirkwood Creek in accordance with the provisions of Section 7, Item 5 of the Settlement.

EID proposes to implement an ecological resources adaptive management program, as specified in Section 8 of the Settlement and discussed in more detail in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*. This program would entail the formation of an ERC by EID that would review the results of ecological monitoring, including that proposed for riparian vegetation, and make recommendations, as appropriate, regarding future flow regime modifications.

Our Analysis

Riparian habitat along the project-affected stream reaches is relatively limited. It is not known to what extent operation of the project has contributed to the current conditions, but it is possible that alteration of the natural hydrograph has resulted in a reduction of riparian vegetation along the affected reaches. In addition, existing recreational usage may have contributed to degradation and/or loss of riparian vegetation.

Riparian vegetation recruitment monitoring (EIP, 2002h) conducted in 2000 and 2002 confirmed that there is a near absence of willow seeding along Caples Creek, below the confluence with the spillway channel. However, monitoring revealed similar results at the control site, Kirkwood Meadow, indicating that this deficiency is not limited to Caples Creek. At this time, the cause of this deficiency is not known, and there is no evidence to support the conclusion that it is a result of project operations. As we concluded in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*, the existing flow regime in Caples Creek closely mimics pre-project flows, and we expect that the riparian vegetation community that is in place now would be similar without project operations. Therefore, we do not concur with EID's proposal to implement spring pulsed flows in Caples Creek. However, we recognize that the terms of the Settlement represent the results of extended negotiations with appropriate stakeholders, and we would therefore not object to the implementation of scheduled spring pulsed flow events during other than critically dry years, if such releases would not occur under the existing operating regime. If the results of monitoring suggest that riparian vegetation along project-affected stream reaches could be enhanced with increased volume or duration of pulsed flows, the Commission would need to approve any such operational changes.

Unseasonably high fall release flows in the natural Caples Creek channel could result in loss of established riparian vegetation and limit recruitment by degrading channel banks and washing away instream and bank vegetation. Without project operation, flows during the fall would typically be below average, which would enable riparian vegetation to thrive at the end of the growing season. Consequently, we recommend that EID limit flows to the natural Caples Creek channel, which are under its control, to no more than 150 cfs during September, October, and November.

We recommend implementation of EID's proposed minimum streamflows in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*. Implementation of a new flow regime may result in predicted and unpredicted responses to riparian vegetation. EID's proposed riparian vegetation species composition monitoring and riparian vegetation recruitment monitoring would provide the means to review the potential effects of streamflow alteration on riparian vegetation. By using the same methods and monitoring the same locations that were evaluated during pre-licensing studies, project-induced changes under the conditions of a new license should be readily identifiable, and consideration should be given to implementing corrective actions, if needed, under the ecological resources adaptive management program that would be established under the conditions of the Settlement. We therefore recommend that EID implement its proposed riparian vegetation monitoring plans and its ecological resources adaptive management program.

Project Effects on Sensitive Species

EID proposes to, as specified in Section 13, Number 1 of the Settlement: (1) ensure that all canal crossings are passable for wildlife; (2) inspect the fencing, canal crossings, and their approaches at least twice a year and repair or replace fencing as necessary; and (3) submit an annual report of wildlife found in the canal, including the date, location, and species for each occurrence. Within 180 days of license issuance, EID would reconstruct any portions of the fencing that are determined not to meet CDFG deer fencing specifications or to develop a schedule for completion of such work, to be approved by FS and CDFG.

EID proposes to prepare a biological evaluation (as specified in Section 13, Number 2, of the Settlement) prior to any new construction or maintenance (including but not limited to proposed recreation developments) authorized by license on National Forest System lands that may affect FS sensitive species or their habitat. EID would notify and consult with the FS if a new sensitive species is found prior to or during construction activities or other project operations. Prior to commencing activities to construct, operate, or maintain the project that may affect a species listed or proposed for listing under the federal ESA, or critical habitat for such a species, EID would ensure that a biological assessment is prepared that evaluates the potential effect of the action on the species or its critical habitat. In addition, EID proposes to, if occurrences of FS sensitive species are detected prior to or during construction, operation, or maintenance of the project or during project operations, immediately notify the FS and implement protective measures, as appropriate (as specified in Section 13, Number 3, of the Settlement).

EID proposes to operate Lake Aloha in a manner designed to prevent spillage at auxiliary dams 1 through 7 during spring runoff and while the reservoir is filling (Condition 3 of the Settlement). If such spill occurs and trout are found in the pools below the dams, EID would submit a trout removal plan for agency approval within 14 days of the spill and implement the approved removal plan within 30 days of the spill to minimize adverse effects on mountain yellow-legged frog from trout predation. In addition, EID would submit an annual report by July 30 documenting whether spill occurred and whether trout were found and removed. Within 1 year of license issuance, EID proposes to survey the pools and ponds below auxiliary dams 1 through 7 to determine whether trout are present. If trout are found, EID would submit a plan for removal of the trout to the FS and CDFG within 30 days. EID would implement the plan upon agency approval.

EID proposes to monitor foothill yellow-legged frog (as described in Condition 7, Item 3 of the Settlement), at specified locations along the SFAR and conduct surveys related to flow fluctuations in specified reaches to determine presence and distribution of the species. EID would identify breeding and larval periods by periodically surveying reaches of known presence during the spring and summer to assess potential effects of the flow regime that would be specified in a new license on foothill yellow-legged frog downstream of the Kyburz diversion dam. The proposed known site monitoring would

occur during years 1, 2, 3, 5, 10, 15, 20, 25, and 30 from license issuance, but the frequency and monitoring sites could be adjusted by the ERC, FS, and SWRCB based on monitoring results. In addition, EID proposes to monitor flow fluctuations in the SFAR between the Kyburz diversion dam and Silver Creek from June through September. When flow is 100 cfs or less in this reach and the diversion into the El Dorado canal causes the flow downstream of the diversion dam to fluctuate 50 cfs or more in 1 day, EID would conduct surveys to assess the potential effects of flow fluctuations on foothill yellow-legged frog egg masses and tadpoles. EID would provide advanced notification to the FS, ERC, and SWRCB of any known project-related flow fluctuations that would meet this criteria between June and September, to the maximum extent possible. The flow fluctuation monitoring would occur during the first 3 years from license issuance and could form the basis for the ERC, FS, and SWRCB to recommend modifications to project operations if flow fluctuations are shown to adversely affect amphibian egg masses and tadpoles (in accordance with the previously discussed ecological adaptive management program). After the first 3 years, the FS, ERC, and SWRCB would reassess the need for continued monitoring after flow changes.

EID proposes to monitor mountain yellow-legged frog at specified locations to determine presence and distribution of the species to assess potential effects of changes in project operations (as described in Condition 7, Item 3 of the Settlement). Monitoring of ponds downgradient of the Lake Aloha auxiliary dams would occur during the first year from license issuance and after any spill. In addition, monitoring at this, and four additional sites, would occur during years 1, 2, 3, 5, 10, 15, 20, 25, and 30 from license issuance (as specified in the Settlement and clarified in EID's letter to the Commission dated May 16, 2003).

Our Analysis

Implementation of proposed and recommended changes in project operations has the potential to affect sensitive plant and wildlife species in the project area. The potential effects to particular species and corresponding staff recommendations are discussed in the following sections. We recommend EID prepare a biological evaluation prior to construction of any new project features (including but not limited to proposed recreational developments) or maintenance that may affect a FS sensitive species. We also recommend a biological evaluation be prepared prior to repair of existing facilities if there is potential for adverse effects on FS sensitive species. As part of this process, measures to avoid or minimize potential adverse effects should be developed and implemented. If a new sensitive species, including but not limited to threatened or endangered species, is found prior to or during construction activities or other project operations, EID should notify and consult with the agencies prior to continuing construction or operations that may adversely affect the species.

Plants

Four species of sensitive plants are known to occur in the vicinity of the project facilities: Red Hills soaproot, short-petaled campion, yellow bur navarretia, and Pacific yew. The short-petaled campion occurrences are in the vicinity of Silver Lake and Caples Lake. No individuals of this species were detected within 200 feet of project facilities at the lakes, so they are unlikely to be affected by ongoing operation and maintenance. In addition, this species occurs in upland subalpine and coniferous forest habitats that are unlikely to be affected by changes in lake levels. Therefore, short-petaled campion is not expected to be adversely affected by continued project operation and by implementation of any proposed changes in operation. The remaining sensitive plant species could be adversely affected by on-going maintenance activities and proposed changes. Red Hills soaproot occurs along the penstock, whereas yellow-bur navarretia, and Pacific yew occur along the El Dorado canal. These species could be affected by vegetation management adjacent to the penstock and canal, repair of these structures, and maintenance of deer fencing along the canal.

EID's proposal to conduct a biological evaluation prior to commencing activities to construct, operate, or maintain the project that may affect sensitive and special-status species or their habitat (including the plant species discussed above) would provide the means to assess the potential effects of the proposed action on threatened and endangered species. The assessment could require the development and implementation of mitigation or protection of these species, as appropriate, in the event there would be adverse effects on the sensitive species as a result of the proposed action. We therefore recommend that EID implement the provisions of Section 13, Number 2 of the Settlement, as appropriate.

In addition, we recommend that EID include in our recommended LHMP (discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.6, *Land Use and Aesthetic Resources*) a listing of special status or sensitive species that could occur in the project area, maps of known populations that could be influenced by project operations, and a description of potential construction, operation, and maintenance procedures that could entail the preparation of a biological evaluation or a biological assessment prior to implementation.

Invertebrates

Button's Sierra sideband snail may be adversely affected by project activities that would result in ground disturbance in areas of suitable riparian and other forest habitats. These activities could include construction of new facilities, repair and maintenance of existing facilities, and development or enhancement of recreational access and facilities. Therefore, we recommend preparation of a biological evaluation, as discussed above, prior to construction of new project features or repair of existing facilities if such activity would

result in ground disturbance of suitable habitat for this species and implementation of appropriate avoidance and minimization measures.

Amphibians

Past project operations may have resulted in and could continue to result in adverse effects on foothill yellow-legged frog and mountain yellow-legged frog. Foothill yellow-legged frogs could be affected by the alteration of the natural hydrograph in project-affected streams, including reduced instream flows and unnatural flow fluctuations during the breeding season. Reduced flows may have led to a reduction in the amount of suitable breeding habitat, and high flow releases and flow fluctuations during the breeding season have the potential to wash out or strand egg masses and tadpoles.

Currently, there is no minimum flow requirement for Ogilby Creek, downstream of the El Dorado canal. The provision of EID's proposed and the agency-recommended minimum flows of 1 to 2 cfs should ensure that habitat remains viable for the known population of foothill yellow-legged frog in the lower reaches of this stream (see table 3-30). Establishing minimum flows in Esmeralda Creek, as proposed, may foster establishment of the foothill yellow-legged frog in this stream.

Monitoring foothill yellow-legged frogs during the breeding season would provide an opportunity to evaluate the effects of the recommended streamflows, flow fluctuations, and ramping rates and make changes to project operations, if necessary, to minimize adverse effects. We recommend implementation of the known site presence monitoring protocol for foothill yellow-legged frogs described in Section 7 of the Settlement. We also concur with EID's proposal that monitoring be conducted any time the SFAR flow is 100 cfs or less and diversion into the El Dorado canal changes by 50 cfs or more in 1 day during June through September. At times when flows are 100 cfs or less, a change of 50 cfs could have a considerable effect on frog egg masses and tadpoles. With the proposed minimum flow regime (discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*), flows in the SFAR during June and July would only infrequently be less than 100 cfs, and during August and September, tadpoles would be more mobile and thus likely able to adjust to flow fluctuations of less than 50 cfs in a day. Monitoring should be conducted for a 3-year period, at which time it would be determined whether flow changes are adversely affecting foothill yellow-legged frogs. If so, modifications should be proposed to minimize those effects and another monitoring period may be required to determine whether the revised flows adversely affect foothill yellow-legged frog. We recommend EID finalize its foothill yellow-legged frog monitoring plan in consultation with FS, ERC, and SWRCB (although the Settlement specifies the monitoring protocol, some of the monitoring sites on the SFAR have not yet been determined). The plan should be filed with the Commission for final approval.

Mountain yellow-legged frogs could be adversely affected by introduction of trout, which prey on this species, into occupied frog habitat and by project-related fluctuations in lake levels during the breeding season. Although trout are present in Lake Aloha, self-sustaining populations do not exist in pools below the auxiliary dams. However, they could be introduced into these pools during spill events. Because trout are known to prey on foothill yellow-legged frogs, this is likely to result in adverse effects.

We concur with EID's proposal to attempt to prevent water from spilling over auxiliary dams 1 through 7 during spring runoff and while the reservoir is filling. This would minimize the potential for trout to be introduced to the pools below the dams. We recommend implementation of a trout removal plan if spill occurs and trout become established in pools below the dams because it would reduce the chances of trout predation on mountain yellow-legged frogs. However, we question the feasibility of implementing some aspects of this recommendation in the manner outlined in the Settlement. Currently, EID has no means by which to know when spill occurs at the auxiliary dams. This situation may be remedied if the recommended water level monitoring is implemented, as discussed in section 3.3.1, *Water Resources*. However, information would not necessarily be transmitted in a real-time fashion (construction needed for this type of equipment may be prohibited in this designated wilderness area), rendering it infeasible for EID to develop a removal plan within 14 days of when spill occurs. As a result, we expect that the timing requirements for plan preparation and implementation may not be achievable. The Settlement (Section 10) includes provisions for EID to perform an investigation of whether telemetry equipment could be installed at Lake Aloha to monitor conditions and control operations. If EID, the FS, and SWRCB agree that installation of such equipment is feasible, and it can be installed consistent with law, regulations, and policies applicable to the Desolation Wilderness, then EID would seek necessary approvals for such installation. If such equipment is installed, it should address our concern regarding the timing of plan preparation and implementation. However, if installation of telemetry equipment does not occur, our concerns about the timing of plan development remain, and we would expect the final plan to address how spill events would be identified in a timely manner so that trout removal efforts can occur as quickly as possible. In addition, the trout removal program could have adverse effects on mountain yellow-legged frogs if electrofishing is used. Therefore, the trout removal program should be implemented in a manner that minimizes the number of times electrofishing would occur. It may be more appropriate to develop a plan that would be implemented on a regular basis or in response to climatological conditions that suggest spill may have occurred, especially if it is determined that telemetry equipment cannot be installed.

We recommend that EID develop a plan for survey and trout removal that addresses our concerns, in consultation with FS and CDFG. This plan should include identification of specific pools to be covered, an initial survey and removal effort within one year of license issuance, determination of when additional survey and removal would be conducted,

specific survey and removal protocols that minimize potential adverse effects, and reporting requirements. The plan should be filed with the Commission for final approval. It may be necessary to modify this plan if spill cannot be controlled and trout are continually being introduced into the pools.

Rising and lowering water levels in lakes and pools that support breeding mountain yellow-legged frogs have the potential to result in egg masses being deposited in water that later becomes too deep and to strand egg masses and tadpoles. Because fluctuating water levels could adversely affect breeding mountain yellow-legged frogs, we concur with EID's proposal to conduct monitoring at additional locations, as long as these additional sites have a nexus to project operations. Therefore, we recommend EID consult with the FS, ERC, and SWRCB to determine the survey locations as part of a mountain yellow-legged frog monitoring plan (some, but not all, of these sites are specified in Section 7 of the Settlement). These locations should coincide with occupied breeding habitat that is affected by project operations. Monitoring should be conducted initially at years 1, 2, 3, and 5 from license issuance, as specified in Section 7 of the Settlement, at which time it would be determined whether the project is adversely affecting mountain yellow-legged frogs. This may be especially relevant for Silver Lake, where EID found this species along the eastern shoreline during its 2002 surveys (ECORP, 2002b). Any management decisions that pertain to mountain yellow-legged frogs at Silver Lake would need to be coordinated with the resource agencies. The important recreational fishery at this lake may preclude the feasibility of eliminating predation on frogs by trout. The plan should be filed with the Commission for final approval.

Similar to our conclusion in the fish and BMI monitoring discussion (in the *Environmental Effects and Recommendations* subsection in section 3.3.2, *Aquatic Resources*), we consider it unlikely that continued monitoring of foothill yellow-legged frog and mountain yellow-legged frog after year 10 from license issuance would yield additional meaningful data, unless a flow regime or reservoir operation change is implemented during the first 10 years of the new project license. However, the provision in the Settlement to allow monitoring to be terminated if resource objectives are being met or no further change is expected should avoid the potential for superfluous monitoring.

Ongoing operation of the project is expected to have no effect on the two remaining sensitive amphibian species, Yosemite toad and Mount Lyell salamander. Although suitable habitat for these species is present in the project area, neither is expected to occur in habitats that are currently or anticipated to be affected by project operations. If Yosemite toads occur in the vicinity of Caples Lake or Silver Lake, they would most likely occur in meadows and other appropriate habitat upstream of these project reservoirs and would not be affected by fluctuating lake levels. Similarly, if Mount Lyell salamander are present in the vicinity of Lake Aloha they would not be affected by fluctuating water levels in the lake or Pyramid Creek.

Reptiles

Western pond turtle could be adversely affected by project operations if they would result in ground disturbance at upland nesting sites. Because this species has been reported in the vicinity of the Silver Fork, it is possible that nesting sites are present in the project area. Such sites could be adversely affected by construction of new facilities, repair and maintenance of existing facilities, and development or enhancement of recreational access and facilities. Therefore, we recommend preparation of a biological evaluation, as proposed by EID in the Settlement and discussed above, prior to construction of new project features or repair of existing facilities if such activities would result in ground disturbance of suitable nesting habitat for this species. As part of this process, we recommend EID consult with the FS to determine appropriate disturbance avoidance or minimization measures, such as avoidance of ground disturbance during the nesting season.

Ongoing operation of the project is unlikely to adversely affect the two remaining sensitive reptile species, California horned lizard and Northern sagebrush lizard, because they are likely to avoid areas that are disturbed during repair of existing facilities or construction of new facilities.

Birds

California spotted owl and Northern goshawk could be adversely affected by repair of existing facilities or development of new facilities if activities would result in disturbance of nesting pairs. Nesting spotted owls have been documented in the vicinity of lower Echo Lake and the Bull Creek portal, and Northern goshawks recently nested near Silver Lake. Both species could nest in additional areas of suitable habitat elsewhere in the project area. We recommend preparation of a biological evaluation, in accordance with the Settlement, prior to construction of new project features or maintenance and repair of existing facilities if such activities could result in disturbance of nesting spotted owls or goshawks. As part of this process, we recommend EID consult with the FS to determine the need for additional surveys and appropriate disturbance avoidance or minimization measures, such as avoidance of activity during the nesting season or establishment of buffer areas around active nest sites.

Willow flycatchers could be adversely affected by repair of existing facilities or development of new facilities if they would result in disturbance of nesting pairs. This species does not currently nest in the project area, but there is potential for willow flycatchers to occupy areas of suitable habitat in the future. Such areas include meadows near the California Department of Transportation (CalTrans) Caples Lake Maintenance Station, at the confluence of Caples Creek and Kirkwood Creek, on the south shore of Silver Lake, and near Kirkwood Inn. Prior to construction of new project features or repair of existing facilities in these areas, EID should consult with FS and CDFG regarding any

known nesting territories. If it is unknown whether or not the habitat is occupied, surveys should be conducted to determine if any active nests are present. We recommend preparation of a biological evaluation prior to construction of new project features or maintenance and repair of existing facilities if such activities could result disturbance of nesting willow flycatchers. As part of this process, EID should consult with FS and CDFG to determine appropriate disturbance avoidance or minimization measures, such as avoidance of activity during the nesting season or establishment of buffer areas around active nest sites.

Ongoing operation of the project is unlikely to adversely affect the remaining sensitive bird species because they are less susceptible to disturbance and are not restricted to small areas of suitable habitat that could be affected by project operations.

Mammals

A number of sensitive bat species could be adversely affected by repair of existing facilities or development of new facilities if they would result in disturbance of roost or maternity sites. Bats are known to or could roost in a number of sites in the project area, including the Alder Creek tailing pile, the Bull Creek portal, the tunnel, the powerhouse, and the nearby abandoned house. We recommend preparation of a biological evaluation prior to construction of new project features or maintenance and repair of existing facilities at these locations. As part of this process, we recommend EID consult with FS to determine appropriate disturbance avoidance or minimization measures, such as avoidance of the breeding season and use of exclusion devices.

Mule deer mortality is known to occur in the El Dorado canal (EIP, 2002i). In order to minimize mortality, exclusion fencing and bridges have been installed along the canal, but structures are in need of repair (EIP, 2002j). Therefore, we concur with EID's proposal to ensure that all canal crossings are passable for wildlife; inspect the fencing, canal crossings and their approaches at least twice a year; and repair or replace fencing as necessary along the El Dorado canal to further reduce deer loss within the canal. We also recommend adoption of EID's proposal to submit an annual report of wildlife found in the canal, including the date, location, and species for each occurrence.

Ongoing operation of the project is unlikely to adversely affect the remaining sensitive mammal species because they are likely to avoid areas that are disturbed during repair of existing facilities or construction of new facilities.

We present the estimated cost of all measures that pertain to terrestrial resources in section 4.0, *Developmental Analysis*, and make our final recommendations regarding these measures in section 5.2, *Comprehensive Development and Recommended Alternative*.

Project Decommissioning

Project decommissioning, including removal of hydroelectric features, such as dams and other structures at the project reservoirs, the penstock, and the powerhouse, could have a variety of effects on terrestrial resources. In most cases, these would be relatively temporary effects, with the resources eventually becoming more similar to those of pre-project conditions. Approximately 1,122 acres of open water habitat would be lost as a result of dam removal. This loss of open water habitat would reduce the amount of waterfowl habitat and could reduce foraging opportunities for fish-eating birds that forage at the reservoirs. Lower water level would result in a temporary loss of wet meadow habitat at the edge of Silver Lake, but this habitat would likely become re-established along the new lake margin. Over time, the amount of wet meadow habitat at Silver Lake and Caples Lake are likely to increase as a result of lower water levels. Based on historic vegetation maps, water level reductions could result in an overall increase of 200 acres of wet meadow and 550 acres of coniferous habitats at the project reservoirs. It is possible that removal of dams associated with Lake Aloha would increase the potential for trout to be introduced into downstream pools, which could have an adverse effect on mountain yellow-legged frog. Removal of hydroelectric features, particularly dams and the penstock, could result in loss and/or disturbance of plant and wildlife species in the vicinity of these features.

A return to pre-project flows between the project reservoirs and the El Dorado Diversion would increase the average annual flow and the magnitude and frequency of floods. Adverse impacts, particularly loss of streamside vegetation, would be likely to occur within the first 5 to 10 years following project decommissioning. This could result from erosion, bank failure, development of debris jams and gravel bars, scour, and deposition. However, riparian systems are characteristically dynamic and resilient, and over time, riparian plant and wildlife communities along the Silver Fork and SFAR would likely equilibrate to changes in seasonal flows and changes caused by those flows. Reestablishment of pre-project flows could result in an increase and/or enhancement of riparian and aquatic habitats for sensitive species, such as foothill yellow-legged frog. Some enhancement of habitat downstream of the diversion is also likely to occur because water would only be diverted for consumptive uses, reducing the amount of diversion and increasing SFAR flows downstream.

Project decommissioning without removal of hydroelectric features would have similar effects to those described above, though there would be no adverse effects from removal of features. Assuming dam gates at the reservoirs would be left open, some reduction in reservoir water levels and subsequent increase in flows would occur. This

would result in similar changes in habitat and associated species effects as those described above, but to a lesser extent.

3.3.3.3 Unavoidable Adverse Effects: None.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

Three federally listed species have potential to occur in the project area: valley elderberry longhorn beetle, California red-legged frog, and bald eagle. We discuss each of these species in the following section. We consider this EIS to constitute our biological assessment for these federally listed species.

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is federally listed as a threatened species. This species only occurs where blue elderberry shrubs are present, at elevations up to 3,000 feet. Blue elderberry shrubs were observed in the vicinity of the El Dorado canal and the powerhouse during the 1999 botanical surveys (EID, 2000a). Therefore, focused surveys were conducted in 2002 at project facilities within the potential elevation range of the beetle to determine if any elderberry shrubs and elderberry beetles are present in areas that could be affected by project operations. The survey area included the lower section of the penstock, the vicinity of the powerhouse, and the access road to the powerhouse. No elderberry plants, and therefore no elderberry beetle habitat, were observed during the surveys (EIP, 2002f).

California Red-legged Frog

The California red-legged frog (*Rana aurora draytoni*) is federally listed as a threatened species. The FWS designated critical habitat for the California red-legged frog in 2001 (66 FR 14626–14674), which included a portion of the Weber Creek watershed within approximately 1 mile of the SFAR. However, in 2002, all but 200,000 of the 4 million acres of critical habitat, including Weber Creek, were nullified as part of a settlement because the designation did not include an economic analysis as required by ESA. Under the settlement, the FWS agreed to redraw the boundaries by 2005. Because no portion of the project area was included in the original designation, it is not expected to be included in the revised critical habitat boundary to be developed by 2005. The FWS also released the Recovery Plan for the California red-legged frog in 2002 (FWS, 2002). Core areas identified in the plan are distributed throughout portions of the historic and current range and represent a system of areas that, when protected and managed for California red-legged frogs, would allow for the long-term viability of existing populations and reestablishment of populations within the historic range. The project area is not within any of these core areas.

Optimal breeding habitat for California red-legged frogs consists of deep, still, or slow-moving water with permanent or nearly permanent pools and emergent or shoreline

riparian vegetation (Jennings and Hayes, 1994). Nearly all of the known populations of this species have been documented below 3,500 feet in elevation, though a few historical sightings were near 5,000 feet (FWS, 2002). California red-legged frogs have never been documented in the project area. The nearest known occurrence is near Weber Creek about 20 miles upstream of its confluence with the SFAR. Weber Creek joins the SFAR about 46 miles downstream of the diversion dam site and 24 miles downstream of the powerhouse (FERC, 2000). In addition, no red-legged frogs were detected during targeted surveys in 1997 along portions of the El Dorado canal near Riverton (JSA, 1997). However, ECORP identified 10 areas of potentially suitable habitat within 1 mile of project-affected streams (ECORP, 2002a). These include the forebay and a number of small ponds, springs, and seeps, all of which are above elevation 3,500 feet. Most of these areas are on private land and permission to survey these areas was denied by the landowners (ECORP, 2002b). However, the forebay was surveyed using FWS protocols and no red-legged frogs were found. The FWS has suggested that low-gradient (less than 4 percent) portions of the SFAR and its tributaries could provide suitable habitat.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a federally listed threatened species that is proposed for delisting; it is also an FS sensitive species. The bald eagle also has spiritual significance to the Washoe, Nisenan, and Miwork Indians (letter from Elaine Whitehurst, Executive Government Liaison, Shingle Springs Rancheria, to the Commission, dated June 11, 2003). Nesting territories are typically associated with lakes, reservoirs, rivers, or large streams, and nests are usually located in multi-storied, predominately coniferous forest with old-growth components (FS, 2000b). Surveys were conducted at Caples and Silver lakes during the 2000 and 2001 breeding seasons. Bald eagles were observed foraging and roosting at Silver Lake and roosting at Caples Lake during the surveys, but no nests were confirmed (EIP, 2002b).

3.3.4.2 Environmental Effects and Recommendations

As described in the *Environmental Effects and Recommendations* subsection in section 3.3.3, *Terrestrial Resources*, EID proposes to prepare a biological assessment prior to commencing any activities to construct (including, but not limited to, proposed recreational developments), operate, or maintain project facilities that may affect a species listed or proposed for listing under the federal ESA or critical habitat for such a species. If a new threatened or endangered species, is found prior to or during construction activities or other project operations, EID would notify and consult with the FS and FWS and implement protective measures, as appropriate, prior to continuing construction or operations. We note that any biological assessment beyond this EIS that may be needed for this project during the term of a new license would need to be developed collaboratively with the Commission.

Valley Elderberry Longhorn Beetle

Ongoing operation of the project is expected to have no effect on valley elderberry longhorn beetle. Surveys conducted in 2002 confirmed that there are no elderberry plants in the vicinity of project facilities located within the elevational range for this species. Much of the survey area is unsuitable for elderberries due to thick coniferous tree canopy in some portions and dry, thin soils in others, and there is little chance for elderberry shrubs to become established in these areas in the future (EIP, 2002f). Consequently, valley elderberry longhorn beetle is not expected to be affected by continued vegetation management and potential repairs at project facilities and along access roads.

California Red-legged Frog

Ongoing operation of the project is not likely to adversely affect California red-legged frogs. Although FWS has suggested that low-gradient reaches of the SFAR and its tributaries below 5,000 feet could support suitable habitat for the species, this is very unlikely to be the case. These reaches are generally characterized by boulder and bedrock channels with little, if any, riparian or emergent vegetation. Areas with appropriate hydrological conditions in these reaches are also expected to be very limited or absent. The project forebay was surveyed by EID using FWS protocols and no red-legged frogs were found. The presence of bullfrogs at the forebay, which compete for the same habitat (ECORP, 2002b), may preclude the future colonization of this pond by California red-legged frogs. The other ponds, springs, or seeps identified as potentially suitable habitat are either hydrologically disconnected from the project-affected reaches or they are located upstream of such reaches. Therefore, any red-legged frogs and their habitat that may be present in these locations are unlikely to be affected by project operations.

Bald Eagle

Ongoing operation of the project is not likely to adversely affect bald eagles. This species is known to occur at Silver Lake and Caples Lake, though survey results suggest they do not breed in the immediate vicinity of the lakes. Most observations of adults are from the late summer, when they are likely to have finished nesting. Eagle observations earlier in the summer are of immature birds unlikely to be of breeding age. If nesting pairs become established in the future, they would be accustomed to high levels of disturbance resulting from residential and recreational activities in the area. As a result, project operations are unlikely to disturb nesting eagles. Proposed changes in management of lake levels are unlikely to adversely affect the foraging suitability of the lakes.

Project Decommissioning

Project decommissioning, with or without removal of hydroelectric features, would not affect valley elderberry longhorn beetle or California red-legged frog. Decommissioning would reduce the amount of open water foraging habitat available for bald eagles at Silver Lake and Caples Lake. However, survey results indicate these lakes are used by a very small number of individuals, and there is no evidence that they rely upon it during the nesting season. Therefore, reduced water levels are unlikely to reduce the foraging habitat to a level that cannot sustain current eagle use.

3.3.4.3 Unavoidable Adverse Effects: None.

3.3.5 Recreational Resources

The project is located in El Dorado, Alpine, and Amador counties in northern California. Lake Tahoe is approximately 10 miles from some of the project resources. Portions of the project lie within the Eldorado National Forest and the LTBMU. Recreational facilities and opportunities within the project area occur at the project reservoirs and along the stream and river segments affected by the project. The following sections describe the recreational facilities and recreational use that occurs within the project area.

3.3.5.1 Affected Environment

Stream and River Reaches

The stream and river reaches located within the project area include Echo Creek, Pyramid Creek, Caples Creek, the Silver Fork, and the SFAR. These stream and river reaches lie within the boundaries of either the Eldorado National Forest or the LTBMU. Recreational facilities on the various stream and river segments in the El Dorado Project tend to be more dispersed than those on the lakes. Table 3-32 contains information about developed facilities on the stream segments, and figure 3-14 shows the location of these facilities. In addition to the developed recreational sites, there are a number of undeveloped and informal access sites along the stream and river reaches, especially along the Silver Fork at Girard Bridge and Fitch Rantz Bridge, and along the SFAR on Highway 50.

Recreational Access and Facilities

There are no developed facilities at Echo Creek. Echo Creek is located within the LTBMU, and management of the area emphasizes the environmental sensitivity of the area. There are no developed facilities along Pyramid Creek; however, the FS maintains a trailhead at Twin Bridges that provides access to a trail paralleling the west side of Pyramid Creek. The trail leads to the Horsetail Falls, a popular location for visitors. There are no

developed facilities along Caples Creek. However, Kirkwood Lake Campground is nearby and provides 12 tent campsites, each designated to accommodate five people at one time.

Along the Silver Fork, the FS maintains two developed campgrounds. The Silver Fork Campground is located about 1.5 miles downstream of the confluence of the Silver Fork and Caples Creek. The campground consists of 31 single and four double campsites. Single campsites are designed to accommodate 5 people at one time and double campsites are designed for 12 people at one time. The China Flat Campground is located about 3 miles upstream of the confluence of the Silver Fork and the SFAR. The campground consists of 17 single campsites and one double campsite.

Along the SFAR, the FS maintains two developed campgrounds. The Lovers Leap Campground is located on the SFAR about 1 mile downstream of the confluence of the SFAR and Pyramid Creek. The campground consists of 21 family campsites with picnic tables and vault toilets. The Sand Flat Campground is located just downstream of the confluence of the Silver Fork and the SFAR. The campground consists of 28 single campsites and 1 double campsite with picnic tables, grills, and fire rings. In addition, the campground is equipped with potable water, trash receptacles, and vault toilets.

Table 3-32. Recreational facilities located along stream and river segments of the El Dorado Project.
(Source: EID, 2000a)

Recreational Facilities	Pyramid Creek	Caples Creek	Silver Fork	SFAR
Campgrounds (number of campsites)	--	Kirkwood Lake Campground (12)	Silver Fork Campground (35) China Flat Campground (18)	Lovers Leap Campground (21) Sand Flat Campground (29)
Picnic areas	--	--	--	42-Mile picnic area, Eagle Rock picnic area, Indian Springs picnic area, Alder Creek picnic area, Bridal Veil picnic area
Trailheads	Twin Bridges	Fitz Ranch Bridge	--	Lovers Leap, Mount Ralston, Pony Express
Whitewater boating runs	--	--	Dugald Bremner Run, Lower Run	Lovers Leap Run, Kyburz to Riverton Run, Riverton to Peavine Run, Golden Gate Run

The FS also maintains several picnic areas along the SFAR, including the 42-Mile picnic area, Eagle Rock picnic area, Indian Springs picnic area, Alder Creek picnic area, and Bridal Veil picnic area. The 42-Mile picnic area is open year-round and includes four picnic units with tables and vault toilets. The Eagle Rock picnic area is open from May 15 through October 15 and includes 10 picnic units with tables and vault toilets. The Indian Springs picnic area is open from May 15 through October 15 and includes four picnic units, vault toilets, and fireplaces. The Alder Creek picnic area was destroyed by the 1997 floods, and, currently, there are no developed facilities. The Bridal Veil picnic area is open from May 15 through October 15 and includes 15 picnic sites with tables, grills, and vault toilets.

There are a number of trailheads that are associated with the stream and river reaches in the project area. The Twin Bridges trailhead provides access to the Horsetail Falls along Pyramid Creek. Along Caples Creek, the Fitch Rantz trailhead provides access to 4 main trails that are maintained by the FS. In addition, trailheads at Hay Flat and Martins Meadow provide access to the Caples Creek area, but are used to a much lesser degree than the Fitch Rantz trailhead. There are three major trailheads along the SFAR. The Lovers Leap trailhead leads to the top of Lovers Leap, a popular rock climbing area. The Mount Ralston offers access to Ralston Peak and the Desolation Wilderness. The Pony Express trailhead provides access to the Pony Express Trail, a National Recreation Trail that consists of a system of trails and paved and unpaved roads that begins in St. Louis and ends in Sacramento.

Recreational Use

Recreational use in the river and stream segments consists primarily of hiking, camping, nature viewing, fishing, hunting, off-road vehicle use, and whitewater boating. EID conducted visitor and vehicle counts of the stream and river segments in the El Dorado Project area during the 1998–1999 winter season and during the 1999 spring, summer, and fall seasons (see table 3-33). In addition, EID conducted a survey of cabin owners in the project area. EID used these data to develop annual use estimates, which are reported in recreation visitor days (RVDs).

Along Pyramid Creek within the project area, recreational use during the 1999 summer season comprised about 83 percent of the total annual use. Of this, about 7 percent was associated with overnight use, about 620 RVDs, and about 93 percent, about 7,900 RVDs with day use. Of the day use, about 21 percent of the recreational use occurred during weekdays and about 78 percent during the weekends.

Table 3-33. Recreational use at El Dorado Project streams. (Source: EID, 2000a)

RVDs	Pyramid Creek	Caples Creek	Silver Fork	SFAR
Total	10,200	5,000	37,100	132,400
Winter/spring	350	300	600	3,200
Summer	8,500	3,600	28,200	111,500
Fall	1,400	1,100	8,300	17,600
Summer overnight	NA	2,800	26,000	106,300

Note: NA - Not applicable.

Along Caples Creek within the project area, recreational use during the 1999 summer season comprised about 72 percent of the total annual use. Of this, about 78 percent was associated with overnight use and about 22 percent with day use. At the day-use areas, about 33 percent of the use occurred during weekdays with the remainder occurring during the weekends.

Along the Silver Fork within the project area, recreational use during the 1999 summer season comprised about 76 percent of the total annual use, or about 28,200 RVDs. Of this recreational use, Silver Fork Campground received about 9,100 RVDs, China Flat Campground received about 5,700 RVDs, and there were about 11,100 RVDs of dispersed overnight recreational use in this area. During the summer season, the day-use areas received about 8 percent of the total summer use. About 37 percent of this recreational use occurred during weekdays and about 63 percent during the weekends.

Along the SFAR within the project area, recreational use during the 1999 summer season comprised about 84 percent of the total annual use. During the summer season, Sand Flat Campground received about 5,700 RVDs of overnight use, and the 686 recreation cabins in the area received about 100,300 RVDs of overnight use. During the summer season, the day-use areas received about 5 percent of the total summer use. About 37 percent of this recreational use occurred during weekdays and about 63 percent during the weekends.

Whitewater Boating

The Silver Fork offers two distinct expert whitewater boating runs. The Dugald Bremner Run is about 3.5 miles long and consists of Class V boating with a mandatory portage. The put-in for the run is located at the Fitch Rantz Bridge and the take-out is at the Girard Bridge. The run is boatable at flows ranging from 300 to 800 cfs. The Lower Run is

about 3.3 miles and consists of Class V+ boating. The put-in for the Lower Run is at China Flat Campground and the take-out is at the confluence of the Silver Fork and the SFAR. The Lower Run is boatable at flows ranging from 350 to 550 cfs. An estimated 50 to 100 user days occur on the Silver Fork annually.

The SFAR offers four sections of whitewater that can be run individually or in combination. The Lovers Leap Run begins near Strawberry and ends about 9.5 miles downstream near Kyburz and consists of Class V rapids. The put-in is generally either the Strawberry Bridge or the Strawberry Creek Bridge and the take-out is either at the Kyburz Bridge or the Wildwood Way Bridge. This section of the river is boatable at flows ranging from 500 to 1,200 cfs, with optimum flows being approximately 1,000 cfs. The Kyburz to Riverton Run consists of Class III to IV+ rapids at flows ranging from 700 to 1,200 cfs and Class IV to V rapids at flows ranging from 1,200 to 3,000 cfs. The El Dorado diversion dam is located in this stretch. This dam was recently reconstructed, and the Commission required EID to incorporate a permanent canoe portage route into the final design of the diversion dam, including signage to direct boaters to the take-out point and put in point downstream of the dam (FERC, 2000). The portage is on the right side of the river. The put-ins available for this run upstream of the diversion dam are the Kyburz Bridge and the Wildwood Way Bridge. Alternatively, boaters who would like to avoid the diversion dam can put in at Sand Flat Campground, Indian Springs picnic area, or Alder Creek picnic area. Boaters on this stretch can take out at Riverton, at the Highway 50 bridge.

The Riverton to Peavine Run begins at the Highway 50 Bridge near Riverton and ends at Peavine Bridge Road. The run consists of 3.5 miles of Class III to IV rapids and is boatable at flows of 700 to 4,000 cfs. The Golden Gate Run begins at Brockliss Bridge and ends 9.4 miles downstream at the Forebay Road Bridge. The run has Class V rapids and is boatable at flows of 700 to 1,500 cfs, with optimum flows of 1,000 cfs.

Project Reservoirs

Recreational Access and Facilities

Table 3-34 provides a summary of the existing developed recreational facilities for each of the El Dorado Project reservoirs.

Table 3-34. Developed recreational facilities at the El Dorado Project reservoirs. (Source: EID, 2000a)

Facility	Silver Lake	Caples Lake	Echo Lake	Lake Aloha ^a
Boat ramps (number of ramps)	Kay's Silver Lake Resort (1)	Caples Lake Resort (1)	Echo Lake Chalet (1)	--
Car-top boat access	Various day-use areas	--	--	--
Marinas (number of boat slips)	--	Caples Lake Resort	Echo Lake Chalet (40)	--
Picnic areas	Sandy Cove picnic area, Ferguson Point picnic area, Silver Lake picnic area, Oyster Creek Roadside Rest	--	--	--
Angler access sites	--	Caples Lake Resort angler access, Woods Creek angler access, Caples Lake dam trailhead	--	--
Trailheads	Thunder Mountain, Horse Canyon, Granite Lake/Hidden Lake, Shealor Lakes, Allen's Camp	Lake Margaret, Emigrant Lake, Schneider Camp/Showers Creek, Meiss Lake/Showers Lake, Round Top Lake, Winnemucca, Carson Pass	Echo Lake	--
Resorts	Kay's Silver Lake Resort Kit Carson Resort Plasse's Resort	Caples Lake Resort	Echo Lake Chalet	--
Campgrounds (number of campsites)	Plasse's Resort (156) Silver Lake East (62) Silver Lake West (35) ^b	Caples Lake Campground (35)	--	--
Organizational camps	Camp Minkalo, Camp Silverado, Stockton Municipal Camp	--	Berkeley Echo Lake Camp	--

- ^a Lake Aloha is located inside of the Desolation Wilderness, and development is restricted.
- ^b In addition to the three developed campgrounds, Martins Meadows overflow is used for camping. There are limited facilities and no developed campsites; however, the area receives a fair amount of use.

Lake Aloha Recreational Facilities

Lake Aloha, which is located completely within the Desolation Wilderness, can only be reached by trail. There are no developed facilities surrounding Lake Aloha as the area is managed to provide primitive recreational experiences. According to a mail survey conducted by California State University, Chico, the majority of hikers visiting Lake Aloha begin their hike at the Echo Lake trailhead.

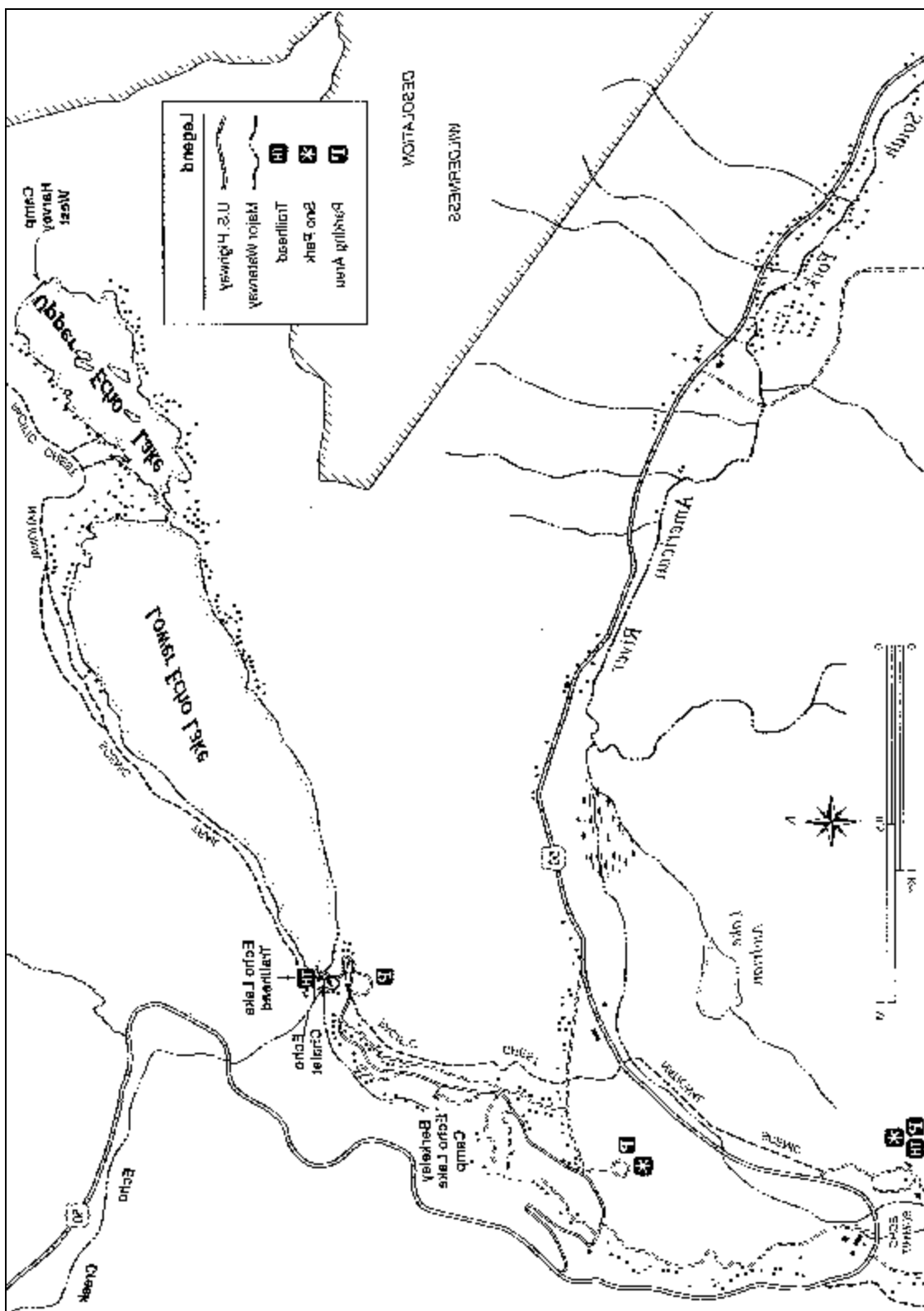
Echo Lake Recreational Facilities

Echo Lake is located about 5 miles southwest of South Lake Tahoe and is within the LTBMU. The lake is composed of two lakes (upper Echo Lake and lower Echo Lake) connected by a small channel. Developed recreational facilities in the vicinity of Echo Lake include: Echo Chalet, Berkeley Echo Camp, Echo Lake trailhead, and the PCT (figure 3-15). The former Camp Harvey West Boy Scout Camp located on the northwest end of upper Echo Lake is no longer in existence, but some dispersed public recreational use occurs in this area.

The Echo Chalet is located at the southeast end of lower Echo Lake outside the project boundary, except for shoreline facilities, and is the only major developed public recreational facility on Echo Lake. The Chalet consists of 8 housekeeping cabins, a store, a deli, a picnic area, a seasonal post office, and a marina. The marina consists of a boat dock, overnight slips, a launch ramp, and a rental center. Currently, the marina has 40 slips, but is permitted by the FS to allow 90 slips. The Echo Chalet offers a boat taxi service from July 1 through Labor Day, which is primarily used by recreational cabin owners and hikers going to the Desolation Wilderness. The boat taxi service travels between the lower Echo Lake to the upper Echo Lake through the narrow channel.

The city of Berkeley operates the Berkeley Echo Lake Camp, which is located approximately 0.5 mile southeast of Echo Lake, outside of the project boundary. The camp includes 39 tent cabins, showers, bathrooms and a laundry, kitchen and dining facilities, volleyball and basketball courts, swimming pool, and hiking trails.

The Echo Lake trailhead provides access to the Desolation Wilderness, PCT, and the only land access to the recreational cabins on lower and upper Echo lakes. The PCT traverses the project area near Echo Lake. The trail crosses Echo Lake dam and continues along the east shore of Echo Lake into the Desolation Wilderness. Angler access on Echo Lake is available along the crest of the dam and at informal sites along the shoreline.



Caples Lake Recreational Facilities

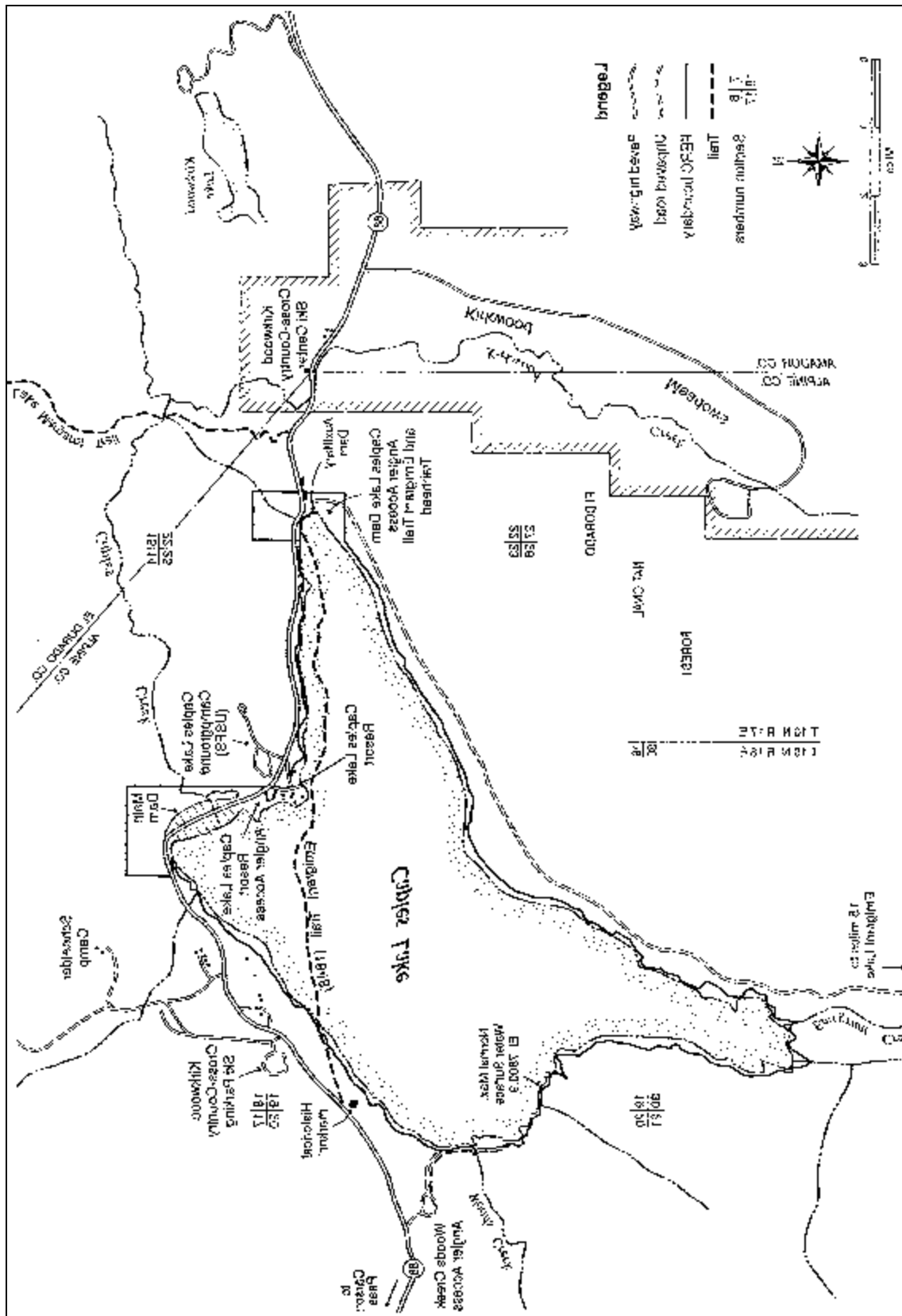
Caples Lake is located in Alpine County and within the boundary of the Eldorado National Forest. Developed recreational facilities near Caples Lake include Caples Lake Resort, Caples Lake Campground, Caples Lake Resort angler access, Woods Creek fishing access, Caples Lake dam trailhead (which provides angler access and access to Emigrant Trail trailhead), and seven trailheads (figure 3-16).

Caples Lake Resort is located on the lake's north shore on Highway 88, partially within the project boundary. The Caples Lake Resort is on FS land and privately operated under a special-use permit. The resort contains a restaurant, nine housekeeping cabins, nine lodge rooms, a store, a marina, and a rental center. The marina includes a public boat launch, a rental dock, a guest dock, and parking facilities. Caples Lake Resort operates the only boat docking and launching facilities on Caples Lake.

Caples Lake Campground is located directly across Highway 88 from the Caples Lake Resort, outside of the project boundary. The campground contains 35 sites, each of which have picnic tables and fire rings. Caples Lake Campground is located on FS lands and is privately operated under a special-use permit.

Formal angler access is available at the Caples Lake Resort angler access, Woods Creek fishing access, and Caples Lake dam trailhead. The Caples Lake Resort angler access area is located within the project boundary between the west end of the main dam and the Caples Lake Resort exit on FS land and is managed by EID. The facility includes a small parking area for 12 vehicles and a trail leading to the main dam and a small picnic area with three picnic tables. The Woods Creek fishing access is located off Highway 88 on the east shore of Caples Lake on EID land within the project boundary. The site includes two paved parking areas that can accommodate 29 vehicles (one of which is disabled accessible), a disabled accessible vault toilet, and a pedestrian access trail. The Caples Lake dam trailhead is located within the project boundary adjacent to the Caples Lake auxiliary dam on FS land. The site includes a paved parking area that can accommodate 22 vehicles, informational signs, and waterless toilets. The facility is managed by both the FS and EID under an alternating 5-year agreement.

The Caples Lake area contains seven major trailheads that provide access to Lake Margaret, Emigrant Lake, Showers Lake, Round Top Lake, Winnemucca Lake, Red Lake, Carson Pass, and the Mokelumne Wilderness. During the winter season, the Kirkwood Ski Resort, located outside of the project boundary west of Caples Lake dam off Highway 88, provides downhill and cross-country skiing opportunities for the region. This ski resort draws water for snow-making purposes from Caples Lake.



Silver Lake Recreational Facilities

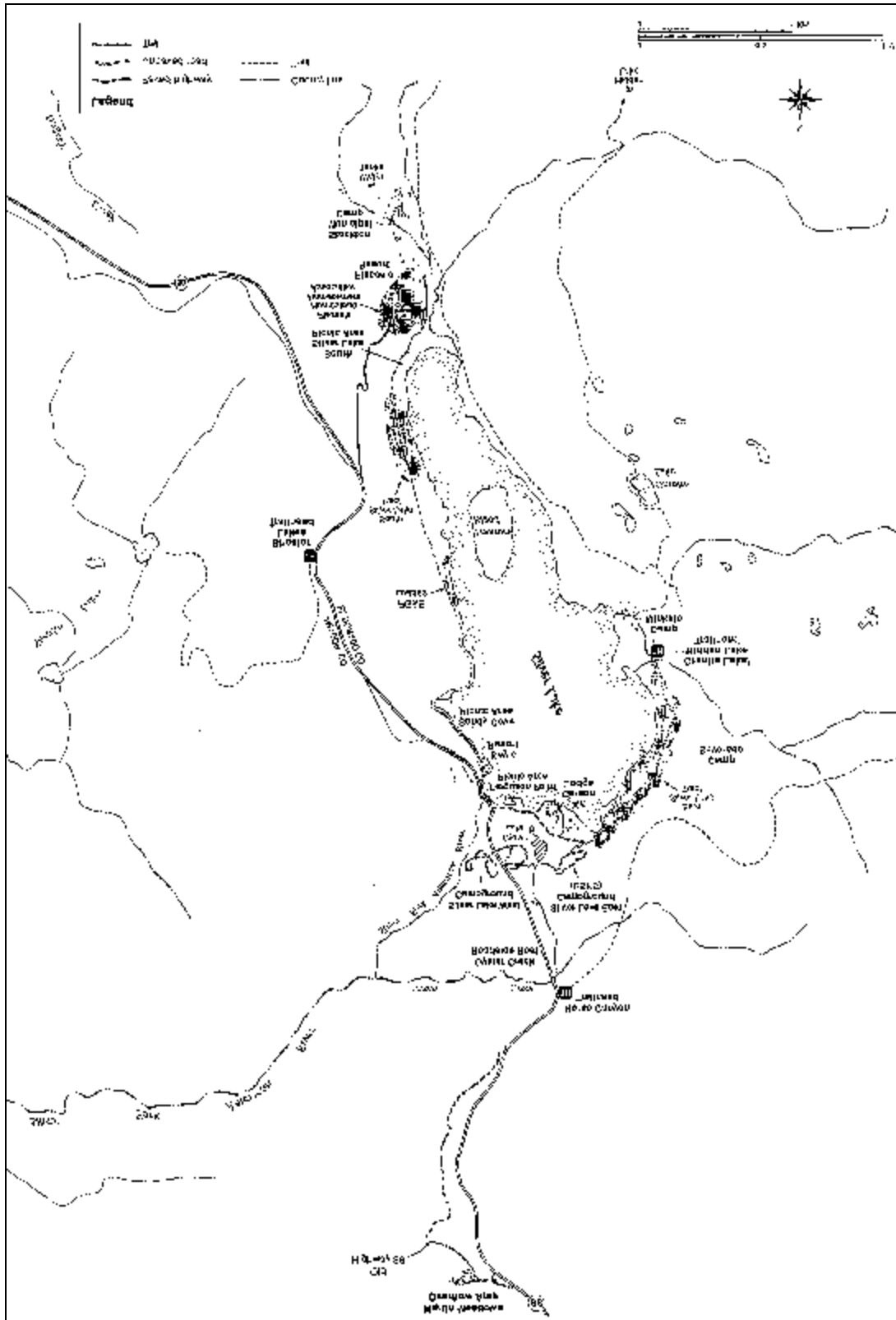
Silver Lake is located in Amador County within the Eldorado National Forest. Developed recreational facilities within the vicinity of Silver Lake consist of Kay's Silver Lake Resort, Kit Carson Lodge, Plasse's Resort, Silver Lake East Campground, Silver Lake West Campground, Sandy Cove picnic and parking area, Ferguson Point picnic and parking area, Oyster Creek Roadside Rest, South Silver Lake picnic area, Martin Meadows overflow camping area, three organizational camps, and five trailheads (figure 3-17).

Kay's Silver Lake Resort is located on Highway 88, just south of the Silver Lake dam and is on EID property within the project boundary. The resort is privately operated and comprises 9 housekeeping cabins, a grocery store, parking facilities, and a boat ramp. Kay's Silver Lake Resort is the location of the primary public boat launch on Silver Lake.

Kit Carson Lodge is located on the north side of Silver Lake and lies on 12 acres of federally owned land managed by the FS (hereafter referred to as FS land) and is located mostly outside of the project boundary, with the exception of the road to the lodge and shoreline facilities. Kit Carson Lodge is privately owned and operated under a special-use permit. The Kit Carson Lodge comprises 19 housekeeping cottages, 8 hotel rooms, a restaurant, an art gallery, a beach with boat rentals, a boat dock, a general store, a laundry, and a post office.

Plasse's Resort is located at the south end of Silver Lake on 160 acres of private land outside of the project boundary. Plasse's Resort consists of tent and recreational vehicle (RV) sites, group campsites, a dining room and bar, a general store, a dump station, a propane station, laundry facilities, shower facilities, a children's playground, horseshoe pits, volleyball and basketball courts, an arcade, campsites for equestrian users, and a horse corral. There are no public boat launching facilities at Plasse's Resort; however, when the water level is high enough, visitors launch boats from the shore of the creek that bisects Plasse's Resort.

Silver Lake East Campground is located just north of Silver Lake on FS and EID land within the project boundary. Silver Lake East consists of 62 campsites, 28 tent sites and 34 tent/trailer/RV sites. Campsites 1 through 10 are situated on land owned by EID and sites 20 through 62 are situated on FS land. A concessionaire manages the campground. Silver Lake West Campground is located north of Silver Lake, across Highway 88 from Silver Lake East Campground, on FS-managed and EID-owned lands, partially within the project boundary. Silver Lake West Campground consists of 35



campsites. Campsites 1 through 18 are situated on FS land and sites 18 through 35 are situated on EID land; however, EID manages the entire campground.

The Silver Lake area contains three formal picnic areas (Sandy Cove picnic area, Ferguson Point picnic area, and Oyster Creek Roadside Rest) and one undeveloped picnic area (South Silver Lake picnic area). The Sandy Cove, Ferguson Point, Oyster Creek Roadside Rest, and South Silver Lake sites are all located within the project boundary.

Sandy Cove picnic area is located on the east side of Kay's Silver Lake Resort and consists of an access road, a paved parking area with one parking space, five picnic tables (one ADA-compliant) with grills, potable water, and two waterless toilets. In addition, the area provides swimming opportunities and a beach area, which is exposed as Silver Lake is drawn down. Sandy Cove is situated on EID-owned land and one of the few locations on Silver Lake that provides easy public shoreline access. The Sandy Cove parking area is located between Kay's Silver Lake Resort and the Sandy Cove picnic area on EID-owned land and can accommodate 18 vehicles.

Ferguson Point picnic area is located on the north shore of Silver Lake on EID-owned land and consists of six picnic tables with grills, parking for 10 vehicles, potable water, and two vault toilets. Ferguson Point, like Sandy Cove, is one of the few locations that provides easy public shoreline access. Ferguson Point parking area is located just east of the Ferguson Point picnic area on EID-owned land and can accommodate five vehicles. The parking area provides access to an unpaved boat launching area for car-top boat launching.

Oyster Creek Roadside Rest, located north of Silver Lake on Highway 88, is owned and operated by EID and consists of a paved parking area for 12 vehicles, 10 picnic tables with grills, potable water, and toilets.

South Silver Lake picnic area is an undeveloped area located on the southwest shore of Silver Lake and consists of a small turnout and a number of user-created trails leading to the waterfront.

Martin Meadows overflow camping area is located to the north of Silver Lake on the west side of Highway 88, outside of the project boundary. The area is currently undeveloped and heavily used by tent, trailer, and RV campers. The site is in poor condition and litter and campsite remnants are common.

The Silver Lake Area contains three organizational camps, all of which are located on FS lands privately operated under special-use permits and located outside of the project boundary. Camp Minkalo has not been used for the past several years. The Boy Scouts of America operates Camp Silverado on the northeast side of Silver Lake. The city of

Stockton operates the Stockton Municipal Camp, which is located on the south end of Silver Lake.

The Silver Lake area contains five major trailheads that provide access to many miles of public trails as well as the Mokelumne Wilderness. Hikers can visit Thunder Mountain, Granite Lake, Hidden Lake, and the Shealar lakes. In addition, there is a well-marked public trail that traverses much of the east side of Silver Lake that provides shoreline access to a number of popular fishing spots.

Recreational Use

The primary recreational activities occurring at the project reservoirs during the summer period include picnicking, swimming, boating, fishing, hiking, backpacking, camping, and nature viewing. During the winter, the primary activities include snow-shoeing, cross-country skiing, ice-skating, and ice-fishing.

EID conducted a recreational use study to determine the level of use at the project for the period from November 1998 to October 1999. Table 3-35 contains EID's estimates of recreational use at each of the project reservoirs. EID conducted visitor and vehicle counts during the 1998–1999 winter season and during the 1999 spring, summer, and fall seasons. EID used survey and vehicle count data to develop annual use estimates, which are reported in RVDs. One RVD is equivalent to 1 individual recreating in the area for 12 hours. Combinations of visitors can add up to 1 RVD. For instance, one RVD is represented by a group of three individuals recreating for 4 hours. Conversely, one individual visiting for 24 hours is equal to two RVDs.

Lake Aloha is located within the Desolation Wilderness. The Desolation Wilderness received a total of 111,644 RVDs during 1998 with 12,646 overnight permits issued by the FS. Based on visitor surveys conducted by the EID in 1999, Lake Aloha was the primary destination for about 56 percent of the recreation visitors to the Desolation Wilderness Area.

Table 3-35. Estimated recreational use at the El Dorado Project reservoirs. (Source: TCW Economics, 2000)

RVDs	Echo Lake	Caples Lake	Silver Lake
Total ^a	55,400	29,700	178,000
Winter/spring ^b	700	2,400	1,900
Summer ^c	49,600	23,000	143,300
Fall ^d	5,400	4,300	32,900

RVDs	Echo Lake	Caples Lake	Silver Lake
Summer overnight ^e	40,900	15,700	126,700

^a 1998–1999 Season, November through October.

^b 1998–1999 Season, November through May.

^c 1999 Season, Memorial Day through Labor Day.

^d 1999 Season, September 7 through October 31.

^e 1999 Season, Memorial Day through Labor Day.

At Echo Lake, recreational use during the 1999 summer season comprised about 89 percent of the total annual use. Of this use, about 82 percent was associated with overnight use. During the summer season, Echo Chalet had an estimated 1,875 RVDs, Berkeley Echo Lake Camp had about 1,875 RVDs, and recreational use associated with the 139 recreational cabins surrounding the lake was estimated to be about 32,800 RVDs. Day-use facilities received about 17 percent of the total summer use. Of this, about 37 percent of the recreational use occurred on weekdays and about 63 percent on weekends.

At Caples Lake, recreational use during the 1999 summer season comprised about 77 percent of the total annual use at the lake. About 68 percent of the summer use was estimated to be associated with overnight use. Recreational use associated with the 13 cabins surrounding the lake was estimated to be about 1,950 RVDs during the summer season. Caples Lake Campground was estimated to receive about 10,500 RVDs and Caples Lake Resort about 3,300 RVDs during the summer season. Day-use facilities, received about 32 percent of the total summer use and, of this, about 35 percent of the recreational use occurred on weekdays and about 65 percent on weekends.

Recreational use at Silver Lake during the 1999 summer season (May 26 through September 6) comprised about 80 percent of the total annual use. Of this use, about 80 percent was estimated to be associated with overnight use and 20 percent associated with day-use facilities. During the summer season, visitation at Silver Lake East Campground was estimated to be about 16,300 RVDs and about 9,500 RVDs at Silver Lake West Campground. During the summer season, Kay's Silver Lake Resort received an estimated 2,600 RVDs, Kit Carson Lodge an estimated 11,900 RVDs, and Plasse's Resort an estimated 42,300 RVDs. Recreational use associated with the 113 recreational cabins surrounding the lake during the summer season was estimated to be about 36,500 RVDs. During the summer season, day-use areas received about 12 percent of the total summer use. Of this, about 27 percent of the recreational use occurred on weekdays and about 73 percent on weekends.

Camping

At Silver Lake, overnight camping in the vicinity of the lake is allowed at the developed campgrounds (Plasse's Resort, Silver Lake East, and Silver Lake West), and at the organizational camps (Camp Minkalo, Camp Silverado, and Stockton Municipal Camp). The FS restricts overnight camping in other areas. Martin Meadows overflow camping area is used by visitors who are turned away from the campgrounds at Caples and Silver Lake when they are full. However, camping reportedly occurs at the Martin Meadows overflow camping area, even at times when camping sites are available at the developed facilities. In addition, some camping reportedly occurs on Treasure Island. At Caples Lake, overnight camping is allowed at the Caples Lake Campground and the Woods Creek fishing access. The FS restricts overnight camping in other areas and a Forest Order associated with the Mokelumne Wilderness prohibits overnight camping within 100 feet of Caples Lake and its tributaries. Some overnight camping reportedly still occurs in restricted areas, such as along the margins on Caples Lake and on the small islands within Caples Lake. Camping is prohibited at Echo Lake except at the Berkely Echo Lake Camp. At Lake Aloha, located within the Desolation Wilderness, permits are required for visitors entering for day or overnight use. The FS limits the number of overnight permits to a total of 700 each day between June 15 and Labor Day. During the remainder of the year, there are no limits to the number of permits issued.

To assess the historical availability of campsites in the vicinity of the project reservoirs, EID collected available information from the FS for Silver Lake East and Caples Lake Campgrounds. Table 3-36 contains information about the number of turn-away days at these two campgrounds from 1989 to 1997. The FS compiles data on the number of turn-away days at its facilities. These numbers indicate the number of individuals who were actively seeking to camp at these facilities but were unable to because the facilities were at capacity. The FS considers the Martins Meadow overflow area to be the location for campers to go when the developed campgrounds are full. However, EID found that individuals camped at Martins Meadow regardless of whether or not there was space available at the developed campgrounds.

Table 3-36. Turn-away days at Silver Lake East and Caples Lake Campgrounds. (Source: EID, 2000a)

Year	Silver Lake East			Caples Lake Campground		
	Number of Days Open During High Season	Number of Turn-away Days	Turn-away Days (% of days open)	Days Open During High Season	Number of Turn-away Days	Turn-away Days (% of days open)
1989	80	27	34	78	24	31
1990	80	27	34	80	17	21
1991	80	4	5	80	15	19
1992	109	24	24	86	5	6
1993	80	14	18	73	17	23
1994	87	0	0	73	27	37
1996	81	11	14	52	16	31
1997	80	21	26	73	20	27

Boating

Boating use on Silver Lake includes primarily small (10 to 14 foot) aluminum boats equipped with outboard engines. Other watercraft used on Silver Lake include small houseboats, sailboats, jet skis, canoes, and kayaks. During 1999, the total annual estimate of boat rentals and boat launches recorded at Kay's Silver Lake Resort were 1,931 and 1,031, respectively. There are no boating restrictions on the type or size of boats or speed limits on Silver Lake. A 5-mile-per-hour speed limit restriction occurs on Caples Lake, and two-stroke engines are not allowed on Echo Lake unless the fuel is injected directly into the cylinder. Lake Aloha is located in the Desolation Wilderness, which precludes motorized use and canoes would have to be carried several miles to use the lake.

Table 3-37 contains information about restrictions on boating use of the lakes due to water-level constraints. Lake Aloha is not included in the table because it receives little to no boating use because there is no vehicle access to the lake and no launching facilities. EID determined the level at which use of the boat ramp facilities at each of the lakes was restricted through a physical evaluation of the sites and an assessment of the water level associated with a restriction of use. EID was then able to compare the water level for the lake on specific dates based on the hydrologic record for water years 1972 to 1996 to

determine historical lake levels. EID used September 7 as the date to assess whether or not the ramp was usable because it is the latest possible date for Labor Day, which is considered the end of the peak recreation season.

Table 3-37. Boating restrictions on the project reservoirs as a result of water-level elevations. (Source: EID, 2000a)

Restrictions	Echo Lake	Caples Lake	Silver Lake
Drawdown level at which boat ramp use is restricted (feet)	3 to 4 foot drawdown causes upper Echo Lake to become inaccessible by boat	8 ^a	4.5 ^{b,c}
Historical % of time boat ramp use is functional on September 7 ^d	NA	44 ^a	24 ^{b,c}
Drawdown level at which boat ramp is unusable (feet)	NA	NA ^a	9.8 ^b 5.6 ^c
Historical % of time boat ramp was unusable on September 7 ^d	NA	NA ^a	8 ^b 64 ^c

^a Based on the assessment of water years 1972 through 1996.

^b Based on the boat launch located at Kay's Silver Lake Resort.

^c Based on the boat launch located at Kit Carson Lodge.

^d Based on the boat launch at Caples Lake Resort. A moveable steel plate allows the boat ramp to be used at levels below an 8 foot drawdown.

Angling

At Silver Lake, fishing is allowed year-round; however, live-bait fishing is prohibited. The daily bag limit for trout and salmon is 5 fish, with 10 fish in possession. Ten brook trout under 10 inches total length per day are allowed by a special CDFG regulation. Anglers fish from both the shore and boats. At Caples Lake, fishing is allowed year-round and occurs from both the shore and boats. Fishing is allowed year-round at Echo Lake and occurs primarily from small boats, with some fishing occurring from the shoreline.

El Dorado Canal and Forebay Areas

The El Dorado canal area has no developed recreational facilities; however, hiking, biking, jogging, and fishing use occurs along the berms of the canal. The recreational use occurs primarily during the summer recreation season, and the section between Fresh Pond and Pacific House is considered to be the most heavily used. A day-use recreational area, maintained by the EID, is located on the north side of the forebay and includes picnic tables, a double-unit comfort station, a paved parking area for 15 vehicles, and a trail that runs along the north and east sides of the reservoir.

Recreational User Preferences

EID conducted several recreational use studies to obtain additional information related to recreator use and preferences within the study area (Caples Creek, Pyramid Creek, Silver Fork and SFAR, Lake Aloha, Echo Lake, Caples Lake and Silver Lake). These studies included on site surveys within the project area (Regional and Economic Sciences, 2002a and 2002b), mail-in surveys for recreators at Lake Aloha (Regional and Economic Sciences, 2002c) and cabin owners (Regional and Economic Sciences, 2002d), and contingent use analysis of the project reservoirs (Regional and Economic Sciences, 2002e).

Based on the 1999 survey information (Regional and Economic Sciences, 2002a), about 97 percent of recreators surveyed along the river corridors and reservoirs associated with the study area stated that water conditions allowed their participation in all planned activities. When asked what improvements they would like to see, about 32 percent of recreators who visited developed campgrounds wanted showers and about 29 percent wanted flush toilets. For improvements at dispersed campgrounds, the recreators' most frequently listed desired improvements were trash collection (30 percent) and toilets (19 percent). For the reservoir areas, the most frequent responses for desired changes or improvements were more picnic tables (11 percent), more hiking trails (8 percent), interpretive programs (6 percent), road bike trails (5 percent), and a dump station (4 percent). For the river corridor areas, the most frequent responses for desired changes or improvements were disabled access (20 percent), hiking trails (10 percent), day-use areas (7 percent), mountain bike trails (6 percent), and access (4 percent).

Based on the 2002 survey information (Regional and Economic Sciences, 2002b), the primary recreational activities within the study area included: hiking (73 percent), relaxing (70 percent), fishing (57 percent), picnicking (43 percent), wildlife observation (37 percent), and sunbathing (34 percent). When asked to rate the importance of certain facilities and services (1 not at all important to 4 extremely important), recreationists rated constant water levels at 3.2, two-wheel drive access at 2.5, picnic facilities at 2.3, developed campgrounds at 2.2, developed swimming/beach areas at 2.2, and boat launch

ramps at 2.2. When asked their satisfaction with certain features within the study area (1 very dissatisfied to 5 very satisfied), recreationists rated water level at 4.2, visual quality at 4.6, hiking trails at 4.2, human effects on vegetation at 3.8, campsite conditions at 3.7, and amount of litter at 4.0. Their overall satisfaction rating was 4.5

Based on the mail-in survey of the cabin owners (Regional and Economic Sciences, 2002d) who use the project reservoirs and portions of Caples Creek, Pyramid Creek, Silver Fork and SFAR, and the project reservoirs, the most popular recreational activities included: just relaxing (95 percent), hiking (85 percent), wildlife observation (69 percent), fishing 54 percent), and swimming (54 percent). The respondents indicated that the most visited areas within the project area were Echo Lake (24 percent), Silver Lake (18 percent), and SFAR (13 percent). The average ratings of the respondents regarding satisfaction of conditions near their cabin (rating from 1 being very dissatisfied to 5 being very satisfied) were water level at 4.1, visual quality at 4.3, parking at 3.8, and facilities at 4. About 90 percent said that the water level was sufficient for them to participate in the types of activities that they enjoy, and about 10 percent stated that they would like the water level to be maintained until late October.

Based on the mail-in survey conducted by EID (Regional and Economic Sciences, 2002c), the primary recreation activities at Lake Aloha were hiking (52 percent), camping (18 percent), and relaxing (12 percent), with many of the recreators participating in four or more activities while in the area. When asked if the water level of Lake Aloha influenced their decision to camp at Lake Aloha, 85 percent of the respondents stated that the water level did not influence their decision to visit the lake. The survey asked whether the respondents were satisfied or dissatisfied with specific conditions at Lake Aloha, including water level, visual quality, hiking trails, human impacts on vegetation, campsite conditions, and amount of litter. The average rating (rating from 1 being very dissatisfied to 5 being very satisfied) for water level was 3.7, visual quality was 4.4, hiking trails was 4.3, human impacts on vegetation was 3.4, campsite conditions were 3.8, and amount of litter was 3.8. The average rating for the overall satisfaction with the most recent visit to Lake Aloha was 4.3.

Results of the contingent use analysis (Regional and Economic Sciences, 2002e), indicated that based on preferences of those surveyed, activities at the project reservoirs increase as the water level increases from low to medium to high water levels. For Lake Aloha about 14 percent stated they would change activities if the water level dropped by 7.5 feet and about 59 percent if the water level dropped an additional 7.5 feet. For Caples Lake about 27 percent they would change activities if the water level dropped by 28 feet and 49 percent if the water level dropped an additional 28 feet. For Silver Lake about 12 percent said they would change activities if the water level dropped by 11 feet and about 52 percent if the water level dropped an additional 11 feet. For Echo Lake about 8 percent said they would change activities if the water level dropped by 3 feet and about 23 percent if the

water level dropped an additional 3 feet. Results of the contingent use analysis (Regional and Economic Sciences, 2002f) indicated that generally, at all water levels, the respondents found that Echo Lake was the most attractive and Lake Aloha was the least attractive for fishing. The study also found that as the water levels rose, the percentage of respondents saying the quality of the fishing would attract them increased.

3.3.5.2 Environmental Effects and Recommendations

Recreation Implementation Plan

EID proposes as part of the Settlement (Section 16) to develop a recreation implementation plan in coordination with the FS within 180 days of license issuance that includes preliminary design drawings, potential funding sources, and a construction schedule for the proposed recreational facilities, as well as other details related to recreational resources, such as signing and sign placement, and consideration of measures to improve efficiency (i.e., areas with joint operation or operation of adjacent facilities). The recreation implementation plan would be maintained and updated in conjunction with the review of recreational developments as described below (*Recreational Use Monitoring*). EID also proposes to provide a liaison to the FS for the planning or construction of recreational facilities, other major project improvements, and maintenance activities taking place within the National Forest. In addition, EID proposes that the following recreational facilities would remain inside the project boundary: Silver Lake East Campground, Caples Lake Campground, Caples Lake dam parking area, Caples Lake boat ramp and picnic facility (once constructed), Echo Lake trailhead and upper parking facility, and the PCT crossing of the Echo Lake conduit. EID proposes that if these facilities are not currently within the existing project boundary, the project boundary should be adjusted to include them. Currently, Caples Lake Campground and the Echo Lake upper parking facility are not within the project boundary.

Our Analysis

A recreation implementation plan for the project area would help coordinate the development, management, and maintenance of recreational opportunities and facilities associated with the project. In addition, developing a recreation implementation plan as part of an LHMP (see section 3.3.6, *Land Use and Aesthetic Resources*) would help ensure that the development and management of recreational facilities is coordinated with other land resource management plans for the project area. Accordingly, we recommend that EID, within 180 days of license issuance, develop and file with the Commission, for approval, a recreation implementation plan in consultation with the FS that would include the following components and considerations, as stipulated in the Settlement:

- a construction schedule and preliminary design drawings for the proposed

enhancements or facilities to be implemented during the 6-year period following license issuance.

- a discussion of how the needs of the physically disabled are considered in the design and construction of the proposed recreational enhancements or facilities.
- identification of the specific procedures that would be used to maintain and update the implementation plan in conjunction with the review of recreation developments as described below (recreation monitoring).

In addition to these components, we recommend that the recreation implementation plan also include the following:

- estimated costs for the new or enhanced facilities that would be implemented during the 6-year period following license issuance.
- identification of the entity responsible for constructing specific recreational enhancements and conducting operation and maintenance of project-related recreational facilities, if other than EID.

EID proposes to provide an FS liaison for planning and construction of recreational facilities related to the project (Section 18 of the Settlement). EID has the authority to decide on staffing for the management of recreational facilities; management and such requirements are not mandated as part of the Commission's authorization for issuance of a license. Therefore, we do not recommend that EID be required to provide an FS liaison as part of any new license that may be issued for this project; however, we recommend that EID consult with the FS as a component of the recreation implementation plan and the recreation monitoring plan as described below. We agree that a single designated liaison seems like an effective means to coordinate recreational-related planning and would not object to implementation of this measure.

Recreational Use Monitoring

EID proposes as part of the Settlement (Section 17) to conduct a recreational survey and prepare a report on recreational resources that is approved by the FS every 6 years from the date of license issuance. The recreational survey would include, but would not be limited to, changes in types of use and use patterns, levels of use, user preferences in recreational activities, types and sizes of recreational vehicles, preference for day-use versus overnight use, carrying capacity information sufficient to indicate changes in capacity, and recreational-user trends in the project area. The recreational resources report would comply with the Commission's regulations at 18 CFR § 4.51(f) (1996), or as amended, and the report would be provided to the FS for review and comment prior to being

filed with the Commission. Within 1 year of submission of the report to the Commission, the FS, ERC, and other interested parties would review the report and make recommendations to address the findings. EID would not be required to construct additional recreational improvements as the remedy for a FS determination that carrying capacity is being exceeded in the project area; however, EID may be required to address resource effects associated with project-related recreational use.

In its October 18, 2002, letter, NPS made a Section 10(a) recommendation that EID expedite the completion of the *Recreational Use Levels and Quality of Experience* study and that the results be made available to resource agencies and stakeholders. In addition, NPS, as a Section 10(a) measure, recommended that EID conduct a study to determine the level of project-induced recreation that occurs in the project vicinity. NPS is a signatory party to the Settlement, and we consider this recommendation to be superceded by the proposed conditions of the Settlement.

In its October 29, 2002, letter to the Commission, the FS commented that it is responsible for establishing the carrying capacity for the project area and it is awaiting information that is still being collected or analyzed to make this determination. The FS, as a preliminary Section 4(e) condition, recommended that EID be required to provide data to support the determination of carrying capacity on project-affected lands, including, but not limited to, visitor perceptions of crowding, user perceptions of “desired conditions,” user preferences for amenities, capacity conditions at developed facilities within or affected by the project, and resource effects and social experience. In its May 9, 2003 letter to the Commission, the FS-revised conditions did not include this recommendation. The carrying capacity monitoring would be covered under the proposed recreational monitoring described above and the periodic review of recreational facilities as described below.

EID proposes to meet with the FS at least every 6 years to review all recreational facilities and areas associated with the project and to agree upon necessary maintenance, rehabilitation, construction, and reconstruction work needed and its timing (Section 19 of the Settlement). The criteria for project selection would be dependent on the amount and type of use, current recreational facility policy, condition of facilities, effects on surrounding areas, and other factors. Following the review, EID would develop a 6-year schedule for maintenance, rehabilitation, and construction, approved by the FS, prior to filing the schedule with the Commission.

Our Analysis

Implementation of a recreation monitoring plan would provide the means to assess the adequacy of the recreational facilities, effects of recreational use on the project area’s resources, recreational-use capacity issues, and the opportunity to adjust recreational facility development and management over the term of a new license. This would help

ensure that minimal adverse effects would occur on sensitive resources, such as cultural resources, as a result of project-area recreational use.

Accordingly, we recommend that EID develop a recreation monitoring plan, in consultation with the FS, and file it with the Commission for approval within 180 days of license issuance. We do not recommend that the recreation monitoring plan specifically comply with the Commission's regulations at 18 CFR § 4.51(f) as proposed by EID. These regulations relate to requirements for the recreational use information to be provided in a license application, not as part of a license-required monitoring plan (the Commission's regulations specify the requirements for periodic recreational monitoring at 18 CFR § 8.11). The recommended plan would include the following components:

- The specific methodology that would be used to assess changes in types of use and use patterns, levels of use, user survey as to preferences in recreational activities, types and sizes of recreational vehicles, preference for day use versus overnight use, carrying capacity information sufficient to indicate changes in capacity, and recreational-user trends in the project area.
- The seasonal and annual frequency of proposed recreational monitoring.
- A clear statement of how the proposed recreational monitoring report review by EID, the FS, the ERC, and other interested parties, as specified in Section 17 of the Settlement, would relate to the review of recreational developments by EID and the FS, as specified in Section 19 of the Settlement. Also, a description of how "other interested parties" would be determined prior to the monitoring report review.

Implementation of the recommended recreation monitoring plan and associated stakeholder consultation would provide the opportunity for the review of the recreational facilities and maintenance over the term of the license.

We recommend that EID submit a summary recreation monitoring report to the Commission every 6 years (coinciding with the FERC Form 80 submittal). This report would include the recreational monitoring results, documentation of consultation, and a summary of planned recreational facility improvement measures or resources protection mitigation measures associated with the recreational facilities within the project boundary, schedule information, the party responsible for funding and implementing the measures, estimated costs for implementation, and the entity responsible for the long-term maintenance and management of the planned recreational facilities and/or mitigation measures. In addition, the report should include a summary of the items required by the SWRCB, per Decision 1635, as modified, which requires a qualitative analysis of the recreational effects associated with the end-of-the-month lake levels for the preceding year, including whether the end-of-the-month lake levels affected the following: the

usability of boat ramps and docks; swimming access, beaches, and angler locations; campgrounds, picnic areas, recreational residences, organized camps, resorts, and marinas; and aesthetic values.

Public Information

EID proposes to provide several different types of public information services (as specified in Section 23 of the Settlement). First, EID proposes to develop a plan, within 1 year of license issuance, to provide information on lake levels, real-time streamflows, simple staff gages, forecasting, and operations projections to the public via toll-free telephone and Internet. This information would include measures to provide, at a minimum, hourly averages of streamflows for gages on the SFAR below Kyburz diversion dam and the Silver Fork and measures to post on its website the current (within 4 hours of obtaining it) and prior 7 days' streamflow gage information for the entire year.

Second, EID proposes to provide public information relating to recreational opportunities, restrictions, and responsibilities associated with project-related recreation facilities at a level approved by the FS. EID would have the option to fund the FS for this work.

Third, EID proposes to, within 5 years of license issuance, develop and print a brochure and map to describe the recreational opportunities, recreational facilities, rules, and responsibilities for the project area, including the lakes and streams. The brochure would be provided to the FS for review and approval prior to completion. EID would keep the brochure and map updated during the term of a new license as conditions change and make it continuously available to the public for no charge.

Finally, EID proposes to annually install prominent signs at Caples Lake, Silver Lake, and Echo Lake during the winter season to warn visitors of unstable snow and ice conditions and to remove these signs annually after the winter season.

Our Analysis

Development of a public information plan would help provide a means to disseminate information regarding project-area resources and management issues to members of the public who use the project area. This information would provide a means to help educate the public about safety factors to consider within the project area and the potential effects of recreational use on sensitive project-area resources.

The posting of warning signs at the Caples Lake, Silver Lake, and Echo Lake project reservoirs during the winter would help warn recreators of the potential dangers of unstable snow and ice conditions and would help with recreational user safety during the winter. Therefore, we recommend that EID continue to annually install prominent signs at Caples

Lake, Silver Lake, and Echo Lake during the winter season to warn visitors of unstable snow and ice conditions and remove these signs annually after the winter season.

We recommend that EID develop a public information plan in consultation with the indicated entities and file the plan with the Commission for approval within 180 days of license issuance. The recommended plan would include the following components, as stipulated in the Settlement:

- Specific measures, developed in consultation with the ERC, FS, and SWRCB, that would be used to address the following public information needs: provision of information on lake levels and real-time streamflows (including posting, within 4 hours, on EID's website current flow information and flow information for the previous 7 days); the location and calibration of simple staff gages for public flow estimation; and the means of providing forecasting and operations projections via toll-free telephone and Internet, including measures to provide, at a minimum, hourly average streamflows for gages on the SFAR below Kyburz diversion dam and the Silver Fork (see reservoir elevation and streamflow information sections below).
- Specific measures, developed in consultation with the FS, that would be used to provide public information relating to recreational opportunities, restrictions, and responsibilities associated with project-related recreation facilities.
- A winter signage plan, developed in consultation with the FS, to post warning signs at the Caples Lake, Silver Lake, and Echo Lake to warn recreators of the potential dangers of unstable snow and ice conditions. The plan would include when the signs would be installed and removed each year.

In addition to these measures, we recommend that EID also include the following components in the public information plan:

- Specific measures to hold annual spring meetings with the FS and local representatives, as appropriate, to schedule water elevation drawdowns associated with needed repairs at the four storage reservoirs to minimize effects on recreational interests, including how such meetings would be publicized, how the results of any such meetings would be reported to the Commission, and how the input from such meetings would be incorporated into EID's annual operation plans (see reservoir elevation discussion below).

We also recommend that EID develop and print a brochure and map to describe the recreational opportunities, recreational facilities, rules, and responsibilities for the project

area, including the lakes and streams, and keep the brochure and map updated during the term of a new license, as proposed in the Settlement.

Recreational Access and Facilities

Stream and River Reaches

Trail, Stream, and River Access

In its October 29, 2002, letter to the Commission, the FS recommended, as a preliminary Section 4(e) condition, that EID implement, within 10 years of license issuance, upgrades at the China Flat picnic area located along the Silver Fork, including replacing the toilet at the picnic area on the west side of the river with a single unit accessible toilet, installing an accessible water faucet unit, constructing a compacted aggregate base access route from the bridge to the picnic site, installing informational panels at the beginning of the main access route near the bridge, constructing two picnic units, and installing two accessible picnic tables. In its May 9, 2003, letter to the Commission, the FS stated that this recommendation was eliminated as a preliminary Section 4(e) condition.

In its October 16, 2002, letter to the Commission, AW recommended that EID improve river access to the SFAR and the Silver Fork. Improvements would include parking, sanitation, changing facilities, information including maps and stream gages, and trails to the river. In its October 30, 2002, letter to the Commission, Trout Unlimited recommended that future license conditions give adequate consideration to recreational angling use of the SFAR in the project vicinity. In its October 30, 2002, letter to the Commission, FOR recommended that EID provide access improvements and facilities adjacent to whitewater reaches, including parking, sanitation measures, and public information. In his October 31, 2002, letter to the Commission, Mr. Shackleton recommends improved whitewater boating river access to the SFAR and the Silver Fork and reasonable access to Caples Creek. In his October 29, 2002, letter to the Commission, Mr. Shutes recommended that measures to enhance whitewater boating should consider increasing accessibility rather than altering flows and that there should be consideration given for the FS to share the cost of facilities required as part of whitewater enhancement or mitigation on the Silver Fork. AW, Trout Unlimited, FOR, and Mr. Shutes are signatory parties to the Settlement, and we consider their recommendations to be superceded by the proposed conditions of the Settlement.

EID states, as part of the Appendix B of the Settlement (measures agreed to by the Settlement parties but not to be included in a new project license), that the Settlement parties identified several locations where access improvements would be made by EID, the FS, and AW in the area between the Kyburz diversion dam and the Akin powerhouse on the

SFAR.

Our Analysis

The angling and whitewater boating access proposed by EID along portions of the SFAR and access recommended by Trout Unlimited, FOR, Mr. Shackleton, and Mr. Shutes would be along the stream and river reaches that are all located outside of the project boundary and not adjacent to project waters or associated with project-related recreational opportunities. Therefore, we do not recommend that EID be required to provide angling and whitewater boating access in these areas as part of the requirements associated with a new license. However, we believe the proposed measures would improve recreational access to the SFAR and encourage EID to cooperate with other parties to implement these access enhancements.

Camping Areas

In its October 29, 2002, letter to the Commission, the FS, as a preliminary Section 4(e) condition, recommended that EID, within 10 years of license issuance, implement the following measures for the Silver Fork Campground: replace 3 toilets with accessible ones; replace faucet units and provide a paved pad in front and on the sides; replace the campground information signs; regrade, widen, remove protrusions, and compact all access routes between parking spurs and camp units; reconstruct, widen to current accessibility standards, and pave spurs for camp units; replace all wood posts with rock; reset barriers that do not meet standards to 4 feet apart; remove obstacles, grade and expand camp units; replace tables with accessible ones; replace fire rings with accessible ones; and reset pedestal grills. In its May 9, 2003, letter to the Commission, the FS states that this recommendation was eliminated as a preliminary Section 4(e) condition.

In its October 29, 2002, letter to the Commission, the FS, as a preliminary Section 4(e) condition, recommended that EID, within 10 years of license issuance, implement the following measures for the China Flat Campground (located along the Silver Fork): replace the toilet at the group site on the west side of the river with a single unit accessible toilet; construct a compacted aggregate-base access route from the bridge to the group site and from the group site to the toilet; install three accessible faucet units at the group site; remove ground protrusions, and level and compact native surface within group camp site; install seven accessible picnic tables, two serving tables, two group pedestal grills and one group fire ring at the group camp site; and install two accessible, bear-proof garbage containers with pedestal stand near the group site. In its May 9, 2003, letter to the Commission, the FS states that this recommendation was eliminated as a preliminary Section 4(e) condition.

Our Analysis

Although the originally recommended recreational enhancements to Silver Fork and China Flat campgrounds would provide an enhanced experience for recreators and enhanced access for the disabled at these areas, the facilities are located outside of the project boundary and are not adjacent to project waters or associated with project-related recreational opportunities. In addition, the FS manages these campground facilities, which are located on FS-managed lands. Therefore, we do not recommend that the Commission require EID to provide recreational enhancements to the Silver Fork and China Flat campgrounds (as originally recommended by the FS) as part of the requirements associated with a new license.

Project Reservoirs

Reservoir Access Areas

As part of the Settlement (Section 20), EID proposes, within 7 years of license issuance, to construct a new boat launching facility at Caples Lake including a boat ramp, parking lot, toilet facilities, access road, and picnic area on land designated by the FS, on the northeast end of the lake. EID would be responsible for the construction of the ingress and egress from State Highway 88, and the FS would be responsible for the access road from Highway 88 to the facility. The FS would assist in obtaining funding for the facility and, in the event that the FS is unable to obtain funding from other sources, EID would be responsible for the full cost of constructing this facility. Construction of the facility would be delayed until 10 years after license issuance in the event EID is responsible for the full funding of this facility. In the event that the facility would be located primarily on National Forest lands, the FS would be responsible for the surveying, planning, and designing the facilities, and EID would be responsible for funding the survey, planning, design, and construction of the facilities. The FS would own the facilities, but EID would operate and maintain them. In the event the facilities would be located totally or mostly on licensee-owned lands, EID would be responsible for the survey, planning, design (approved by the FS), and construction of the facilities.

In its October 29, 2002, letter to the Commission, the FS made a Section 10(a) recommendation that EID, within 5 years of license issuance, implement the following improvements at the Woods Creek fishing access at Caples Lake: construct a van accessible parking space with markings and signage; chip seal the parking area and entrance/exit road on a routine basis (approximately every 5 to 10 years) as determined jointly between the FS and EID; and paint traffic markings within the site on a routine basis (approximately every 3 to 5 years) as determined jointly between the FS and EID. In its May 9, 2003, letter to the Commission, the FS states that this recommendation was eliminated and was not included in the Settlement.

EID proposes to, within 10 years of license issuance, bring the recreation facilities

at Silver Lake, including Ferguson Point, Sandy Cove, and Silver Lake West recreational facilities, and the Woods Creek fishing access at Caples Lake into compliance with ADA accessibility standards (Section 21 of the Settlement). These facilities, along with the Silver Lake boat ramp, would be operated and maintained by EID throughout the term of a new license.

Our Analysis

EID, the Caples Lake Resort owner, and FS indicate that during peak-use times, the marina and parking area at Caples Lake Resort exceed capacity. As the parking lot fills, visitors park along Highway 88 causing potential safety concerns. Therefore, we recommend that EID, as part of the development of the recreation implementation plan, identify measures for the construction of a new boat launching facility at Caples Lake within 10 years of license issuance. We recommend that the boat launching facility include a boat ramp, parking lot, toilet facilities, access road, and picnic area facilities and that the design and construction of such facilities consider the needs of disabled individuals. Our on-site observations suggest that the existing access road to an EID building in the vicinity of the recommended new boat launching facility could not be used for public access without major highway modifications to provide safe lines of sight for traffic turning off of Highway 88. Therefore, we recommend that EID consult with CalTrans in the development of this facility. Because such highway modifications may be costly, it may be necessary for EID to seek joint funding for the construction of this facility. Although EID would ultimately be responsible for surveying, planning, designing, and funding this project-related facility, the Commission would not object to EID delegating some of this responsibility to the FS or others, as provided for in the Settlement. Further, given that the use of the new facility would be project-related and that it would be located at Caples Lake, we recommend that the project boundary be modified as necessary to include the new boat launching facility at the time this facility is constructed. This would provide the Commission the means to ensure that the facility is adequately constructed and maintained over the term of a new license.

The Woods Creek fishing access, Ferguson Point, Sandy Cove, and the Silver Lake boat ramp are located on EID property within the project boundary, and the Silver Lake West Campground is located on EID property, partially within the project boundary. Accordingly, EID should be responsible for the upkeep and maintenance of these facilities. We recommend that EID incorporate measures for the operation and maintenance of these facilities as part of the development of the recreation implementation plan. Regarding Silver Lake West Campground, we also recommend that the project boundary be modified to include the entire Silver Lake West Campground. This would provide the means for the Commission to ensure that the facility is adequately maintained over the term of a new license.

EID's proposed measures to bring the Ferguson Point, Sandy Cove, and Silver Lake West recreational facilities, and the Woods Creek angler access into compliance with ADA accessibility standards would provide enhanced accessibility for disabled individuals.

Section 2.7(b) of the Commission's regulations requires a project licensee to consider the needs of the physically disabled in the design and construction of public recreational facilities on project lands and waters, including public access to such facilities. The Commission has no statutory role in implementing or enforcing the ADA as it applies to its licenses. A licensee's obligation to comply with the ADA exists independent of its project license. We recommend that the recreation implementation plan developed by EID for project recreational facilities include a discussion of how the licensee considered the needs of physically disabled individuals in the design and construction of the proposed recreational enhancements.

Trails and Dispersed Access Areas

EID proposes to provide, within 10 years of license issuance, one-half the cost of preparing and resurfacing the Echo Lake upper parking area (Section 20 of the Settlement). In the event that EID is unable to obtain a grant to build the Caples Lake boat launching facility, EID would not be responsible for this cost. In his October 29, 2002, letter to the Commission, Mr. Shutes recommended that recreational improvements to the Echo Lake trailhead should not be required of EID because the activities there are not project related. Mr. Shutes is a signatory on the Settlement, and we consider his comments to be superceded by the proposed conditions of the Settlement.

EID proposes, within 5 years of license issuance, to make specific improvements to the Caples Lake dam trailhead parking area (Section 20 of the Settlement). EID proposes to replace the toilet seats with 18-inch-high toilet seats and install accessible signage to the exterior of the toilet, replace one garbage container with one that is bear proof and accessible, and construct a van-accessible parking space near the toilet, with required markings and signage. EID also proposes, within 5 years of license issuance, to replace the gate at the road to Caples Lake dam and to construct a crossing for the PCT over the Echo Conduit at a location agreed to by the FS.

As part of the Settlement (Section 20), EID proposes, within 5 years of license issuance, to construct an information kiosk to FS specifications on Highway 88 at a location agreed to by the FS and, after construction, to maintain the kiosk according to FS standards.

Our Analysis

Visitors to Echo Lake use the Echo Lake trailhead as a means to access project

lands and waters. Besides limited, short-term parking near the Echo Chalet, the nearby upper parking area (see figure 3-15) serves as the primary parking facility for recreational visitor access to the lake, and geographical constraints (topography and the presence of existing buildings) preclude such parking from being established elsewhere. Those visitors would benefit from resurfacing of the parking area. Therefore, we recommend that EID provide measures, as part of the recreation implementation plan, to resurface the parking area at the Echo Lake trailhead. Although EID would ultimately be responsible for implementing this measure, we would not object to cost sharing measures, such as provided for in the Settlement. We recommend that the project boundary be modified to expand the Echo Lake trailhead to include the upper parking area and the road that leads from this parking area to the east end of Echo Lake, in order to help ensure that these project-related facilities are adequately maintained over the term of a new license.

EIS's proposed enhancements at the Caples Lake dam trailhead, including disabled-accessible parking, a disabled-accessible toilet facility, and a bear-proof and disabled-accessible garbage container would help to provide enhanced access and amenities for the disabled at this site. Therefore, we recommend that EID as part of the recreation implementation plan, incorporate measures to provide a disabled-accessible toilet facility, a disabled-accessible parking space with the appropriate signage and a bear-proof and disabled-accessible garbage container at the Caples Lake dam trailhead, as proposed in the Settlement. Although EID would ultimately be responsible for implementing this measure, we would not object to cost-sharing measures, such as provided for in the Settlement.

The PCT crosses the Echo conduit, and there is potential for this crossing to be difficult for hikers when water is released through the conduit as a result of project operations. Therefore, we recommend that EID, as a component of the recreation implementation plan, provide measures to implement a crossing of the PCT over the Echo conduit and that these measures be developed in consultation with the FS.

We do not recommend that EID construct an information kiosk on Highway 88 as part of the requirements associated with a new license because information about project-related recreational facilities would be provided to the public through other means. EID is required by the Commission to provide signage and information related to project recreational access at the project's recreational access areas. In addition, the recommended brochures and signage to be developed as a component of the public information plan would provide information to the public regarding public recreational opportunities associated with the project. Although we do not recommend that EID construct the information kiosk as part of the requirements associated with a new license, we acknowledge that the proposed information kiosk would provide an additional means to distribute information regarding project-related recreational opportunities to the public and would not object to the implementation of this measure in accordance with the Settlement.

Camping Areas

EID proposes to, within 10 years of license issuance, implement the following measures for Caples Lake Campground (Section 20 of the Settlement): replace existing toilets with 4 single unit accessible vault toilets; construct a paved parking turnout in front of each toilet; replace faucet units and provide a paved pad in front and on the sides; re-grade and widen the pathways between camp units and spurs/roadway; widen spurs where feasible to meet most current accessibility standards; reconstruct and pave all spurs; prepare existing campground roads for resurfacing and place asphalt overlay on the campground roads; remove obstacles and protrusions and level and compact the native surface at each camp unit; enlarge the camp units to a minimum of 900 square feet where feasible; and replace all waterlines.

EID proposes to implement, within 5 years of license issuance, the following measures for Silver Lake East Campground (Section 20 of the Settlement): replace all toilets with disabled-accessible toilets; construct paved parking turnouts in front of each toilet with a paved access route to the toilet; replace and relocate all faucet units adjacent to the roadway with disabled-accessible faucets; construct a paved area at all of the faucet units; widen spurs for units to meet most current accessibility standards and reconstruct and pave the spurs; prepare existing campground roads for resurfacing and place asphalt overlay on the campground roads; and replace all waterlines.

EID proposes to, within 5 years of license issuance, install barrier rocks to restrict uncontrolled vehicle travel at the Martin Meadows overflow camping area near Silver Lake (Section 20 of the Settlement). The FS would make available the barrier rocks from a site identified by the FS.

The FS made an initial Section 10(a) recommendation that EID coordinate with Amador and Alpine counties and consult with FS to prohibit camping on Treasure Island at Silver Lake and licensee lands surrounding Caples Lake. In its May 9, 2003, letter, the FS stated that this recommendation was eliminated and was not included in the Settlement or the FS revised 10(a) recommendations.

Our Analysis

Caples Lake Campground is currently located outside of the project boundary on FS lands and is privately operated under a special-use permit. This campground is separated from Caples Lake by Highway 88; however, the facility is located adjacent to the existing project boundary, and some of the campers that use this facility undoubtedly recreate at Caples Lake. Therefore, we recommend that EID include provisions, as part of the recreation implementation plan, to implement its proposed recreational enhancements at Caples Lake Campground and that the project boundary be expanded to include this campground, as proposed in the Settlement. EID's proposed recreational enhancements would improve the campground facilities and provide enhanced accessibility at the campground.

A FS concessionaire manages Silver Lake East Campground, which is located on FS and EID land within the project boundary. EID does not specify in the license application that any of the facilities at Silver Lake East Campground are disabled accessible. The provision of disabled-accessible facilities would enhance access for disabled individuals to project facilities. Therefore, we recommend that EID include provisions, as part of the recreation implementation plan, to implement its proposed recreational enhancements at Silver Lake East Campground.

Martins Meadow Campground area currently is undeveloped, although it is heavily used by tent, trailer, and RV campers, and the site is currently in poor condition. Although measures to control vehicular traffic at Martin Meadows Campground area would help control adverse effects of vehicular traffic in this area, these facilities, located about 2 miles north of Silver Lake dam, are outside of the project boundary, and there is no apparent direct association of these facilities with the project reservoir. Therefore, we do not recommend that any new license for this project require EID to install barrier rocks at Martin Meadows Campground. However, even though the facility is not related to project purposes, we acknowledge the benefits of placing barrier rocks to control vehicular traffic at Martin Meadows, and we would not object to the implementation of this measure.

The FS did not provide justification to require EID to coordinate with Amador and Alpine counties and consult with FS to prohibit camping on Treasure Island at Silver Lake and licensee lands surrounding Caples Lake. Therefore, we do not recommend that EID, as part of the requirements associated with a new license, pursue measures to prohibit camping on Treasure Island and on certain licensee-owned lands surrounding Caples Lake. The FS withdrew this recommendation.

Recreational Site Operations and Maintenance

EID proposes specific items regarding operation and maintenance of facilities. At

the Caples Lake dam trailhead, EID proposes to provide: routine cleaning and repair of all constructed features within the developed site; toilet pumping; trash removal and litter pick-up within the site; maintenance of signboards and the information on those signboards to FS standards; and vegetation management. At the proposed Caples Lake boat launching facility, EID proposes that at such time as facilities are constructed at this site, it would be responsible for operating and maintaining the boat ramp, associated parking lot, and other public facilities. EID proposes to be responsible for maintenance of signboards. The FS would be responsible for maintaining the information on those signboards to FS standards, in the event that this facility is totally, or mostly, on National Forest System lands. At the Echo Lake trailhead, EID proposes to be responsible for toilet pumping and trash removal/litter pick-up within the site. EID would be responsible for the cost of these maintenance items at Echo Lake trailhead for no longer than 7 years, unless a grant is acquired to build the Caples Lake boat launching facility.

EID proposes to pay annually, by October 1, the amount of \$4,800 (year 2002 cost basis) to provide for performing monitoring and permit compliance assurance for the campground concessionaire special-use permits at Caples Lake Campground and Silver Lake East Campground.

The FS, in its October 29, 2002, letter to the Commission, recommended that EID be required to provide a proportionate cost of the total annual cost to perform monitoring and permit compliance assurance for the additional project-related special-use authorizations listed below, which would total \$31,200 (year 2002 cost basis). The special-use authorizations include: (1) campground concessionaire permits at Sand Flat, Silver Fork, and China Flat campgrounds; (2) special-use permits for Caples Lake Resort, Kit Carson Resort, and Echo Chalet Resort; (3) recreation residence permits for the Silver Lake East, Silver Lake South, and Caples Lake recreation residence tracts; and (4) special-use permits for Stockton Municipal Camp and Silverado Boy Scouts of America Organization Camp. The FS recommended that in the event that any of the campgrounds listed above are no longer operated by a concessionaire, EID would be responsible for the full cost, or a proportionate share, of operating and maintaining that campground. The FS did not provide this recommendation in its revised Section 4(e) conditions (May 9, 2003, letter to the Commission), and this recommendation was not included in the Settlement.

EID proposes to be responsible for the cost of the necessary maintenance, rehabilitation, and reconstruction, including the costs of design and administration (defined in the Settlement as heavy maintenance), as determined through the 6-year review of recreational developments for Silver Lake East Campground and Caples Lake Campground. EID would be responsible for road spurs and other paved surfaces unless it is unable to acquire a grant to build Caples Lake boat launching facility, in which case, EID would not be responsible for ongoing maintenance of these facilities. EID also proposes to be responsible for all heavy maintenance associated with the Caples Lake boat launching

facility and the Highway 88 information kiosk. Heavy maintenance is defined as work that is necessary to keep existing facilities in serviceable condition to meet FS standards and includes components of recreational facilities, such as water systems; traffic control barriers; roads, spurs, and associated drainage structures; grills, fire rings, and picnic tables; toilets; and signboards. EID proposes to be responsible for 50 percent the cost of heavy maintenance at Caples Lake dam trailhead and for 18 percent of the cost of heavy maintenance at Pyramid Creek trailhead. In its October 29, 2002, letter to the Commission, the FS also recommended the EID provide heavy maintenance for the following project recreation facilities: Echo Lake trailhead upper parking facility, Silver Fork Campground, China Flat Campground and picnic area, Sand Flat Campground, Bridal Veil picnic area, Shealor Lake trailhead, Lake Margaret trailhead, Allen's Camp trailhead, Martin Meadows overflow camping area, and Horse Canyon trailhead. In its May 9, 2003, letter to the Commission, the FS stated that the revised Section 4(e) conditions and Settlement eliminate the recommendations for conducting heavy maintenance at these additional sites.

EID proposes to pay, by October 1 of each year, \$25,000 (year 2002 cost basis) for patrol and operation of non-concessionaire developed and dispersed recreation facilities, as well as trails and other locations used by visitors to the project, within and adjacent to the project boundary. Work to be completed within these areas is separated into four units, including: Upcountry Highway 88 Unit, Silver Fork Unit, Pyramid Creek Unit, and Lake Aloha/Echo Lake Unit.

In addition, EID proposes to annually provide a boat and operator at least twice each season on Caples and Silver lakes to police the shoreline along these lakes and clean up litter.

Our Analysis

We agree that EID should provide operation and maintenance measures for Caples Lake dam trailhead and the Echo Lake trailhead because both of these facilities are located within the project boundary. Therefore, we recommend that at the Caples Lake dam trailhead, EID be responsible for routine cleaning and repair of constructed features within the developed site, toilet pumping, trash removal/litter pick-up within the site, O&M of signboards, and vegetation management. We do not recommend that EID be required to provide signboards to FS standards as part of a new license, but that the signage be in compliance with the Commission's regulations for signage at recreational facilities which should not preclude compliance with FS signage criteria. For the Echo Lake trailhead, we recommend that EID be responsible for the following annual maintenance items: toilet pumping and trash removal/litter pick-up within the site. Although EID would ultimately be responsible for implementing project-related operation and maintenance measures, we would not object to cost sharing measures, such as provided for operation and maintenance

at some facilities in the Settlement.

As stated above, we recommend the development of a new boat launching facility at Caples Lake. In addition, we recommend that EID provide enhancements at Caples Lake Campground and that the project boundary be modified to include this facility. As part of the recreation implementation plan, EID would be required to identify measures to maintain and manage the recreational facilities within the project boundary, including identifying the entity responsible for managing these facilities.

The FS recommendation that EID provide funding to perform monitoring and permit compliance assurance would not fall under the Commission-required responsibilities of EID as related to project facility operation and maintenance. The monitoring and permit compliance assurance responsibilities recommended by the FS are related to FS special-use permits and FS special-use authorizations and would, therefore, more appropriately be the responsibility of the FS to provide monitoring and compliance measures.

For the EID-owned and managed facilities located within the project boundary, we concur that EID should be responsible for the long-term maintenance and upkeep of these facilities (heavy maintenance). We recommend that measures to provide for the maintenance of these facilities be incorporated into the recreation implementation plan. Other facilities for which the FS originally proposed that EID provide long-term maintenance are located outside of the project boundary, are privately owned and operated, or are FS facilities, including Silver Fork Campground, China Flat Campground and picnic area, Sand Flat Campground, Bridal Veil picnic area, Pyramid Creek trailhead, Shealor Lake trailhead, Horse Canyon trailhead, Lake Margaret trailhead, Allen's Camp trailhead, and Martin Meadows overflow area. We do not recommend that EID provide for the maintenance and upkeep of these facilities as part of the requirements associated with a new license because they are not located within the project boundary and are not directly associated with project-related recreational opportunities.

Although increased law enforcement and monitoring would be beneficial to the project area by providing a mechanism to help ensure that laws and regulations are followed and to help ensure public safety, law enforcement is generally the state's and county's responsibility, or the FS on National Forest System lands, not the licensee's. Therefore, we do not recommend that EID, as part of the requirements associated with a new license, be required to provide funding to perform site policing, signing, maintenance, monitoring, public information, and enforcement of dispersed public-use sites beyond those already provided by EID (e.g., management of Silver Lake West Campground). Additionally, it is outside of the Commission's jurisdiction to mandate that the licensee fund law enforcement personnel.

Reservoir Elevations

EID proposes to implement the provisions for target lake levels and minimum pool as described in section 3.3.1, *Water Resources*, and Section 22 of the Settlement. Under the Settlement, EID would operate the project so that for each water-year type, lake levels would remain at or above the range of lake levels defined in Decision 1635, except for circumstances beyond its control or if lower drawdowns are needed to meet proposed minimum flow requirements (discussed in section 3.3.2.2, *Environmental Effects and Recommendations*, in *Aquatic Resources*). EID proposes to operate Echo Lake such that the isthmus between upper and lower Echo Lake is passable by watercraft between July 1 and Labor Day of each year, while still complying with minimum streamflow or other conditions and requirements. If EID anticipates that the reservoir would not meet this target level for reasons other than non-discretionary releases by EID, EID would notify the FS, CDFG, SWRCB, and the Commission in writing, within 10 days of this determination, and provide an explanation of why the target reservoir level would not be attained.

In its October 31, 2002, letter to the Commission, Kit Carson Lodge recommends that the water level at Silver Lake be held as high as possible in September and October, stating that Silver Lake is a busy recreational destination through mid-October and that Silver Lake Campground is open through the first week in November. In addition, Kit Carson Lodge recommends that EID conduct annual spring meetings with local representatives to schedule project repairs in a manner that would have the least effect on project-influenced lakes and their users. In its letter to the Commission dated October 30, 2002, the League to Save Sierra Lakes states that it is in the public interest to maintain high lake levels in order to maximize passive and active recreational usage during the recreation season that extends into October of each year.

Our Analysis

EID's proposed measure to operate Echo Lake such that the isthmus between upper and lower Echo Lake is passable by watercraft between July 1 and Labor Day of each year would provide the means to help ensure recreational access between upper and lower Echo Lake during the peak recreation season. Therefore, we agree with EID's proposed target elevations for the operation of Echo Lake.

We recommend operating Caples Lake as specified under the Settlement, because it would provide higher lake levels that would enhance recreational experiences in the area, particularly during dry and critically dry years. This is largely a function of operating the project to meet a target minimum pool of 10,000 acre-feet, which would prevent the lake from being drawn down as far as allowed under Decision 1635 (i.e., the no-action alternative) and facilitate filling the lake to full pool during the summer recreational season.

Based on our assessment of recreational use during the fall season (about 18 percent of the total use), we do not see adequate justification to require EID to maintain a higher reservoir elevation at Silver Lake as recommended by Kit Carson Lodge and the League to Save Sierra Lakes. The SWRCB Decision 1635, as modified, provides target elevations to protect Lake Aloha, Caples Lake, and Silver Lake's recreational uses. The terms of the Settlement would generally result in higher lake water levels than those specified in Decision 1635, as modified. In addition, the SWRCB requires EID to provide annual monitoring reports on lake level effects on recreational uses at Lake Aloha, Caples Lake, and Silver Lake. We recommend that, as part of the public information plan, EID provide measures to hold annual spring meetings with the FS and local representatives, as appropriate, to schedule drawdowns associated with any needed repairs at the storage lakes. This would provide the opportunity for the FS and local representatives to provide input on the timing of the drawdowns so that they would have minimal effects on recreational interests.

We recommend operating Caples Lake as specified under the Settlement because it would provide higher lake levels that would enhance recreational experiences in the area, particularly during dry and critically dry years. This is largely a function of operating the project to meet a target minimum pool of 10,000 acre-feet, which would prevent the lake from being drawn down as far as allowed under Decision 1635 (i.e., the no-action alternative) and facilitate filling the lake to full pool during the summer recreational season.

Whitewater Boating Flows

In its October 29, 2002, letter to the Commission, the FS, as a preliminary Section 4(e) condition, recommended that within 90 days of license issuance, EID provide to the FS an analysis that assesses the minimum acceptable and the optimum boating flow levels for the following whitewater reaches: SFAR; Lover's Leap, Kyburz to Whitehall, Whitehall to Riverton, Riverton to Peavine, and Golden Gate and on the SFAR; Dugald Bremner Run, and Lower Run. In addition, the FS also recommended that EID conduct a comparative analysis sufficient to display the difference, if any, of the number of annual whitewater boating days between the regulated and unimpaired hydrographs. In its October 18, 2002, letter to the Commission, the NPS made a Section 10(a) recommendation that EID conduct a study to determine the feasibility and optimal flow for instream recreation, including conducting model runs of the stakeholders' desired flow rates using EID's hydrologic model. The FS, in its May 9, 2003, letter, stated that its recommendation was withdrawn from the recommended Section 4(e) conditions and this recommendation was not included in the Settlement. Because NPS and FS both signed the Settlement, we consider their earlier recommendations to be superseded by the conditions of the Settlement.

In its October 16, 2002, letter to the Commission, AW recommended that EID

conduct a controlled flow study to pinpoint the flows necessary for whitewater recreation. This study would help AW and the stakeholder group to determine project influences on whitewater opportunities on the SFAR and the Silver Fork by identifying flow access and flow information, the annual number of regulated and unregulated whitewater boating days, flow information needs, and possible enhancement measures for whitewater, based on the results of the study. AW also recommended that EID provide scheduled whitewater flows between the minimum acceptable and optimum range for respective reaches on the SFAR and Silver Fork and augment instream flows to a range between the whitewater minimum acceptable and optimum for respective reaches on the SFAR and Silver Fork. AW is a signatory party to the Settlement, and we consider its comments to be superceded by the proposed conditions of the Settlement.

In its October 30, 2002, letter to the Commission, FOR recommended mitigation to reduce the effects of diversions on whitewater boating opportunities and suggested that flows only be provided during periods when such flows were available under the natural hydrograph. In his October 31, 2002, letter to the Commission, Mr. Shackleton recommends scheduled whitewater releases during summer or fall to compensate for lost whitewater opportunities during the spring while the reservoirs are being filled and diversion of water from the streambeds. In his October 29, 2002, letter to the Commission, Mr. Shutes recommended that if releases to augment whitewater boating occur, they should occur at the high end of the hydrograph, such as adding flows during a period when flows are already high, but not quite high enough for whitewater boating, and avoiding unseasonable pulse flows. In his October 30, 2002, letter to the Commission, Robert Payne commented that both the SFAR and the Silver Fork are of extreme importance to the whitewater community and requests that these stretches of river continue to flow unabated. FOR and Mr. Shutes are signatory parties to the Settlement, and we consider their original recommendations to be superceded by the proposed conditions of the Settlement.

Our Analysis

EID conducted an assessment of the number of days of boatable flows based on modeling of pre-project conditions, conditions based upon FS preliminary Section 4(e) recommendations, and conditions based upon EID's current operation (Floch & Associates, 2002). EID modeled whitewater boating optimal flow ranges for whitewater runs on the SFAR and Silver Fork as originally recommended by AW for the years from 1972 through 1996. The flow ranges that AW provided to EID for the boatable days study (letter from J. Gangemi, AW, to S. Shewbridge, EID, dated September 20, 2002) are very similar to the flow ranges that are indicated in other sources, including whitewater boating guides for the area (Holbeck and Stanley, 1998). Given that the recommended flows provided by various boating experts are within the same range, it is unlikely that an additional boating flow assessment would yield flow ranges that are very different than the existing recommended

flow ranges. Therefore, we do not recommend that EID conduct a study to determine the optimal flow for whitewater boating as originally recommended by NPS and AW. In addition, we do not recommend that EID conduct further assessment of the boatable days as the existing study (Floch & Associates, 2002) conducted by EID provides the boatable days assessment originally suggested by the FS, NPS, and AW.

We used EID's boatable days modeling assessment to examine the number of boatable days that would be provided under the existing conditions and under the recommended FS flow conditions. Although EID also provided information about pre-project condition, Commission policy is to consider existing conditions as baseline; therefore, we only assess the changes from the existing conditions to the FS-recommended flow conditions. Table 3-38 provides a summary of the boatable days per reach that EID assessed as part of the modeling study. Overall, based on EID's modeling, the existing conditions provide an average of about 267 boatable days per year, and the original FS-recommended flows would provide an average of about 264 boatable days per year for the modeled stream and river reaches. The mean change in boatable days from the existing conditions as compared to the FS-recommended flows for three of the runs would provide an increase in the number of boatable days between 1.1 to 1.7 days, for two runs would provide a decrease in boatable days between 1.1 to 4.3 days, and for two runs would provide an increase of less than 1 day. Based on availability of whitewater boating opportunities under the existing conditions, we are not recommending any additional whitewater boating flows be provided as part of any new license issued for this project. In addition, under the original FS-recommended flow conditions, there would be essentially the same overall number of boatable days per year as compared to the existing conditions.

Table 3-38. Summary of whitewater boatable days analysis based on modeling of flows from 1972 to 1996. (Source: Floch & Associates, 2002)

Whitewater Boating Run	Class	Length (miles)	Optimal Boating Flows ^a	Existing Conditions		FS Preliminary 4(e) Conditions		Change from existing to FS conditions (boatable days)
				Range of Boatable Days	Avg./Median Boatable Days	Range of Boatable Days	Avg./Median Boatable Days	
Lovers Leap	V	9.5	500–1,500 cfs	0–55 (12 yrs at 0 days)	7/2	0–55 (12 yrs at 0 days)	7/1	.04
Kyburz to Whitehall	IV+	6	700–3,200 cfs	0–110 (5 yrs at 0 days)	48/53	0–110 (4 yrs at 0 days)	49/51	1.1
Whitehall to Riverton	III	3.6	700–1,000 cfs	0–62 (4 yrs at 0 days)	26/28	0–61 (3 yrs at 0 days)	26/30	0.2
Riverton to Peavine	III–I V	3.5	700–4,000 cfs	0–132 (4 yrs at 0 days)	58/55	0–136 (3 yrs at 0 days)	59/55	1.3
Golden Gate	V	9.4	500–1,800 cfs	0–133 (2 yrs at 0 days)	61/57	0–134 (2 yrs at 0 days)	62/57	–4.3
Dugald Bremner	V	3.5	400–800 cfs	0–57 days (9 yrs at 0 days)	20/17	0–57 (10 yrs at 0 days)	20/22	–1.1
Lower Run	V	3.3	350–750 cfs	0–88 days (3 yrs at 0 days)	42/43	0–86 (3 yrs at 0 days)	44/55	1.7

^a Based on AW recommended flows (letter from J. Gangemi, AW, to S. Shewbridge, EID, dated September 20, 2002)

Streamflow Information

EID proposes to develop a plan, within 1 year of license issuance, for measures to provide information on lake levels, real-time streamflows, simple staff gages, forecasting, and operations projections to the public via toll-free telephone and the Internet. EID would provide at a minimum, hourly averages of streamflows for gages in the SFAR below Kyburz diversion dam and Silver Fork, and would post on its website the current (within 4 hours of obtaining it) and prior 7 days' information for the entire year.

In its October 16, 2002, letter to the Commission, AW recommends that EID provide real-time flow information accessible via the Internet and toll-free phone line for locations on the SFAR and Silver Fork sufficient for the public to assess flow conditions in the respective boating reaches on the SFAR and Silver Fork. In its October 30, 2002, letter, FOR recommends that EID provide reliable streamflow information to the public via an information kiosk, the Internet and a toll-free phone number. In addition, FOR recommends that EID install and maintain staff gages and depth indicators in reaches agreed to by the boating public and that this information be made available in real-time to the public via the Internet or phone. AW and FOR are signatory parties to the Settlement, and we consider their original recommendations to be superceded by the proposed conditions of the Settlement.

In his October 29, 2002, letter to the Commission, Mr. Shutes supports the provision of real-time streamflow information on the Internet. Mr. Shutes comments that there are three main types of recreators who would be interested in flow information (i.e., whitewater boaters, stream anglers, and recreational lake users) and that the streamflow information needed by each group, such as the location of the gages and information reporting needs, are different. Mr. Shutes suggests that the website on which the flow information is posted also contain flow information from the gages; information related to whether the lakes are frozen, thawing or ice-free; the annual operating plan and short-term forecast of EID operations and maintenance periods; historical information; schedule of minimum flows for each stream; and conversion tables for each river gage (river stage versus flow). Mr. Shutes is a signatory party to the Settlement, and we consider his original recommendations to be superceded by the proposed conditions of the Settlement.

In his October 31, 2002, letter to the Commission, Mr. Shackleton recommends that annual whitewater release schedules and flow forecasts for the SFAR, Silver Fork, and Caples Creek be made freely available to the public and that streamflow information be made available to the public via the Internet or at the following locations: directly downstream of the Kyburz diversion dam; directly upstream of the El Dorado reservoir on the SFAR, measuring inflow into the impoundment; directly downstream of the powerhouse on the SFAR, measuring outflow from the project; on the Silver Fork directly downstream of Silver Lake; on Caples Creek directly downstream of Caples Lake; and on the Silver Fork just

upstream of the confluence with the SFAR.

Our Analysis

The implementation of a flow information system would provide valuable information to a variety of recreational resource users. We recommend that EID develop, as part of the public information plan, measures to provide real-time streamflow information as proposed by EID. Information to be provided to the public for recreational purposes should be coordinated with the information to be provided to the Commission to monitor compliance with flow regimes and lake waters surface elevation (discussed in the *Environmental Effects and Recommendations* subsection in section 3.3.1, *Water Resources*).

3.3.5.3 Unavoidable Adverse Effects: None

3.3.6 Land Use and Aesthetic Resources

The El Dorado Project is situated on public and private lands. All of the project reservoirs are surrounded by land that is either owned by EID or the United States and managed by the FS, with the exception of the forebay, which is surrounded by private and EID lands. The general character of the lands in the region surrounding the project include urban, residential, industrial, manufacturing, transportation, commercial, parks and recreation, extraction, and open space. The developed urban, industrial, and commercial lands tend to be concentrated along the Highway 50 corridor. Much of the region consists of low-density residential and undeveloped lands. The aesthetic character of the area is heavily forested with large mountains and snow-capped peaks. Much of the area is undeveloped with large areas of wilderness contained within the Eldorado National Forest. The highways and trails in the area offer scenic views of the lakes, streams, waterfalls, and surrounding mountains.

A total of 2,237.02 acres of federally owned lands are located within the project boundary. Of this acreage, about 1,334 acres of federally owned land within the project boundary are administered by the Eldorado National Forest. The FS issues permits for piers, docks, and other structures located on FS lands in the project area. EID requires permits for structures located on lands owned by EID.

Portions of the FS lands located within the project area are within two designated Wilderness Areas: the Desolation Wilderness and the Mokelumne Wilderness. The Desolation Wilderness is managed jointly by the Eldorado National Forest and the LTBMU of the FS. The Mokelumne Wilderness area is jointly managed by the Eldorado, the Stanislaus, and the Toiyabe National Forests. Portions of Caples Creek and the Silver Fork lie within the proposed Caples Creek Wilderness Area, which has not yet been designated by Congress as a Wilderness Area, but is managed to protect the values for which it is considered eligible.

3.3.6.1 Affected Environment

Stream and River Reaches

The land use and aesthetics along the stream and river reaches vary throughout the area. The smaller streams located away from the Highway 50 corridor are surrounded by mainly undeveloped lands. The area along the Highway 50 corridor consists of a combination of undeveloped areas, low-density areas (with cabins), and more developed areas around the towns of Kyburz, Riverton, and Peavine.

Pyramid Creek is fed by Lake Aloha and passes over Horsetail Falls, which is visible from the westbound lanes of Highway 50. EID assessed the effects of project operations on whether Horsetail Falls was visible from Highway 50 and determined that flows greater than 34.9 cfs created a waterfall that was visible from Highway 50. EID also found that 32 percent of visitors to Pyramid Creek found out about the area by “seeing the falls from Highway 50.”

EID examined the hydrologic record to determine the effects of the various dams and water releases on instream flows of the stream and river reaches in the project. EID found that in general flows are decreased in the spring and increased during the late summer and fall and that the changes in instream flows are generally not of a magnitude that would be noticed by individuals in the area.

Project Reservoirs

Lake Aloha

Lake Aloha is located entirely within the Desolation Wilderness and the shoreline consists of undeveloped land. The land surrounding the lake consists of large rock outcroppings with sparsely scattered trees and shrubs. The views from Lake Aloha are dominated by the lack of unnatural structures and elements. The PCT follows the eastern shore of the lake for about 1.5 miles. Lake Aloha is typically drawn down by about 15 feet in July and August. The lower water levels result in variations in the color of the shoreline and the exposure of dead trees, boulders, and sediment. The FS visual quality objective (VQO) for the area (see section 3.3.6.3 below) is preservation and allows only ecological changes to the landscape. The project facilities were built prior to designation of the area as Desolation Wilderness and are allowed as a special use with certain management conditions. Key observation points identified in the Lake Aloha area include views from the PCT (EIP, 2002k).

Echo Lake

Echo Lake comprises a lower and upper basin and is located adjacent to the Desolation Wilderness. Steep slopes adjacent to Echo Lake rise 900 feet above the north shore and over 1,300 feet above the south shore of the lake and dominate the views. The PCT, designated a National Scenic Trail, crosses the dam at the eastern outlet of lower Echo Lake and parallels the northern shores of lower and upper Echo Lake for about 2 miles before entering the Desolation Wilderness northwest of the lakes. Lower Echo Lake is surrounded by a combination of undeveloped and rural residential lands. There is also one rural commercial area at the far eastern shoreline occupied by the Echo Chalet. There are 247 recreational residences within the vicinity of Echo Lake with 140 situated on small tracts surrounding Echo Lake, and the remaining located on Echo Road and at Echo Summit. Of the 140 residences surrounding Echo Lake, 122 are located on FS lands and 18 are located on private lands. On average, Echo Lake is drawn down a total of 6 feet. The drawdown begins after Labor Day and is completed by November 15. The steep rocky shoreline of Echo Lake does not lend itself to a visible change in color and line. The FS VQO classification for the Echo Lake area is partial retention for most of the northern and southern shore of the upper and lower Echo lakes. A 0.5-mile stretch at the eastern end of Echo Lake and the western end of upper Echo Lake and the larger surrounding landscape of Echo Lake has a VQO classification of retention. Key observation points identified in the Echo Lake area include views from the PCT, Echo Lake Chalet, and parking areas (EIP, 2002k).

Caples Lake

Caples Lake is surrounded mainly by undeveloped lands. The Mokelumne Wilderness borders Caples Lake along 3.5 miles of the southern shore. The surrounding lands provide views of forested and rocky mountain peaks. The Caples Lake Resort is located along a small section of the north side of the lake. Highway 88, a federal Scenic Byway and state- and county-designated Scenic Highway, follows the northern shoreline of the lake. There are 13 recreational residences located on the northeast side of Caples Lake, all located on FS land and occupied under FS leases. On average Caples Lake is drawn down about 10 feet by September 7, 13 feet by October 1, and 14 feet by October 15. The maximum allowable drawdown is 44 feet. Lower water levels are apparent as a change in color along the shore and is most obvious at the southern end of the lake as the lake bottom becomes exposed. The FS VQO classifications for Caples Lake area include retention for the landscape surrounding the lake and partial retention for areas where developed facilities are located. Key observation points identified in the Caples Lake area include views from the Emigrant Lake Trail, Highway 88, Caples Lake Resort, Caples Lake Campground, and Wood's Creek lake access (EIP, 2002k).

Silver Lake

Silver Lake is surrounded by a combination of undeveloped, rural commercial, and

rural residential land uses. The general character of the lake is forested land with a moderate amount of low-density development. The surrounding land provides views of red fir forest and barren granite slopes. Kay's Silver Lake Resort and Kit Carson Lodge represent the rural commercial areas on the north side of the lake. Plasse's Resort represents the rural commercial enterprise on the south side of the lake. A total of 112 private recreational residences are located in the vicinity of Silver Lake with 78 residences located on FS lands, 7 residences on EID lands, and 27 residences on private lands. The residences on FS lands are referred to as the East Silver Lake Tract (54 residences) located along the northeast section of the lake and the South Silver Lake Tract (24 residences) located along the southwest section of the lake. Most residences have boat docks and typically the boat docks along the southwest shoreline are floating docks and boat docks on the northeast shore are primarily stationary. Only a few of the residences are used year-round, with the majority of the use occurring during May through October. On average, the lake is drawn down about 6 feet by September 7, 10 feet by October 1, and 12 feet by October 15. The maximum allowable drawdown of Silver Lake is 22.7 feet. The drawdown is visible to visitors during the fall, especially at the shallow south end of the lake. Mud flats become visible during the fall at the south end of the lake and can extend up to a mile north around Treasure Island. The FS VQO classifications for the Silver Lake area include retention and partial retention. Key observation points identified in the Silver Lake area include views from the Highway 88, Kay's Resort, and the Ferguson Point picnic area (EIP, 2002k).

Project Area Management Plans

Eldorado National Forest Land and Resource Management Plan

Almost 60 percent of the lands within the project boundary is located within the Eldorado National Forest and is managed by the FS. The Eldorado National Forest Land and Resource Management Plan (LRMP) provides a guide to management of these forest lands. Applicable goals apply to providing recreational opportunities; protecting visually sensitive areas; maintaining quality wilderness; preserving and protecting the Wild, Scenic, and Recreation Rivers; and developing appropriate transportation systems. The Eldorado National Forest LRMP establishes management classifications for Eldorado National Forest lands, and these classifications provide guidelines for the preferred Recreation Opportunity Spectrum (ROS) and for the preferred VQO. Any private development proposed within the Eldorado National Forest must first be granted a special-use permit from the FS, which would contain any conditions that the FS considers necessary for the facility to be consistent with the LRMP.

The FS implements the ROS to define the management guidelines of FS lands for recreational opportunities. The ROS provides a framework for defining the types of outdoor recreational opportunities that the public may desire and identifies the portion of the ROS that any given area may be able to provide. In designating the ROS, factors considered

include qualities provided by the natural setting (i.e., vegetation, topography, scenery), qualities associated with recreational use (i.e., type and level of recreational use), and management (i.e., development, access, and regulations). Table 3-39 summarizes the ROS classifications and guidelines that are applied to the Eldorado National Forest lands within the project area.

The FS developed the Visual Management System in the early 1970's to evaluate the aesthetic character and visual effects on FS lands. This system evaluates physical features, visitor sensitivity to scenic quality, distance zones, existing visual conditions, and VQOs to determine visual compatibility of projects within the forests. Table 3-40 contains descriptions of the VQO classifications and the types of management activities that are appropriate for each category that is present in the project area.

Table 3-39. Summary of ROS classifications and guidelines. (Source: EID, 2000a)

ROS Classification	Guidelines
Primitive	Provide a primarily unmodified natural environment. Area is essentially free from human-induced controls and restrictions.
Semi-primitive Non-Motorized	Provide for minimum evidence of onsite. Only subtle modifications to an otherwise natural environment.
Semi-Primitive Motorized	Same as Semi-Primitive Non-Motorized, except motorized use of roads and trails is allowed.
Roaded Natural	Provide for low-to-moderate interaction between users. Sights and sounds of others are clearly evident.

Table 3-40. Visual quality objective classification guidelines. (Source: EID, 2000a)

VQO Classification	Guidelines
Preservation	Allows ecological changes only. Management activities, except for very low visual impact recreational facilities, are prohibited. Applies to Wilderness Areas, primitive areas, Wild River corridors, other specialty classified areas, areas awaiting classification, and some unique management units that do not justify special classification.

VQO Classification	Guidelines
Retention	Allows management activities that are not visually evident. Activities may only repeat form, line, color, and texture that are frequently found in the characteristic landscape. Changes in size, amount, intensity, direction, and pattern should not be evident.
Partial Retention	Allows management activities that remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color, and texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, and pattern remain visually subordinate to the characteristic landscape. Activities may also introduce form, line, color, and texture that are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.

Eldorado National Forest LRMP Classifications for Project Area Stream and River Segments

Table 3-41 summarizes the Eldorado National Forest LRMP management classifications for the project area stream and river segments. Echo Creek is located within the LTBMU within the Echo Lakes Management Area, which emphasizes environmental sensitivity, and the Tahoe Valley Management Area, which emphasizes meeting the recreational, scenic, and special use demands of the visiting population. For areas managed as maintenance along Echo Creek, the ROS classification is Semi-Primitive Non-Motorized, and the VQO classification is Retention. For areas managed as timber stand maintenance, the ROS classification is Roaded Natural, and the VQO classification is Retention.

Table 3-41. Summary of Eldorado National Forest management classifications and guidelines for FS lands within the project area stream and river segments. (Source: EID, 2000a)

River/Stream	Management Classification	ROS Classification	VQO Classification
Echo Creek	Maintenance Timber Stand Maintenance	Semi-Primitive Non-Motorized Roaded Natural	Retention Retention
Pyramid Creek	Desolation Wilderness (Mgmt. Area 1) Pyramid Creek Geological Area Pyramid Creek Geological Area	Primitive Semi-Primitive Non-Motorized Semi-Primitive Motorized	Preservation Preservation-Retention Retention
Caples Creek	Roaded Natural High Country (Mgmt. Area 8)	Roaded Natural Semi-Primitive Non-Motorized	Retention Partial Retention
Silver Fork	Roaded Natural High Country (Mgmt. Area 8) Caples Creek Wilderness Area (Mgmt. Area 1) Visual Foreground Retention General Forest (Mgmt. Area 20)	Roaded Natural Semi-Private Non-Motorized	Partial Retention Foreground Retention
SFAR	Visual Foreground Retention General Forest (Mgmt. Area 20) Private Sector Recreation (Mgmt. Area 13)	Roaded Natural Rural Semi-Primitive Non-Motorized	Foreground Retention Partial Retention

Pyramid Creek is located within the Eldorado National Forest, and the upper portion of Pyramid Creek lies within the Desolation Wilderness in Management Area 1. The preferred ROS classification is Primitive, and the preferred VQO classification is Preservation. The lower portion of Pyramid Creek lies within the Pyramid Creek Geological Area, Management Area 4, Special Area. The preferred ROS classification is Semi-Primitive Non-Motorized above Horsetail Falls, and Semi-Primitive Motorized below Horsetail Falls. The preferred VQO classification is Preservation above Horsetail Falls and Retention below Horsetail Falls.

Caples Creek is located within the Eldorado National Forest and a portion of the Creek is classified as Roaded Natural High Country (Management Area 8). Its preferred ROS classification is Roaded Natural and the VQO classification is Retention. The Silver Fork lies within the Eldorado National Forest and also includes areas under private ownership. Several Eldorado National Forest management classifications apply to the Silver Fork, including Roaded Natural High Country (Management Area 8), Caples Creek Wilderness Area (Management Area 1), and Visual Foreground Retention General Forest (Management Area 20). The preferred ROS classification in Caples Lake Wilderness Area is Semi-Primitive Non-Motorized. The SFAR also traverses FS and private lands. The areas where it lies within the Eldorado National Forest are classified as Visual Foreground Retention General Forest (Management Area 20) and Private Sector Recreation (Management Area 13). The preferred VQO classification for management Area 20 is Foreground Retention.

Eldorado National Forest LRMP Classifications for Project Area Reservoirs

Table 3-42 summarizes the Eldorado National Forest LRMP management classifications for the project reservoirs. Silver Lake is located within the boundaries of the Eldorado National Forest in an area primarily classified by the FS in the Eldorado National Forest LRMP as Roaded Natural High Country and Semi-Primitive Motorized, with smaller areas classified as Existing Developed Recreation and Private Sector Recreation. The Semi-Primitive Motorized and Roaded Natural classifications have VQOs of Retention, and the Existing Recreation and Private Sector Recreation classifications have Partial Retention VQOs. Caples Lake is classified as Roaded Natural High Country, and the VQO for the landscape surrounding the lake is Retention and Partial Retention in areas of developed facilities. The Mokelumne Wilderness, which borders a portion of the southern shore of Caples Lake, has a VQO of Preservation.

Table 3-42. Summary of Eldorado National Forest management classifications and guidelines for FS lands within the project area reservoirs. (Source: EID, 2000a)

Reservoir	Management Classification	ROS Classification	VQO Classification
Aloha Lake	Desolation Wilderness	Primitive	Preservation
Echo Lake ^a	Developed Recreation Unroaded Recreation	Rural	Partial Retention Retention
Caples Lake	Roaded Natural High Country (Mgmt. Area 8) Mokelumne Wilderness	Roaded Natural Primitive	Retention-Partial Retention Preservation
Silver Lake	Roaded Natural High Country Semi-Primitive Motorized Existing Developed Recreation Private Sector Recreation	Rural	Partial Retention

^a Echo Lake is located in the LTBMU, and these designations are from the LTBMU Land and Resource Management Plan.

Lake Tahoe Basin Management Unit

Echo Lake is located within the LTBMU of the FS and within the Echo Lakes Management Area management designation. The LTBMU LRMP manages the area along most of the northern and southern shore of upper and lower Echo lakes for developed recreation with a VQO classification of Partial Retention. A small area of the northern and southern shore at the eastern end of lower Echo Lake, and the western end of upper Echo Lake are managed for Unroaded Recreation with a VQO classification of Retention. Lake Aloha is located entirely within the Desolation Wilderness and falls within an area under the management jurisdiction of Eldorado National Forest. The Eldorado National Forest LRMP applies a VQO classification of Preservation to the Desolation Wilderness.

Sierra Nevada Forest Plan Amendment

The Sierra Nevada Forest Plan Amendment establishes the management direction for five problem areas, including old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; noxious weeds; and lower westside hardwood forest ecosystems. It amends the LRMPs for nine National Forests within California including the Eldorado National Forest and the LTBMU LRMPs. It also amends the Regional Guidelines for the Intermountain and Pacific Southwest Regions. The Sierra Nevada Forest Plan Amendment only replaces standards and guidelines of the LRMPs that conflict with it. The management direction of the Sierra Nevada Forest Plan Amendment focuses on providing for species conservation with explicit Californian spotted owl and fisher conservation strategies. It also focuses on integrating species conservation with aquatic management and fire and fuels management, recognizing the need to reduce fire threat to human communities.

Regional Plan for the Lake Tahoe Basin

The Tahoe Regional Planning Agency (TRPA) developed the Regional Plan for the Lake Tahoe Basin (RPLTB) to address development, noise, and land use issues in the region. Echo Lake and Echo Creek are the areas within the El Dorado Project that are affected by this plan. The relevant goals and policies of the RPLTB are described here. The first goal of the RPLTB is to restore, maintain, and improve the quality of the Lake Tahoe region for the visitors and residents of the region. Policies included under this goal are that the primary function of the region shall be as a mountain recreational area with outstanding scenic and natural values and the plan shall seek to maintain a balance between economic health and the environment. The second goal indicates that the plan seeks to direct the amount and location of new land uses in conformance with the environmental threshold carrying capacities and the other goals of the Tahoe Regional Planning Compact. A relevant policy included in this goal is that uses of the bodies of water within the region shall be limited to outdoor water-dependent uses required to satisfy the goals and policies of this plan.

Project Area Roads

Highway 50, a federal highway, passes through the project vicinity and serves as a travel route for project operation and maintenance activities. It is also used to access secondary roads which lead to various portions of the project area. Highway 88 provides direct access to portions of the project area. Major access roads situated within the project boundary are summarized in table 3-43.

Table 3-43. Access roads within the project boundary. (Source: EID, 2000a)

Road Easement	Description
LD2111-12-0073 and LD 2111-12-00366	From FS road 12N34.3 (Forebay Road) to El Dorado powerhouse
LD 2111-12-0379 and LD 2111-12-0048	From FS road 12N34.3 (Forebay Road) to El Dorado powerhouse pipeline east of the surge tank
LD 2111-12-00400	From FS road 12N34.3 (Forebay Road) to El Dorado powerhouse pipeline west of the forebay reservoir
LD 2111-13-0180	(Deep Haven Road) FS road 12N34.3 (Forebay Road) to PG&E resort
LD 2111-13-0176 and LD 2111-13-0180	From FS road 12N34.3 (Forebay Road) east of forebay reservoir
LD 2111-13-0032	Near Fresh Pond ravine
LD 211-13-0023	From FS road 10N40.2 (Plum Creek Road) to Esmeralda tunnel on El Dorado canal
LD 2111-13-0023	From FS road 10N40M to near Ditch Camp Three on El Dorado canal
LD 2111-14-0026	Access road near Mill Creek and El Dorado tunnel
LD 2111-15-0075	Access road near Carpenter Creek

Wild and Scenic Designations

The FS determined that four stream and river sections in the project area are eligible for inclusion into the Wild and Scenic Rivers System. The FS has not conducted a Wild and Scenic Rivers Suitability Study for the sections and Congress has not incorporated them into

the Wild and Scenic Rivers System. Table 3-44 contains information about the four river segments and their outstanding characteristics.

Table 3-44. Sections of rivers found eligible for inclusion in the Wild and Scenic River System. (Source: EID, 2000a)

River	Location	Values
Pyramid Creek	From Avalanche Lake to Highway 50	Visual, geologic, and recreational
Caples Creek	From the proposed Caples Creek Wilderness Area boundary to the confluence with the Silver Fork	Recreational and fisheries
Silver Fork	From its confluence with Caples Creek to its confluence with the SFAR	Recreational
SFAR	From its headwaters to Blair Bridge	Cultural and recreational

The Federal Highway Administration, CalTrans, and El Dorado County have each designated scenic highways in the project area. CalTrans has designated two state Scenic Highways in the project area: Highway 50 from the eastern limits of the Government Exchange Center in Placerville to South Lake Tahoe and Highway 88 from Dew Drop Fire Station to the Nevada state line. Highway 50 runs parallel to the South Fork between Kyburz and Ditch Camp. Where project-related waterways cross under Highway 50 (i.e., the Eldorado intake canal, several canal spillway channels, and the Echo Lake conduit), this scenic highway is included within the project boundaries. The only project-related features visible from Highway 50 are glimpses of the SFAR and a small portion of the project's canal. State Highway 88 passes near and along the banks of Silver and Caples lakes and passes within a portion of the project boundary over and near the project dams at both lakes.

3.3.6.2 Environmental Effects and Recommendations

Land Use

Land and Facility Management

Prior to approving, developing, or providing for additional commercial services or exclusive uses at Silver Lake, Caples Lake, or Echo Lake, beyond those that already exist as of the date of issuance of the license, EID proposes to complete an analysis that displays the effects of the proposed development on adjacent National Forest System lands (Section 30

of the Settlement).

EID proposes to, within 1 year of license issuance, prepare a facility management plan that is approved by the FS and includes the following: a map showing all project facilities, including structures on or affecting National Forest System lands, and above and below ground storage tanks; identification of the type and season of use of each structure; and identification of the condition of each structure and planned maintenance or removal. Every 5 years, EID proposes to prepare a 5-year plan to identify the maintenance, reconstruction, and removal needs for project facilities (Section 29 of the Settlement).

EID proposes to, within 2 years of license issuance, develop a land adjustment proposal that addresses possible land exchanges or other management actions that would result in more efficient land management by concerned parties (Section 31 of the Settlement). The proposal would include consideration of land exchanges between the FS and EID at Silver Lake East and West campgrounds, Oyster Creek Roadside Rest, and in the Sly Park/Pollock Pines area. EID would consult with the involved parties in the development of the proposal and file the proposal with the Commission.

In its May 9, 2003, letter to the Commission, the FS, as a preliminary Section 4(e) condition, recommends that EID, within 90 days of license issuance, consult with the FS to bring existing special-use authorizations for project-related occupancy and use of National Forest System lands up to current standards through the issuance of new permits or the re-issuance of obsolete authorizations. The FS also recommends that EID obtain the executed authorizations, to be filed with the Commission, before beginning ground-disturbing actions related to these permitted activities on National Forest System lands, or within 1 year of license issuance. In addition, the FS recommends that EID prepare for the FS's review of an operation and maintenance plan for project facilities covered by the special-use authorization, and that this plan be updated annually and reviewed at a meeting with the FS on or about April 1 each year. The FS recommends that EID be allowed to commence ground-disturbing activities authorized by the license and special-use authorization no sooner than 60 days following the date EID files the FS special-use authorizations with the Commission, unless the Commission prescribes a different commencement schedule. The FS recommends that in the event there is a conflict between any provisions of the project license and FS special-use authorization, the special-use authorization would prevail to the extent that the FS, in consultation with the Commission, deems necessary to protect and use National Forest System resources.

Our Analysis

The FS expressed concern that commercial or exclusive services and development would have the potential to conflict with the FS management goals specified in the LRMPS for the FS lands. The management goals range from providing a primarily unmodified natural

environment to providing low to moderate interaction between users and a natural-looking setting. In addition, the FS management plans include strategies for road management and maintenance, and management of recreational and aesthetic resources. The standard land use article, which the Commission typically includes in most license orders, authorizes the licensee to permit certain land uses within the project boundary associated with the project without needing prior Commission approval, provided that such uses are not inconsistent with the purposes of enhancing and protecting the scenic, recreational, and environmental values of the project. Other proposed uses within the project boundary that are outside the scope of the standard land use article, such as commercial development that would involve implementation of boat piers for 10 or more watercraft, would require prior Commission approval. The Commission staff in its review of the proposed action would assess the effects of any proposed development, including consistency with FS management objectives. In addition, our recommendations discussed below pertaining to implementation of a transportation system management plan, trail management plan, visual resource management plan, and the recreation implementation plan (discussed in section 3.3.5, *Recreational Resources*) would require EID to consult with the FS and determine measures to ensure that future project land and recreational facility development and management are consistent with the FS strategies and the Eldorado National Forest and LTBMU LRMPs. Therefore, we do not recommend that EID conduct a specific analysis of the effects of proposed development on adjacent FS lands.

Components of the facility management plan proposed by EID, such as project facilities and structures, would be provided in other Commission required filings, such as Exhibit F (drawings of project works), and the project's Emergency Action Plan. In addition, we note that the Environmental Protection Agency requires a spill prevention, control, and counter-measure plan (SPCCP)⁸ for major above- or below-ground storage tanks. This existing requirement is not related to project licensing and should be sufficient to ensure that such facilities are operated and maintained in a safe manner. Therefore, we do not recommend that EID develop a facility management plan as specified in the Settlement. However, we recognize that the conditions of the Settlement represent the results of extensive negotiations among the stakeholders; therefore, we would not object to the development of a facility management plan to the extent that it is not duplicative of existing plans but is consistent with current procedures to ensure the security of hydroelectric projects.

EID proposes to develop a land adjustment proposal that addresses possible land exchanges or other management actions. We support the idea of interested parties exploring

⁸ An SPCCP is required to be in place for any facility where unburied storage capacity exceeds 1,320 gallons of oil or a single container that has a capacity in excess of 660 gallons in accordance with 40 CFR § 112.1.

possible land exchanges to resolve longstanding management difficulties and land ownership patterns. Although the Commission may support such land transfers if included in a broader reaching agreement that resolves multiple resource issues, the Commission is unable to recommend actions by parties other than EID; therefore, we do not recommend that such a land exchange be required as part of the license issuance. However, for any license issued for the project, if during the license term, EID proposes a land exchange that affects project property, it must obtain prior Commission approval before executing such an agreement.

The FS recommendations to update and implement special-use authorizations would help to ensure that current land-use practices within the project boundary are consistent with FS LRMPs. However, although FS plans and regulations require that private use of FS lands be covered by a current authorization, such requirements are not mandated as part of the Commission's authorization for issuance of a license. Therefore, we do not recommend that EID be required in any new license that may be issued for this project to update these authorizations; however, we encourage EID to consult with the FS to update the FS special-use authorizations as part of the recreation management plan (see section 3.3.5, *Recreational Resources*). We recommend that EID include components related to the identification of the operation and maintenance of recreation facilities within the project boundary. Therefore, we do not recommend that EID prepare an operation and maintenance plan for facilities covered by special-use authorization.

Land and Habitat Management Plan

In this document, we recommend several resource plans to be developed and implemented for the project. As discussed below, we recommend these plans be consolidated into an overall LHMP. The consolidation of these resource plans into a single document would facilitate the implementation of related plans and help ensure that management of project resources is coordinated throughout the term of the license. The consulted entities for the individual component plans would be different, depending on the nature of the plan. Therefore, each component plan should be developed as a separate chapter to the LHMP, but if other plans are incorporated by reference into a plan, the referenced plan should also be provided to the consulted entities to provide the proper review context. We recommend that the LHMP be filed for Commission approval, along with evidence of consultation on each component plan within 2 years of license issuance.

The LHMP could include, at a minimum, the following:

- an overview and discussion of general land management measures within the project area. This section would include a discussion of key land management objectives, and measures about how the various components of the LHMP would be implemented and coordinated);

- ecological resources adaptive management program, that includes water temperature, general water quality (as appropriate), geomorphology, fish, invertebrate, amphibian, intake canal, and riparian vegetation monitoring plans and provisions to recommend adjustments in project operations to the Commission based on the results of the monitoring (discussed in sections 3.3.1, *Water Resources*, 3.3.2, *Aquatic Resources*, and 3.3.3, *Terrestrial Resources*);
- noxious weed prevention and control plan (discussed in section 3.3.3, *Terrestrial Resources*);
- identification of special status species that occur or could occur in the project area, provisions for updating this listing, maps of known occurrences of the special-status species, and specific activities (construction, operation, and maintenance) that would require preparation of a biological evaluation or biological assessment prior to implementation (discussed in section 3.3.3, *Terrestrial Resources*);
- mountain yellow-legged frog protection procedures (trout removal at pools near Lake Aloha) (discussed in section 3.3.3, *Terrestrial Resources*);
- recreation implementation plan (discussed in section 3.3.5, *Recreational Resources*);
- recreation monitoring plan (discussed in section 3.3.5, *Recreational Resources*);
- public information plan (discussed in section 3.3.5, *Recreational Resources*);
- transportation system management plan (discussed below);
- trail system management plan (discussed below); and
- visual management plan (discussed below).

Each chapter would consist of the specified plan, with cross-referencing to related plans to avoid redundancy, as appropriate, that would describe the proposed management and enhancement measures, an implementation schedule, and monitoring and maintenance measures and would document consultation conducted in the development of the plan.

Access Roads

EID proposes to file with the Commission within 1 year of license issuance a transportation system management plan that is approved by the FS (Section 27 of the Settlement). The plan, at a minimum, would include:

- a map showing all roads, both FS system roads (classified), and FS unclassified roads associated with the project;
- identification of the project-related uses (i.e., recreation, facility access) of the roads, including an estimate of the amount of use by season of the year;
- identification of the condition of the roads that are determined to be the primary responsibility of EID, including any construction or maintenance needs, such as information related to the length and width of the road, location and size of culverts, grade, slope position, hydrologic connectivity, surfacing, maintenance level, service level, and jurisdiction;
- a traffic safety and signage plan, for all roads that are the primary responsibility of EID, including both safety and destination/distance information signs at major road intersection and features, and an inventory of all signs with photographs and a map of locations of the signs using a GPS;
- a map of all drainage crossings of bridges and culverts for all roads that are the primary responsibility of EID; provision of hydraulic calculations verifying that all intermittent and perennial stream crossings pass a 100-year storm event and associated bedload and debris, and allow fish passage through all culverts that are identified as fish habitat areas; and development of a plan to upgrade those culverts not meeting this standard;
- identification of measures to control erosion related to project facilities on or affecting National Forest System lands, including dams, roads, penstocks, powerlines, transformer sites, reservoirs, and reaches; consideration of stream sedimentation, dust, and soil movement induced by project roads and road maintenance activities; prevention of loss of roads through ongoing hillside erosion, sediment management of roads within 150 feet of the SFAR, the Silver Fork, and project affected streams; and
- identification of helispots routinely used to access project facilities, including any staging areas and access roads.

Every 5 years, EID would prepare a 5-year plan to identify the maintenance and reconstruction needs of project-related roads, in consultation with the FS, and file the plan with the Commission for approval.

EID also proposes to, within 5 years of license issuance, to replace the gate at the road to Caples Lake dam.

Our Analysis

The maintenance of roads associated with the project within the project boundary would help ensure that long-term access is provided and that the roadways are maintained and potential adverse effects of road use (such as roadway erosion) would not lead to detrimental effects on project-area resources. Therefore, we recommend that EID develop a transportation system management plan, in consultation with the FS for project-area road segments (identified in table 3-43). The plan would be developed to provide for public-use levels and safety, protect facilities from failure, and reduce resource degradation from improperly maintained road segments within the project boundary. We recommend that the final transportation system management plan be included as a component of the LHMP and include the following components:

- an inventory and map of existing road segments and parking areas within the project boundary, FS classified and unclassified, including the purpose of each road and parking area relative to project operations, season of operation, and drainage crossings (bridges and culverts);
- identification of the condition of the roads, including any construction or maintenance needs;
- details that relate to site-specific construction and maintenance to include the length and width of the road, location and size of culverts, grade, slope position, hydrologic connectivity, surfacing, maintenance level, service level, and jurisdiction;
- identification of measures to address existing road and parking area rehabilitation needs to bring existing project roads up to current levels of public safety, including: (1) measures to control erosion related to project facilities considering stream sedimentation, dust, and soil movement induced by project roads and road maintenance activities; (2) prevention of loss of roads through ongoing hillside erosion; (3) sediment management at road segments within 150 feet of a stream or river; and (4) provisions for developing 5-year plans to identify maintenance and reconstruction planned for project-related roads within the designated period; and
- identification of helispots routinely used to access project facilities, including any staging areas and access roads.

The proposed replacement of the gate at Caples Lake dam would repair an existing damaged gate located on a project road on the northwest side of the second dam at Caples Lake. The EID-owned gate is used to restrict public access to a project road. Therefore, we agree with EID's proposed measures to replace this gate and recommend that EID, as a component of the transportation system management plan, provide measures to replace the

gate at Caples Lake dam within 5 years of license issuance, as proposed by EID.

Project-Related Trails

EID proposes to within 1 year of license issuance prepare a trails system management plan that is approved by the FS (as specified in Section 28 of the Settlement) for the trails that are needed for project operations and that are located on or affect National Forest System lands. The trails system management plan would include the following: a map of all trails, including both FS system and non-FS system trails, associated with the project (with trail locations verified using a GPS); identification of the season(s) of use and the amount of use by the licensee for each trail annually; and identification of the condition of the trails, including any construction or maintenance needs. In addition, every 5 years, EID would prepare a 5-year plan to identify the maintenance and reconstruction needs for trails required for project operations.

Our Analysis

We recognize that there are trails that provide public and EID access to project lands, waters, and facilities. A trails system management plan for project-related trails would provide the means to identify measures for the ongoing maintenance and upkeep and the party responsible for implementing those measures. We recommend that EID prepare a trails system management plan as proposed, in consultation with the FS, along with the proposed 5 year maintenance and reconstruction plan, for those trails that provide public and EID access to project lands, waters, and facilities. As part of the trail system management plan and the 5-year maintenance and reconstruction plan, EID should identify the party responsible for, and estimated cost of, maintenance and reconstruction of each project-related trail segment. Both plans should be filed with the Commission and implemented upon approval.

Aesthetics

Visual Resource Management

During planning and prior to any new construction or maintenance of facilities that have the potential to affect visual resources of National Forest System lands (including but not limited to the recreation related construction), EID proposes to file with the Commission a plan approved by the FS for the protection and rehabilitation of National Forest System visual resources affected by the project (Section 24 of the Settlement). The plan, at a minimum, would address clearings; spoil piles; and project facilities, such as diversion structures, penstocks, pipes, ditches, powerhouses, other buildings, corridors, and access roads; and facility configurations, alignments, building materials, colors, landscaping, and screening. The plan would provide a proposed mitigation and implementation schedule to bring the project facilities affecting visual resources on National Forest System lands into

compliance with visual resource standards and guidelines in the Eldorado National Forest LRMP and the LTBMU LRMP during planning and prior to any new construction or maintenance. Mitigation measures identified for either the visual resource plan for new construction or the measures identified for existing facilities would include, but not be limited to: (1) surface treatments with earth-tone colors and natural-looking materials that would be in harmony with the surrounding landscape; (2) use of non-specular conductors for the transmission lines; (3) use of native plant species to screen facilities from view; (4) reshaping and revegetation of disturbed areas to blend with surrounding visual characteristics; and (5) location of transmission facilities to minimize visual effects.

EID also proposes to implement, within 2 years of license issuance, the following measures related to visual resources at existing facilities: paint the metal components of the walkway across the Lower Echo Lake spillway a non-reflective black color and perform a visual inspection every 2 years and touch up or repaint as necessary; paint the metal components of the dam and walkway across the Caples Lake auxiliary dam a non-reflective black color and perform a visual inspection every 2 years and touch up or repaint as necessary; and paint the metal components of the stairway, ramps, and handrail associated with the west side Silver Lake dam that are visible from the new bridge a non-reflective black color and perform a visual inspection every 2 years and touch up or repaint as necessary.

Our Analysis

The project facilities are visible and can be dominant within the landscape and can conflict with the area's FS VQOs, which range from partial retention to preservation. The project features were in place at the time the FS visual management policies were developed and were existing features of the landscape. Therefore, we do not recommend that existing facilities be modified to meet existing FS VQOs. There are no transmission lines associated with this project, so proposed measures that apply to transmission facilities are not relevant to this project. However, we recommend consideration of visual screening, such as painting or vegetative screening or other measures, during regular maintenance or upgrading of existing facilities. We recommend that EID paint the project facilities associated with the lower Echo Lake spillway, Caples Lake auxiliary dam, and Silver Lake dam, as proposed by EID and specified in the Settlement. Also, we recommend that new facilities, such as recreational facilities, be designed and implemented in a manner that would be consistent with the FS VQOs for the respective area and that measures should be implemented to minimize the visual effects of new facilities.

A coordinated approach to address visual effects of the existing facilities and proposed new facilities would help to protect aesthetic resources within the project area and help ensure that project facilities would be consistent with the FS's VQOs for the project area. EID proposes to develop visual resources plans during planning and prior to any new construction or maintenance of facilities that have the potential to affect visual resources of

National Forest System lands. Although we have no objection to this approach, sufficient information is not provided in the Settlement as to the process that would occur associated with the development of these visual resources protection plans, such as circumstances when visual resources protection plans would be needed (i.e., new construction and type of maintenance activities). Therefore, we recommend that EID develop a visual resource management plan within 1 year of license issuance in consultation with the FS that defines the process for visual resources protection, such as when a visual resources protection plan would be needed, consultation process with the FS in the development and review of the plan, and components to be included in the visual resources protection plans. We recommend that the visual resource management plan be included as a component of the LHMP.

Eligible Wild and Scenic Rivers

EID proposes no specific measures to protect the values that resulted in four project stream and river reaches being nominated for inclusion in the Wild and Scenic River System. EID proposes to continue the existing flow regime in each reach. In its October 18, 2002, letter to the Commission, NPS recommended, as a Section 10(a) measure, that EID conduct a study to determine whether the project adversely affects the four river segments (Caples Creek, Silver Fork, Pyramid Creek, and a 31-mile segment of the SFAR) that have been determined to be eligible for Wild and Scenic designation. In its October 30, 2002, letter to the Commission, Trout Unlimited recommended the consideration of all possibilities to protect and enhance the outstandingly remarkable values of the river reaches determined to be eligible for inclusion in the Wild and Scenic River System. In its October 30, 2002, letter to the Commission, FOR stated that FS's recommended minimum flows appear inadequate to protect the outstanding values of the river segments determined to be eligible for inclusion in the Wild and Scenic River System. FOR stated that FS's recommended 20-cfs minimum flow for Pyramid Creek is not adequate to maintain the outstanding scenic and recreational values of Pyramid Creek and Horsetail Falls, which is located on Pyramid Creek. In addition, FOR stated that although the FS recommended minimum flows for the SFAR appear adequate to support most recreational activities, they do not provide for whitewater recreation, and, therefore, do not fully protect the SFAR's recreational values. NPS, FOR, and Trout Unlimited are signatory parties to the Settlement, and we consider their original recommendations to be superceded by the proposed conditions of the Settlement.

Our Analysis

We do not recommend that EID conduct a study as originally recommended by NPS to determine the effects of project operations on the Wild and Scenic River System designation. As part of the NEPA assessment of the potential environmental effects of the proposed action, Commission staff is required to assess the potential effects of project operations and proposed actions on stream and river segments that are designated or eligible to be designated under the National Wild and Scenic River System.

As summarized in table 3-44, there are four sections of rivers found to be eligible for inclusion in the Wild and Scenic River System, including portions of Pyramid Creek, Caples Creek, Silver Fork, and SFAR. EID proposes to release from 1- to 20-cfs minimum flows, or natural flows, according to month and type of water year for Pyramid Creek below Aloha Lake dam, pursuant to the terms of the Settlement (see table 3-26). EID proposes to release from 5- to 55-cfs minimum flows, or natural flows except under certain conditions, according to month and type of water year for Caples Creek below Caples Creek dam, pursuant to the terms of the Settlement (see table 3-27). EID proposes to release from 8- to 100-cfs minimum flows, or natural flows, according to month and type of water year for the Silver Fork below Oyster Creek, pursuant to the terms of the Settlement (see table 3-28). EID proposes to release from 15- to 240-cfs minimum flows according to month and type of water year for the SFAR below the Kyburz diversion, pursuant to the terms of the Settlement (see table 3-24).

For all of the stream and river segments that are eligible to be designated under the National Wild and Scenic River System, EID's proposed action would enhance the existing conditions, under which the stream and river segments were determined by the FS to be eligible for inclusion into the Wild and Scenic River System. Therefore, there would be no adverse effect on the designation under EID's proposed action. We therefore conclude that relicensing the project, with EID's proposed and our recommended measures, would not jeopardize the eligibility for inclusion in the Wild and Scenic River System of any of the four nominated segments.

Recreational Facility Enhancement

Implementation of some of the proposed recreational enhancements (see section 3.3.5, *Recreational Resources*) may affect the aesthetics of the project area. During construction of new facilities, earth-disturbing activities and equipment operations could have short-term adverse effects on the scenic value of the area. Vegetation removal would also be likely, to accommodate new facilities, and may result in temporary or long-term change in the visual character of the immediate area surrounding the facilities. However, development of recreational enhancements would be in consultation with the FS and consistent with the previously discussed visual resource management plan to help ensure that new facilities are consistent with the appropriate VQOs for the area.

3.3.6.3 Unavoidable Adverse Effects: None

3.3.7 Cultural Resources

3.3.7.1 Affected Environment

Prehistoric and Historic Context

The El Dorado Project is located along the SFAR in an area encompassing several environmental zones, extending from the sub-alpine region of the Sierran crest at elevations greater than 8,000 feet, downriver to the lower western slope and foothills of the Sierras at elevations less than 2,000 feet (for a more detailed discussion, see Waechter et al., 2002). This range of elevations, and the resulting variety of plants, animals, water, and other natural resources, would have provided prehistoric and historic human occupants with abundant water and at least seasonal food resources, such as fish, waterfowl, large and small mammals, insects, seeds, nuts, berries, and bulbs. Some of these resources would have been available nearly any time of the year as people moved up and down the western slope with the changing seasons.

The prehistory of this area is not well understood by archeologists, chiefly due to the lack of large-scale intensive studies. Nevertheless, the earliest known occupations of the foothills and western slope occurred about 4000 years before present (BP) and are probably ancestral to the Washoe in the upper Sierra crest zone, and Nisenan or Southern Maidu in the foothills to the west. These early inhabitants of the foothills and Sierran crest zone would have relied on a broad spectrum of hunting and gathering subsistence strategies using chipped stone dart points and other lithic tools for hunting and procuring meat resources, with the aid of ground-stone bedrock mortars and other materials for processing wild plant foods. With the onset of the Middle Archaic period after 4000 BP, human populations appear to have grown dramatically, probably as a result of climate change that brought winter precipitation, and therefore more water and better conditions for flora and fauna and thus for the humans who depended on them. Prolonged droughts in the period since about 1500 BP resulted in severe demographic stress for Late Archaic peoples in the region. The land became less productive in terms of plants and animals. The bow and arrow replaced the dart as a hunting tool, and mortars and pestles became more common. Houses, and presumably groups associated with hamlets, became smaller, more ephemeral, and more dispersed.

The so-called Late Kings Beach, or Terminal Prehistoric phase (covering the last few centuries prior to Euro-American contact) initiated patterns of settlement, subsistence, trade, and mobility that were still much in evidence in the early nineteenth century when native peoples came into contact with Euro-Americans. At that point, Nisenan or Southern Maidu were well-established in the western Sierra foothills, while the Washoe dominated the crest and eastern slope of the Sierras. The geographic/cultural demarcation between these groups probably fluctuated from season to season, or for longer periods, resulting in alternate use of the same lands near these boundaries.

Euro-American trappers seeking beaver pelts first entered the project area in the 1820's. The Mormon-Emigrant Trail, which passed through a meadow where Caples Lake is now located, was a major emigration route across the Sierras from about 1849 to 1853. During the early 1850's, mining for placer gold was common along streams and waterways in the vicinity of the project. In 1855, the California legislature authorized the construction of what became known as the Placerville Road which became an important link between California and Nevada, especially after the discovery of gold and silver at the Comstock Lode. This road became the Pony Express Trail from 1860 to 1861 and ran parallel to portions of the SFAR.

A shortage of angora in England in the 1860's gave rise to extensive goat-raising in what is now the Desolation Wilderness, in which Aloha Lake is located. The area around Caples Lake was a well-established summer range for sheep during the 1870's and 1880's.

The first dams at Caples Lake, Silver Lake, Echo Lake, and Lake Aloha were built between the late 1850's and early 1870's. In 1873, the El Dorado Deep Gravel and Mining Company was formed and over the next 3 years, many of the original features of the current El Dorado Project were constructed, including canal, ditches, dams, and tunnels.

Improvements continued to be made to the Placerville Road during the late nineteenth century, facilitating access to what is now the project area by recreational visitors. Recreational use in the area grew steadily during the early and mid-20th century, especially with the advent of the automobile and increased publicity about the growing number of recreational opportunities, including lodges, camp sites, and other amenities, along the river and at the project lakes.

Between 1917 and 1994, the Western States Gas and Electric Company upgraded the existing dams, canals, and other features associated with the El Dorado Deep Gravel and Mining Company, and the hydroelectric project first went online in 1924. The project was purchased by PG&E in 1928 and EID assumed sole ownership in 1999.

Area of Potential Effects

In its application, EID identified the APE for the relicensing of the El Dorado Project as corresponding to the project boundary. In subsequent consultation with the California State Historic Preservation Office (SHPO) and FS, the APE was expanded to include areas outside project boundaries where project operations could affect significant archeological or historical resources, if any were to exist at those locations. According to the 2001 preliminary report on cultural resources investigations (Waechter et al., 2002), the APE was defined using a combination of topography, information gathered from archival records searches, and ground conditions. Where the project boundary cut through a logical archeological topographic feature or a known archeological site, the APE was expanded to

include these. Heavy-use areas, such as campgrounds and boat ramps, and archeologically sensitive areas at or near the high water line also were included in the APE. The exact boundaries of the APE were determined in large part by ground conditions.

The APE for the El Dorado Project can be divided into three portions; (1) the lower portion, (2) the main canal or middle portion, and (3) the upper reservoir portion. The lower portion consists of FERC project boundary lands around the El Dorado powerhouse, forebay area, power facilities located at the top of the penstock in the surge tank area, and the powerhouse operators' housing area on the north bank of the SFAR across from the powerhouse. The main canal/middle portion of the APE consists of an approximate 100-foot corridor along the El Dorado canal footprint which includes associated rock walls, structures and features, and access roads from the diversion dam near Silver Fork, downriver to the lower portion associated with the forebay area. The upper reservoir portion consists of 15 meters above the highwater mark around Silver Lake, Caples Lake, Upper and Lower Echo Lake, and Aloha Lake, and includes associated project facilities such as dams, ditch tenders' houses, EID cabins, flume bench foundation walls, conduit, and rock wall features.

To date, most of the APE has been systematically inventoried by on-the-ground pedestrian survey; however, 6.3 miles of access road along the ridge top, 1.2 miles along steep terrain, and 1.5 miles of access trails remain to be surveyed in the main canal/middle portion. Due to winter conditions limiting surveys in 2000, additional areas around Caples Lake and Silver Lake also need to be inventoried and reported on. Completion of surveying these remaining tracts of land has been finished as of the writing of this draft EIS, and resulting reports are planned to be finished in the near future.

Archeological Resources

At least 24 archeological surveys have been undertaken at various locations within the APE over the past four decades. Since the late 1960's, at least 15 archeological surveys have been undertaken at various locations within the APE. Most appear to have been commissioned by the FS, PG&E, EID, or CalTrans in association with specific actions planned by these entities (e.g., highway construction, telephone cable rerouting, timber sales, and proposed license amendments). Although these studies resulted in a substantial amount of information about archeological resources within the APE, many areas remained unsurveyed, and some locations were found to require resurvey to verify earlier results. In October 2000, EID initiated a program of archeological and historical resource surveys designed to update earlier surveys and to investigate heretofore unsurveyed locations, particularly in the vicinity of the upland lakes. Heavy winter storms resulted in suspension of archeological fieldwork on October 25, 2000, with fieldwork being finally completed in October 2002. EID has issued two reports on the progress of the investigations. The interim report (Waechter et al., 2001) summarizes results of the fieldwork that was completed as of October 2000 at the Echo lakes, portions of Silver Lake, and portions of Lake Aloha. The

preliminary report (Waechter et al., 2002) includes results of the 2002 surveys at Lake Aloha. As mentioned above, reports on the results of 2002 surveys at Silver and Caples lakes are still in progress.

Detailed descriptions of all of the archeological sites recorded to date within the El Dorado Project APE have been published in the Waechter et al. 2001 and 2002 reports, but have not been disclosed here due to confidentiality involving the prevention of unauthorized visitation and collection activities on these sites. The 2002 report also provides detailed maps of the project APE with the location of archeological sites.

So far a total of 42 archeological sites have been located along the lower and middle portions of the APE from the diversion dam downriver to the El Dorado powerhouse. Prehistoric sites consist of mainly bedrock mortars and lithic scatters associated with house pits and burned rock middens at some sites. Historic sites consist of scatters of artifacts, trash dumps, pits, ditches, flume segments, and the remains of transitory and semi-permanent structures associated with mining, road and canal building during the nineteenth century, and electric hydropower developments during the twentieth century. An additional seven archeological sites have been located outside, but near the defined APE, adjacent to the SFAR. Six of the seven sites are prehistoric and contain bedrock mortars. The seventh site consists of a historic medicinal spring with concrete bathtub, walls, and other debris that was associated with an early local resort. These seven sites were recorded because they are close enough that the effects of a canal breach could affect them directly or indirectly due to erosional effects caused by additional water being discharged into the river. Other than a few, the vast majority of the archeological sites in the upper and middle portion of the APE remain to be evaluated for their eligibility for inclusion in the National Register of Historic Places (National Register).

In the upper reservoir portion of the APE, approximately 25 archeological sites and eight isolated finds have been located so far around Silver Lake (some remaining prerecorded sites still need to be recorded in the recently surveyed unreported areas). Sites around Silver Lake consist principally of prehistoric living occupations (presence of house pits at some sites) involved with the processing of nuts (presence of milling sites with bedrock mortars) and other food procurement activities (presence of lithics, burned rock middens, hearths, etc.). Historic sites at Silver Lake include trash scatters and dumps, remains of several historic resorts, and the original 1906 lake dam. Around the Echo Lake, a total of six archeological sites have been recorded. Four are prehistoric sites and consist of lithic scatters similar to those found at Silver Lake, and the remaining two historic sites consist of the original dam and hydroelectric facility that was destroyed by a 1955 avalanche, and the remains of a recreational camping area. Five prehistoric sites were recorded at Lake Aloha. These sites also consist of probable food processing activity areas and consist of lithic scatters, with one site containing a milling station, and another with a hearth. At Caples Lake, the results of the 2002 survey have not been published as of this date, and the total number

and nature of archeological sites are not known. Nevertheless, 10 sites have been previously recorded. Three of these sites are prehistoric and contain midden deposits with some lithics. The other seven sites are historic, two of which represent nineteenth century wagon routes (namely the Old Emigrant Trail) and associated features, while three are associated with the Caples Lake dam and its construction. A historic house site and grave represent the last two sites. As with the archeological sites in the lower and middle portions of the APE, only a few archeological sites in the upper reservoir portion have been evaluated for National Register eligibility.

Historic Structures

Historic structures within the El Dorado APE consist of buildings, houses, work sheds, earthworks, retaining abutments, ditches, roads, trails, dams and water conveyance features associated with gold mining and initial settlement of the area during the mid and last half of the nineteenth century, along with the development of hydroelectric power in the first part of the twentieth century. Much of the water conveyance systems and associated features built prior to the 1880's were modified since the 1920's to accommodate hydroelectric power. Most significantly, has been the modification of the El Dorado canal for these purposes.

Principal historic structures within the lower portion of the APE are the El Dorado powerhouse (1924), wood stave conduit and El Dorado powerhouse generators (1920's), riveted iron Sad Bridge (1938), segments of the Ogilby Grade (nineteenth century road cut and bed), and a possible uninvestigated historic sawmill (1800's?). In the middle portion of the APE, principal historic structures are the El Dorado canal (1870's with later twentieth century modifications), rock walls on the El Dorado canal (1870's), and a log cribbed diversion dam (built in 1923 and later destroyed by flood in 1997). In the upper portion of the APE there are the Echo Lake facilities and Echo Lake conduit (1870's).

Segments of rock walls once associated with the El Dorado canal have been determined eligible for the National Register by the SHPO. The eligibility of other historic-period buildings and structures in the El Dorado APE are currently under review and further investigation. The SHPO earlier concurred with survey findings that the El Dorado powerhouse and the hydroelectric facility's water conveyance system (inventoried under the number CA-ELD-511H) were not eligible for listing in the National Register (letter from K. Gualtieri, SHPO, Sacramento, CA, to J. Hutchins, Supervisor, Eldorado National Forest, dated January 25, 1991). The Echo Lake hydroelectric dam and conduit (CA-ELD-726H) was also evaluated as ineligible (Maniery, 1995), but EID has been unable to locate documentation of SHPO concurrence with this finding. Recently, however, the SHPO subsequently requested a comprehensive evaluation of the entire El Dorado Hydroelectric Power System (including both previously recorded elements [unevaluated or evaluated] and elements heretofore unrecorded) and its predecessor, the El Dorado canal. This study was

initiated in late 2001 and is still in progress as of the issuance of this final EIS.

Traditional Cultural Properties

The APE is located within the traditional territories of the Nisenan (Southern Maidu), Eastern (Northern Sierra) Miwok, and Washoe peoples. A variety of ethnographic resources are expected to occur within the APE, including villages and campsites used into the historic period; traditional hunting, fishing, or gathering areas; locations where human remains may be present; shrines, places of power, or locations where mythic events occurred; rock art sites; and traditional foot trails. In 1999, EID sponsored an ethnographic overview that identified, through review of existing anthropological and ethnographic literature, seven ethnographically documented locations within or in proximity to the APE. These locations are: (1) the American River; (2) the settlement of O'waiwa; (3) the settlement of O'kopa'kan; (4) a salt spring at Riverton; (5) a location of "celebration" at Kyburz; (6) the Echo Lake Washoe Camp (archeological site FS-05-19-765/05-03-55-517); and (7) Silver Lake (White, 1999).

In late 2001, EID initiated a study to amend the 1999 ethnographic overview that would include direct contact with Native American groups to refine and, if possible, expand the body of available information about traditional and sacred sites within the El Dorado Project APE. As of the issuance of the October 2002 preliminary report (Waechter et al. 2002), this study—being conducted with assistance from the Tribal Relations Program of the Eldorado National Forest—is still underway. EID's ethnographic consultant has begun a series of contacts, interviews, and field visits with members of seven contemporary Native American communities in the area and include the: (1) Washow Tribe of Nevada and California; (2) Woodsfords Community of Washoe Tribe; (3) Shingle Springs Rancheria; (4) El Dorado County Indian Council; (5) United Auburn Indian Community; (6) Miwok Indian Community of the Wilton Rancheria; and (7) Jackson Rancheria.

3.3.7.2 Environmental Effects and Recommendations

Archeological investigations have identified a variety of ways in which cultural resources within the El Dorado Project APE are or may be affected. Some kinds of effects may be attributed to project operation or project-related actions, while others may result primarily from activities and land use by other parties. Road construction and maintenance have had the greatest effects on resources associated with the canal system and along access roads, although effects from non-project-related logging, recreational camping, and recent house construction have also been identified. Canal breaches have affected sites immediately below the conduit and the forebay.

At the project's high-elevation storage reservoirs, Lake Aloha, Upper and Lower Echo Lake, Caples Lake, and Silver Lake, sites between the high- and low-water lines are subject to

seasonal inundation and operational drawdowns. Sites near residences, camps, and hiking trails may be affected by vandalism, unauthorized artifact collecting, and unintentional recreation-based disturbances, such as campfires or trampling. Ethnographic sites may be expected to experience similar kinds of damage and, in addition, may experience changes to settings that are of critical importance to the cultural values of such locations.

Intensification of residential, camping, or hiking activities in the APE may increase effects on archeological and Native American cultural resources, and may exacerbate existing adverse effects with increases in seasonal population facilitated by private, institutional, and public resorts and cabins. The 2002 preliminary report on cultural resource investigations (Waechter et al., 2002) also notes that private residential development in the vicinity of Silver Lake may limit or prevent Native American access to sites of cultural significance.

EID proposes to, within 180 days of license issuance, prepare an Historic Properties Management Plan (HPMP) for FS approval and to incorporate the HPMP into the Programmatic Agreement (PA) by reference. The HPMP would take into account project effects on prehistoric and historic resources, Native American traditional cultural values, direct and indirect effects on heritage resources within the APE, ethnographic studies, historic archaeological studies, and project-related recreation effects on archaeological properties affecting National Forest System lands. The HPMP would also provide measures to mitigate the identified effects, a monitoring program, and management protocols for ongoing protection of archaeological properties. The HPMP would be filed with the Commission and implemented upon Commission approval of the plan.

EID also proposes that if, prior to or during ground disturbance or as a result of project operations, items of potential cultural, historic, archaeological, or paleontological value are reported or discovered, or known deposit of such items is disturbed on National Forest System lands and EID's adjoining property, EID would immediately cease work in the area so affected. EID would notify the FS and not resume work on ground-disturbing activities until it receives written approval from the FS.

Our Analysis

In conjunction with any new license issued for the El Dorado Project, the Commission would execute a PA with the SHPO and the Advisory Council on Historic Preservation (Advisory Council), with EID, the tribes, and the FS as consulting parties. The PA would require EID to prepare and implement an HPMP, in consultation with the SHPO, the FS, and tribes. The HPMP would specify how EID would manage cultural resources, provide a process and schedule when National Register evaluations can be done for the remaining archeological sites and historic structures that have not been evaluated, and would ensure that project-related effects on important and eligible cultural resources are avoided or satisfactorily resolved. The HPMP should also provide a program for monitoring eligible archeological sites and other important cultural resources for the term of a new license. The

HPMP should also contain appropriate procedures that EID would follow if previously unknown cultural resources are discovered during project-related ground-disturbing actions. Finally, the HPMP should have contingency plans for protecting/mitigating cultural resources in adjacent areas to the APE that might be affected by the project, due to a canal breach or other erosional or flooding event.

The Commission circulated the draft PA and the HPMP for comment to the Advisory Council, FS, SHPO, the Washoe Tribe of Nevada and California, Shingle Springs Rancheria and EID on March 13, 2003, and subsequently extended the comment period until May 29, 2003. Comments on the draft PA and HPMP were received from the Advisory Council, SHPO, and the FS. As a result of these comments, Commission staff directed EID to revise the HPMP, and we circulated the final PA for review and signature on June 30, 2003. The final PA would require EID to file a revised final HPMP within 6 months of any license issuance for this project.

With execution of the PA and development and implementation of the final HPMP, there should not be any unanticipated adverse effects on cultural resources involved with the project; cultural resources would be protected during the term of a new license.

Project Decommissioning

If the project is decommissioned, the protective and enhancement measures that would be specified in the HPMP would not be implemented. Abandonment of the project facilities could lead to loss or deterioration of significant project elements due to lack of repair, maintenance, and the protection afforded by active use. Removal of the dams would result in loss of these historic elements that contribute to the significance of the El Dorado Hydroelectric System as a whole. Given these considerations, the Commission would require EID to consult with the SHPO to determine what provisions would be necessary to protect those project elements that contribute to its eligibility for listing in the National Register, and what provisions would be necessary to mitigate adverse effects on the dams. Sale of project land without adequate provisions to protect historic properties could cause damage to or loss of such properties.

3.3.7.3 Unavoidable Adverse Effects: None.

3.4 No-action Alternative

Under the no-action alternative, EID would continue to operate the project under the terms and conditions of the existing license. The no-action alternative would result in no change to the existing environment. There would be continued energy production, but environmental measures proposed by EID and recommended by staff (discussed in the previous sections) would be foregone. There would be no change in the native aquatic

species community that currently exists under the present flow regime.

3.5 Irreversible and Irretrievable Commitment of Resources

Continued operation of the existing project would continue to commit the lands and waters previously developed for energy production and consumptive water use. Some of our recommended measures could entail modifications to the project boundary (e.g., enhancements and maintenance to the upper Echo Lake parking area) because we have determined that these measures are related to project purposes. However, our measures would not modify the existing usage of such land and, therefore, there would be no additional irreversible or irretrievable commitment of resources. Construction of new facilities (e.g., flow gaging stations and recreational facilities) would commit the land on which these facilities are built to project purposes, but the effects on habitat changed in this manner would diminish in time with proper erosion and sedimentation control measures in place.

3.6 Relationship Between Short-term Uses and Long-term Productivity

Our recommended operating alternative for the project is expected to provide at least an average of about 91,401,000 kilowatt hours (kWh) of energy each year to the region. This long-term energy productivity would extend at least as long as the duration of the new license. Our recommendations are designed to minimize, or avoid in certain cases, long-term decreases in biological productivity of the system, as well as enhance aquatic habitat and local and regional recreational opportunities.

If the project was to operate solely to maximize hydroelectric generation, there could be a loss of long-term productivity of the river fisheries due to decreases in habitat availability. Moreover, efforts to enhance recreational opportunities at the project would be foregone.

With our recommended operating mode, as well as with appropriate enhancement or protection measures, the project would continue to provide a low-cost, environmentally sound source of power. Moreover, the project, with our recommendations, would further the many goals and objectives identified by the agencies and other interested parties for managing the resources of the SFAR, its tributaries, project lakes, and Echo Creek.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the water resources of the SFAR to generate power, estimate the economic benefits of the El Dorado Project, and estimate the cost of various environmental protection and enhancement measures and the effects of these measures on project operations.

Under its approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶ 61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

For our economic analysis of alternatives, we used the assumptions, values, and sources shown in table 4-1.

4.1 Power and Economic Benefits of the Proposed Project

As proposed by EID, the El Dorado Project would generate an average of approximately 91,401,000 kWh of electricity annually, have an annual power value of \$4,993,400 (54.63 mills/kWh), and total annual costs of \$5,498,420 (60.16 mills/kWh), resulting in a net annual benefit of -\$505,020 (-5.53 mills/kWh).

Table 4-1. Staff assumptions for economic analysis of the El Dorado Project. (Source: Staff)

Assumption	Value
Energy value (2002) ^a	37.4 mills/kWh
Capacity value (2002) ^b	\$75/kilowatt-year (x mills/kWh)
Period of analysis	30 years
Interest/discount rate ^c	5.73 percent
Cost of money ^c	5.73 percent
State and federal income tax rate ^d	0 percent
Local tax rate ^c	3.0 percent
Insurance rate	0.25 percent of cost of construction
Term of financing	20 years
Escalation rate after 2002	0 percent
O&M costs (2002\$) ^e	\$2,249,680

Assumption	Value
Net investment (2002\$) ^f	\$38,013,890
^a	EID provided an energy value of \$34 mills/kWh in its license application based on California Energy Commission projections of the cost of energy in 2005 or 2006 (EID, 2000a). We added 3.4 mills/kWh for ancillary services, based on similar projects in the vicinity. We applied the same total rate for 2002. This rate is the same rate provided for Pit 3, 4, 5 Project No. 233 (PG&E, 2001).
^b	EID did not provide a value for project capacity value in the license application (EID, 2000a); however, we applied a value of \$75/kilowatt-year for the project's 21 MW of dependable capacity, based on similar projects in the vicinity of the project. This rate is the same rate provided for Pit 3, 4, 5 Project No. 233 (PG&E, 2001).
^c	These values were provided in EID (2000a).
^d	Because EID is a political subdivision organized and existing under the laws of the state of California, it does not pay federal or state taxes (EID, 2000a).
^e	EID provided an estimate for normal O&M of \$1,997,850 per year for the project (EID, 2000a). Staff escalated the 2000 value to 2002 and added \$165,000 for annual Commission fees (EID, 2000a).
^f	EID provided the current net investment value of \$12,945,758, assumed to be as of December 31, 1999 (letter from EID, to Commission, November 8, 2000). Staff then depreciated the net investment value to a December 31, 2002, value using straight line depreciation over a 20-year period. Staff then added \$23,560,000 to account for ongoing expenditures related to the reconstruction of the diversion dam, rehabilitation of the powerhouse, miscellaneous repairs to the El Dorado canal, construction of the Mill Creek-Bull Creek tunnel, and \$3,450,000 for relicensing costs (Complete Energy Services, Inc., 2000).

4.2 Power and Economic Benefits of the Staff-Recommended Alternative

Resource agencies and NGOs recommended implementing a variety of measures at the project. We reviewed each recommendation and determined the measures that we consider most appropriate for implementation.

As recommended by staff, the El Dorado Project would generate an average of 91,401,000 kWh of electricity annually, have an annual power value of \$4,993,400 (54.63 mills/kWh), and total annual costs of \$5,438,030 (59.50 mills/kWh), resulting in a net annual benefit of -\$444,630 (-4.86 mills/kWh). The annual benefit of the project, as recommended by staff, is greater than the project as proposed by EID because we do not see the need for some of the measures that are included in the Settlement, and we conclude that other measures, although needed, are beyond the jurisdiction of the Commission and we cannot recommend their implementation. However, we would not object to the implementation of conditions that are specified in the Settlement.

Table 4-2 compares the power value, annual costs, and net benefits for the no-action alternative, the applicant's proposal, and the applicant's proposal with additional staff-adopted measures for the El Dorado Project.

Table 4-3 shows the effect on costs and power values of individual measures proposed by the applicant and recommended by staff and others, including the additional measures that staff has adopted. In section 5.2, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the staff alternative and why we conclude the environmental benefits are worth these costs.

4.3 Power and Economic Benefits of the No-action Alternative

Under the no-action alternative, the El Dorado Project generates an average of 106,000,000 kWh of electricity annually, has an annual power value of \$5,539,400 (52.26 mills/kWh), and total annual costs of \$5,027,070 (47.73 mills/kWh), resulting in a net annual benefit of \$512,330 (4.83 mills/kWh).

4.4 Power and Economic Benefits of the Project Decommissioning Alternative

Under the project decommissioning alternative, we evaluated the project with the decommissioning of the power generating features of the project, but retaining any features that would continue to be used for conveyance of water supply to EID's irrigation supply canal. EID estimates it would cost approximately \$5,843,370 (escalated to 2002 dollars) to decommission the power generation portions of the project (Complete Energy Services, Inc., 2000). With project decommissioning, the 106,000,000 kWh of power currently provided annually to the transmission grid by the project would need to come from an alternative source.

Table 4-2. Summary of the annual net benefits for the applicant's proposed action, applicant's proposed action with additional staff-adopted measures, and no-action alternative for the El Dorado Project. (Source: Staff)

	Applicant's Proposed Action	Applicant's Proposed Action with Additional Staff-adopted Measures	No Action
Installed capacity (kW) ^a	21,000	21,000	21,000
Annual generation (kWh) ^b	91,401,000	91,401,000	106,000,000
Annual power value (mills/kWh)	\$4,993,400 54.63	\$4,993,400 54.63	\$5,539,400 52.26
Annual cost (mills/kWh)	\$5,498,420 60.16	\$5,438,030 59.50	\$5,027,070 47.43
Annual net benefit (mills/kWh)	-\$505,020 -5.53	-\$444,630 -4.86	\$512,330 4.83

^a The installed capacity of the El Dorado Project is 21,000 kW (EID, 2000a).

^b EID provided an estimated average annual generation for the El Dorado Project of 106,000,000 kWh, which is the equivalent to the average generation at the plant over its 70-plus-year history, adjusted for the bypassed reach flows implemented in 1984 (EID, 2000a).

Table 4-3. Summary of capital and one-time costs, annual costs, annual energy costs, and total annualized costs of environmental measures proposed by the applicant and recommended by staff and others for the El Dorado Project. (Source: Staff)

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
Water resources measures						
1. Maintain minimum streamflows in project-affected reaches according to month and water year, as appropriate.	Settlement	\$0 ^b	\$0 ^b	\$546,000 ^b	\$546,000	Yes
2. Annually release 5,000 acre-feet of water from Silver Lake through powerhouse, then to Folsom Lake.	Kit Carson Lodge	\$0	\$0	Indefinite ^c	Indefinite	No
3. Provide for bedload (spawning gravel) movement.	Settlement	\$0	\$4,690 (\$50,000 per year in year 5 and 10) ^d	\$0	\$4,690	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
4. Develop and implement a streamflow and reservoir water surface elevation monitoring plan.	Settlement	\$20,000	\$10,000	\$0	\$11,460	Yes
5. Maintain storage reservoirs in accordance with the Settlement.	Settlement	\$0	\$0	Indefinite ^c	Indefinite	Yes
6. Investigate the use of telemetry to monitor lake levels at Lake Aloha and install, if feasible.	Settlement	\$100,000 ^e	\$10,000 ^e	\$0	\$17,310	Yes
7. Maintain high lake levels at all High Sierra lakes to maximize recreational use.	League to Save Sierra Lakes	\$0	\$0	Indefinite ^c	Indefinite	No

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
8. Prepare a report describing whether or not target lake levels have been met.	Settlement	\$0	\$5,500 (\$5,000 annually, plus an additional \$3,000 in years 5, 10, 15, 20, 25)	\$0	\$5,500	Yes
9. Provide 5-day continuous pulse flows to Caples Creek; if bedload is not transported effectively, increase pulse flows to maximum of 600 cfs or change to minimum of 10 days. ^c	Settlement	\$0	\$0	Indefinite ^c	Indefinite	No

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
10. Conduct a feasibility study to assess releasing up to 250 cfs at the Caples Lake auxiliary spillway and redesigning the outlet works to release up to 600 cfs.	Settlement	\$70,000	\$0	\$0	\$5,110	No
11. Do not release more than 60 cfs in Caples Lake spillway channel.	Settlement	\$0	\$0	Indefinite ^c	Indefinite	Yes
12. Implement a Caples Lake spill channel detailed geomorphology survey plan.	Settlement	\$27,000	\$0	\$0	\$1,970	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
13. Develop a Caples Lake spill channel detailed fluvial geomorphology survey plan.	Staff	\$3,000	\$0	\$0	\$220	Yes
14. Based on monitoring results, develop a plan to restore the Caples Lake dam spillway channel.	Settlement	\$10,000 ^g	\$0	\$0	\$730	Yes
15. Develop and implement a temperature monitoring program.	Settlement	\$5,000	\$8,500 (\$30,000 per year in years 2, 3, 4, 5, 6) ^d	\$0	\$8,870	Yes
16. Develop a water quality and water pollution control plan.	Settlement	\$5,500	\$8,990 (\$50,000 per year in years 1, 3, 5) ^{d, e}	\$0	\$9,390	No

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
17. Survey Oyster Creek and develop a plan for restoration of Oyster Creek channel and implement if project-related.	Settlement	\$35,830 (\$10,000 per year in years 1 and 2; \$50,000 for implementation by year 5)	\$0	\$0	\$2,620	Yes
18. Develop an Oyster Creek detailed fluvial geomorphology survey plan.	Staff	\$3,000	\$0	\$0	\$220	Yes
19. Hold annual spring meetings with local representatives to schedule repairs to have the least effect on four High Sierra lakes.	Kit Carson Lodge	\$0	\$1,000	\$0	\$1,000	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
20. Develop a plan to designate preferred canal drainage structures and release points to be used in emergencies.	Settlement	\$8,000	\$0	\$0	\$580	Yes
Aquatic resource measures						
21. Develop and implement a fish monitoring plan.	Settlement	\$7,200	\$1,870 (\$6,720 per event in years 5, 6, 10, 11, plus \$7,200 for a report in years 6 and 11) ^d	\$0	\$2,400	Yes
22. Develop and implement a plan to install fish protective devices at the Alder Creek and Carpenter Creek diversions.	Settlement	\$144,000 ^e	\$5,200 ^e	\$0	\$15,720	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
23. Develop and implement a multi-year macroinvertebrate monitoring plan.	Settlement	\$3,600	\$3,270 (\$14,400 per event in years 5, 6, 10, 11, plus \$7,200 for a report in years 6 and 11) ^d	\$0	\$3,530	Yes
24. In September, October and November, do not release flows greater than 150 cfs from Caples Creek.	Settlement	\$0	\$0	Indefinite ^c	Indefinite	Yes
25. Develop and implement a plan to restore a single channel in Esmeralda Creek below the El Dorado canal.	Settlement	\$36,160 (\$20,000 for plan and \$50,000 for implementation by year 5)	\$0	\$0	\$2,640	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
Terrestrial resources						
26. Finalize the noxious weed prevention and control plan.	Settlement	\$5,000	\$10,000	\$0	\$10,370	Yes
27. Implement a riparian vegetation monitoring plan as part of the ecological resources adaptive management program.	Settlement	\$0	\$4,430 (\$30,000 per year in years 5, 10, 15, 20) ^d	\$0	\$4,430	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
28. Install wildlife fencing between intake and Sand Flats, upgrade existing fencing to cyclone fencing, perform biannual inspections, maintain fencing and crossings along the El Dorado canal, and report.	Settlement	\$219,130 ^h	\$60,000 ^h	\$0	\$76,010	Yes
29. Develop a biological evaluation prior to any construction or maintenance that could affect FS-sensitive or special status species.	Settlement	\$0	\$3,000	\$0	\$3,000	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
30. Develop and implement a foothill yellow-legged frog monitoring plan.	Settlement	\$5,000	\$17,000 (\$60,000 in years 1, 2, 3, 5, and 10) ^d	\$0	\$17,370	Yes
31. Attempt to prevent water from spilling over auxiliary dams 1–7 at Lake Aloha during spring runoff and while reservoir is filling and develop a plan for survey and trout removal.	Settlement	\$5,000	\$30,000	\$0	\$30,370	Yes
32. Initial plan development for Lake Aloha trout surveys and subsequent trout removal plan development procedures.	Staff	\$5,000	\$0	\$0	\$370	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
33. Develop and implement a mountain yellow-legged frog monitoring plan.	Settlement	\$5,000	\$2,820 (\$30,000 per year in years 5 and 10) ^d	\$0	\$3,190	Yes
34. Annually review ecological conditions with FS, CDFG, SWRCB.	Settlement	\$0	\$3,000	\$0	\$3,000	No
Recreational resource measures						
35. Develop a recreation implementation plan.	Settlement	\$25,000	\$0	\$0	\$1,830	Yes
36. Conduct recreation monitoring and surveys and submit a report every 6 years.	Settlement	\$0	\$2,690 (\$20,500 per year in years 6, 12, 18, 24)	\$0	\$2,690	Yes
37. Develop a recreational survey plan.	Staff	\$10,000	\$0	\$0	\$730	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
38. Meet with FS every 6 years and develop a 6-year schedule for maintenance, rehabilitation and reconstruction of recreational facilities.	Settlement	\$0	\$660 (\$5,000 per year in years 6, 12, 18, 24)	\$0	\$660	Yes
39. Provide public information relating to recreational opportunities, restrictions, and responsibilities associated with project-related recreational facilities.	Settlement	\$25,000	\$1,000	\$0	\$2,830	Yes
40. Develop and print a brochure and map for the project area.	Settlement	\$5,000	\$250	\$0	\$620	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
41. Develop a public information plan.	Settlement	\$15,000	\$0	\$0	\$1,100	Yes
42. Annually install prominent signs at Caples Lake, Silver Lake, and Echo Lake during the winter season.	Settlement	\$0	\$1,590 ⁱ	\$0	\$1,590	Yes
43. Construct an informational kiosk on Highway 88.	Settlement	\$25,000	\$500	\$0	\$2,330	No
44. Provide whitewater boating and angler access. ^j	C. Shackleton	\$50,000	\$2,000	\$0	\$5,650	No
45. Construct a new boat launching facility at Caples Lake.	Settlement	\$200,000 ^k	\$20,000 ^k	\$0	\$34,610	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
46. Bring the recreation facilities at Silver Lake, including Ferguson Point and Silver Lake West Campground into compliance with current accessibility standards.	Settlement	\$150,000	\$1,500	\$0	\$12,460	Yes
47. Bring the recreation facilities at Sandy Cove and Woods Creek Fishing Access into compliance with current accessibility standards.	Settlement	\$125,000	\$1,000	\$0	\$10,130	Yes
48. Implement improvements at the Echo Lake upper parking area.	Settlement	\$75,000 ^k	\$5,000	\$0	\$10,480	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
49. Implement improvements at the Caples Lake dam trailhead.	Settlement	\$50,000 ^k	\$0	\$0	\$3,650	Yes
50. Replace the gate at the road to Caples Lake dam.	Settlement	\$25,000	\$0	\$0	\$1,830	Yes
51. Construct a crossing of the PCT across the Echo Lake conduit.	Settlement	\$30,000	\$1,000	\$0	\$3,190	Yes
52. Implement improvements at Caples Lake Campground.	Settlement	\$200,000	\$0	\$0	\$14,610	Yes
53. Implement accessibility improvements at Silver Lake East Campground.	Settlement	\$100,000	\$0	\$0	\$7,310	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
54. Reconstruct and pave all spurs and campground roads and replace all water lines at Silver Lake East Campground.	Settlement	\$100,000	\$0	\$0	\$7,310	Yes
55. Install rock barrier at Martin Meadows Overflow Camping Area.	Settlement	\$5,000	\$0	\$0	\$370	No
56. Provide routine cleaning and repair of all constructed features at Caples Lake dam trailhead and Echo Lake trailhead.	Settlement	\$0	\$2,500 ^k	\$0	\$2,500	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
57. Provide funding for the administration of FS special-use authorizations and campground concessionaire special-use permits at Caples Lake and Silver Lake East campgrounds.	Settlement	\$0	\$4,800 ¹	\$0	\$4,800	No
58. Fund heavy maintenance for Silver Lake East Campground, Caples Lake boat launch facility, Caples Lake Campground, and Caples Lake dam trailhead.	Settlement	\$0	\$30,000	\$0	\$30,000	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
59. Fund heavy maintenance for Pyramid Creek trailhead and the Highway 88 information kiosk.	Settlement	\$0	\$10,000	\$0	\$10,000	No
60. Provide a proportionate amount of the cost for dispersed area patrols.	Settlement	\$0	\$25,000 ^l	\$0	\$25,000	No
61. Post projected operating plan for the year with projected lake levels on the Internet.	Settlement	\$0	\$15,460 ^m	\$0	\$15,460	Yes
62. Provide flow information on the Internet.	Settlement, C. Shackleton	\$7,140 ⁿ	\$10,200 ⁿ	\$0	\$10,720	Yes
63. Install staff gages to provide flow information.	Settlement, C. Shackleton	\$5,000	\$2,000	\$0	\$2,370	Yes

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
Land and aesthetic resource measures						
64. Complete an analysis that displays the effects of proposed development on adjacent National Forest System lands.	Settlement	\$15,000	\$0	\$0	\$1,100	No
65. Complete a facility management plan.	Settlement	\$20,000	\$0	\$0	\$1,460	No
66. Develop a land adjustment proposal to address possible land exchanges.	Settlement	\$5,000	\$0	\$0	\$370	No
67. Update special-use authorizations and prepare O&M plan for facilities covered by special-use authorizations.	FS	\$20,000	\$0	\$0	\$1,460	No

Environmental Measures	Recommending Entity	Capital and One-time Costs (2002\$)	Annual Costs, Including O&m (2002\$)	Annual Energy Costs (2002\$)	Total Annualized Cost (2002\$)	Adopted by Staff?
68. Complete a transportation system management plan.	Settlement	\$20,000	\$0	\$0	\$1,460	Yes
69. Develop and implement a trail system management plan.	Settlement	\$10,000	\$2,000	\$0	\$2,730	Yes
70. Develop and implement a visual resource management plan.	Settlement	\$10,000	\$1,000	\$0	\$1,730	Yes

Cultural resource measures

71. Prepare an HPMP.	Settlement	\$25,000	\$0	\$0	\$1,830	Yes
^a	When a measure is specified in the Settlement, the recommending entity is considered to be EID and all other signatory parties to the Settlement.					
^b	EID did not provide estimates for expected capital and annual expenditures associated with this measure. EID also did not provide energy loss estimates pertaining to this measure; however, in its November 27, 2002, response to REA notice comments, it provided an estimated energy loss total value of \$546,000 per year for all of the FS Section 4(e) conditions when compared to existing conditions. (See Hydrologics, 2002b). Using the power value rate for the project (no-action alternative), we estimate the energy loss to be about 14,600,000 kWh per year on average.					
^c	EID did not provide energy estimates of the effect on project generation resulting from this measure. Because of the					

complex operational aspects of storage and inflows to the project, and the confidentiality of EID's operations model to assess such measures, staff was unable to provide reasonable estimates of the effect of this measure on project generation.

^d Settlement provisions could entail additional monitoring.

^e This estimate is intended to be a placeholder; the actual cost may vary depending on the details of the plan.

^f Our cost estimates do not include costs of a new outlet valve that would be required to release greater than 350 cfs into Caples Creek; the cost of replacing the outlet valve or making other modifications to the dam to accommodate additional flow releases would be substantial.

^g We did not estimate an implementation cost for this measure because it could range from minimal, for rolling out fiber mats with seedlings, to major, for bringing in heavy equipment and materials by helicopter to regrade slopes and install riprap.

^h Cost estimate provided by EID in its AIR response dated November 8, 2000 (Response 20) and modified in its AIR response dated January 12, 2001. EID estimated \$210,000 in capital costs (2000 dollars) to install fencing between the intake and Sand Flats, \$810 per year (2000 dollars) to perform biannual monitoring, and \$53,200 per year (2001 dollars) to upgrade existing fencing to cyclone fencing. We escalated these values to 2002 dollars. We added approximately \$5,000 for annual maintenance, resulting in an annual O&M cost of about \$60,000 (2002 dollars).

ⁱ A cost estimate for installing signage at Caples Lake and Echo Lake was provided by EID in its AIR response dated November 8, 2000. In its January 12, 2001, AIR response, EID noted that the installation of signage at Echo Lake would be part of an ongoing program, so there would be no additional cost for Echo Lake. Staff added a cost equal to the amount for Caples Lake signage to cover the cost of signage at Silver Lake. We escalated these values to 2002 dollars.

^j This measure was addressed in Appendix B of the Settlement, which includes measures that EID proposes to implement, but the signatory parties agree should not be included as a license condition.

^k FS would assist EID in attempting to obtain funding for this work.

^l Cost provided in the Settlement .

^m Cost estimate provided by EID in its AIR response dated November 8, 2000 (Response 20). We escalated these values to 2002 dollars.

ⁿ Cost estimate provided by EID in its AIR response dated January 12, 2001 (Response 7). We escalated these values

to 2002 dollars.

5.0 STAFF'S CONCLUSIONS

5.1 Comparison of Proposed Action and Alternatives

Section 4(e) of the FPA directs the Commission to consider equally a broad range of developmental and environmental purposes in making licensing decisions. Section 10(a) directs the Commission to license projects that are best adapted to a comprehensive plan for improving or developing a waterway, which includes all relevant public considerations.

Based on our independent review and evaluation of EID's proposed action, staff's modifications of EID's proposed action, project decommissioning, and the no-action alternative (summarized in table 5-1), we recommend licensing the project for continued operation with some additions and modifications to EID's proposal. This alternative includes the environmental measures that EID proposes (see section 2.1.2, *Proposed Environmental Measures*), and the additional or modified measures that are listed in section 2.2 (*Proposed Action with Additional Staff-Recommended Measures*). We developed the staff's alternative after evaluating EID's proposal and recommendations and comments from resource agencies and other interested parties and individuals.

Table 5-1. Summary of environmental effects associated with EID's proposed action, staff's alternative to the proposed action, project decommissioning, and no action. (Source: Staff)

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Lake level management	Lake levels would generally be higher than specified by Decision 1635; increased minimum flows could result in slightly lower water levels in certain cases; EID would publicize expected lake levels much more than previously; more opportunities for review of lake management issues.	Similar to EID's proposed action, but we provide for additional consultation with local stakeholders	Same as no action with dam retention and continued consumptive use by EID; with storage lake dam removal, lakes would still exist, although much smaller; would likely remain at full pool for most of the year	Lake levels would be governed by Decision 1635, which protect most recreational interests

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Flow regime in project-affected reaches	Increased minimum flows would enhance aquatic habitat; restricting fall flows in Caples Creek should further enhance aquatic habitat and our flow and lake level monitoring plan would ensure compliance with conditions and provide a basis for considering modifications	Same as Eid's	May more resemble natural hydrograph; consumptive withdrawals would still alter flows to some degree	No change

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Water quality	Provides for restoration of Caples Lake auxiliary dam spillway channel, if needed, and Oyster Creek channel which would reduce sedimentation from eroding banks; sedimentation also would be reduced by identifying appropriate canal dewatering locations; monitoring water temperature and water quality should confirm Basin Plan compliance	Same as EID's but we do not see the need for general water quality monitoring to confirm compliance with applicable standards, since current operations are in compliance		
	fish protection afforded at Alder and Carpenter creeks by screens; monitoring aquatic and riparian biota would provide a basis to adjust future operations, if needed; Esmeralda Creek channel would be restored	Same as EID's	Likely increase in habitat due to more natural hydrograph	No change

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Sensitive and rare plants and animals	Proposed plans and protective actions should better protect sensitive plants, owls; proposed canal wildlife measures should minimize deer losses; amphibian monitoring would serve as a basis for future management; mountain yellow-legged frog should be better protected at Lake Aloha	Similar to EID's; development of an initial trout survey and removal plan should better ensure mountain yellow-legged frog protection	Sensitive amphibians may do better with natural hydrograph	No change
Vegetation management	Consultation with agencies regarding noxious weed control plan finalization should enhance effectiveness	Similar to EID's, although our measures would require limits and justification for use of other pesticides	Same as no-action	Noxious weeds could spread on project lands

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Lacustrine recreational opportunities	Increased access and amenities would be provided at Echo, Caples, and Silver lakes; new boat launch at Caples (within 10 years) should eliminate much of the current congestion at existing ramp; plans to publicize existing opportunities should enable more recreationists to take advantage of the opportunities; information to be developed should also reduce effects of usage on environment and increase safety	Same as Eid's	With dams in place, may be little change from no-action; without dams, existing access points for trailered boats would need to be redesigned; upper Echo Lake would be inaccessible by boat, rendering many of the summer homes relatively inaccessible	No change

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Whitewater boating opportunities	Better publicity of flows on boatable reaches would enhance public's ability to take advantage of the reaches; installation of informational staff gages would allow the public to estimate the flows at put-in sites	Same as EID's	Higher flows in the spring would likely enhance opportunities during this season	No change
Angling opportunities	Proposed flows likely to increase fish populations; formalizing public information services would allow information to be provided to anglers and the businesses that support them; publicizing project flows and lake levels should afford anglers with information needed to better select angling sites	Same as EID's	Return to more natural hydrograph likely to increase trout populations in stream reaches to some extent; angler access to lakes would be diminished	No change

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Recreational monitoring	Implementation of recreational monitoring with report in addition to Form 80 requirements would allow adjustments to be considered based on usage and capacity data	Development of a recreational monitoring plan would ensure that monitoring will meet objectives	No monitoring would occur	No monitoring beyond that required by Form 80 would occur
Project access road management	Transportation system management plan would clearly identify project roads, maintenance responsibilities, and measures to minimize erosion and sedimentation	Same as Eid's	No change; some former project roads would fall into disrepair	No change
Aesthetic resources	Development of a visual resource protection plan prior to construction and maintenance would enable coordination with FS to maximize consistency with VQOs	Similar to Eid's; development of a visual resource management plan would enable conditions that would require visual protective measures to be clearly defined	Expected elimination of seasonal lake fluctuations would avoid bathtub visual effect	No change

Resource	Eid's Proposed Action	Eid's Proposed Action with Additional Staff-recommended Measures	Project Decommissioning	No Action
Cultural resources	Development of an HPMP should enhance protection of historic properties	Same as Eid's	No change; loss of Commission oversight may result in damage to cultural resources	No change

5.2 Comprehensive Development and Recommended Alternative

Based on our independent review and evaluation of the proposed actions with the additional staff-recommended measures, project decommissioning and no action, we select the proposed action, with additional staff-recommended measures as the preferred alternative.

We recommend this alternative because: (1) issuance of a license would allow EID to continue to operate the project as a dependable source of electric energy; (2) continued operation of the project would avoid the need for an equivalent amount of fossil-fuel-fired electric generation and capacity, continuing to help conserve these nonrenewable energy resources and reduce atmospheric pollution; and (3) the recommended environmental protection and enhancement measures would improve water quality, protect and enhance fish and terrestrial resources, improve public use of recreational facilities and resources, and maintain and protect historic and archeological resources within the area affected by the operations of the project.

As stipulated in the Settlement, EID proposes to provide the following operational and environmental measures:

- maintain minimum streamflows in project-affected reaches according to month and water year, as appropriate within 90 days of license issuance (as specified in Section 1 of the Settlement);
- maintain target and minimum water levels in the four project storage reservoirs (as specified in Section 22 of the Settlement)”;
- maintain the following ramping rates for EID-controlled streamflow releases from Caples and Silver lakes as early as reasonably practicable within 90 days of license issuance (as specified in Section 2 of the Settlement):

Ramping Rate (feet/hour)	Flow Range (cfs)
1.00	1 to 75
0.50	75 to 175
0.55	>175

- maintain the following ramping rates for EID-controlled streamflow releases from Lake Aloha and Echo Lake as early as reasonably practicable within 90 days of license

issuance (as specified in Section 2 of the Settlement):

Ramping Rate (feet/hour)	Flow Range (cfs)
0.5	1 to 75
1.0	75 to 75
1.5	>175

If facility modification is required to provide the specified ramping rates, EID would complete such modifications as soon as reasonably practicable and no later than 3 years after license issuance.

- operate and maintain Lake Aloha as follows (as specified in Section 3 of the Settlement):
 - S attempt to prevent water in the reservoir from spilling over auxiliary dams 1 through 7 during spring runoff and while the reservoir is filling; if spill occurs, submit a plan for removal of trout from downgradient pools within 14 days and initiate removal within 30 days of spillage; and produce an annual report documenting whether spill occurred and whether trout were found and removed from downgradient pools; and
 - S within 1 year of license issuance, survey and monitor the pools and ponds downgradient of the auxiliary dams to determine if trout are present and, if so, implement a removal program;
- provide Caples Lake flow releases and flow release limitations (as specified in Section 4 of the Settlement), including:
 - S annual pulse flow releases of 150 cfs (dry years), 210 cfs (below normal years), 300 cfs (above normal years), and 345 cfs (wet years) for 5 continuous days timed to correspond with annual spring peak runoff in Caples Creek channel below Caples Lake dam; beginning within 90 days of license issuance but not prior to the implementation of the new minimum streamflows; where facility modification is required to provide the specified pulse flows, EID would make such modification as soon as practicable and no later than 3 years after license issuance (**We do not concur that EID's proposal is needed; however, we would not object to the implementation of scheduled spring pulsed flow events during other than critically dry years, if such releases would not occur under the existing operating regime.**);
 - S flows released to Caples Creek channel during September, October, and November would not be greater than 150 cfs; and
 - S no more than 60 cfs would be released into the Caples Lake spillway channel;

- survey and develop a plan approved by the FS within 2 years of license issuance for stabilization of the Oyster Creek channel and implement project-related portions of the plan within 5 years of license issuance (as specified in Section 5 of the Settlement);
- survey and develop a plan approved by the FS within 2 years of license issuance for stabilization of the Esmeralda Creek channel on National Forest System lands and implement the plan within 5 years of license issuance (as specified in Section 6 of the Settlement);
- implement a monitoring program in coordination with the FS, ERC, and SWRCB (as specified in Section 7 of the Settlement) to include the following:
 - S monitor specified reaches for rainbow trout and hardhead to determine habitat quality and to assess the potential effects of changes in the streamflow regime;
 - S monitor macroinvertebrates at specified locations to determine habitat quality and to assess the potential effects of changes in the streamflow regime;
 - S monitor foothill yellow-legged frog at specified locations along the SFAR and conduct surveys related to flow fluctuations in specified reaches to determine presence and distribution of the species and identification of breeding and larval periods to assess potential effects and appropriate rates of flow fluctuation downstream of the Kyburz diversion dam;
 - S monitor mountain yellow-legged frog at specified locations to determine presence and distribution of the species to assess potential effects of changes in project operations;
 - S monitor riparian vegetation species composition in representative habitat types at specified transect locations to assess riparian conditions and response to changes in the streamflow regime;
 - S monitor riparian vegetation conditions and responses to changes in the streamflow regime in the Caples Creek area;
 - S conduct a detailed investigation of fluvial geomorphic properties of specified reaches to assess the need for and most effective method of stabilization;
 - S monitor permanent cross-section transects, longitudinal profiles, and channel properties at representative channel areas to assess changes in channel condition relative to changes in the streamflow regime;
 - S monitor water temperature at locations specified in a plan to be developed within 1 year of license issuance (as specified in Section 12 of the Settlement) to confirm that streamflow changes result in water temperatures that are consistent with designated beneficial uses of project waters;
 - S monitor selected water quality parameters at specified locations to confirm that project-related changes result in water quality that is consistent with applicable state standards (**We do not concur that water quality monitoring**

as proposed is needed, but would not object to implementation of this proposed measure.);

- S monitor flow fluctuations in the SFAR between the Kyburz diversion dam and Silver Creek from June through September so that when flow is 100 cfs or less and the diversion into the El Dorado canal causes the flow downstream of the diversion dam to change 50 cfs or more in 1 day, the previously mentioned monitoring of foothill yellow-legged frog response to flow fluctuations can occur;
- implement an ecological resources adaptive management program within 90 days of license issuance that includes specific management measures that would be considered if monitoring indicates that applicable ecological resource objectives are not being met (as specified in Section 8 of the Settlement), including the following:
 - S adaptive management measures associated with minimum streamflow releases from project reservoirs;
 - S adaptive management measures for modifying the maximum flow in Caples dam spillway channel;
 - S adaptive management measures for modifying pulse flows in Caples Creek, including the following: (1) within 2 years of license issuance, development of a feasibility study to determine if the Caples Lake auxiliary dam spillway could be modified to release flows of up to 250 cfs and if the main dam outlet works could be modified to release up to 600 cfs to the natural channel of Caples Creek (**We do not concur that this study is needed, but would not object if it were implemented**); and (2) within 2 years of license issuance, development of a stabilization plan for the spillway channel in consultation with the FS, SWRCB, and ERC;
 - S adaptive management measures for modifying the project-related flow fluctuations in the SFAR reach between Kyburz diversion dam and Silver Creek; and
 - S invitations to the Settlement signatory parties to participate in an ERC.
- within 180 days of license issuance, develop a plan, in consultation with the SWRCB and ERC, for screening Carpenter and Alder creeks for all life stages of trout and submit the plan for approval by the FS and CDFG prior to implementation (as specified in Section 9 of the Settlement);
- develop and file for Commission approval, a streamflow and reservoir storage gaging plan within 1 year of license issuance, in consultation with the FS, ERC, and SWRCB (as specified in Section 10 of the Settlement); EID also proposes as part of this plan to conduct an investigation to determine whether telemetry equipment can be installed at Lake Aloha to monitor conditions and/or control operations. If EID, SWRCB, and

FS concur that such equipment is economically and technological feasible and can be installed consistent with law, regulations and policies applicable to Desolation Wilderness, EID would install such equipment;

- develop, in consultation with the ERC, a plan to designate preferred canal drainage structures and release points to be used in the event of an emergency and for maintenance and file the plan, that is approved by the FS and SWRCB, for Commission approval within 1 year of license issuance (as specified in Section 11 of the Settlement);
- provide measures to protect wildlife from the hazards of open canals and other project facilities (as specified in Section 13, Number 1 of the Settlement), including:
 - S inspect the fencing, canal crossing, and approaches at least twice per year and repair or replace fencing as necessary;
 - S provide an annual report to the FS and ERC describing the date, location and species of wildlife found in the El Dorado canal; and
 - S within 180 days of license issuance, reconstruct portions of the canal fence that do not meet deer fencing specifications or develop a schedule for completing the work that is agreed upon by the FS and CDFG;
- C prepare a biological evaluation prior to any new construction or maintenance (including but not limited to proposed recreational developments) authorized by license on National Forest System lands that may affect FS sensitive species or special-status species and its habitat; prior to commencing activities to construct, operate, or maintain the project that may affect a species listed or proposed for listing under the federal ESA, or critical habitat for such a species, EID would ensure that a biological assessment is prepared (as specified in Section 13, Number 2, of the Settlement);
- C if occurrences of FS sensitive species are detected prior to or during construction, operation, or maintenance of the project or during project operations, immediately notify the FS and implement protective measures, as appropriate (as specified in Section 13, Number 3, of the Settlement);
- finalize and implement the noxious weed plan for the prevention and control of project-related noxious weeds, and comply with the Eldorado National Forest and LTBMU prescriptions for seed, mulch, and fertilizer for restoration or erosion control purposes (as specified in Section 14 of the Settlement);
- schedule and facilitate an annual meeting with the FS, CDFG, and SWRCB to review and discuss the results of implementing ecological conditions and to discuss other

issues related to preserving and protecting ecological values affected by the project (as specified in Section 15 of the Settlement) **(We do not concur that this meeting should be specified as a license condition, but encourage EID to meet with appropriate resources agencies regarding project operations, as needed.);**

- develop a recreation implementation plan in coordination with the FS within 180 days of license issuance that includes preliminary design drawings, potential funding sources, and a construction schedule for the proposed recreational facilities, as well as other details related to recreational resources such as signing and sign placement, and consideration of measures to improve efficiency (i.e., areas with joint operation or operation of adjacent facilities) (as specified in Section 16 of the Settlement);
- conduct a recreational survey and prepare a report on recreational resources that is approved by the FS every 6 years from the date of the license issuance, within 1 year of the report, the FS, ERC, and other interested parties would review the report and make recommendations to address the findings; EID would not be required to construct additional recreational improvements as the remedy for a FS determination that carrying capacity is being exceeded in the project area; however, EID may be required to address resource effects associated with project-related recreational use (as specified in Section 17 of the Settlement);
- provide a liaison to the FS for the planning or construction of recreational facilities, other major project improvements, and maintenance activities taking place within the Eldorado National Forest (as specified in Section 18 of the Settlement) **(We do not recommend this measure be included as a license condition, but would not object to its implementation.);**
- meet with the FS at least every 6 years to review all recreational facilities and areas associated with the project to agree upon necessary maintenance, rehabilitation, construction, and reconstruction work needed and its timing; following the review, EID would develop a 6-year schedule for maintenance, rehabilitation, and construction, approved by the FS, prior to filing the schedule with the Commission (as specified in Section 19 of the Settlement);
- the following recreational facilities would remain inside the project boundary: Silver Lake East Campground, Caples Lake Campground, Caples Lake dam parking area, Caples Lake boat ramp and picnic facility (once constructed), Echo Lake trailhead and upper parking facility, and the PCT crossing of the Echo Lake conduit, and if these facilities are not currently within the license boundary, the boundary shall be adjusted to include them (as specified in Section 19 of the Settlement) **(The Commission would make any final determination regarding adjustment of project boundaries in any license order that may be issued for this project.);**

- provide the following recreation enhancements (as specified in Section 20 of the Settlement):
 - S reconstruct the paved surfaces, toilets, and water system and upgrade the facility to meet current FS design standards and accessibility requirements at Silver Lake East Campground within 5 years of license issuance;
 - S reconstruct the paved surfaces, toilets, and water system and upgrade the facility to meet current FS design standards and accessibility requirements at Caples Lake Campground within 10 years of license issuance;
 - S reconstruct and upgrade Caples Lake dam parking area to meet current FS design standards and accessibility requirements within 5 years of license issuance;
 - S construct a new boat launching ramp, parking lot, toilet facilities, access road and picnic area at Caples Lake on land designated by the FS on the northeast end of the lake within 7 years of license issuance;
 - S construct an information kiosk to FS specifications at a location agreed to by the FS within 5 years of license issuance **(We do not recommend this measure because we do not see a nexus of this kiosk to project purposes, however, we would not object to its implementation.)**;
 - S install barrier rocks to restrict uncontrolled vehicle travel at Martin Meadows Overflow Camping Area within 5 years of license issuance **(We do not recommend this measure because we do not see a nexus of this area to project purposes, however, we would not object to its implementation.)**;
 - S provide one-half the cost of resurfacing the Echo Lake Upper parking area within 10 years of license issuance, unless EID is unable to acquire a grant to build the Caples Lake boat launching facility, in which case EID would not be responsible for one half the cost; and
 - S within 5 years of license issuance, construct a crossing for PCT across the Echo Conduit that meets FS design standards;
- provide the following operation and maintenance measures associated with recreational facilities (as specified in Section 21 of the Settlement):
 - S provide one-half the annual maintenance costs of Caples Lake dam parking area;
 - S operate and maintain the Caples Lake boat launching facility once the facilities are constructed;
 - S maintain Echo Lake trailhead, unless EID is unable to acquire a grant to build the Caples Lake boat launching facility in which case EID would not be responsible for maintenance;
 - S pay \$4,800 annually to the FS for performing monitoring and permit

- compliance assurance for the campground concessionaire special-use permits at Caples Lake Campground and Silver Lake East Campground **(We do not recommend this measure because it is not within the Commission's jurisdiction to ensure compliance with FS special-use permits, but would not object to its implementation.)**;
- S provide necessary heavy maintenance, rehabilitation, and reconstruction as determined through the recreational review for the following recreational developments: Silver Lake East and Caples Lake campgrounds (unless EID is unable to acquire a grant to build the Caples Lake boat launching facility, in which case EID would not be responsible for maintenance after the initial resurfacing of the paved areas); Caples Lake boat launching facility; Highway 88 information kiosk; 50 percent of the cost for Caples Lake dam trailhead; and 18 percent of the cost for Pyramid Creek trailhead **(We do not recommend heavy maintenance for Pyramid Creek trailhead and Highway 88 information kiosk, but would not object to its implementation.)**;
- S pay \$25,000 annually to the FS for patrol and operation of non-concessionaire developed and dispersed recreational facilities within and adjacent to the project boundary **(We do not recommend this measure, but would not object to its implementation.)**;
- S annually provide a boat and operator at least twice each season to police Caples Lake and Silver Lake **(We do not recommend this measure, but would not object to its implementation.)**; and
- S bring the Ferguson Point, Sandy Cove, Woods Creek fishing access and Silver Lake West recreational facility into compliance with the ADA accessibility standards within 10 years of license issuance;
- provide public information services (as specified in Section 23 of the Settlement), to include the following:
 - S develop a plan, within 1 year of license issuance, for measures to provide information about lake levels, real-time streamflows, simple staff gages, forecasting, and operations projections to the public via toll-free telephone and Internet of streamflows for gages on the SFAR below Kyburz diversion dam and the Silver Fork (including provisions to post hourly average flows within 4 hours on the internet for the current and prior 7 days);
 - S provide public information relating to recreational opportunities, restrictions, and responsibilities associated with project-related recreational facilities at a level approved by the FS;
 - S develop, within 5 years of license issuance, print, and make available free of charge to the public a brochure and map that describe the

- recreational opportunities, facilities, rules and responsibilities for the project area and update the brochure and map as needed over the term of the new license; and
 - S** install prominent signs at Caples Lake, Silver Lake, and Echo Lake during the winter season that warn visitors of unstable snow and ice conditions;
- implement the following measures for visual resources protection within the project area (as specified in Section 24 of the Settlement):
 - S** during planning and prior to any new construction or maintenance of project facilities, including recreational facilities, file a plan approved by the FS for the protection and rehabilitation of National Forest System visual resources affected by the project; and
 - S** paint the metal components of the walkway across the lower Echo Lake spillway, the stairway to the Caples Lake auxiliary dam and walkway across the dam, and metal components of the stairway, ramps, and handrail associated with the west side of Silver Lake dam a non-reflective black color within 2 years of license issuance and inspect each of these project features every 2 years, and repaint as necessary;
- prepare within 180 days of license issuance, in consultation with the FS, an HPMP that takes into account project effects on prehistoric and historic resources, Native American traditional cultural values, direct and indirect effects to heritage resources within the APE, ethnographic studies, historic archaeological studies, project-related recreation effects on archaeological properties affecting National Forest System lands, and provide measures to mitigate identified effects, a monitoring program, and management protocols for the ongoing protection of archaeological properties (as specified in Section 25 of the Settlement);
- in the event that items of potential cultural, historical, archaeological, or paleontological values are reported or discovered as a result of project operations or during ground-disturbing activities, EID would notify the FS and not resume work until it receives written approval from the FS (as specified in Section 26 of the Settlement);
- prepare a transportation system management plan, in consultation with the FS (as specified in Section 27 of the Settlement), within 1 year of license issuance, to include the following:
 - S** a map showing all roads, both FS system roads and non-FS system roads, associated with the project;
 - S** identification of project-related uses of project roads, including an estimate of the amount of use by season of the year;

- S identification of the condition of the project roads that are determined to be the responsibility of EID, including length and width of road, location and size of culverts, grade, slope position, hydrologic connectivity, surfacing, and jurisdiction;
 - S a traffic and safety signage plan for roads determined to be the responsibility of EID, including safety and destination/distance information signs at major road intersections and features, an inventory and photographs of all signs, and a map showing sign locations;
 - S a map of all drainage crossing of bridges and culverts for roads that are determined to be the responsibility of EID;
 - S measures to control erosion related to project facilities on or affecting National Forest System lands;
 - S identification of helispots routinely used to access project facilities on National Forest System lands, including notification standards for the FS;
 - S provisions to develop a 5-year plan to identify the maintenance and reconstruction needs for project roads at 5 year intervals;
 - S provisions to construct, operate, and maintain project facilities, including roads, parking and storage lots, reservoir shorelines, bridges, and culverts to maintain natural fluvial and colluvial sediment transport to the project reaches, to the extent feasible;
 - S provisions to ensure all road maintenance and construction meet FS specifications and BMPs; and
 - S provisions to replace the gate at the road to Caples Lake dam within 5 years of license issuance;
- prepare a trails system management plan that is approved by the FS within 1 year of license issuance (as specified in Section 28 of the Settlement) that includes the following:
 - S a map of all trails, including both FS system and non-FS system trails, associated with the project, with trail locations established using a GPS;
 - S identification of the season(s) of use and the amount of use by EID for each trail annually;
 - S identification of the condition of the trails, including any construction or maintenance needs; and
 - S provisions to prepare a 5-year plan to identify the maintenance and reconstruction needs for trails required for project operations at 5 year intervals;
 - within 1 year of license issuance, prepare a facility management plan that is approved by the FS (as specified in Section 29 of the Settlement) that includes the following:
 - S a map showing all project facilities, including structures on or affecting National Forest System lands, above and below ground storage tanks;

- S identification of the type and season of use of each structure;
 - S identification of the condition of each structure and the planned maintenance or removal; and
 - S provisions to prepare a 5-year plan to identify the maintenance, reconstruction and removal needs for project facilities at 5 year intervals **(We do not concur that development of a facilities management plan is needed, but would not object to its implementation.)**;
- prior to approving, developing, or providing for additional commercial services or exclusive uses at Silver, Caples and Echo lakes, beyond those that exist as of the date of license issuance, complete an analysis that displays the effect of proposed development on adjacent National Forest System lands (as specified in Section 30 of the Settlement) **(We do not recommend this measure, but would not object to its implementation.)**; and
 - develop a land adjustment proposal within 2 years of license issuance, that addresses possible land exchanges or other management actions that would result in more efficient land management, including consideration of land exchanges between the FS and EID at Silver Lake East and West campgrounds, Oyster Creek Roadside Rest, and in the Sly Park/Pollock Pines area (as specified in Section 31 of the Settlement) **(We do not recommend this measure, but would not object to its implementation.)**.

In addition to, or in lieu of, EID's proposed measures, we recommend the following additional environmental measures:

- in the event structural modifications are proposed to better enable the ramping rate criteria to be implemented, develop a plan, in consultation with the FS, ERC, and SWRCB, that would specify any structural changes that are proposed, the advantages of the proposed modifications over existing ramping rate control measures, the costs of implementing the structural changes, any alternatives that may be more cost-effective (while achieving the objective of minimizing downramping effects), and a schedule for implementing the proposed structural change;
- develop a plan for survey and trout removal at Lake Aloha, in consultation with FS and CDFG, that includes identification of specific pools to be covered, an initial survey and removal effort within 1 year of license issuance, determination of when additional survey and removal would be conducted, specific survey and removal protocols that minimize potential adverse effects, and reporting requirements. If installation of telemetry equipment (as proposed in Section 10 of the Settlement) does not occur, the final plan should address how spill events would be identified in a timely manner;
- develop a study plan for the detailed investigation of fluvial geomorphic properties at

the Caples Lake spillway channel, Caples Creek downstream of the confluence of the spillway channel, and Oyster Creek, in consultation with the FS, SWRCB, and ERC, and file it with the Commission for approval;

- develop a stabilization plan for the Caples Lake spillway channel within 180 days of the completion of the detailed fluvial geomorphic study (instead of 2 years from license issuance, as specified in Section 8, Number 4.b of the Settlement), so that the results of this study could be incorporated into the stabilization plan. The plan should include a proposed implementation schedule, the alternatives that were considered for stabilization along with associated estimated costs, and the recommended stabilization alternative;
- provide documentation in the proposed streamflow and reservoir storage gaging plan that releases of 150 cfs to the Caples Creek channel from Caples Lake approximate 7/10 bankfull conditions;
- if EID plans to use pesticides to control undesirable insects or rodents on National Forest System lands, which are not covered by its noxious weed control plan, EID should first submit a request for approval to the FS that provides details of the need for the use of such pesticides and protective measures to ensure that non-target species are protected. EID should not apply any such pesticide until it receives written approval from the FS, which would ensure that its use is justified;
- as part of the recreation implementation plan, identify specific procedures that would be used to maintain and update the implementation plan in conjunction with the review of recreational developments, estimated costs for the new or enhanced facilities that would be implemented during the 6-year period following license issuance, identify how the needs of the physically disabled are considered in the design and construction of the proposed recreational enhancements or facilities, and identify the entity responsible for constructing specific recreational enhancements and conducting operation and maintenance of project-related recreational facilities, if other than EID;
- develop a recreation monitoring plan, in consultation with the FS, and file it with the Commission for approval within 180 days of license issuance; the recommended plan would include the following components:
 - S The specific methodology that would be used to assess changes in types of use and use patterns, levels of use, user preferences in recreational activities, types and sizes of recreational vehicles, preference for day use versus overnight use, carrying capacity information sufficient to indicate changes in capacity, and recreational-user trends in the project area.
 - S The seasonal and annual frequency of proposed recreational monitoring.
 - S A clear statement of how the proposed recreational monitoring report review,

which would include EID, the FS, the ERC, and other interested parties, as specified in Section 17 of the Settlement, would relate to the review of recreational developments, which would include EID and the FS, as specified in Section 19 of the Settlement. Also, a description of how “other interested parties” would be determined prior to the monitoring report review;

- include in the recreational survey report a summary of the items required by the SWRCB, per Decision 1635, as modified, which requires a qualitative analysis of the recreational effects associated with the end-of-the-month lake levels for the preceding year, including whether the end-of-the-month lake levels affected the following: the usability of boat ramps and docks; swimming access, beaches and angler locations; campgrounds, picnic areas, recreational residences, organized camps, resorts, and marinas; and aesthetic values;
- incorporate into the public information plan measures to hold annual spring meetings with the FS and local representatives, as appropriate, to discuss the schedule of drawdowns associated with any needed repairs at the four storage reservoirs, to minimize effects on recreational interests, including how such meetings would be publicized, how the results of any such meetings would be reported to the Commission, and how the input from such meetings would be incorporated into EID’s annual operation plans;
- develop a visual resource management plan within 1 year of license issuance that defines the process for visual resource protection, such as when a visual resource protection plan would be needed (i.e., new construction and type of maintenance activities), consultation process with the FS in the development and review of the plan, and components to be included in the visual resources protection plans;
- as part of the trail system management plan and the 5-year maintenance and reconstruction plan, identify the party responsible for, and estimated cost of, maintenance and reconstruction of each project-related trail segment; and
- consolidate several resource plans into an overall LHMP; the LHMP would include, at a minimum, the following:
 - S an overview and discussion of general land management measures within the project area. This section would include a discussion of key land management objectives, and measures about how the various components of the LHMP would be implemented and coordinated;
 - S ecological resources adaptive management program that includes water temperature, general water quality (as appropriate), geomorphology, fish, invertebrate, amphibian, intake canal, and riparian vegetation monitoring plans and provisions to recommend adjustments in project operations to the

- Commission based on the results of the monitoring;
- S** noxious weed prevention and control plan;
- S** identification of special status species that occur or could occur in the project area, provisions for updating this listing, maps of known occurrences of the special status species, and specific activities (construction, operation, and maintenance) that would require preparation of a biological evaluation or biological assessment prior to implementation;
- S** mountain yellow-legged frog protection procedures (trout removal at pools near Lake Aloha);
- S** recreation implementation plan;
- S** recreation monitoring plan;
- S** public information plan;
- S** transportation system management plan;
- S** trail system management plan; and
- S** visual management plan.

Implementation of these measures would protect and enhance water quality, fisheries, terrestrial, recreational, aesthetic, and cultural resources in the project area and provide for the best use of the waterway.

The costs of some of these measures would reduce the net benefit of the project. Specifically, our recommendations that would require incremental costs over the measures proposed by EID include developing: (1) a plan for survey and trout removal; (2) a study plan for the detailed investigation of fluvial geomorphic properties; (3) additional measures associated with the public information plan; and (4) a recreation monitoring plan. .

5.2.1 Protecting and Monitoring Mountain Yellow-Legged Frogs

We recommend that EID prepare an initial plan to describe the process associated with the survey for trout in the ponds below Lake Aloha and subsequent trout removal procedures. There is no indication in the Settlement that a plan would be developed prior to the initial trout survey, and we consider it important to ensure that the methods used for this initial survey, as well as any subsequent surveys, be designed to effectively identify the presence of trout, while not adversely influencing mountain yellow-legged frog. In addition, the Settlement specifies that EID would investigate whether or not it would be feasible to install telemetry at Lake Aloha to monitor when spillage occurs. No provision is made to address the contingency that installation of telemetry is not feasible or inconsistent with provision to protect the Desolation Wilderness. If telemetry is not installed, then developing a plan for trout removal within 14 days of a spill event (as specified in the Settlement) may not be practical. We therefore recommend that EID specify in our recommended plan how spill events would be identified in a timely manner, if telemetry equipment cannot be installed, and provisions for submitting a trout removal plan under those circumstances. We

estimate that developing this plan would decrease the net annual benefit of the project by \$370. The additional protection that it would provide to mountain yellow-legged frog is worth this modest cost.

5.2.2 Assessing Unstable Stream Channels

We recommend that EID develop a study plan that would identify the procedures for the detailed investigation of fluvial geomorphic properties at Caples Lake spillway channel, Caples Creek downstream of the spillway channel and Oyster Creek. There is no indication in the Settlement that a study plan would be developed by EID prior to implementing this detailed investigation. Without a common understanding of how this study would be conducted, the objectives of EID, the FS, the SWRCB, and the ERC may not be achieved. We consider it likely that a well-designed study plan, along with the results of EID's geomorphology study conducted from 1998 through 2002, could provide a basis for developing an appropriate stabilization plan for the spillway channel. However, we consider it important to identify in the study plan not only the specific methods that would be used to assess each of the sites but what range of flows would be assessed in the spillway channel study and how the causes of Oyster Creek channel instability would be identified. We estimate that developing this plan would decrease the net annual benefit of the project by \$440. The additional assurance that the expectations of the stakeholders and the Commission would be met by implementing this study plan is worth this modest cost.

5.2.3 Recreational Monitoring and Consultation

The Settlement specifies that EID would conduct a recreational survey and prepare a report on recreational resources every 6 years from the date of license issuance. The report would address a variety of recreational use parameters and would supplement the Commission's Form 80 requirements. The report would provide a basis for assessing the adequacy of project-related recreational facilities that would be included in a new license and provide a basis for adjusting the management of these facilities as well as considering new facilities. However, the Settlement provides no indication that EID would develop a recreational monitoring plan prior to implementing its survey. There are a variety of methods that could be used to assess the recreational use parameters specified in the Settlement; some more rigorous than others. Survey and monitoring frequency could also vary widely, both within and between years. We consider it important to first develop a recreational monitoring plan, in consultation with the FS, that would define the specific methods that EID would use during its monitoring efforts. This should avoid the possibility that the report on recreational resources would be based on inadequate information. Without our recommended plan, this may not be apparent until after the first 6 years of data collection. We estimate that developing this plan would decrease the net annual benefit of the project by \$730. We conclude that the additional assurance that the expectations of the stakeholders and the Commission would be met by implementing this study plan is worth this

modest cost.

The Settlement (Section 23) specifies that EID would develop a streamflow and lake level information plan that would address, among other things, how information regarding lake levels, forecasting, and operations projections, would be made available to the public. This plan would be developed in consultation with the FS, SWRCB, and ERC. These entities would also be consulted on other reports and plans that pertain to lake levels and associated recreational usage (e.g., Sections 17, Recreation Survey, and 22, Target Lake Levels and Minimum Pool). We consider it likely that during the term of a new license, EID may, on occasion, find it necessary to draw down Lake Aloha, and Echo, Caples, and Silver lakes to perform maintenance on project facilities. The timing of such scheduled drawdowns can influence the suitability of shoreline recreational facilities at these lakes, especially the latter three. However, the Settlement does not provide for consultation with the entities that would be directly affected by such scheduled drawdowns. Such consultation during the spring would serve to inform residential and commercial establishments at these lakes of potential scheduled drawdowns, and provide an opportunity for the affected entities to provide input on alternative drawdown schedules prior to the finalization of the drawdown schedule. Such meetings, if held on an annual basis, would provide an opportunity for EID to receive comments on the lake level management under the conditions of the new license, which could be incorporated, as appropriate, into subsequent annual operation plans. We therefore recommend that EID include provisions in its proposed streamflow and lake level information plan for annual spring meetings to be held with the FS and appropriate local representatives to discuss the schedule for drawdowns associated with any needed repairs at the four storage reservoirs, and potential measures to minimize effects on recreational interests. We estimate that the incremental cost of having such annual meetings would decrease the net annual benefit of the project by \$1,000. However, we consider it important to provide a forum for those directly influenced by lake levels to be informed of pending drawdowns and to provide input that could be incorporated, as appropriate, into the annual project operation plans. We conclude that this measure is worth the cost.

5.3 Cumulative Effects Summary

We identified the following resources that have the potential to be cumulatively affected by relicensing the El Dorado Project with our recommended measures in combination with other activities in the SFAR and Upper Truckee River basins: (1) water quality; (2) water quantity; and (3) coldwater fishery resources.

We conclude, in section 3.3.1.3 of this EIS, that there could be potential adverse cumulative effects on water quality because existing project operation could result in sedimentation from Caples Lake auxiliary dam spill channel erosion. This sedimentation, when combined with sedimentation to Caples Creek via Kirkwood Creek, could cumulatively affect trout spawning habitat if the combined sediment load settles on spawning gravel. Our

recommended measures to restrict EID-controlled flows to this channel to 60 cfs and survey, monitor, and stabilize the spill channel erosion, as appropriate, should minimize this potential cumulative effect.

We conclude, in section 3.3.1.3 of this EIS, that there could be a substantial potential cumulative effect from continued project operations on EID's consumptive water use customers. Because the amount of energy revenue EID would be able to generate would be reduced if the project is relicensed with our recommended measures, EID would have to increase the cost of water sold to its consumers. Some of the hardest hit water users would be farmers with an already narrow profit margin, and they may be forced out of business unless an alternative low cost source of water could be found (which we consider unlikely). Further, if commercial operations are forced out of business, the economic effect would extend beyond the area serviced by EID. This effect would be a negative cumulative effect from the project on water quantity resources in the project area.

We conclude, in section 3.3.2.3 of this EIS, that several of our recommended measures would contribute to a cumulative benefit for coldwater fisheries by increasing flows which would enhance water temperatures and potentially increase trout abundance, particularly rainbow trout, in the project area. Increasing the flows in Echo Creek would translate to increased flows in the Upper Truckee River, which flows through the community of South Lake Tahoe, a popular tourist destination. If increased flows result in new habitat and increased trout production in this area of the Upper Truckee River, it could also result in enhanced angling opportunities. Therefore, there would be a cumulative benefit to the coldwater fishery resources from project operations.

5.4 Fish and Wildlife Agency Recommendations

Under the provisions of the FPA, each hydroelectric license issued by the Commission would include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation of damage to, and enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. In response to our REA notice, California Fish & Game filed 28 recommendations by letter dated October 29, 2002. FWS did not file any recommendations.

Table 5-2 summarizes recommendations from CDFG, our conclusions on whether or not the recommendations are appropriate Section 10(j) measures, and whether or not we

adopted the original CDFG recommendations. We consider recommendations that are outside the scope of Section 10(j) under Section 10(a) of the FPA and address them in other sections of the EIS.

Table 5-2. Analysis of fish and wildlife agency recommendations for the El Dorado Project. (Source: Staff)

Recommendation						Agency	Subject to Section 10(j)	Annual Cost	Conclusion
1. Minimum flows (cfs) in Echo Creek below Echo Lake dam by water year should be as listed or natural flow.						CDFG	Yes	\$546,000 (includes the cost of all minimum flow)	Adopted
	CD ^a	Dry	BN	AN	Wet				
Oct	6	6	6	6	6				
Nov	6	6	6	6	6				
Dec	6	6	6	6	6				
Jan	6	6	6	6	10				
Feb	6	6	6	10	15				
Mar	6	6	6	15	25				
Apr	6	10	15	25	45				
May	6	15	30	45	40				
June	6	15	30	40	20				
July	6	10	15	20	6				
Aug	6	6	6	6	6				
Sept	6	6	6	6	6				
2. Minimum flows (cfs) for Pyramid Lake downstream of Lake Aloha by water year should be as listed or natural flow.						CDFG	Yes	(Included in 1)	Adopted

Recommendation						Agency	Subject to Section 10(j)	Annual Cost	Conclusion
	CD ^a	Dry	BN	AN	Wet				
Oct	1	1	2	3	3				
Nov	1	3	4	5	5				
Dec	2	3	5	6	6				
Jan	2	3	5	6	6				
Feb	2	4	6	8	8				
Mar	2	5	7	10	10				
Apr	3	5	8	11	11				
May	5	10	15	20	20				
June	5	10	14	19	19				
July	2	4	6	8	8				
Aug	1	2	3	4	4				
Sept	1	1	2	2	2				
3. Minimum flows (cfs) for Caples Creek downstream of Caples Lake by water year should be as listed or natural flow.						CDFG	Yes	(Included in 1)	Adopted
	CD ^a	Dry	BN	AN	Wet				
Oct	5	5	5	5	5				
Nov	5	6	8	10	10				
Dec	5	7	10	10	10				
Jan	5	7	10	15	15				
Feb	5	7	10	15	15				
Mar	5	10	15	20	20				
Apr	10	12	18	25	25				
May	14	27	40	55	55				
June	14	28	42	55	55				
July	12	25	35	50	50				
Aug	5	5	6	8	8				
Sept	5	5	5	5	5				
4. Minimum flows for Silver Fork downstream of Silver Lake dam for all water years should be 4 cfs or natural flow during all months.						CDFG	Yes	(Included in 1)	Adopted

Recommendation						Agency		Subject to Section 10(j)	Annual Cost	Conclusion
5. Minimum flows (cfs) for Silver Fork downstream of Oyster Creek should be as listed or natural flow.						CDFG		Yes	(Included in 1)	Adopted
	CD ^a	Dry	BN	AN	Wet					
Oct	8	8	8	8	8					
Nov	8	8	10	16	16					
Dec	8	8	10	16	16					
Jan	8	8	12	16	16					
Feb	8	10	17	23	23					
Mar	8	15	26	35	35					
Apr	8	18	50	50	50					
May	10	20	90	100	100					
June	8	10	60	60	60					
July	8	8	18	20	25					
Aug	8	8	8	8	8					
Sept	8	8	8	8	8					

Recommendation	Agency	Subject to Section 10(j)	Annual Cost	Conclusion																																																																														
6. Minimum flows (cfs) for SFAR downstream of Kyburz diversion dam by water year should be as listed.	CDFG	Yes	(Included in 1)	Adopted																																																																														
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7. Minimum flows for Carpenter Creek downstream of Carpenter Creek diversion dam for all water years should be as listed or natural flow.	CDFG	Yes	(Included in 1)	Adopted																																																																														
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8. Minimum flows for No Name Creek downstream of No Name Creek diversion into the El Dorado Canal for all water years should be 1 cfs or natural flow during all months.	CDFG	Yes	(Included in 1)	Adopted																																																																														

Recommendation	Agency	Subject to Section 10(j)	Annual Cost	Conclusion																																																																														
9. Minimum flows (cfs) for Alder Creek downstream of Alder Creek diversion into the El Dorado Canal by water year should be as listed or natural flow.	CDFG	Yes	(Included in 1)	Adopted																																																																														
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Sept	25	25	25	25	25																																																																													
10. Minimum flows for Mill Creek downstream of the Mill Creek diversion into the El Dorado Canal for all water years should be as listed or natural flow.	CDFG	Yes	(Included in 1)	Adopted																																																																														
<table><tr><td>Oct</td><td>1</td><td>Apr</td><td>6</td></tr><tr><td>Nov</td><td>2</td><td>May</td><td>4</td></tr><tr><td>Dec</td><td>3</td><td>June</td><td>2</td></tr><tr><td>Jan</td><td>4</td><td>July</td><td>1</td></tr><tr><td>Feb</td><td>6</td><td>Aug</td><td>1</td></tr><tr><td>Mar</td><td>7</td><td>Sept</td><td>1</td></tr></table>	Oct	1	Apr	6	Nov	2	May	4	Dec	3	June	2	Jan	4	July	1	Feb	6	Aug	1	Mar	7	Sept	1																																																										
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11. Minimum flows for Bull Creek downstream of the Bull Creek diversion into the El Dorado Canal for all water years should be 1 cfs or natural flow during all months.	CDFG	Yes	(Included in 1)	Adopted																																																																														

Recommendation	Agency	Subject to Section 10(j)	Annual Cost	Conclusion
12. Minimum flows for Ogilby Creek downstream of the Ogilby Creek diversion into the El Dorado Canal for all water years should be as listed or natural flow. Oct 1 Apr 2 Nov 1 May 2 Dec 1 June 1 Jan 1 July 1 Feb 2 Aug 1 Mar 2 Sept 1	CDFG	Yes	(Included in 1)	Adopted
13. Minimum flows for Esmeralda Creek downstream of the Esmeralda Creek diversion into the El Dorado Canal for all water years should be as listed or natural flow. Oct 1 Apr 2 Nov 1 May 2 Dec 1 June 1 Jan 1 July 1 Feb 1 Aug 1 Mar 2 Sept 1	CDFG	Yes	(Included in 1)	Adopted
14. Within 90 days after issuance, use the following ramping rates for licensee controlled streamflow releases at Echo Lake, Lake Aloha, Caples Lake, and Silver Lake Change in Water Level of Stream (feet/h0ur) 0.5 1.0 1.5	CDFG	Yes; although timing of measure is not.	\$0	Adopted for Echo Lake and Lake Aloha; we adopt the rates specified in the Settlement for Caples and Silver lakes
Flow Range (cfs) 1–75 75–175 >175				

Recommendation	Agency	Subject to Section 10(j)	Annual Cost	Conclusion
15. Minimum pool for Caples Lake should be 10,000 acre-feet with 8,500 acre-feet being the absolute minimum.	CDFG	No ^b	Unknown, but likely to be small ^c	Adopted the slightly different measure in the Settlement under Section 10(a)
16. Silver Lake should be held as high as possible until after Labor Day. No absolute minimum pool is specified.	CDFG	No ^b	Unknown, but likely to be small ^c	Adopted under Section 10(a)
17. Provide annual 5-day continuous pulse flow events in the natural Caples Creek channel below Caples Lake dam timed to correspond to annual spring peak runoff as listed by water year.	CDFG	Yes	Unknown, but likely small.	Do not adopt
CD ^a Dry BN AN Wet 0 150 210 300 345				
18. Fall release flows for hydroelectric operations (minimum flows and generation flows) in Caples Creek channel should not be greater than 150 cfs.	CDFG	Yes	Unknown, but likely small.	Adopted, as long as flow determined to be 7/10 bankfull
19. Do not release more than 60 cfs into the existing Caples Lake spillway channel.	CDFG	No ^b	Unknown, but likely small.	Adopted

Recommendation	Agency	Subject to Section 10(j)	Annual Cost	Conclusion
20. Operate Lake Aloha to prevent water in the reservoir from spilling over auxiliary dams 1–7 during spring runoff and while reservoir is filling to protect mountain yellow-legged frog. Within 5 days of a spill occurring, a fish removal program to manually remove trout would be necessary.	CDFG	Yes; although timing of measure and agency consultation is not.	\$30,740	Adopted; we recommend plan development on an alternative schedule.
21. Within 90 days, implement an ecological resources adaptive management program including implementing a stream ecology monitoring program and specific adaptive management measures a. Fisheries monitoring program b. Additional site for fish program c. Macroinvertebrate monitoring program d. Amphibian monitoring program e. Temperature monitoring program f. Water quality monitoring program g. Riparian vegetation monitoring program	CDFG	Yes; although timing of measure and agency consultation is not.	\$54,860	Adopted; we recommend plan development on an alternative schedule; we recommend water quality monitoring beyond temperature be incorporated into recreation and road plans.
22. Within 5 years, develop and implement a plan for restoration of the Caples dam spillway channel if determined by FS to be necessary to achieve applicable ecological resource objectives.	CDFG	Yes; although timing of measure and agency consultation is not.	\$730 (includes plan only; implementation costs cannot be estimated)	Adopted; provided Commission concurs with FS determination

Recommendation	Agency	Subject to Section 10(j)	Annual Cost	Conclusion
23. Based on the first 5 years of monitoring results, increase pulse flows from Caples Lake dam up to a maximum of 600 cfs based on water-year type, or increase duration to 10 days if monitoring indicates bedload is not transported effectively.	CDFG	Yes; although timing of measure and agency consultation is not.	Unknown; could be substantial (dam may need to be re-designed)	Do not adopt
24. Make available all minimum streamflow releases from Lake Aloha dam, Caples Lake dam and Silver Lake dam in the South Fork American River below Kyburz diversion dam in addition to streamflows required at Kyburz diversion am.	CDFG	No ^b	Unknown	Do not adopt; it is not clear what this measure entails.
25. Within 2 years, survey Oyster Creek and develop a plan for restoration of Oyster Creek channel. Implement within 5 years	CDFG	No ^b	\$2,840	Adopted; provided EID only implements project-related restoration
26. Within 2 years, survey Esmeralda Creek and develop a plan for restoration of the Esmeralda Creek channel. Implement within 5 years.	CDFG	No ^b	\$2,640	Adopt, under Section 10(a)
27. Screen all diversions for protection of aquatic fish resources. Concepts and criteria should be developed in consultation with the FS and CDFG.	CDFG	Yes; although agency consultation is not.	\$32,600	Adopt for Alder and Carpenter creeks, do not adopt for remainder

Recommendation	Agency	Subject to Section 10(j)	Annual Cost	Conclusion
28. Maintain and operate in working condition all devices and measures for wildlife protection along the El Dorado Canal	CDFG	Yes; although timing of measure and agency consultation is not.	\$76,010	Adopt
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^a	CD - Critically dry: <50% of forecast average pre-project inflow to Folsom reservoir; Dry - Dry: 50–70% of forecast average pre-project inflow to Folsom reservoir; BN - Below Normal: 75–100% of forecast average pre-project inflow to Folsom reservoir; AN - Above Normal: 100–125% of forecast average pre-project inflow to Folsom reservoir; Wet - Wet: >125% of forecast average pre-project inflow to Folsom reservoir			
^b	Not a specific measure to protect fish and wildlife resources.			
^c	EID did not provide energy estimates of the effect on project generation resulting from this measure. Because of the complex operational aspects of storage and inflows to the project, and the confidentiality of EID's operations model to assess such measures, staff was unable to provide reasonable estimates of the effect of this measure on the project.			

We do not adopt CDFG's recommendation to provide annual continuous pulse flow events to the Caples Creek channel immediately downstream of the Caples Lake dam (recommendation 17). All evidence that we reviewed indicates that under existing conditions, pulsed flows sufficient to flush fine-grained sediment from spawning gravel already occur in Caples Creek. We, therefore, make a determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) of the FPA.

We initially did not adopt CDFG's recommendation to release flows no greater than 150 cfs to the Caples Creek channel during the fall (recommendation 18). The objective of this release restriction is to provide relatively low, stable flows during a period when natural flow would be typically be less than bankfull, which would be expected to enhance fish and invertebrate conditions prior to the winter months, which can be stressful for many aquatic organisms. According to EID's November 27, 2002, letter to the Commission, flows of this magnitude would overflow the banks of Caples Creek. We agree with CDFG's objective to provide less than bankfull flows, but restricting flows to 150 cfs may not achieve this objective. Instead, we recommended that EID provide flows that provide no more than 7/10 bankfull conditions in Caples Creek. We also recommended that EID consult with CDFG and the FS to resolve the apparent discrepancy in flows that would achieve 7/10 bankfull

conditions. Since the Commission would be charged with verifying compliance with this flow, we recommended that the resolution of this issue be included in our recommended flow and lake level monitoring plan. We expected that our recommendation should meet the same objectives as the CDFG recommendation. However, because our recommendation did not correspond to CDFG's 10(j) recommendation, we made a preliminary determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) of the FPA. However, in the Settlement, which now represents EID's proposed project, the fall flow restriction is listed as 150 cfs without qualifications. We interpret this to mean that the collaborative team may have resolved the apparent inconsistency between 7/10 bankfull and 150 cfs, and releases of no more than 150 cfs would result in less than bankfull conditions. However, no documentation confirming this resolution has been provided to the Commission. Therefore, we now adopt CDFG's original 150 cfs fall flow restriction recommendation as long as it results in about 7/10 bankfull conditions in the natural Caples Creek channel. To ensure that releases of 150 cfs would not overtop the banks when released, we recommend that EID include documentation of its determination that restricting flows to 150 cfs would approximate 7/10 bankfull conditions in our recommended streamflow and water storage gaging plan.

We do not adopt CDFG's recommendation to increase pulse flows from Caples Lake dam to 600 cfs based on water-year type, or increase the duration to 10 days, if monitoring indicates that bedload is not transported effectively. As we note in our discussion of recommendation 17, the evidence that we reviewed indicates that Caples Creek currently receives flushing flows that should be sufficient to transport bedload and remove fines from spawning gravel. During our site visit, we noted what appears to be abundant gravel of a suitable size for trout spawning in the reach of Caples Creek that passes through Caples Meadow. If pulsed releases of 5 days are not sufficient to flush sediments and move bedload, we have reservations about whether increasing the duration to 10 days would achieve this objective. Because the capacity of the existing outlet gate from the dam is only 350 cfs, increasing the capacity of the valve or retrofitting the dam with a spillway that would allow flows of 600 cfs would be costly, most likely in the millions of dollars range. We see no evidence that there is a need for this measure. We, therefore, make a determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) of the FPA and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

We do not adopt CDFG's recommendation to screen all diversions for the protection of fish resources that reside in the tributaries that are diverted into the El Dorado canal. Our review of the available information indicates that trout have only been documented in six of the seven diverted streams. Only five of these six streams have documentation of trout upstream of the diversion point into the canal. We originally concluded that four of these streams have limited flows on a year-round basis and would not support substantial populations of trout that could contribute to a fishery that is accessible to anglers. However,

we conclude that Alder Creek, which has year-round flows in all water-year types, supports a population of trout that should be protected from entrainment into the canal. Trout that are produced upstream of the diversion point may contribute to a fishery in the lower portions of Alder Creek, which passes through the Alder Tract of summer cottages and, therefore, are readily accessible to anglers, and the SFAR. Rather than expending the resources to screen all seven streams, we concluded that screening should focus on the protection of the Alder Creek trout population because of its documented importance. In response to our draft EIS, EID pointed out that of Esmeralda, Ogilby, Mill, and Carpenter creeks, only Carpenter Creek has a moderately high amount of trout spawning habitat upstream of the diversion point, and this contributed to the decision to include in the Settlement screening for Carpenter and Alder creeks at the diversion points. Our review of trout productivity data supports EID's statement, and in the final EIS, we now recommend also screening the Carpenter Creek diversion. However, we still conclude that screening the remaining stream diversions is not warranted. We, therefore, make a determination that this measure may be inconsistent with the substantial evidence standard of Section 313(b) of the FPA and the comprehensive planning standard of Section 10(a) of the FPA, including the equal consideration provision of Section 4(e) of the FPA.

CDFG states that the Settlement resolves the four inconsistencies that we identified in the draft EIS and that if the Commission incorporates license conditions substantially similar to the Settlement, it would consider the Section 10(j) process complete (letter from B. E. Curtis, Regional Manager, CDFG, to the Commission dated May 14, 2003). The four inconsistencies pertain to: (1) release of pulsed flows to Caples Creek during the spring; (2) restricting flows to Caples Creek to no more than 150 cfs in the fall; (3) increasing the duration or magnitude of Caples Creek pulsed flows, if bedload is not effectively transported; and (4) screening diversions of flow from streams that feed the El Dorado canal. In this final EIS, we agree with the provisions of the Settlement that address items (2) and (4). We recognize that the conditions of the Settlement represent the result of substantial negotiations among the stakeholders, including CDFG, and therefore would not object to the implementation of the other two items in accordance with the Settlement. Consequently, we consider the 10(j) inconsistencies to be resolved.

5.5 Consistency with Comprehensive and Other Resource Plans

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Other resource plans are also examined under Section 10(a). There are 49 comprehensive plans that address various

resources in California; 17 are applicable to this project.⁹ We found no inconsistencies of the proposed project with our recommendations and the 17 applicable comprehensive plans.

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- ⁹ (1) California Department of Fish and Game. 1993. Restoring Central Valley streams: A plan for action. Sacramento, California. November 1993. 129 pp. (2) California Department of Parks and Recreation. 1998. Public opinions and attitudes on outdoor recreation in California. Sacramento, California. March 1998. 72 pp. and appendices. (3) California Department of Parks and Recreation. 1993. California outdoor recreation plan. Sacramento, California. April 1994. 177 pp. (4) California Department of Parks and Recreation. 1994. California outdoor recreation plan 1988. Sacramento, California. June 1988. 223 pp. (5) California Department of Parks and Recreation. 1994. California outdoor recreation plan 1993. Sacramento, California. April 1994. 154 pp. and appendices. (6) California Department of Water Resources. 1983. The California water plan: projected use and available water supplies to 2010. Bulletin 160-83. Sacramento, California. December 1983. 268 pp. and attachments. (7) California Department of Water Resources. 1994. California water plan update. Bulletin 160-93. Sacramento, California. October 1994. Two volumes plus executive summary. (8) California State Water Resources Control Board. 1975. Water quality control plan report. Sacramento, California. Nine volumes. (9) California-The Resources Agency. Department of Parks and Recreation. 1983. Recreation needs in California. Sacramento, California. March 1983. 39 pp. and appendices. (10) Fish and Wildlife Service. California Department of Fish & Game. California Waterfowl Association. Ducks Unlimited. 1990. Central Valley habitat joint venture implementation plan: a component of the North American waterfowl management plan. U.S. Department of the Interior, Portland, Oregon. February 1990. 102 pp. (11) Forest Service. 1988. Eldorado National Forest land and resource management plan. Department of Agriculture, Placerville, California. December 1988. 752 pp. (12) Forest Service. 1990. Tahoe National Forest land and resource management plan. Department of Agriculture, Nevada City, California. March 1990. 687 pp. and appendices. (13) Forest Service. 2001. Sierra Nevada Forest Plan Amendment, including final environmental impact statement and record of decision. Department of Agriculture. Vallejo, CA. January 2001. (14) State Water Resources Control Board. 1999. Water Quality Control Plans and Policies Adopted as Part of the State Comprehensive Plan. April 1999. Three enclosures. (15) Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986. 19 pp. (16) Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C. 11 pp. (17) National Park Service. 1982. The nationwide rivers inventory. Department of the Interior, Washington, D.C. January 1982. 432 pp.

5.6 Relationship of License Process to Laws and Policies

NEPA mandates the preparation of an EIS for all federal actions significantly affecting the quality of the human environment. We have determined that issuance of a new license for the El Dorado Project is an action that falls within this NEPA mandate.

Per the Fish and Wildlife Coordination Act¹⁰ the Commission has consulted with the FWS and CDFG on preventing loss or damage to fish and wildlife resources and on developing and improving water resources.

In addition, Section 10(a) of the FPA¹¹ requires that each licensed project be best adapted to a comprehensive plan for improving or developing a waterway for, among others, beneficial public uses including recreational purposes. The Commission, therefore, requires that each license applicant consult with the concerned federal, state, and local recreation agencies to determine an appropriate level of development to help meet the recreational needs of the area. EID has consulted with appropriate stakeholders relevant to the El Dorado Project.

Moreover, the Commission, the SHPO, and the Advisory Council would execute a PA for protecting historic properties that will satisfy the Commission's obligations under Section 106 of the National Historic Preservation Act (NHPA).¹²

In the following sections, we describe the project's compliance with Section 401 of the CWA, Sections 18 and 4(e) of the FPA, the ESA¹³ and the NHPA.¹⁴

5.6.1 Section 401 of the Clean Water Act—Water Quality Certification

On June 20, 2001, EID applied to the SWRCB for water quality certification (WQC) for the El Dorado Project. EID withdrew its application for WQC and reapplied on May 13, 2002. On April 25, 2003, EID again withdrew its pending request and filed a new request that was received by the SWRCB on April 28, 2003, beginning the 1-year period to act on the request. The Commission would not issue a license for this project unless the SWRCB had

¹⁰ 16 U.S.C. §§661 *et seq.*

¹¹ 16 U.S.C. §803(a).

¹² 16 U.S.C. §470(f).

¹³ 16 U.S.C. §1531, as amended.

¹⁴ 16 U.S.C. §470(f).

issued a WQC or waived its authority to do so.

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

Section 18 of the FPA states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Commerce and Interior may prescribe. No fishway prescriptions that pertain to the El Dorado Project have been filed by Commerce or Interior.

5.6.3 Section 4(e) of the Federal Power Act

Because the project occupies federally owned lands administered by the Eldorado National Forest and the LTBMU, the FS has authority to impose conditions under Section 4(e) of the FPA. The FS provided 60 preliminary license conditions by letter dated October 29, 2002 (letter from J. Gipsman, Attorney, U.S. Department of Agriculture, Office of General Counsel, Pacific Region, San Francisco, CA, to the Commission, October 29, 2002). The FS provided 65 revised license conditions by letter to the Commission dated May 9, 2003. Many of these conditions are identical to the terms that are specified in the Settlement. The FS intends to provide final Section 4(e) conditions within 90 days after the issuance of our final EIS. The staff recognizes that many of the Section 4(e) conditions relate to indirect effects of the project or to non-project issues related to the same natural resources. We also recognize that the FS has concerns based on the continuing presence and operation of the project that relate to its administrative functions or statutory requirements. In section 3.0, *Environmental Consequences*, we identify whether our recommendations are consistent with the revised preliminary 4(e) condition that apply to this relicensing proceeding.

5.6.4 Endangered Species Act

Section 7 of the ESA requires that federal agencies consult with the FWS when a proposed action may adversely affect federally listed or endangered species. Three federally listed threatened species of animals could potentially occur within the area affected by project operations: valley elderberry longhorn beetle, California red-legged frog, and bald eagle. Only the bald eagle has been documented in the project area. We conclude that the recommended relicensing of the project is not likely to have an adverse effect on California red-legged frog and bald eagle, and will have no effect on valley elderberry longhorn beetle. We sought concurrence, within 30 days, with our conclusion from the FWS (letter to Jan Knight, Chief, Endangered Species Division, FWS, from the Commission dated March 13, 2003). On July 1, 2003, we issued a follow-up letter to the FWS, requesting concurrence with our conclusion within 10 days (letter to Jan Knight, Chief, Endangered Species Division, FWS, from the Commission dated July 1, 2003). We have not yet received concurrence

from FWS.

5.6.5 National Historic Preservation Act

Relicensing is considered an undertaking within Section 106 of the NHPA of 1966, as amended (P.L.89-665; 16 U.S.C.470). Section 106 requires that every federal agency “take into account” how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register. As the lead federal agency for issuing a license, the Commission is responsible for ensuring that the licensee will take all necessary steps to “evaluate alternatives or modifications” that “would avoid, minimize, or mitigate any adverse effects on historic properties” for the term of the new license involving the project. The lead agency must also consult with the SHPO(s), as well as with other land management agencies where the undertaking may have an effect, and with Indian tribes who may have cultural affiliations with affected properties involving the undertaking. The overall review process involving Section 106 is administered by the Advisory Council, an independent federal agency.

To meet the requirements of Section 106, the Commission will execute a PA for the protection of historic properties from the effects of the continued operation of the El Dorado Project. The terms of the PA would ensure that EID would address and treat all historic properties identified within the project area through an HPMP. The HPMP entails ongoing consultation involving historic properties for the license term.

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