



**Federal  
Energy  
Regulatory  
Commission**

**Office of  
Energy  
Projects**

**February 2002**

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**FERC/FEIS - 0138F**

## **Final Environmental Impact Statement**



### **Big Creek No. 4 Project California**

**(FERC Project No. 2017)**

*888 First Street, N.E., Washington, DC 20426*

020215-0360-3

FINAL ENVIRONMENTAL IMPACT STATEMENT

RELICENSING THE BIG CREEK No. 4 HYDROELECTRIC PROJECT  
IN THE SAN JOAQUIN RIVER BASIN

FERC Project No. 2017-011

Applicant:

Southern California Edison Company  
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Federal Energy Regulatory Commission  
Office of Energy Projects  
Division of Environmental and Engineering Review  
888 First Street, N.E.  
Washington, DC

February 2002

FEDERAL ENERGY REGULATORY COMMISSION  
Washington, DC

TO THE AGENCY OR INDIVIDUAL ADDRESSED:

Attached is the Federal Energy Regulatory Commission's (FERC's or Commission's) final Environmental Impact Statement (EIS) for Southern California Edison Company's application for a new license for its Big Creek No. 4 (BC#4) Hydroelectric Project located in the San Joaquin River Basin in Fresno, Madera, and Tulare counties, California. This final EIS has been prepared pursuant to requirements of the National Environmental Policy Act (NEPA) and the Commission's regulations implementing NEPA (18 CFR Part 380).

This final EIS documents the view of government agencies, non-governmental organizations, affected Indian tribes, the public, the license applicant, and Commission staff. It contains staff recommendations on licensing for the BC#4 FERC Project No. 2017-011.

Before the Commission makes a licensing decision, it will take into account all concerns relevant to the public interest. The final EIS will be part of the record from which the Commission will make its decision. The final EIS was sent to the U. S. Environmental Protection Agency and made available to the public on or before February 22, 2002.

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, DC 20426. The final EIS also may be viewed on the Internet at <http://rimsweb1.ferc.gov> Please call 202-208-2222 for assistance.

Attachment

## COVER SHEET

- a. Title: Relicensing the Big Creek No. 4 Project in the San Joaquin River Basin
- b. Subject: Final Environmental Impact Statement (EIS)
- c. Lead Agency: Federal Energy Regulatory Commission
- d. Abstract: Southern California Edison Company (Edison) filed an application for a new license for the existing 98.8-megawatt Big Creek No. 4 (BC#4) Hydroelectric Project, located on the San Joaquin River in central California.

The BC#4 Project is the most downstream project in Edison's Big Creek System. Both the project impoundment (Redinger Reservoir), and the 6.3-mile-long bypassed reach (Horseshoe Bend) have a native transitional zone fish community dominated by hardhead, Sacramento pikeminnow, and Sacramento sucker. Such well established fish communities are becoming rare in California, and resource agencies manage this portion of the river to protect this fish community. Spillage at the dam does not occur every year, but when it does, an attractive whitewater boating opportunity exists in the project's bypassed reach. Much of the project is within an area of the Sierra National Forest (SNF) that the U.S. Forest Service (FS) designates as "Front Country." Within this designated area, the FS emphasizes wildlife and range management activities, as well as protecting watershed values. The key issues associated with relicensing this project entail trying to enhance recreational experiences, including whitewater boating opportunities, without adversely affecting the native aquatic and riparian community, while being compatible with the relevant SNF land use prescriptions.

The staff's recommendation is to relicense the project as proposed, with additional measures to protect and enhance environmental resources, including implementing an adaptive management approach to scheduled whitewater releases, carefully evaluating the ecological and recreational user consequences of scheduled releases, implementing protective measures for rare plants and animals, and developing and updating several land use plans.

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f. Transmittal: This final EIS prepared by the Commission's staff on the hydroelectric license application filed by Edison for the existing BC#4 Project (FERC No. 2017-011) is being made available to the public on or about February 22, 2002, as required by the National Environmental Policy Act of 1969<sup>1</sup> and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR Part 380).

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<sup>1</sup> 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 Commission, pursuant to the Federal Power Act (FPA)<sup>2</sup> and the U.S. Department of Energy Organizations Act<sup>3</sup> 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)...<sup>4</sup>

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.<sup>5</sup> 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.<sup>6</sup>

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<sup>2</sup> 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).

<sup>3</sup> Public Law 95-91, 91 Stat. 556 (1977).

<sup>4</sup> 16 U.S.C. §803(a).

<sup>5</sup> 16 U.S.C. §803(g).

<sup>6</sup> 18 CFR §385.206 (1987).

## TABLE OF CONTENTS

COVER SHEET .....	iii
FOREWORD .....	v
ACRONYMS AND ABBREVIATIONS .....	xi
EXECUTIVE SUMMARY .....	xiv
1.0 PURPOSE OF ACTION AND NEED FOR POWER .....	1
1.1 Purpose of Action .....	1
1.2 Need for Power .....	1
1.3 Interventions .....	4
1.4 Scoping .....	4
1.5 Recommendations, Terms, and Conditions .....	6
2.0 PROPOSED ACTION AND ALTERNATIVES .....	6
2.1 Applicant's Proposal .....	6
2.1.1 Project Description and Operation .....	7
2.1.1.1 Big Creek System .....	7
2.1.1.2 Big Creek Number 4 .....	12
2.1.2 Proposed Environmental Measures .....	15
2.2 Modifications to Applicant's Proposal .....	16
2.2.1 Agency and Interested Party Recommendations .....	16
2.2.2 Staff's Alternative .....	19
2.2.3 Mandatory Requirements .....	20
2.3 No-Action .....	27
2.4 Alternatives Considered but Eliminated from Detailed Study .....	28
2.4.1 Federal Government Takeover of the Project .....	28
2.4.2 Issuing a Nonpower License .....	28
2.4.3 Retiring the Project .....	28
3.0 ENVIRONMENTAL CONSEQUENCES .....	29
3.1 General Locale .....	29
3.2 Cumulatively Affected Resources .....	30
3.2.1 Geographic Scope .....	30
3.2.2 Temporal Scope .....	31
3.3 Proposed Action and Alternatives .....	31
3.3.1 Water Quantity and Quality .....	31

3.3.1.1	Affected Environment	31
3.3.1.2	Environmental Effects and Recommendations	42
3.3.1.3	Cumulative Effects on Water Use	48
3.3.1.4	Unavoidable Adverse Effects	49
3.3.2	Fisheries Resources	49
3.3.2.1	Affected Environment	49
3.3.2.2	Environmental Effects and Recommendations	54
3.3.2.3	Cumulative Effects on Native Transition Zone Fish	64
3.3.2.4	Unavoidable Adverse Effects	65
3.3.3	Terrestrial Resources	65
3.3.3.1	Affected Environment	65
3.3.3.2	Environmental Effects and Recommendations	69
3.3.3.3	Unavoidable Adverse Effects	78
3.3.4	Federally Listed Threatened and Endangered Species	78
3.3.4.1	Affected Environment	78
3.3.4.2	Environmental Effects and Recommendations	79
3.3.4.3	Cumulative Effects on Central Valley Steelhead	82
3.3.4.4	Unavoidable Adverse Effects	83
3.3.5	Cultural Resources	83
3.3.5.1	Affected Environment	83
3.3.5.2	Environmental Effects and Recommendations	84
3.3.5.3	Unavoidable Adverse Effects	92
3.3.6	Recreation and Land Use	92
3.3.6.1	Affected Environment	92
3.3.6.2	Environmental Effects and Recommendations	101
3.3.6.3	Cumulative Effects on Whitewater Boating	129
3.3.6.4	Unavoidable Adverse Effects	130
3.3.7	Aesthetic Resources	130
3.3.7.1	Affected Environment	130
3.3.7.2	Environmental Effects and Recommendations	132
3.3.7.3	Unavoidable Adverse Effects	133
3.4	No-Action Alternative	133
3.5	Irreversible and Irrecoverable Commitment of Resources	134
3.6	Relationship between Short-term Uses and Long-term Productivity	134
4.0	DEVELOPMENTAL ANALYSIS	135
4.1	Power and Economic Benefits of the Project	135
4.2	Cost of Environmental Enhancement Measures	137
4.3	Comparison of Alternatives	141
4.4	Cumulative Effects on Hydropower Generation	142

4.5	Greenhouse Gas .....	143
5.0	<b>STAFF'S CONCLUSIONS .....</b>	<b>143</b>
5.1	<b>Comparison of Proposed Action and Alternative .....</b>	<b>143</b>
5.2	<b>Cumulative Effects Summary .....</b>	<b>150</b>
5.3	<b>Comprehensive Development and Recommended Alternative .....</b>	<b>152</b>
5.3.1	<b>Developing a Habitat and Land Use Management Plan .....</b>	<b>155</b>
5.3.2	<b>Measures Associated with Implementing an Adaptive Approach to Whitewater Boating Releases .....</b>	<b>157</b>
5.3.3	<b>Enhanced Recreational Use Monitoring .....</b>	<b>158</b>
5.3.4	<b>Revisions to the Existing Road Management Plan .....</b>	<b>159</b>
5.4	<b>Conclusions Regarding Access Roads and Project Boundaries .....</b>	<b>160</b>
5.5	<b>Fish and Wildlife Agency Recommendations .....</b>	<b>161</b>
5.6	<b>Consistency with Comprehensive Plans .....</b>	<b>162</b>
5.7	<b>Relationship of License Process to Laws and Policies .....</b>	<b>163</b>
5.7.1	<b>Section 401 of the Clean Water Act - Water Quality Certification .....</b>	<b>163</b>
5.7.2	<b>Coastal Zone Management Act .....</b>	<b>164</b>
5.7.3	<b>Section 18 of the Federal Power Act - Reservation of Authority to Require Fishways .....</b>	<b>164</b>
5.7.4	<b>Endangered Species Act .....</b>	<b>164</b>
6.0	<b>LITERATURE CITED .....</b>	<b>165</b>
7.0	<b>LIST OF PREPARERS .....</b>	<b>168</b>
8.0	<b>LIST OF RECIPIENTS .....</b>	<b>169</b>
<b>APPENDIX A COMMENTS ON THE BIG CREEK NO. 4 PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT .....</b>		<b>A-1</b>

## LIST OF FIGURES

Figure 1.	Big Creek No. 4 general project location	2
Figure 2.	Upper San Joaquin River Basin and Big Creek Hydropower System	8
Figure 3.	Schematic of Edison's Big Creek System	9
Figure 4.	Big Creek No. 4 project facilities	13
Figure 5.	Inflow to Redinger Reservoir	32
Figure 6.	Summary of flow data for San Joaquin River upstream of Willow Creek	34
Figure 7.	Summary of flow data for Willow Creek at mouth	35
Figure 8.	Summary of flow data for San Joaquin River downstream of Willow Creek	36
Figure 9.	Summary of flow data for Big Creek powerhouse No. 4	37
Figure 10.	Summary of flow data for San Joaquin River below Big Creek powerhouse No. 4	38
Figure 11.	Recreation opportunities in the vicinity of the Big Creek No. 4 project	93
Figure 12.	Recreation facilities in the Big Creek No. 4 project area	95
Figure 13.	Project area land jurisdictions	100
Figure 14.	Summary of staff's alternative whitewater release recommendation	114

## LIST OF TABLES

Table 1.	Edison's licensed projects in the Big Creek System .....	10
Table 2.	Sample storage targets for the Big Creek System for 1999 .....	11
Table 3.	Summary of Edison's proposed changes to lands within the Big Creek No. 4 project boundary. ....	14
Table 4.	Water temperatures and dissolved oxygen measurements in the project area, May 1995 and September 1994 .....	41
Table 5.	Species composition and relative abundance of fish collected in Redinger Reservoir, September 1995 .....	50
Table 6.	Fish distribution and relative abundance in the Horseshoe Bend reach of the San Joaquin River, 1985-6 and 1995 .....	52
Table 7.	Percentage of change in weighted usable area in the bypassed reach for selected species of fish .....	55
Table 8.	Potential effects and treatment recommendations for historic properties located in the Big Creek No. 4 Project area of potential effect .....	85
Table 9.	Summary of key parameters for economic analysis of the Big Creek No. 4 Project .....	136
Table 10.	Existing annual costs for the Big Creek No. 4 Project .....	137
Table 11.	Costs of non-energy-related measures for the Big Creek No. 4 Project .....	138
Table 12.	Energy benefit reduction associated with several whitewater boating release regimes (Source: Staff) .....	140
Table 13.	Summary of costs, power benefits, and net benefits for the Big Creek No. 4 Project alternatives .....	142
Table 14.	Summary of environmental effects associated with Edison's proposed action, staff's alternative to the proposed action, and no action .....	144

## ACRONYMS AND ABBREVIATIONS

ac-ft	acre-feet
Advisory Council	Advisory Council on Historic Preservation
AIR	Additional Information Request
Alliance	California Sportfishing Protection Alliance
APE	area of potential effect
Audubon	Yosemite Area Audubon
AWA	American Whitewater Affiliation
BC#4	Big Creek No. 4
BCS	Big Creek System
BMP	best management practices
Bureau	U.S. Bureau of Reclamation
CA Fish & Game	California Department of Fish & Game
Cal-ISO	California Independent System Operator
Cal Trout	California Trout Unlimited
CA/MX	California-Mexico Power Area
CDBW	California Department of Boating and Waterways
CDEC	California Data Exchange Center
CDWR	California Department of Water Resources
CEC	California Energy Commission
cfs	cubic feet per second
Commission Conservation Coalition	Federal Energy Regulatory Commission  A coalition of non-governmental organizations that includes: American Whitewater Affiliation; Friends of the River; and San Joaquin Paddlers; and for selected filings, Sierra Club (Tehipite Chapter); Yosemite Area Audubon; and Trout Unlimited
CRMP	cultural resource management plan
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DO	dissolved oxygen
EA	Environmental Assessment
Edison	Southern California Edison Company
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FOR	Friends of the River

FPA	Federal Power Act
fps	feet per second
FS	U.S. Forest Service
ft	feet
FWS	U.S. Fish and Wildlife Service
GWh	gigawatt-hours
IFIM	Instream Flow Incremental Methodology
Interior	U.S. Department of the Interior
kV	kilovolt
kWh	kilowatt-hour
MCL	maximum contaminant level
mg/l	milligram per liter
MOA	memorandum of agreement
MW	megawatt
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPS	National Park Service
PAC	Protected Activity Center
PG&E	Pacific Gas and Electric Company
Quail Unlimited	The Quail Unlimited Chapter of Fresno
REA	Ready for Environmental Analysis
ROW	right-of-way
RNA	Research Natural Area
SHPO	State Historic Preservation Officer
Sierra	Sierra Club Tehipite Chapter
SJP	San Joaquin Paddlers
SNF	Sierra National Forest
SPCC plan	spill prevention control and countermeasure plan
SWRCB	State Water Resources Control Board
Trail Council	San Joaquin Trail Council
TU	Trout Unlimited
μS/cm	microsiemens per centimeter
μg/l	micrograms per liter
USGS	United States Geological Survey
VQO	visual quality objective

VRP  
WBOC  
WSCC

visual resource plan  
whitewater boating oversight committee  
Western Systems Coordinating Council

## **EXECUTIVE SUMMARY**

This final Environmental Impact Statement (EIS) evaluates the potential effects on the environment associated with relicensing the Big Creek No. 4 (BC#4) Hydroelectric Project on the San Joaquin River in central California, including the beneficial and adverse effects on natural, cultural, recreational, developmental, and economical resources. The project partially occupies lands in the Sierra National Forest.

Specifically, issues addressed in this EIS are the potential effects of relicensing the BC#4 Project on: (1) water quantity and quality; (2) fisheries resources; (3) terrestrial resources; (4) cultural resources; (5) recreation and land use; and (6) aesthetic resources. We also analyzed the cumulative effects of the project on water use, native riverine fish, whitewater boating, and hydropower generation.

In this EIS, we, the Federal Energy Regulatory Commission (Commission) staff, evaluated the effects of three alternatives: (1) operating the project as proposed (the proposed action) by Southern California Edison Company (Edison); (2) operating the project as proposed by Edison with additional or modified measures, including measures to further protect, enhance, or mitigate adverse effects on environmental resources (the staff's alternative); and (3) continuing to operate the project with no changes or enhancements (the no-action alternative).

### **Proposed Action**

Edison proposes to continue operating the project in a peaking mode with the following environmental measures:

- Develop a sediment management plan to reduce sediment loading in the Horseshoe Bend reach of the San Joaquin River.
- Develop a native aquatic species management plan to enhance conditions and habitats for native warmwater fish species in the area, including monitoring fish populations and habitat conditions.
- Maintain a 3 cubic feet per second (cfs) minimum flow between the dam and the confluence of Willow Creek with the San Joaquin River, and maintain that quantity of water necessary to, with the water from Willow Creek, provide a flow of 20 cfs between the confluence and the powerhouse.

- Implement the proposed Transmission Line Right-of-Way (ROW) Habitat Management and Maintenance Plan, dated February 1997, to avoid or reduce minor disturbances to wildlife and botanical resources during project maintenance.
- Implement a memorandum of agreement implementing the project cultural resource management plan, as appropriate, for land within the project boundary of the new license.
- Assist in the completion of the San Joaquin Trail in the Redinger Reservoir area through acquisition or granting of an easement and providing labor to help with construction.
- Establish and maintain an Internet site and flow phone that would provide real-time and forecasted flow information pertaining to the bypassed reach.
- Provide safety signs, emergency telephone, and trash collection at Redinger Reservoir.
- In cooperation with the U.S. Forest Service (FS), support the completion of the boat ramp facility improvements at Redinger Reservoir.
- In consultation with the FS, improve the Horseshoe Bend Trail.
- Construct a general recreational river access trail near Willow Creek to improve access to the bypassed reach.
- Monitor boater use of the bypassed reach with a video camera at the powerhouse.
- Implement a Road Management Plan.
- Consult with the FS regarding appropriate colors to use when repainting project facilities, if necessary.

The implementation of these environmental measures would cost about \$81,100 a year, leaving the project with a net annual benefit of about \$13,484,600 or 30.7 mills/kilowatt-hour (kWh). The project would generate about 439.4 gigawatt-hours (GWh) of energy annually under Edison's proposal.

## **Staff's Alternative**

After evaluating Edison'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. The staff's alternative consists of the proposed action with these additional or modified environmental measures:

- Develop and implement a habitat and land use management plan for all project lands that incorporates appropriate components of Edison's Transmission Line ROW Habitat Management and Maintenance Plan; the overall plan would also include sedimentation and erosion control measures, a noxious weed management plan, a fire prevention and response plan, and a visual resource plan.
- Install a staff gage in the bypassed reach marked in 500 cfs increments that would be visible from the whitewater staging area near the confluence of Willow Creek.
- Develop a native aquatic species management plan with ecological monitoring during the first 5 years following plan development and approval by the Commission and at 5-year intervals thereafter, and submit a report to the Commission with recommendations pertaining to scheduled whitewater releases.
- Develop and implement a flow augmentation plan.
- Implement an adaptive management approach to scheduled whitewater boating releases.
- Conduct enhanced recreational use monitoring, including a boater preference survey.
- Update Edison's Road Management Plan to more clearly specify agency consultation, follow-up monitoring, and ownership and maintenance responsibilities for access roads that remain in the project boundary following license issuance.
- Include a reopener clause that would allow modification of flows to the bypassed reach, as needed, in accordance with the relicensing of the other projects in the Big Creek System.

The implementation of Edison's proposal with these additional or modified measures would cost about \$168,600 a year with single-day event scheduled whitewater releases and \$244,500 a year with three-day event scheduled whitewater releases, leaving the project with a net annual benefit of about \$13,397,100 (30.6 mills/kWh) and \$13,321,100 (30.5 mills/kWh), respectively. The project would generate an average of about 438.3 to 436.3 GWh of energy annually under the staff's alternative.

### **No-Action Alternative**

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental measures would be implemented. With an average generation of about 439.4 GWh, the existing project costs about \$4,010,300 annually to operate, has power benefits of about \$17,576,000, and has a net annual benefit of about \$13,565,700 or 30.9 mills/kWh.

Based on our independent review and evaluation of the proposed action and alternatives under sections 4(e) and 10(a) of the Federal Power Act, we recommend the staff's alternative because: (1) issuing a new license would allow Edison to operate the project as a beneficial and dependable source of electric energy for Edison and its customers; (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 use of the San Joaquin waterway, including producing electricity, while protecting and enhancing natural resource values and uses. Based on our findings, we recommend that a new license be issued for continued operation of the BC#4 Project.

## **1.0 PURPOSE OF ACTION AND NEED FOR POWER**

### **1.1 Purpose of Action**

On February 26, 1997, the Southern California Edison Company (Edison), filed an application for a new major license for the existing Big Creek No. 4 (BC#4) Hydroelectric Project.<sup>1</sup> The 98.8-megawatt (MW) project is located on the San Joaquin River in central California (figure 1). The project is located in Fresno, Madera, and Tulare counties, California, and partially occupies federal lands within the Sierra National Forest (SNF). The Federal Energy Regulatory Commission (Commission or FERC) must decide if it is going to issue a new license for the continued operation of BC#4, and what conditions should be placed on any license issued.

In this final Environmental Impact Statement (EIS), we, the Commission staff, assess: (1) continuing to operate the project as proposed by Edison; (2) operating the project as proposed by Edison with additional or modified environmental measures (i.e., Modification to Applicant's Proposal); and (3) continuing to operate the project with no changes or enhancements (the no-action alternative).

In deciding whether to issue any license, the Commission must determine that the alternative chosen would be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation, the protection, 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. This EIS reflects the above considerations.

### **1.2 Need for Power**

Edison is part of the California-Mexico Power Area (CA/MX) of the Western Systems Coordinating Council (WSCC). The CA/MX is a summer peaking region heavily dependent (43 percent of installed capacity) on gas-fired generation (NERC, 1998).

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<sup>1</sup> The original license for the project expired on February 28, 1999. The Commission issued a notice of authorization for continued project operation on March 5, 1999. The terms and conditions of the original license are continued under the annual license.

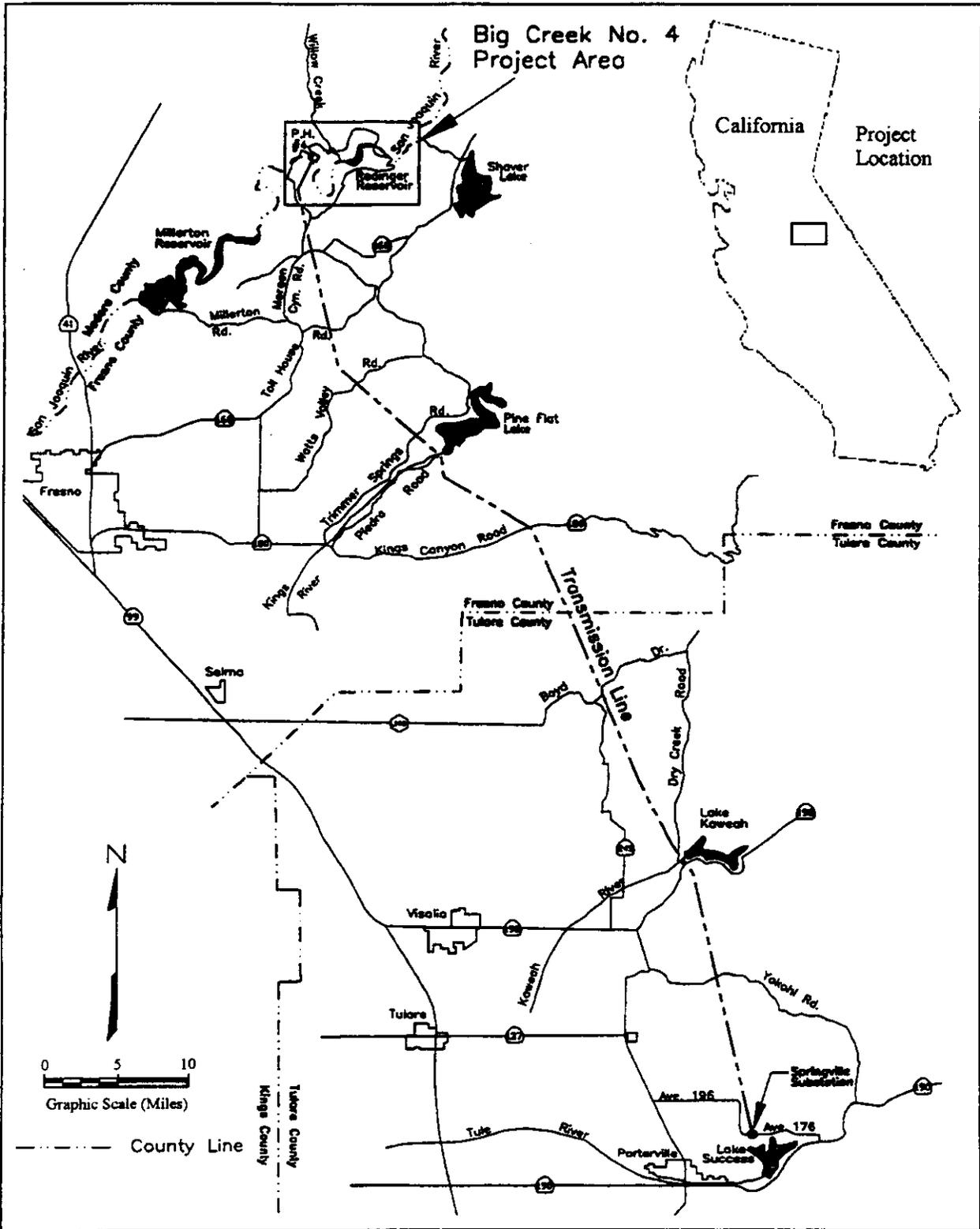


Figure 1. Big Creek No. 4 general project location (Source: Edison, 1997, as modified by staff).

The Edison system includes about 5,048 MW of generating capacity. The BC#4 Project has a dependable capacity of 94.2 MW and generates an average of 439.4 gigawatt-hours (GWh) of renewable energy annually.

Edison's service area covers approximately 50,000 square miles of coastal central and southern California with about 4.2 million commercial, industrial, agricultural, and residential customers. The 1999 summer peak demand in the Edison service area was 19,125 MW. Edison's forecasted peak load for the year 2000 was 19,800 MW and this is expected to rise to nearly 24,000 MW by 2010 (CEC, 2000). Edison must purchase the difference between its demand and its generating capacity from outside sources.

The California energy market was deregulated in 1998. Deregulation of the energy market has caused an ongoing restructuring of the electric industry. Much uncertainty exists regarding projections of future demands and planned capacity due to recent and ongoing restructuring of the electric industry in California. It is not known what effect this will have on Edison's portion of the generating capacity. Since deregulation was implemented, the California Independent System Operator (Cal-ISO) has controlled about 75 percent of the California Power Grid (FERC, 2000). California has experienced multiple electrical supply emergencies in the years 2000 and 2001. Over 30 stage 3 emergencies were declared by March 2001 (Cal-ISO, 2001).<sup>2</sup>

The projected annual increase in total load in the Cal-ISO control area is from 48,380 MW in 2000 to 56,104 MW in 2010, or an increase of 7,724 MW (Cal-ISO, 2001). During the same period, the California Energy Commission (CEC) forecasts an increase in capacity of 9,342 MW, taking into account retirements. Most of the new capacity additions will be either combined cycle or cogeneration technology (1998 WSCC Information Summary, [www.wsc.com](http://www.wsc.com), website accessed on February 15, 1999). Recent estimates forecast up to 29,900 MW of new capacity by 2006, excluding retirements (Cal-ISO, 2001). Based on these estimates, current reserve margins in the short run would not diminish and in fact may increase immediately after new plants are built. However, the BC#4 Project would continue to contribute to maintaining an adequate and resource-diverse capacity mix.

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<sup>2</sup> Stage 3 emergencies are declared when operating reserves are less than or equal to 1.5 percent of the combination of spinning and non-spinning total reserve requirements to reliably operate the Cal-ISO grid. Rolling blackouts have occurred during Stage 3 emergencies.

### 1.3 Interventions

On November 13, 1997, the Commission issued a public notice that requested filings for protests or motions to intervene. The following entities filed motions to intervene in this proceeding:

<u>Entity</u>	<u>Date of Letter</u>
California Sportfishing Protection Alliance (Alliance)	January 13, 1998
U.S. Forest Service (FS)	February 18, 1998
American Whitewater Affiliation (AWA), Friends of the River (FOR), San Joaquin Paddlers (SJP), Sierra Club Tehipite Chapter (Sierra), and Yosemite Area Audubon (Audubon)	February 19, 1998
North Fork Mono Tribe	February 19, 1998
California Department of Fish & Game (CA Fish & Game)	October 13, 2000
Trout Unlimited (TU)	November 6, 2000

See section 2.2.1 for a summary of issues raised by intervenors.

### 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 November 13, 1997, of our intent to prepare an Environmental Assessment (EA) for BC#4, concurrent with Scoping Document 1, which identified potential issues to be addressed in the EA. The notice also scheduled scoping meetings and a site visit.

We visited the project site on December 15, 1997, held two public scoping meetings in North Fork, California, on December 15, 1997, and Clovis, California, on December 16, 1997. The following entities (in addition to the intervenors listed in section 1.3) filed written comments in response to our November 13, 1997, notice:

<u>Entity</u>	<u>Date of Letter</u>
Sierra Club Tehipite Chapter (Sierra)	December 30, 1997
San Joaquin Trail Council (Trail Council)	December 30, 1997
U.S. Environmental Protection Agency (EPA)	January 26, 1998
The Quail Unlimited Chapter of Fresno (Quail Unlimited)	February 7, 1998
Southern California Edison Company (Edison)	February 17, 1998
California Trout Unlimited (Cal Trout)	February 18, 1998
National Park Service (NPS)	February 23, 1998

After we reviewed public and agency comments resulting from the initial scoping process, we determined that licensing the project could constitute a major federal action significantly affecting the quality of the human environment. Subsequently, on February 3, 1999, we issued a notice saying that we decided to prepare an EIS and that the scoping conducted in late 1997 still applies. In addition, the notice requested any additional comments that may result from our change from an EA to an EIS. The following entities filed comments in response to our February 3, 1999, notice:

<u>Entity</u>	<u>Date of Letter</u>
American Whitewater Affiliation (AWA), Friends of the River (FOR), and San Joaquin Paddlers (SJP)	March 5, 1999
Southern California Edison Company (Edison)	March 17, 1999

We prepared and distributed to agencies, interested parties, and the public, Scoping Document 2, also dated February 3, 1999, which identified the issues to be addressed in the EIS. We summarize issues and comments received from interested parties in section 2.2.1.

## 1.5 Recommendations, Terms, and Conditions

On April 18, 2000, 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]). The entities who commented and the dates of their comments are listed below.

<u>Entity</u>	<u>Date of Letter</u>
American Whitewater Affiliation (AWA), Friends of the River (FOR), and San Joaquin Paddlers (SJP) and Trout Unlimited (TU) <sup>3</sup>	June 12, 2000
U.S. Forest Service (FS)	June 15, 2000

All comments become part of the record and are considered during the staff's analysis of the proposed action. We summarize their comments and recommendations in section 2.2.1.

## 2.0 PROPOSED ACTION AND ALTERNATIVES

### 2.1 Applicant's Proposal

Edison proposes to continue operating the project with no modifications in project operation and several non-operational measures to enhance the environment. The

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<sup>3</sup> These groups are collectively known as the "Conservation Coalition." References to the Conservation Coalition membership have changed over time. The original intervention included AWA, FOR, SJP, Sierra, and Audubon. In subsequent filings, AWA, FOR, and SJP are always included. The comments received from scoping also include Audubon. Comments on the change to the EIS do not include anyone else. Finally, the REA comments include TU.

following sections describe the existing project features and current project operations, and highlight the changes Edison proposes for relicensing.

## **2.1.1 Project Description and Operation**

### **2.1.1.1 Big Creek System**

The Big Creek System (BCS) is an integrated operation consisting of nine major powerhouses, six major reservoirs, various conveyance facilities, access roads, electrical transmission facilities, and appurtenant facilities (figures 2 and 3). The system is authorized under seven Commission licenses, all of which are operated together to maximize the value of hydropower produced from the available water supply (table 1).

In a typical year, the projects are run at full capacity beginning anywhere from mid-April to mid-May until the end of peak runoff, which typically occurs by the end of July. At that point Edison gains control of inflows and begins managing the water to meet grid requirements. Both baseload and peak cycling demands are met by the projects. The projects are subject to several operating constraints including:

- (1) minimum instream flow requirements;
- (2) minimum reservoir elevations at certain locations;
- (3) downstream water rights;
- (4) water management agreements (most notably the Mammoth Pool Agreement); and
- (5) memoranda of agreement (MOA) with CA Fish & Game and U.S. Fish and Wildlife Service (FWS), specifying instream flow releases in the BCS.

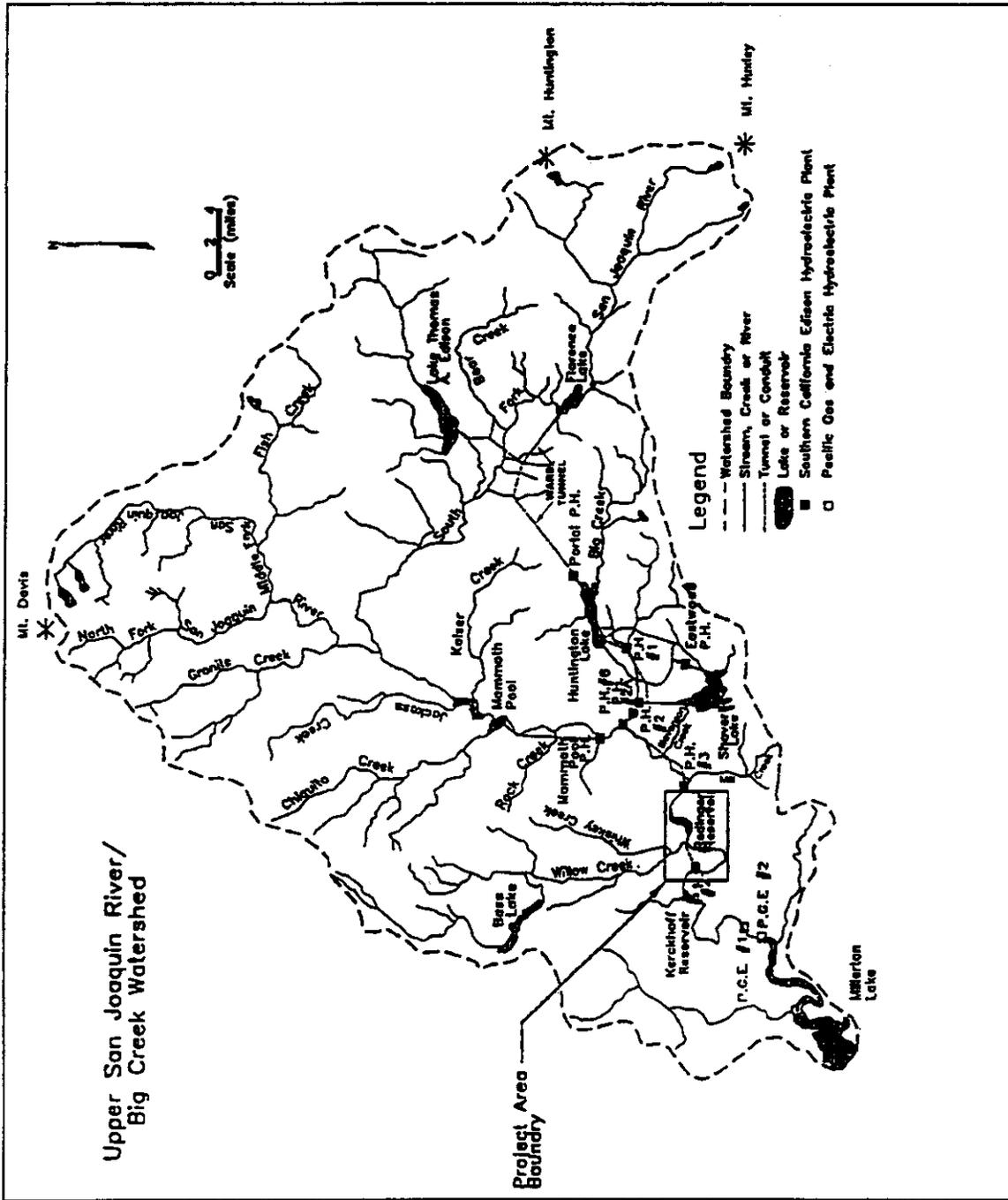
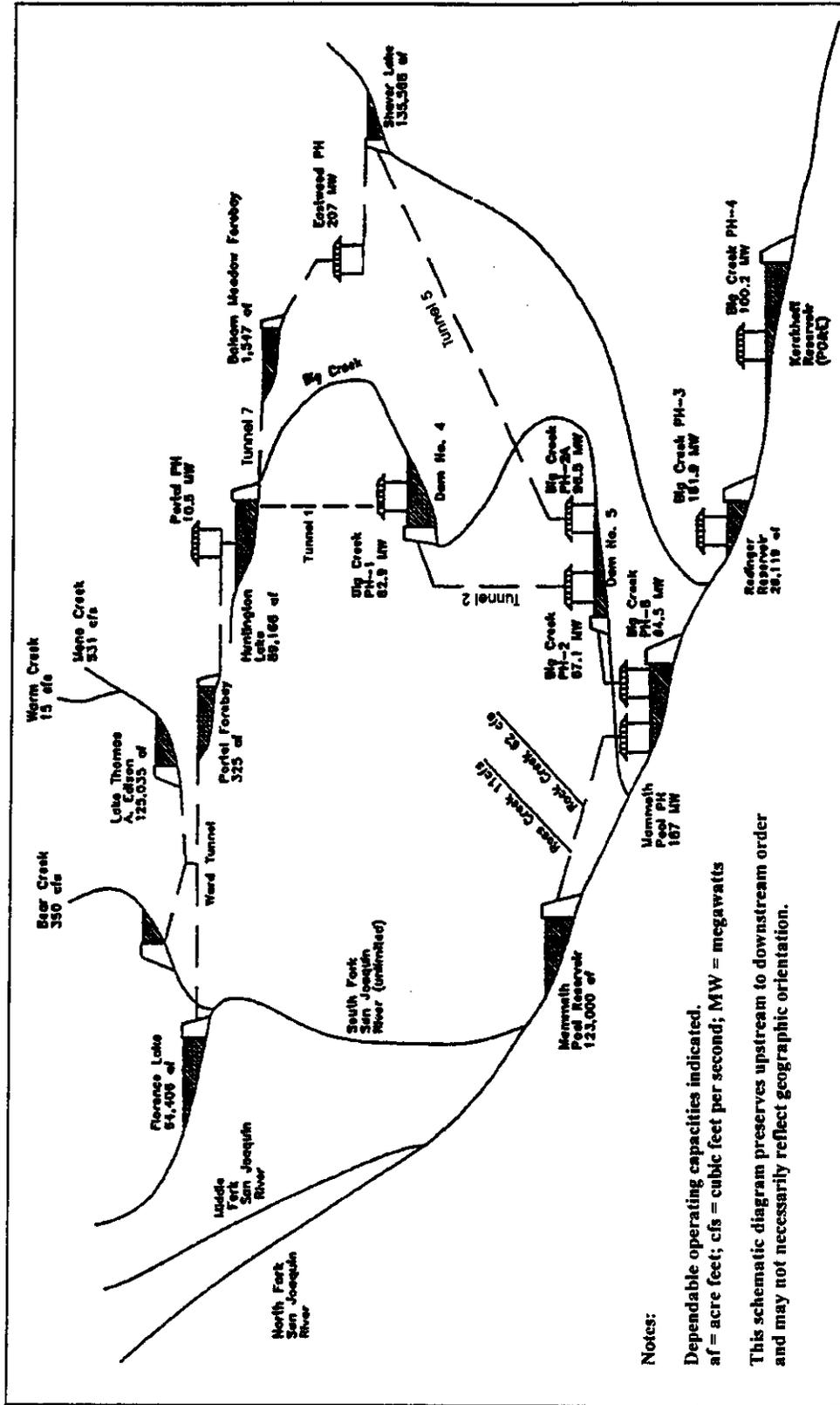


Figure 2. Upper San Joaquin River Basin and Big Creek Hydropower System (Source: Edison, 1997, as modified by staff).



**Notes:**

Dependable operating capacities indicated.

af = acre feet; cfs = cubic feet per second; MW = megawatts

This schematic diagram preserves upstream to downstream order and may not necessarily reflect geographic orientation.

Figure 3. Schematic of Edison's Big Creek System (Source: Edison, 1997, as modified by staff).

Table 1. Edison's licensed projects in the Big Creek System (Source: FERC, 1992, and Edison, 1999a, as modified by staff).

Project name (FERC Project No.)	License expiration date (month/day/year)	Dependable <sup>a</sup> operating capacity (MW)	Average annual generation (GWh)
Big Creek No. 4 (No. 2017) (Redinger Reservoir)	2/28/99	100.2	439
Vermillion Valley (No. 2086) (Lake Thomas Edison)	8/31/03	0	0
Portal (No. 2174) (Florence Lake)	3/31/05	10.5	51
Mammoth Pool (No. 2085)	11/30/07	187.0	546
Big Creek No. 3 (No. 120)	2/28/09	181.9	1,275
Big Creek Nos. 1 (Huntington Lake) & 2 (Shaver Lake) (No. 2175)	2/28/09	82.9 67.1	656 451
Big Creek 2A	2/28/09	98.5	391
Big Creek 8		64.5	337
Eastwood Pumped Storage (No. 67)		207.0	Not applicable

\* Edison defines "dependable operating capacity" as "...the capacity that may be available for system use from the individual resources listed under favorable conditions. Where common facilities are shared between units, capacity ratings should be based on the Company's operating experience and exclude capacity associated with auxiliary, house and fishwater turbine-generators, and emergency engine-generators." This is different from how the Commission defines "dependable capacity."

A primary driver of the BCS operation is designated storage targets (table 2). The goal is to have all six major reservoirs filled to their maximum target elevation by July. Florence Lake is filled to capacity and maintained at that level generally through August 1 and then drawn down considerably by October 1. Typical flows from Florence Lake into the Ward Tunnel are 1,100 cubic feet per second (cfs). No diversion is made from Lake

Edison into the Ward Tunnel unless needed to prevent Florence Lake from being drawn down below target levels. The Ward Tunnel delivers water to the Portal powerhouse. Additional water may enter the tunnel from either the Mono Diversion or Bear Diversion located downstream from Lake Edison. Water from Lake Edison is used to maintain Huntington Lake target elevations. Lake Edison is drawn down from July 1 through October 1.

Table 2. Sample storage targets for the Big Creek System for 1999 (Source: Edison, 1999b).

Reservoir	Total Storage (ac-ft)	July 1st (ac-ft)	August 1st (ac-ft)	September 1st (ac-ft)	October 1st (ac-ft)
Edison	125,035	111,000	97,000	73,000	50,000
Florence	64,406	60,000	60,000	28,000	5,000
Huntington	89,166	88,000	88,000	88,000	82,000
Shaver	135,568	134,000	122,000	134,000	130,000
Mammoth	119,940	112,000	115,000	52,000	35,000
Redinger	26,119	25,000	23,000	25,000	23,000

Huntington Lake is maintained at full pond through Labor Day. Huntington Lake water can be delivered by two different flow lines. It can drop over 2,100 feet (ft) into Big Creek powerhouse No. 1 (No. 2175) or drop 1,700 ft through the Eastwood powerhouse into Shaver Lake. Eastwood (No. 67) is a pumped storage project, so water can be recycled through the 207 MW facility several times. Water from Big Creek No. 1 discharges water to Big Creek powerhouse No. 2 (No. 2175), which provides an additional drop of 1,900 ft.

By reducing flows (2 hours per day) through Eastwood powerhouse, storage in Shaver Lake can be drawn down to 120,000 acre-feet (ac-ft) by August 1 in order to have sufficient room to accommodate higher Eastwood powerhouse flows in the month of August. Shaver Lake provides water to Big Creek powerhouse 2A (No. 67). Both Big Creek powerhouse Nos. 2 and 2A are located on the same pond and provide water to Big Creek No. 8 powerhouse (No. 67) after dropping 800 ft.

Mammoth Pool provides water through an eight-mile-long tunnel to Mammoth Pool powerhouse (No. 2085) after dropping 1,100 ft. Mammoth Pool is filled to its

maximum capacity until spill ceases. Powerhouse releases are then matched to reservoir inflows except for strategic releases to eliminate predicted spills.

Both Mammoth Pool and Big Creek powerhouse No. 8 are located on the same pond (formed by Dam No. 6) which in turn discharges to Big Creek powerhouse No. 3. Big Creek powerhouse No. 3 discharges into Redinger Reservoir of the BC#4 Project.

#### **2.1.1.2 Big Creek Number 4**

The existing BC#4 Project consists of: (1) a 248.5-foot-high concrete dam (known as Dam No. 7), impounding a 35,033-acre-foot reservoir (Redinger Reservoir); (2) a combination penstock/pressure tunnel about 11,770-foot-long; (3) one powerhouse with a total installed capacity of 98.8 MW; (4) a bypassed river reach totaling about 6.3 miles (known as Horseshoe Bend, most of which is not within the project boundary, but influenced by project operation); (5) a 10-mile-long communication cable between the BC#4 and Big Creek No. 3 powerhouses; and 6) appurtenant facilities (figure 4). The existing and proposed project would operate to provide maximum generation during peak demand periods, and it would generate about 439.4 GWh of energy annually. Under the current peaking mode, the project typically generates more during the daylight hours and more during weekdays when inflow to the project is limited. During a portion of the spring and early summer, the project may operate at the hydraulic capacity of the powerhouse, because inflow equals or exceeds that capacity.

Redinger Reservoir is maintained at its storage targets until October 1. Flows from the BC#4 powerhouse discharge into the San Joaquin River. Pacific Gas and Electric Company's (PG&E's) Kerckhoff Reservoir Project (FERC No. 96) is located downstream. Water from the Kerckhoff Project eventually flows into Millerton Reservoir which is operated by the U.S. Bureau of Reclamation (Bureau). Water is stored in Millerton Reservoir for eventual release through the Friant-Kern and Friant-Madera canals to provide irrigation in the San Joaquin Valley. Currently, all conservation water in Millerton Reservoir is used, and drawdown of the Millerton Reservoir to its minimum conservation level occurs every year (Bureau, 2000).

Approximately 1,325 acres of land under the jurisdiction of the FS (SNF) are within the boundaries of the existing BC#4 Project. Edison proposes to reduce the project boundary to exclude about 716 acres of lands of the United States that are not necessary for the operation and maintenance of the project. About 123 acres of this land is SNF land associated with transmission lines that Edison requested be removed from the project. On March 9, 2001, the Commission issued an Order Amending License that removed from the project license the 132.5-mile-long transmission line from the BC#4

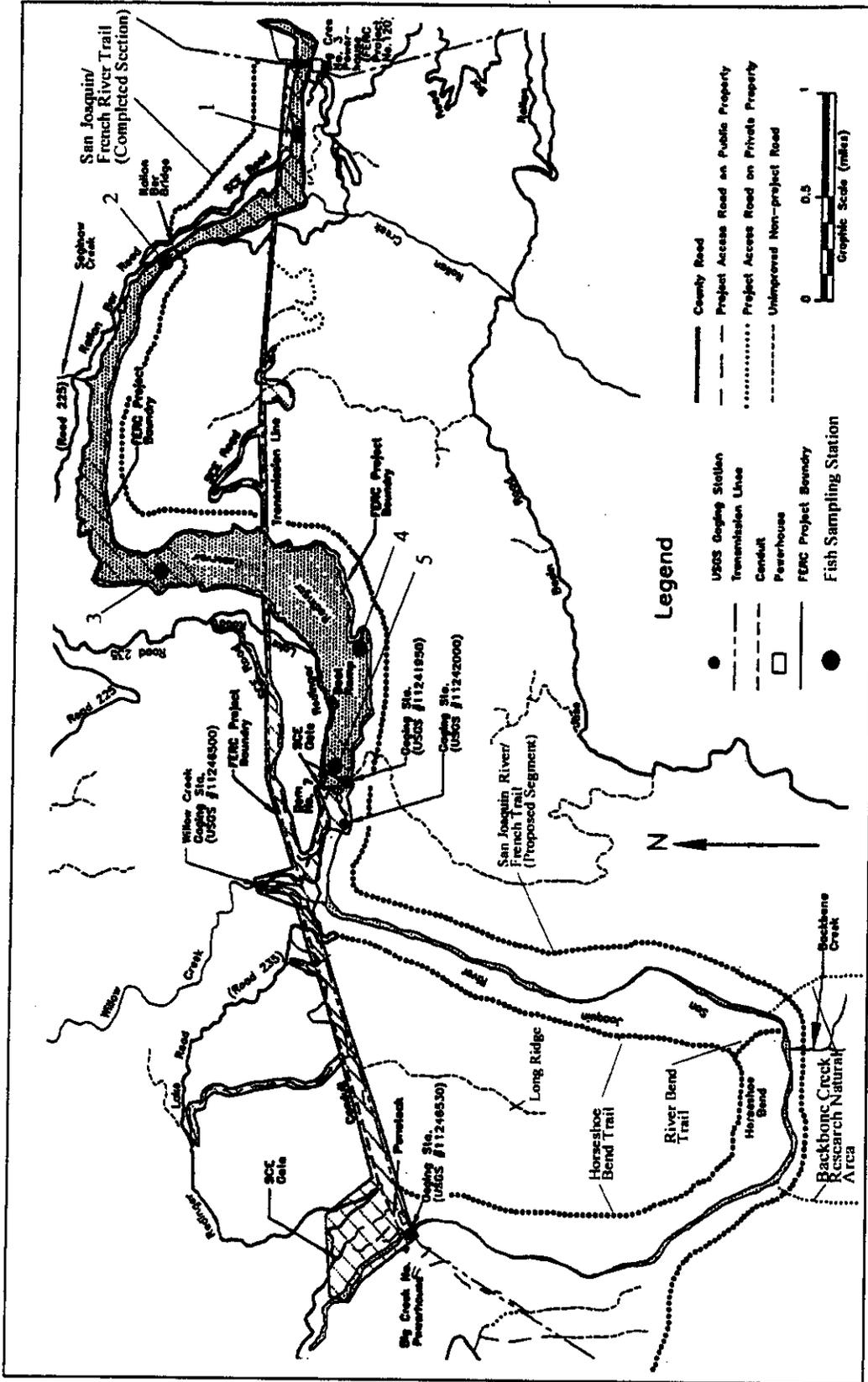


Figure 4. Big Creek No. 4 project facilities (Source: Edison, 1997, as modified by staff).

switchyard to the Magunden Substation, and the 5.7-mile-long transmission line from the BC#4 switchyard to the Big Creek No. 3 switchyard (94 FERC ¶62,202). Edison's January 10, 2000, application to amend its license requested that access roads associated with these transmission lines also be removed from the project license and that the project boundary be modified to reflect the removal of the transmission lines and other land not necessary for project purposes. The Commission's March 9, 2001, order provided for the deletion of acreage associated with the transmission lines. Deletion of the 123 acres of federal land, associated with the transmission lines, is contingent on Edison receiving all necessary permits and approvals for the continued use of federal land. Estimates of federal and non-federal land that Edison requests be removed from the project boundary are presented in table 3. The Commission's March 9, 2001, order defers to this relicensing proceeding action on Edison's request to remove project access roads from the project license and modify the project boundary to eliminate the 594 acres not associated with transmission lines. We summarize our conclusions regarding access roads and project boundaries in section 5.4.

Table 3. Summary of Edison's proposed changes to lands within the Big Creek No. 4 project boundary (Sources: Edison, 1997; letters from Edison to the Commission, dated February 17, 1998, and November 8, 2000; and the staff).

	Non-transmission line land (acres)		Transmission line land (acres)		Total (acres)	
	Proposed for removal	Proposed to be retained	Proposed for removal	Proposed to be retained	Proposed for removal	Proposed to be retained
Federal land	592	609	123	0	716	609
Non-federal land <sup>a</sup>	2	9	2,015	0	2,017	9

<sup>a</sup> Edison did not provide estimates of the non-federal land proposed for removal from the project boundary; we estimated these acreages based on our review of Edison's maps of the existing and proposed project boundaries, and designated transmission line right-of-way (ROW) widths; our estimates should be considered approximate.

The majority of federal land that Edison proposes to have deleted from the project boundary (592 acres) is in proximity to Redinger Reservoir. Edison proposes to reduce the buffer zone to 7 ft above the 1,403-foot-high water elevation (which generally equates

to a horizontal distance of about 200 ft) and the site of former employee housing at the powerhouse (which is no longer needed or standing). Access roads to project facilities would remain in Edison's proposed project boundary.

### **2.1.2 Proposed Environmental Measures**

Edison proposes to operate the project as described above, with the following environmental measures:

- Develop a sediment management plan including mapping the watershed adjacent to the bypassed reach, identifying potential sediment sources, and developing and implementing appropriate stabilization measures.
- Develop a native aquatic species management plan to include monitoring fish populations and habitat conditions. This plan may include identification of limiting factors for native warmwater fish species in the bypassed reach, such as duration, frequency, and volume of sediments suspended and deposited in the reach; amount and quality of spawning habitat in the reach; the availability of adequate types and amount of food; sufficient frequency, duration, and volume of flow in the reach; and water temperature.
- Maintain a 3-cfs minimum flow between the dam and the confluence of Willow Creek with the San Joaquin River, and maintain that quantity of water necessary to, with the water from Willow Creek, provide a flow of 20 cfs between the confluence and the powerhouse.
- Implement the proposed Transmission Line ROW Habitat Management and Maintenance Plan, dated February 1997, which includes Edison's Endangered Species Alert Program, Edison's Raptor Protection Program, and the FS's policy on noxious weed management.
- Implement an MOA and cultural resource management plan (CRMP).
- Assist in the completion of the San Joaquin Trail in the Redinger Reservoir area through acquisition or granting of an easement and providing labor to help with construction.
- Establish and maintain an Internet site and flow phone that would provide real-time and forecasted flow information pertaining to the bypassed reach.

- Provide safety signs at Italian Bar Bridge, boat ramp, and camping areas, solar-operated emergency telephones near the overflow parking and camping areas, speed limit signs at the boat launch, and trash collection at Redinger Reservoir.
- In cooperation with the FS, support the completion of the boat ramp facility improvements at Redinger Reservoir (completed).
- In consultation with the FS, improve the Horseshoe Bend Trail to correct drainage problems, provide enhanced access, and improve dispersed recreational opportunities.
- Construct a general recreational river access trail near Willow Creek to improve access to the bypassed reach.
- Monitor boater use of the bypassed reach with a video camera at the powerhouse.
- Implement a Road Management Plan.
- Consult with the FS regarding appropriate colors to use when repainting project facilities, if necessary.

## **2.2 Modifications to Applicant's Proposal**

### **2.2.1 Agency and Interested Party Recommendations**

Commission regulations require applicants to consult with the appropriate resource agencies before filing a hydropower license or relicense application. This consultation is required to comply with the Fish and Wildlife Coordination Act, the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and other federal statutes. Prefiling consultation must be completed and documented in accordance with the Commission's regulations.

The following is a summary of the comments received during the scoping process of the BC#4 Project and any specific concerns or recommendations provided by intervenors and other commenting parties.

The **Alliance** is a statewide non-governmental organization that advocates on behalf of sportfishing. The Alliance is primarily interested in considerations relating to the protection of gamefish and enhancement of recreational opportunities. The Alliance recommends a cumulative analysis of the BCS, development of a fire prevention corridor

plan, the institution of whitewater boating flows, a minimum flow release from the dam of 60 percent of the average mean runoff, and public access to all project roads.

The FS is responsible for the management of the SNF and is primarily interested in issues related to the protection of cultural, aesthetic, natural, and land use resources.

**AWA, FOR, SJP, and Audubon** recommend a cumulative analysis of the BCS, analysis of a range of minimum flow alternatives, consideration of sensitive reptiles and amphibians, development of a comprehensive recreation and land management plan, and regularly scheduled annual whitewater releases.

The **North Fork Mono Tribe** opposes the relicensing of the BC#4 Project based on its claim that it still retains aboriginal sovereignty water rights. The North Fork Mono Tribe is interested in assistance from Edison in the curation of artifacts and the provision of power to tribal families currently without power.

**CA Fish & Game** is interested in the effects of the amount and scheduling of flows to the bypassed reach on native fish and wildlife. Determination of flow discharges and the amounts and scheduling of flow discharges must protect fish, wildlife, habitat, and recreational resources. It supports the continued development of the native aquatic species management plan.

**TU** is interested in the effect of various flows below the BC#4 dam on the health of aquatic species.

**Sierra** is primarily concerned with the Horseshoe Bend Trail. Its concerns deal with trail maintenance and access to the trail within the project boundary.

The **Trail Council** is concerned with completing the San Joaquin River Trail in the vicinity of the project.

**Quail Unlimited** supports the proposed protection and enhancement measures. It is most concerned with access and improvements to the recreation facilities at Redinger Reservoir.

**EPA** recommends a cumulative analysis of the BCS. EPA supports a single license for the entire system.

**NPS** supports a watershed approach to all analyses and recommends that recreation and land use issues be addressed in a comprehensive recreation and land management plan.

**Cal Trout** supports a watershed level analysis of effects on hydrology, macroinvertebrates, and fish populations.

**Edison** provided comments in response to comments provided by other parties.

The following is a summary of responses to the Commission's decision that the relicensing could constitute a major action significantly affecting the quality of the human environment thus requiring an EIS.

**AWA, FOR, and SJP** commend the Commission for its decision. They encourage the Commission to expand the cumulative analysis to include water quality, water rights, aquatic reptiles and amphibians, riparian vegetation, threatened and endangered species, and land use.

**Edison** disagrees with the Commission's decision. It believes that the EIS is not justified by prior Commission policy or necessitated by the National Environmental Policy Act (NEPA) due to the lack of unmitigated environmental effects. It further believes that a cumulative analysis is unnecessary.

The following is a summary of comments, recommendations, and terms and conditions received in response to the Commission's REA notice.

**AWA, FOR, SJP, and TU** recommend a recreational whitewater release schedule and the inclusion of accessible, real-time flow information as a license condition. They also recommend including BC#4 in an alternative relicensing proceeding encompassing four upstream projects. Their recommendation in regard to a cumulative analysis is reiterated as well.

**FS** recommends a variety of conditions for the license. Among its recommendations are specific minimum flow requirements, the development of specific recreation facilities, whitewater recreation flows and a cumulative effects analysis. It also recommends the development of the following plans: native aquatic species management; recreational resources; visual resources; fire prevention and response; transmission line corridor habitat management and maintenance; sediment management; noxious weed management; hazardous substance; and cultural resources management.

In this EIS we address the environmental concerns raised by intervening and commenting parties.

### **2.2.2 Staff's Alternative**

After evaluating Edison's proposal and recommendations from resource agencies and other interested parties, we considered what, if any, additional protection or enhancement measures would be necessary or appropriate with continued operation of the project. The staff's alternative consists of the proposed action (section 2.1.2) with these additional or modified environmental measures.

- Develop and implement a habitat and land use management plan for all project lands that incorporates appropriate components of Edison's Transmission Line ROW Habitat Management and Maintenance Plan (erosion and sedimentation control measures, the Endangered Species Alert and Environmental Training programs, and the FS's policy on noxious weed management incorporated into a noxious weed management plan); the overall plan would also include a fire prevention and response plan, and a visual resource plan (VRP).
- Install a staff gage in the bypassed reach marked in 500 cfs increments that would be visible from the whitewater staging area near the confluence of Willow Creek.
- Develop a native aquatic species management plan with ecological monitoring during the first 5 years following plan development and approval by the Commission and at 5-year intervals thereafter, and submit a report to the Commission with recommendations pertaining to scheduled whitewater releases.
- Develop and implement a flow augmentation plan.
- Implement an adaptive management approach to scheduled whitewater boating releases.
- Conduct enhanced recreational use monitoring, including a boater preference survey.
- Update Edison's Road Management Plan to more clearly specify when agencies would be consulted regarding proposed erosion and sedimentation control measures, how post-implementation monitoring would be addressed, and ownership and maintenance responsibilities for access roads that remain in the project boundary following license issuance.

- **Include a reopener clause that would allow modification of flows to the bypassed reach, as needed, in accordance with the relicensing of the other projects in the BCS.**

For each of these measures (and those proposed by Edison and other entities) we:  
(1) **analyze them in the appropriate Environmental Consequences section(s), section 3.0;**  
(2) **assess their economic effects in Developmental Analysis, section 4.0; and (3) tell why we chose them in Staff's Conclusions, section 5.0.**

### **2.2.3 Mandatory Requirements**

Because the project occupies lands of the SNF, the FS has authority to impose conditions under Section 4(e) of the FPA. The FS provided revised license conditions on October 15, 2001. The FS intends to provide final 4(e) conditions within 90 days after the issuance of our final EIS. The FS revised Section 4(e) conditions filed in October 2001, would require Edison to do the following:

- (1) **Obtain FS approval for all final design plans for project components FS deems as affecting or potentially affecting National Forest System resources (administrative);**
- (2) **Obtain FS approval for making any changes in the location of project features or facilities, or in the use of project land or waters, or any departure from the requirements of any approved exhibits filed with the Commission (administrative);**
- (3) **Consult with FS each year regarding measures needed to ensure protection and development of the project area's natural resource values (administrative);**
- (4) **Maintain a year-round minimum flow of 3 cfs in the bypassed reach downstream of the BC#4 dam and 20 cfs in the bypassed reach downstream of the confluence of Willow Creek (our recommendations are consistent with this condition);**
- (5) **Develop and implement a native aquatic species management plan within 1 year of license issuance designed to determine whether project operations affect the native aquatic species within the bypassed reach; assure that flows continue to be beneficial to those native aquatic species identified as key species of concern; and identify opportunities to maintain or enhance habitat conditions for native aquatic species in the bypassed reach, Willow Creek, and other tributaries to the San Joaquin River within the project area, and collect data during the first 5 years from license issuance that would allow a recommendation to be made regarding the**

restoration of whitewater opportunities, as proposed in condition 9 (our recommendations are similar to this condition although we recommend that monitoring occur during the first 6 years from license issuance, since the first year would be spent developing the management plan and its monitoring component);

- (6) Before taking actions to construct, operate, or maintain the project (including proposed recreational facilities) that may affect a FS sensitive species or its habitat, prepare a Biological Evaluation that assesses the potential effect of the action on the species or its habitat and submit it to the FS for approval; before taking actions to construct, operate, or maintain the project (including proposed recreational facilities) that may affect a species proposed for listing or listed under the federal ESA or that may affect that species' critical habitat, Edison shall prepare a Biological Assessment and submit it to the FS prior to being submitted to the Commission and either FWS or the National Marine Fisheries Service (NMFS) (the native aquatic species management plan, referenced in item 5, and our recommended habitat and land use management plan should provide sufficient information for Edison to prepare any needed Biological Evaluations for FS sensitive species; we consider this EIS to represent the Biological Assessment for federally listed species that may be influenced by the proposed relicensing of the BC#4 Project; we consider our recommendations to be consistent with this condition);
- (7) Conduct a recreational survey and prepare a report summarizing the results of the survey, consistent with the Commission's regulations, once every 6 years beginning in October 2002, and provide the report to the FS prior to being submitted to the Commission (our recommendations are consistent with this condition);
- (8) Provide the following recreation-related amenities:
  - (a) two toilets for the overflow parking area used as an informal camping area (one has already been installed), one toilet at the boat launch (already installed), chip seal the access road to the boat launch, plant at least 10 trees, and install two concrete picnic tables near the boat launch (our recommendations are consistent with this condition);
  - (b) relocate the Horseshoe Bend Trail around the powerhouse, reconstruct the remainder of the existing trail to reduce the potential for erosion and sedimentation, and install appropriate directional signs to direct the public to the trailheads and ensure that the trail can be followed (our

recommendations pertaining to Edison creating and implementing a VRP, now a part of our recommended habitat and land use management plan, would accommodate relocation of the trail in the vicinity of the powerhouse; we conclude that the FS's other recommendations pertaining to the entire Horseshoe Bend Trail, although needed, cannot be specifically included in any new license for this project because we have not been able to establish a nexus of this trail to project operations; however, we encourage Edison to implement these remaining trail improvements; during a December 19, 2001, teleconference, the FS clarified that it intends for Edison to reconstruct only that part of the trail from the powerhouse to the western terminus of the trail to accommodate the powerhouse trail relocation);

- (c) install an emergency telephone near the boat launch (our recommendations are consistent with this condition);
- (d) post speed limit signs at the boat launch facility and at various locations around Redinger Reservoir to discourage excessive boating speeds (our recommendations are consistent with this condition);
- (e) install signs at Italian Bar Bridge to discourage people from jumping off the bridge into Redinger Reservoir (our recommendations are consistent with this condition);
- (f) install signs at the public boat launch and the overflow parking area informing boaters of safe boating practices (our recommendations are consistent with this condition);
- (g) establish and maintain a trash collection service at the recreational facilities adjacent to Redinger Reservoir (our recommendations are consistent with this condition); and
- (h) construct a general recreational pedestrian access trail beginning near the junction of County Road 235 and Willow Creek and ending at the San Joaquin River near its confluence with Willow Creek (our recommendations are consistent with this condition).

Edison shall be responsible for maintenance, repair, and major rehabilitation of project-related recreational facilities (our recommendations are consistent with this condition);

- (9) Implement the following measures pertaining to whitewater boating flows:
- (a) Beginning during the sixth year from license issuance, provide scheduled flow releases of 1,200 cfs from 9:30 a.m. to 1:00 p.m. on one to three, 3-day weekends (Friday, Saturday, Sunday) depending on water year type according to the following schedule:
- Wet years:
    - ▶ Two, 3-day weekends, the 1<sup>st</sup> and 2<sup>nd</sup> weekend following complete cessation of spill for a minimum of 4 days
  - Above normal years:
    - ▶ One, 3-day weekend, the 1<sup>st</sup> weekend following complete cessation of spill for a minimum of 4 days
  - Critical dry, dry, and below normal years:
    - ▶ One, 3-day weekend to occur on Memorial Day weekend, middle of June, and the July 4<sup>th</sup> weekend

The FS provides for modifications to this schedule, based on recommendations of the whitewater boating oversight committee (WBOC) that arise from ecological studies, following approval by the FS and Commission. The above release schedule describes the maximum release days. Releases will start with one day (Saturday) per weekend, with the additional days added in the subsequent year, if use exceeds 40 boats a day (1 raft will count as 2 boats, 1 kayak as 1 boat). A minimum of one day per weekend will be provided, however, the other two days will be deleted from the flow schedule if use falls below 20 boats a day (although, we agree that scheduled releases should be based on the monitoring specified in condition 5, we consider it premature to refine scheduled release conditions without supporting ecological data; we will ask the FS to consider our recommendation in developing its final Section 4(e) conditions);

- (b) when Redinger Reservoir is spilling, augment spill so that flows do not fall below 1,200 cfs in the project reach during the period of spill, on weekend days (Friday, Saturday, and Sunday), between 9:30 a.m. and 1:00 p.m., between Memorial Day weekend through the July 4<sup>th</sup> weekend or until spill

- has ceased, whichever comes soonest (our recommendations are consistent with this condition);
- (c) ramping rates will initially be 150 cfs/hour up and 100 cfs/hour down; (our recommendations are consistent with this condition; these rates would be evaluated within the monitoring specified in condition 5 to determine if they are adequate);
  - (d) establish an Internet site and flow phone to provide real time flow data including the previous 7 days and scheduled whitewater flow release dates, to be forecasted by April 15 and updated weekly (our recommendations are consistent with this condition);
  - (e) construct a general recreational river access trail near the junction of County Road 235 and Willow Creek and ending at the San Joaquin River near its confluence with Willow Creek; the trail will be designed to protect sensitive resources and suitable for carrying a 14 foot raft to the river (as indicated under condition 8(h), our recommendations are consistent with this condition); and
  - (f) monitor recreation use annually from May 1 through August 31 through on-site boat counts or video; if video is used, the accuracy of the system will need to be verified initially by on-site boat counts; monitoring shall be done by using a stratified random sampling design (our recommendations are consistent with this condition);
- (10) Prepare a transportation system management plan for protection and maintenance of project roads lands within 1 year of license acceptance (our recommendations are consistent with this condition);
  - (11) Prepare a VRP for protection and rehabilitation of visual resources on National Forest System lands affected by the project within 1 year of license acceptance (our recommendations are consistent with this condition);
  - (12) Prepare a fire prevention and response plan within 1 year of license acceptance (our recommendations are consistent with this condition);
  - (13) Prepare a transmission line corridor habitat management and maintenance plan within 1 year of license acceptance (the Commission has approved the deletion of all but 375 ft of transmission lines from the project; our recommended habitat and

land use management plan, which applies to all lands remaining within the project boundary, is consistent with this condition);

- (14) Prepare a sediment management plan within 6 months of license acceptance that is designed to reduce project-induced sediment delivery into the Horseshoe Bend reach within the project area that includes the following:
  - (a) identification of sediment sources, including causes of sedimentation from Willow Creek, the toe of Long Ridge, and Backbone Creek, and delineation of opportunities for controlling and stabilizing problem areas;
  - (b) definition of management measures and procedures designed to reduce sediment movement and delivery to the San Joaquin River; and
  - (c) a schedule for implementation of the identified stabilization projects, effectiveness monitoring within 3 years of completion of the stabilization measures, and a maintenance schedule for completed stabilization projects, as necessary.

Edison shall be responsible for completing the identified stabilization projects identified as project-induced (our recommended habitat and land use management plan would require Edison to identify and stabilize sources of sedimentation that are within the project boundary and related to project operations; however, the FS identified sources of sedimentation are outside the project boundary and not related to project operation; Edison has agreed to work with the FS to help identify sources of sediment to the bypassed reach; we can only recommend that Edison identify and correct sedimentation sources related to project operation);

- (15) Prepare a noxious weed management plan for controlling and containing the spread of noxious weeds within 1 year of license acceptance (our recommendations are consistent with this condition; this plan would be included in our recommended habitat and land use management plan);
- (16) Maintain improvements and premises to FS approval and standards (proper project maintenance is a standard Commission license article);
- (17) Be subject to all valid claims and existing rights (administrative);
- (18) Comply with federal, state, and local regulations that apply to the project area or project operations (administrative);

- (19) Exercise diligence in protecting from damage the land and property of the United States covered by any license issued for this project (administrative);
- (20) Prior to any license surrender, restore the National Forest System resources to a condition satisfactory to the FS (administrative);
- (21) Indemnify, defend, and hold the United States harmless for any costs, damages, claims, liabilities, and judgments arising from past, present, and future acts or omissions of Edison in connection with the use and occupancy authorized by this license (administrative);
- (22) Discharge no waste or byproduct if it contains any substances in concentrations that would result in violation of water quality standards (administrative; our recommendations and standard license conditions would be designed to ensure that such discharges do not occur);
- (23) Be liable for all injury, loss, or damage to the United States land and property directly or indirectly resulting from Edison's power lines covered by any new license issued for this project or any other high risk use and occupancy of the area covered by any new license (administrative);
- (24) Be responsible for inspecting its site for hazardous conditions and be responsible for removing such hazards, after securing permission from the FS except in an emergency (administrative);
- (25) Consult with the FS prior to erecting signs related to safety issues in the area covered by any new license issued for this project (our recommendations are consistent with this conditions);
- (26) Only use pesticides for the control of undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, trash fish, etc., after consultation with the FS (our recommended habitat and land use management plan would document when this type of consultation would need to occur);
- (27) Allow the United States unrestricted use of any road constructed within the project area for all purposes related to protection, administration, management, and use of federal lands (administrative);
- (28) Confine all project-related vehicle use to roads or specifically designed access routes (would be addressed by our recommended habitat and land use management

plan or road management plan, both of which would be developed in consultation with the FS);

- (29) File with the Commission a plan approved by the FS for oil and hazardous substances storage and spill prevention and cleanup within 1 year of license acceptance and prior to land disturbing activities (as we discuss in this EIS, under certain conditions, this plan would be required by law, independent of this relicensing proceeding; in other cases of ground-disturbing activities [e.g., the proposed general river access trail at Willow Creek and trail relocation efforts near the powerhouse], this plan could be included in the final designs that would be developed in consultation with the FS and submitted to the Commission for approval);
- (30) Implement the CRMP submitted in the license application (our recommendation to implement the CRMP, as appropriate, for land within the project boundary of any new license issued for this project is essentially consistent with this condition); and;
- (31) File, within 3 years following license acceptance, a basinwide assessment of cumulative effects associated with the BC#4 Project, including consideration of all power projects within the BCS (our cumulative effects analysis of the BC#4 Project concludes that, because this project serves as a conduit for flows from upstream projects, there are little if any cumulative effects that could be attributed to the BC#4 Project; we conclude that this FS condition would be more appropriately considered in the ongoing relicensing process of the other projects in the BCS; the Commission has sufficient authority, through standard reopener articles, to enable implementation of any measures that pertain to the BC#4 Project that originate during the licensing proceedings at upstream projects).

### **2.3 No-Action Alternative**

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license and no new environmental measures would be implemented. We use this alternative to establish baseline conditions for comparison with the proposed action and other alternatives. The alternative of license denial and project decommissioning is discussed below, in section 2.4.3.

## **2.4 Alternatives Considered but Eliminated from Detailed Study**

As part of our independent analysis we considered several other alternatives to the relicensing proposal but eliminated them from detailed study because they are not reasonable in the circumstances of this case. They are: (1) federal government takeover of the project; (2) issuing a nonpower license; and (3) retiring the project.

### **2.4.1 Federal Government Takeover of the Project**

We do not consider federal takeover to be a reasonable alternative. Federal takeover of the project would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is no evidence indicating 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 interest in operating the project.

### **2.4.2 Issuing a Nonpower License**

Issuing a nonpower license would not provide a long-term resolution of the issues presented. A nonpower license is a temporary license that the Commission would terminate whenever it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the nonpower license. In this case, no agency has suggested its willingness or ability to do so. No party has sought a nonpower license and we have no basis for concluding that the project should no longer be used to produce power. Thus, a nonpower license is not a realistic alternative to relicensing in this circumstance.

### **2.4.3 Retiring the Project**

Project retirement could be accomplished with or without removing the project dam. Either retirement option would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions.

Under a project retirement alternative, the energy currently generated by the project would be lost. Historically, the project has produced about 439.4 GWh of electricity annually. Edison delivers this electrical power to serve customers in the San Joaquin Valley and Los Angeles Basin areas. The project dam, reservoir, and existing recreational facilities would have to be maintained by some unknown entity if some or all of the project facilities remained. If the dam was removed, the existing recreational

benefits attributed to the reservoir would be lost. There would be substantial costs involved in retiring the powerhouse, penstock, and appurtenant facilities and higher costs if any or all of the project facilities were removed. Finally, the environmental enhancements currently proposed by Edison would be foregone.

At this point, no party in the proceedings has recommended retirement with or without removing the project dam. Therefore, we do not consider project retirement a realistic alternative to relicensing the project and will not study the alternative further.

### **3.0 ENVIRONMENTAL CONSEQUENCES<sup>4</sup>**

#### **3.1 General Locale**

The BC#4 Project is located in the Upper San Joaquin River watershed, which drains a 1,600 square mile area situated between the Sierra Nevada crest to the east and the Central Valley foothills to the west. The drainage area contributing to the project above Willow Creek confluence includes 1,295 square miles. Elevations in the project drainage range from 1,040 ft National Geodetic Vertical Datum (NGVD) near the BC#4 powerhouse No. 4 to high mountain terrain in the Sierras ranging from the 12,000 to 13,000 ft NGVD. The specific project area ranges from 1,040 ft NGVD to 1,440 ft NGVD near Redinger Reservoir (just downstream of the Big Creek No. 3 powerhouse), while the steep and rugged terrain of the surrounding hillsides and canyon walls extend upwards to 4,500 ft NGVD.

The region around the project has a Mediterranean climate with hot, dry summers and moderate winters. High air temperatures in the San Joaquin canyon range from 90 to 105°F in the summer. Severe thunderstorms can occur during the summer. Winter low temperatures range from 20 to 30°F, but warm daytime temperatures in the 70's can occur near the dam. Because much of the watershed is located in higher elevations, much of the winter precipitation occurs as snow. There is also typically greater precipitation at the higher elevations. Average annual precipitation at BC#4 is 26 inches per year with a range of 11 to 54 inches. Huntington Lake at elevation 7,020 ft NGVD receives more than 30 inches per year. Locations at higher elevations than Huntington Lake may receive as much as 40 to 60 inches of precipitation per year.

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<sup>4</sup> Unless otherwise indicated, all information is from Edison, 1997; Edison, 1999a; Edison, 1999b; Edison, 1999c; and Edison, 2000a.

## **3.2 Cumulatively Affected Resources**

Based on the project record, which includes scoping and responses to our REA notice, we: (1) reviewed all resources to see if they could be affected in a cumulative manner by BC#4, other hydro projects, and non-hydro activities in the basin; and (2) determined the geographic and temporal scope of this EIS for our cumulative analysis. The issues addressed in this EIS include potential cumulative effects on water use, native transition zone fish, Central Valley steelhead, whitewater boating, and hydropower generation.

### **3.2.1 Geographic Scope**

The geographic scope of our cumulative effects analysis defines the physical limits or boundaries of the proposed action's effects (on potentially cumulatively affected resources). Our analysis of resources that could be cumulatively affected in the Upper San Joaquin River Basin is limited in geographic scope to the area upstream of Millerton Reservoir, which includes the BCS (see figure 2). The BCS (figure 3) is located throughout the North, Middle, and South Forks of the Upper San Joaquin River, which originates on the west side of the Sierra Mountains and flows westward downstream of the BCS to eventually flow into the San Joaquin Valley of California. The BC#4 is Edison's most downstream hydropower facility within the BCS.

We decided to analyze the cumulative effects on the above resources within the Upper San Joaquin River Basin because: (1) these resources could occur throughout the Upper San Joaquin Basin; (2) the operations of many of the hydropower developments and of the non-hydropower activities, such as irrigation and flood control, could affect one another; (3) information regarding cumulative effects within the basin is available; and (4) many of the developments that may contribute to cumulative effects on resources in the Upper San Joaquin area are Commission-licensed hydropower projects. We did not include the San Joaquin River downstream of Friant dam because Millerton Reservoir has sufficient storage capacity to control the timing of discharge from Friant dam regardless of the timing of inflows.<sup>5</sup> All available conservation water outflows from Friant dam are currently used every year (Bureau, 2000). Therefore, any shifts in the timing or volume of flows from Friant dam are under the control of the Bureau, and not directly related to

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<sup>5</sup> The combined flows from a complete breach of the BC#4 dam and the downstream Kerckhoff dam would be contained by the Millerton Reservoir without overtopping Friant dam (Edison 2000b).

the operation of BC#4 (although downstream water rights and agreements influence the delivery of flow from the BCS).

### **3.2.2 Temporal Scope**

The temporal scope includes a discussion of the past, present, and future actions and their effects on water use, native riverine fish, whitewater boating, and hydropower generation. Based on a possible new license term of 30 years and the last license expiration date of the projects in Edison's BCS (February 28, 2009), the temporal scope projected 40 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. This historical discussion of past actions and effects is, by necessity, limited to available information for each resource. The present resource conditions are based on the license application and previous comments from resource agencies and other parties.

## **3.3 Proposed Action and Alternatives**

### **3.3.1 Water Quantity and Quality**

#### **3.3.1.1 Affected Environment**

##### **Water Quantity**

Much of the San Joaquin watershed above Redinger Reservoir is highly regulated and includes five reservoirs: Mammoth Pool; Lake Edison; Florence Lake; Huntington Lake; and Shaver Lake and eight powerhouses: Portal; Eastwood; Mammoth Pool; and Big Creek powerhouse Nos. 1, 2, 2A, 8, and 3 (figures 2 and 3 and table 1).

Flow releases from the BC#4 powerhouse and Redinger Reservoir are subject to the Operating Contract Relating to Edison's Mammoth Pool and Existing Projects on the San Joaquin River (Bureau, 1957). Several United States Geological Survey (USGS) gages are installed in the project vicinity. Estimates of project inflow for the period 1965 to 1994 are shown in figure 5. Average annual inflow to Redinger Reservoir is about 2,400 cfs. The maximum hydraulic capacity of the powerhouse is 3,565 cfs.

Edison currently provides a minimum flow of 3 cfs in the river between the dam and the confluence of Willow Creek with the San Joaquin River. In addition, sufficient water is released such that the combination of Willow Creek and the dam release yields a minimum flow of 20 cfs between the confluence and the powerhouse.

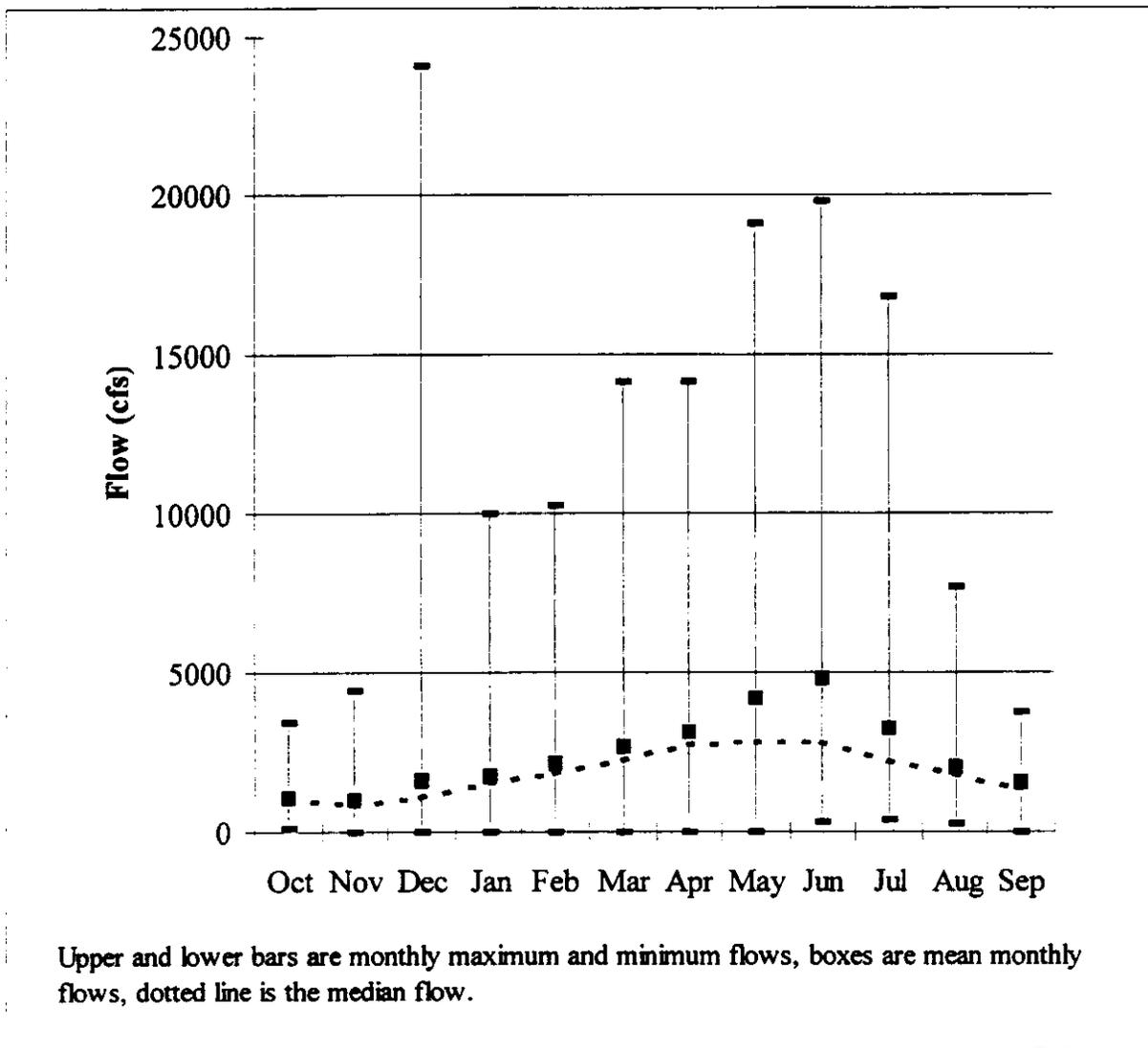


Figure 5. Inflow to Redinger Reservoir (Period of record: 1965-1994, Source: Edison, 1997, as modified by staff).

Redinger Reservoir, formed by Big Creek Dam No. 7, has a gross capacity of 35,033 ac-ft and an active storage of 26,199 ac-ft when the water surface is at elevation 1,403 ft NGVD. The surface area at elevation 1,403 ft NGVD is 465 acres. The project bypassed reach (known as Horseshoe Bend) is 6.3 miles long, most of which is not in the project boundary.

Monthly flow statistics were developed below the BC#4 dam at several locations including USGS gages. The range and average monthly flow for the period of record, 1973 to 1994, are shown on figures 6, 7, 8, 9, and 10. Spillage over the dam occurred in 9 out of 22 years of the period of record.

### **Water Rights**

The project is also subject to downstream water right constraints including the PG&E Kerckoff Reservoir Hydroelectric Project, Bureau irrigation deliveries via Friant dam and Millerton Reservoir, and irrigators with water rights predating those of the Bureau.

Water rights in the State of California are administered by the State Water Resources Control Board (SWRCB). Edison was issued two water right licenses. License No. 6001, issued May 1960 with a priority date of December 3, 1941, permits total simultaneous diversion from the San Joaquin River not to exceed 3,200 cfs, and limits storage in Redinger Reservoir to 26,120 ac-ft divertible from September 1 of each year through April 15 of the following year. License No. 8739, issued in August 1968, designates the BC#4 Project as a point of use and modifies License No. 6001 to increase simultaneous diversion from the San Joaquin River to 3,345 cfs. Permit No. 020683, issued by the SWRCB, allows an additional 300 cfs to be directly diverted into the BC#4 Project, thereby increasing the maximum allowable diversion to 3,645 cfs.

Edison must satisfy senior downstream water right holders under California water law. The operations of the BCS are constrained under the Mammoth Pool Agreement of June 1, 1957, to meet some of these senior rights (Bureau, 1957). This agreement is based on storage criteria for the end of each water year in the BCS, the forecast natural runoff at Friant, and other hydrologic criteria. The agreement between Edison and the Bureau was developed in response to the acquisition of water rights by the United States government associated with construction of Friant dam (and its associated reservoir, Millerton Reservoir). The largest quantity included in the purchase of water rights required the annual delivery of 800,000 ac-ft of water to Millerton Reservoir.

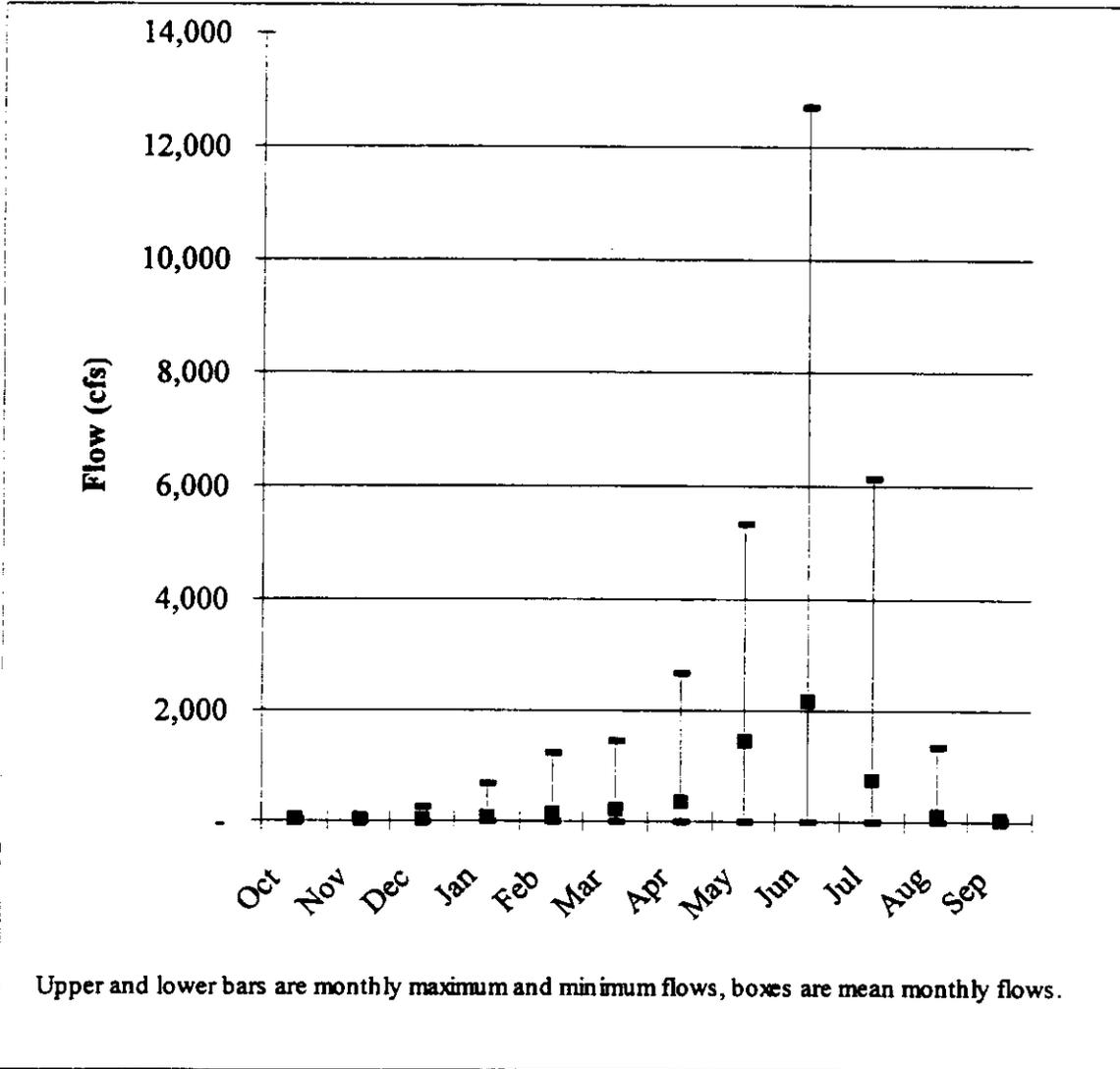


Figure 6. Summary of flow data for San Joaquin River upstream of Willow Creek (Period of record: 1973-1994 from USGS gage 1124200).

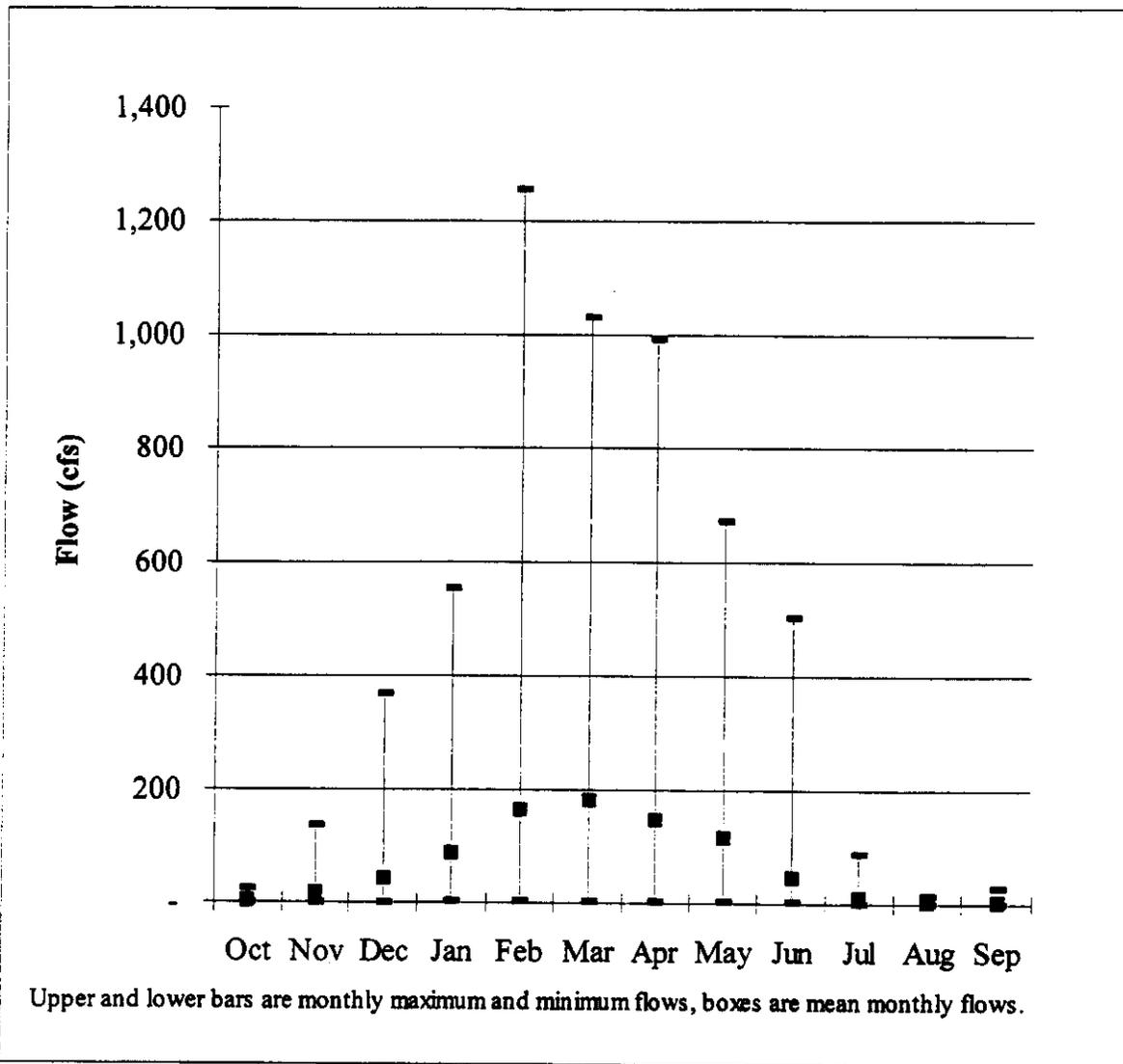


Figure 7. Summary of flow data for Willow Creek at mouth (Period of record: 1973-1994 from USGS gage 11246500).

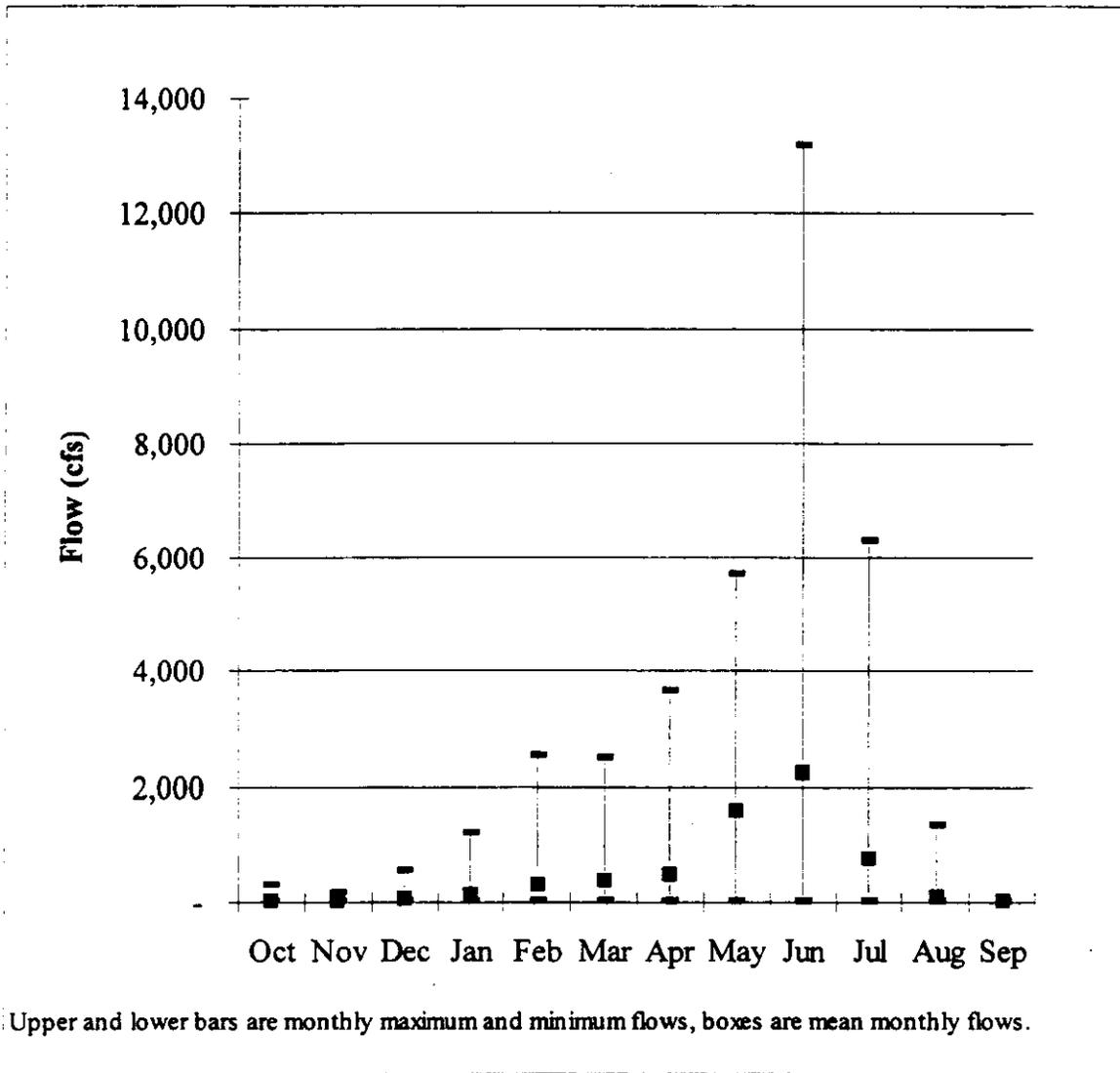


Figure 8. Summary of flow data for San Joaquin River downstream of Willow Creek (Period of record: 1973-1994 computed from USGS gages 11242000 and 11246500).

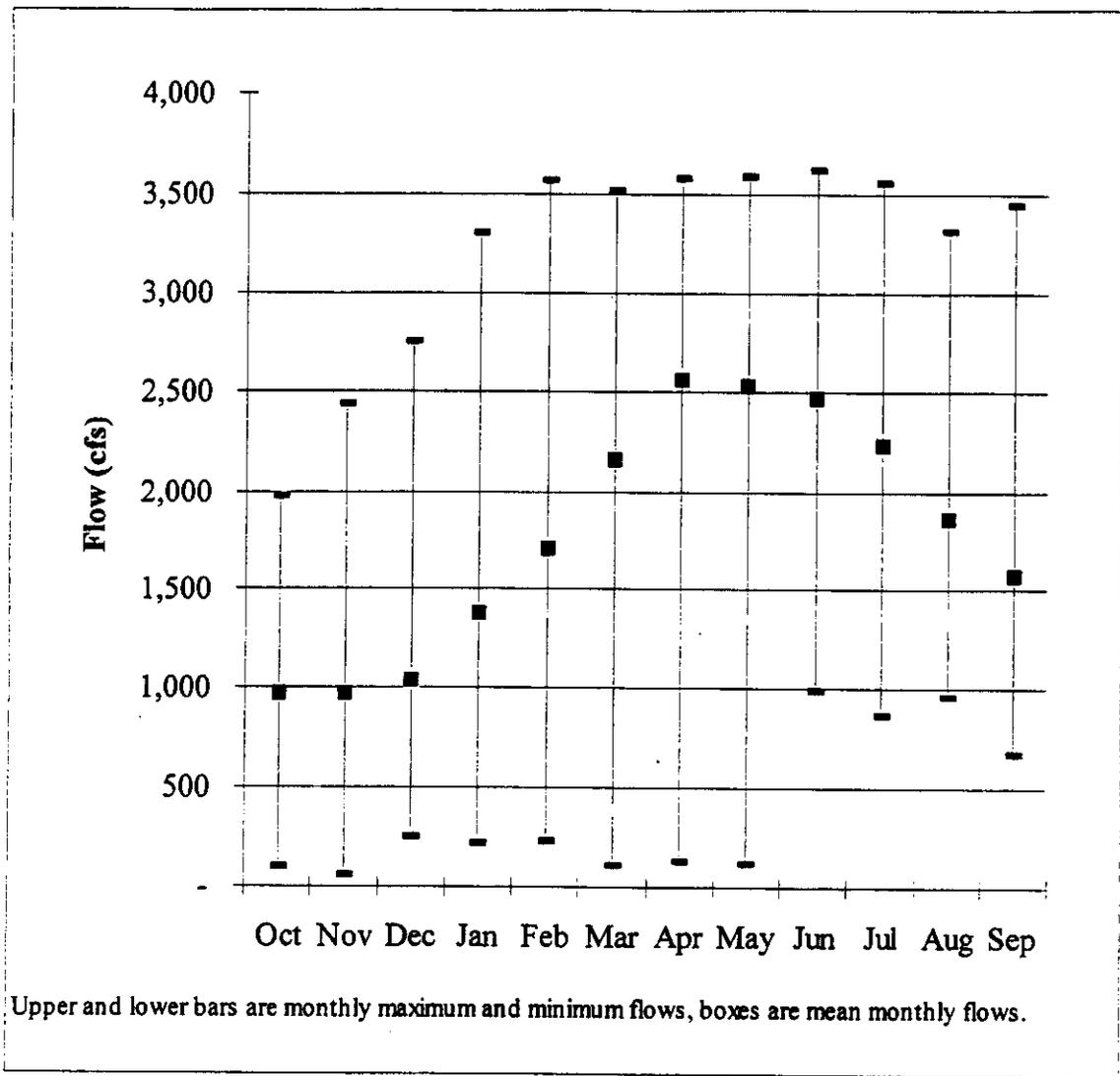


Figure 9. Summary of flow data for Big Creek powerhouse No. 4 (Period of record: 1973-1994 from USGS gage 11246530).

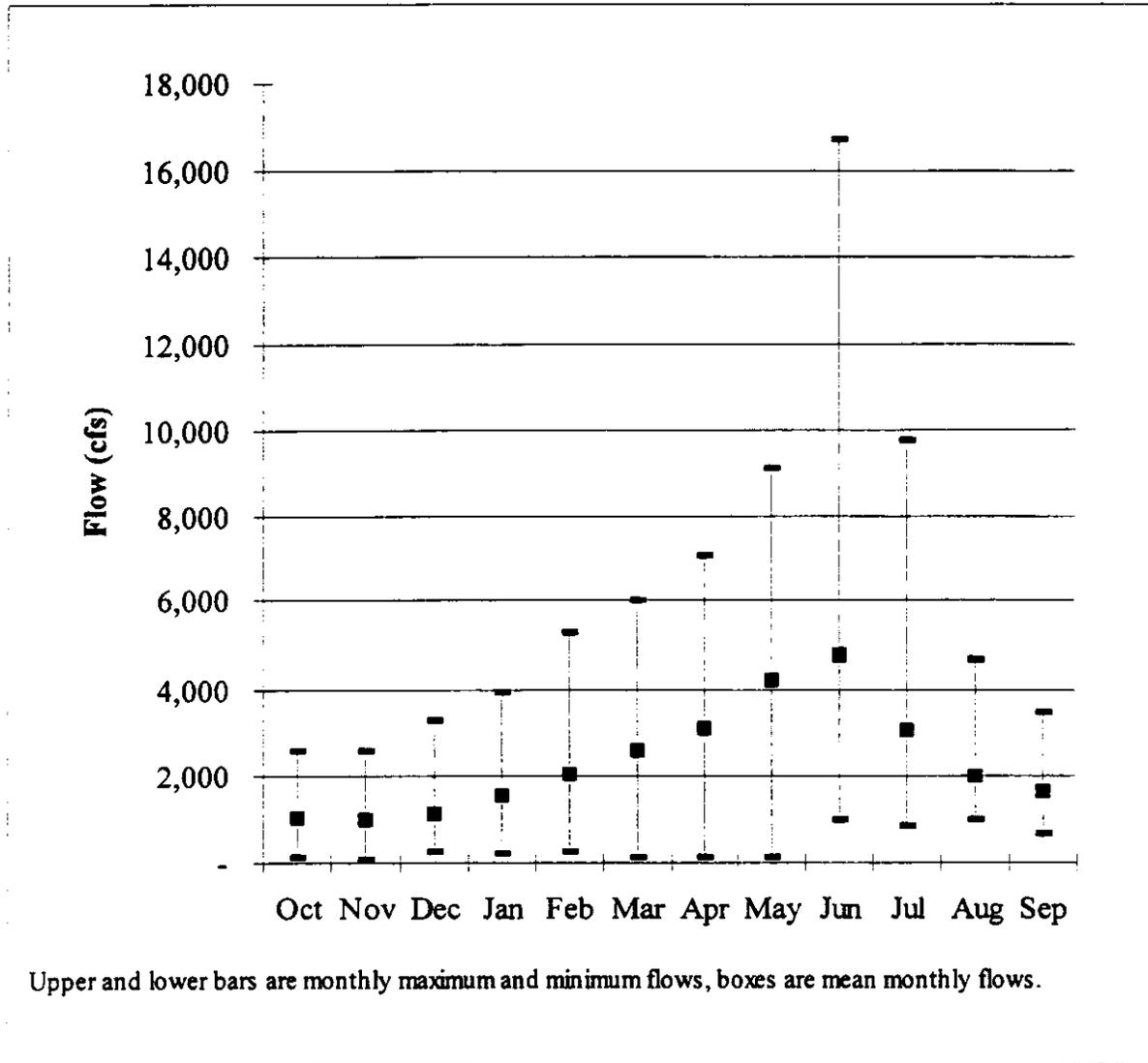


Figure 10. Summary of flow data for San Joaquin River below Big Creek powerhouse No. 4 (Period of record: 1973-1994 computed from USGS gages 11242000, 11246900, and 11246530).

## **Water Quality**

### *Applicable Standards*

The Sacramento River Basin and San Joaquin River Basin water quality control plan (basin plan), and the California inland surface waters plan (CRWQCB, 1994) contain objectives (such as meeting defined water quality criteria) for the protection of beneficial uses of water in the project area (such as contact recreation and wildlife habitat). These plans set forth criteria to protect human and aquatic life. State and federal secondary maximum contaminant levels (MCLs) are referenced in the basin plan. The California Department of Health Services and the EPA adopted the MCL levels in Title 22 of the California Code of Regulations, Division 4, Chapter 15, Domestic Water Quality and Monitoring, and in the Safe Drinking Water Act, respectively.

The basin plan lists the following existing beneficial uses for the segment of the San Joaquin River extending from its source to Millerton Reservoir, which includes the project area:

- municipal and domestic water supply;
- irrigation;
- stock watering;
- power;
- contact recreation;
- canoeing and rafting recreation;
- other non-contact recreation;
- warm freshwater habitat;
- cold freshwater habitat; and
- wildlife habitat.

Project waters are not designated as impaired under Section 303(d) of the Clean Water Act (CWA) (i.e., beneficial uses can still occur) and are not subject to total maximum daily load limits. Overall, the FS characterizes the basin as having good water quality, which is attributed to its relatively undeveloped nature (FS, 1998).

### *Sediment Transport and Streambank Stability*

Soils directly influence the streambank stability and potential for sediment transport and thus can potentially influence water and habitat quality. Soil composition, gradient, and vegetative cover of the streambank directly influence the bank's stability and consequently, the potential for erosion and sedimentation of the stream, which can

affect the stream's water and habitat quality. Moderately deep to deep and well-drained coarse sandy loam and sandy clay loam of the Auberry and Ahwahnee families dominate the soils in the project area. Slopes range from 5 to 75 percent (elevation range 1,000 to 3,000 ft NGVD ) in the Ahwahnee soils, while the Auberry soils range in slope from 5 to 85 percent (elevation range 1,000 to 4,400 ft NGVD ). These soils form on ridges, mountainsides and foothills, in material from weathered granitic rock (FS, 1998). The Ahwahnee soils located in the watershed above the project are highly erodible. Edison determined that the fine sediment in the bypassed reach originated from Willow Creek, the toe of Long Ridge, or Backbone Creek (figure 4). Upstream sediment supply to the bypassed reach is limited by Redinger Reservoir (which acts as a sediment sink, preventing further downstream transport of most sediment) (FS, 1998). Erosion along the bypassed reach channel is controlled by bedrock and boulder substrate.

### *Site-specific Water Quality*

Redinger Reservoir is described as oligotrophic or nutrient poor, (which means that organic compounds, such as nitrogen and phosphorus are not abundant.) Consequently, aquatic plant and animal life are also not abundant, which is typical of many alpine lakes with predominantly low-nutrient, granitic-type soils, with a short residence time (the typical time it takes water entering the reservoir to exit the reservoir) of approximately 1 week (FS, 1998). The reservoir is long and narrow, extending over a distance of 5.25 miles and covering 465 acres. Water flowing into the project from Big Creek No. 3 powerhouse is cold. Stratification may not occur during wetter years. Surface water temperatures were estimated at or below 68°F within 15 ft of the surface.

Edison conducted field and laboratory studies of the water quality in Redinger Reservoir, the bypassed reach, and the river downstream from the BC#4 powerhouse. At all three locations, Edison sampled water temperature and dissolved oxygen (DO) during May to characterize a colder regime and September to characterize a warmer regime, as shown in table 4. The most substantial warming occurred during the September sampling period when temperature in the bypassed reach increased to 70°F. Edison concluded that DO levels on the surface of Redinger Reservoir were quite high (8.2 milligrams per liter [mg/l]), well above the minimum level of 5.0 mg/l for waters designated as warm and exceeding the 7.0 mg/l for waters designated as coldwater habitat specified in the state water quality standards.

Table 4. Water temperatures and dissolved oxygen measurements in the project area, May 1995 and September 1994 (Source: Edison, 1997, as modified by staff).

	BC4-1 (Redinger Reservoir)	BC4-2 (Bypassed reach upstream)	BC4-3 (Bypassed reach downstream)	BC4-4 (Downstream of powerhouse)
May 24:				
Temperature	10.2°C/50°F	9.5°C/49°F	9.9°C/50°F	9.6°C/49°F
DO	10.3 mg/l	10.9 mg/l	11.4 mg/l	11.3 mg/l
September 1-2:				
Temperature	23.0°C/73°F	17.8°C/64°F	21.8°C/71°F	19.4°C/67°F
DO	8.2 mg/l	8.7 mg/l	8.9 mg/l	8.9 mg/l

The basin plan targets pH in the range of 6.5 to 8.5 with no change to normal ambient pH greater than 0.5. Values measured ranged from 6.7 to 7.8 and therefore meet the basin plan criteria.

Edison sampled water quality in Redinger Reservoir at a location approximately 200 ft upstream of Dam No. 7 (site BC4-1). The only exceedance of the MCL for secondary drinking water was collected from a depth of 131 ft during May 1995. A high concentration of total iron (1,170 micrograms per liter [ $\mu\text{g/l}$ ]) and total manganese (51  $\mu\text{g/l}$ ) were measured against the respective standards of 300  $\mu\text{g/l}$  and 50  $\mu\text{g/l}$ . The high concentrations were attributed to the suspended sediments in the sample.

Edison conducted water quality sampling in the bypassed reach at two locations. The first (site BC4-2) was located approximately 300 ft downstream of Dam No. 7. The second (site BC4-3) was located about 500 ft upstream of the BC#4 powerhouse. The granitic composition of the substrate causes low electrical conductivity in the bypassed reach, ranging from 26.2 to 41.0 microsiemens per centimeter ( $\mu\text{S/cm}$ ).

Downstream of the BC#4 powerhouse, sampling was conducted at a single location (site BC4-4), about 500 ft downstream of the BC#4 powerhouse. This site is representative of waters leaving the project area. Cooler water from the powerhouse produced lower temperatures at station BC4-4 than at sampling station BC4-3, just upstream.

### **3.3.1.2 Environmental Effects and Recommendations**

#### **Water Quantity**

Edison proposes to continue to release a minimum flow of at least 3 cfs from the dam and sufficient flows to ensure that a minimum flow of 20 cfs is maintained in the bypassed reach downstream of the confluence of Willow Creek. Therefore, this proposal would have no effect on the existing water flow in the bypassed reach. The FS makes a revised Section 4(e) recommendation consistent with Edison's proposal.

The FS and Conservation Coalition recommend that whitewater boating releases of about 1,200 cfs be made periodically on 1 to 3 weekends during May, June, July, and possibly August, depending on the type of water year and when complete cessation of spills occur. Both recommendations would increase the existing flow in the bypassed reach during some periods.

The amount of flow in the bypassed reach could affect aquatic habitat, including fish habitat, terrestrial resources, and recreational resources. Therefore, the effects of alternative flow regimes in the bypassed reach on these resources are discussed in section 3.3.2, Fisheries Resources, section 3.3.3, Terrestrial Resources, and section 3.3.6, Recreation and Land Use.

Edison currently operates and maintains three discharge gages under the supervision of the USGS to measure project flows. Edison proposes to make discharge data from two of these gages available to the public on a real-time basis (discussed in section 3.3.6, Recreation and Land Use). Edison's operation and maintenance of discharge gages helps ensure compliance with flow requirements. Furthermore, providing the public with valid, real-time flow data, would allow the public to determine whitewater boating opportunities in the bypassed reach. We, therefore, recommend that Edison continue to operate and maintain discharge gaging stations which would allow flow from the dam, the powerhouse, and from Willow Creek to be measured accurately and to provide real-time flow information to the public. We recommend that land required for the operation of these gages should be included in the project boundary.

#### **Water Quality**

The quality of project waters meets state standards and supports the designated beneficial uses identified in the basin plan. Continuing project operations, as proposed by Edison, would not affect the water quality of the San Joaquin River, including Redinger Reservoir and the bypassed reach.

Alternative project operations have the potential to influence water temperature, primarily in the bypassed reach. Substantial increases in flow releases from the reservoir would reduce the temperature of Willow Creek inflows to the bypassed reach that are warmed by solar radiation during the summer. Consequently, the prevailing water temperature regime in the bypassed reach downstream of the confluence of Willow Creek would be cooler. At the BC#4 Project, the existing native transition zone fish community in the bypassed reach is sensitive to the prevailing temperature regime. We, therefore, discuss the effects of alternative project operations on temperature in section 3.3.2, Fisheries Resources.

Edison proposes to continue to implement the measures of the spill prevention control and countermeasure plan (SPCC plan). This plan is included in its license application and is designed to reduce the possibility of an oil spill and reduce the level of effect on the local area and the San Joaquin River should a spill occur. Edison proposes to update the SPCC plan regularly, as required.

An SPCC plan is required to be in place for any facility where unburied storage capacity exceeds 1,320 gallons of oil or a single container has a capacity in excess of 660 gallons in accordance with 40 CFR §112.1. According to Edison's SPCC plan, the largest oil volume in the vicinity of the powerhouse is about 15,650 gallons in the 220-kilovolt (kV) switchyard. These two containers contain circuit breaker oil which is used to cool transformers. The Commission's March 9, 2001, Order Amending the BC#4 license deleted transmission facilities in the 220-kV switchyard from the project license, but not the transformer banks next to the powerhouse. In addition, the SPCC plan shows an 8,000 gallon lubrication oil tank near the powerhouse. Therefore, an SPCC plan is required independent of this relicensing proceeding. Edison states, in its October 16, 2001, letter to the Commission, that the oil storage tanks within the 220-kV switchyard provide oil to the non-project circuit breakers in the switchyard and that an oil storage tank supporting project equipment is located in an area adjacent to the powerhouse. We therefore recommend that the oil storage tank within the switchyard not be retained in the project boundary because it would not continue to support project operations. However, regardless of whether the tanks in the 220-kV switchyard are deleted from the project boundary, they would still require an SPCC plan to ensure that oil spills from either storage tank would be minimized or prevented, and spill control and countermeasures would be implemented in the event of an unforeseen spill. The 8,000 gallon lubrication oil tank near the powerhouse and any storage tanks that supply the circuit breaker oil for the transformer banks would continue to serve the project, remain in the project boundary, and require an SPCC plan. The Commission's San Francisco Regional Office and other compliance staff are responsible for ensuring that Edison has an appropriate SPCC plan

for the project in place and it is being properly implemented. Therefore, the risk of an oil spill and its effects on the area's resources would be minimal.

## **Erosion and Sedimentation**

### *Bypassed Reach and Reservoir*

Continued operation of the project by Edison would not change the existing reservoir water level management regime or the flows to the bypassed reach. Consequently, project-related sedimentation would remain the same as it is under the existing license. However, Edison proposes to develop a sediment management plan, in consultation with the FS, FWS, and CA Fish & Game. As part of this plan, Edison would map land use in the watershed of the bypassed reach and identify land use activities and natural phenomena that contribute sediment to the bypassed reach. Edison would then consult with the agencies regarding implementing procedures to stabilize exposed soil and reduce erosion such as:

- revegetating slopes denuded by past construction, poor land management practices, or fire;
- constructing berms or culverts to reduce erosion; and
- stabilizing banks, slopes, and trails with manmade or natural materials.

Edison states, in its October 16, 2001, letter commenting on the draft EIS, that its proposal should not be interpreted to include implementation of any large-scale measures to stabilize the area around the bypassed reach. Edison states that the intent of its proposal is to identify potential sources of sediment that are under the control of land management agencies such as the FS and may affect Redinger Reservoir and the bypassed reach.

The FS provides a revised Section 4(e) condition that is similar to Edison's proposal; specifically, that Edison should develop a plan for sediment management within the project area (see section 2.2.3, Mandatory Requirements). In addition to Edison's proposal, the FS recommends that the plan include an implementation schedule for identified stabilization projects, as well as effectiveness monitoring within 3 years of completion of specific measures, and, if appropriate, a maintenance schedule. The FS further recommends that Edison be responsible for completing identified stabilization projects that are identified as project-induced. The FS notes that this plan should be consistent with the objectives of the native aquatic species management plan, which we discuss in section 3.3.2, Fisheries Resources.

Based on our aerial photo interpretation we conclude that Redinger Reservoir has a largely non-erosive shoreline and erosion problems are limited to isolated locations such as those near the public boat launch.<sup>6</sup> Edison stabilized this location by applying concrete.

Furthermore, we conclude that the upstream sediment supply to the bypassed reach is limited by Redinger Reservoir because the low velocity conditions in the reservoir permit sediment to settle out. This is supported by Edison's observation of sediment deposition in the vicinity of Italian Bar Bridge near the upstream end of Redinger Reservoir.<sup>7</sup> Edison stated during the scoping meeting that no dredging of sediment from the reservoir was anticipated and supported its statements with estimates of very minor sediment movement into the reservoir during the January 1997 flood (150-year recurrence interval). Edison also currently does not sluice sediments and does not propose to do so in the future.

We observed sediment deposits that varied in size for each year for which photos were available at the confluence of each tributary to the San Joaquin River along the current bypassed reach. The primary, but limited, sources of sediment to the bypassed reach are the two main tributaries, Willow Creek and Backbone Creek. The FS, in its revised Section 4(e) condition, also identifies these two sources of sediment input, in addition to the toe of Long Ridge. Relatively large sediment deposits observed in the aerial photos from 1970 were apparently removed by high flows occurring between 1970 and 1976. We consider the variability of the deposits to indicate that flows during spillage events are sufficient to mobilize and transport the sediment deposits in the bypassed reach, and providing additional flushing flows to remove sediment from the bypassed reach is not warranted. We also conclude from our photo analysis that the bypassed reach channel morphology, shape, and position do not appear to have changed as a result of dam construction. Bedrock and boulder controls the channel configuration, and the net extent of sediment accumulation has not substantially changed.

We agree that identifying and controlling the sources of sediment that continually accumulate in the bypassed reach would be an effective approach to enhancing the aquatic habitat. We strongly encourage Edison to consult with the FWS, FS, and CA Fish & Game to develop and implement a sediment management plan. However, our analysis indicates that all identified sources of sediment to the bypassed reach may not have a nexus to project operations, a necessary condition to be included in a new license.

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<sup>6</sup> Staff observations during July 1, 1999, site visit.

<sup>7</sup> December 16, 1997, scoping meeting transcript; pp. 28 and 29.

Backbone Creek, the toe of Long Ridge, and all but several hundred feet of Willow Creek, are outside of the existing and proposed project boundary and not directly influenced by project operation. During our December 19, 2001, teleconference to clarify the FS revised Section 4(e) conditions, we asked the FS if it was aware of any project-induced sources of sediment in the bypassed reach, and it responded that it was not aware of any such sources. Consequently, we do not recommend that any new license for the BC#4 Project include the development and implementation of a sediment management plan. However, we make a preliminary recommendation, discussed further in the following section, that Edison should develop a habitat and land use management plan that would include specification of how Edison would identify and stabilize potential project-related sources of sedimentation within the project boundary. This could identify whether Willow Creek sedimentation originates on project lands and, if so, what corrective action would be taken by Edison.

During a December 19, 2001, teleconference, we asked the FS to clarify its revised Section 4(e) condition that specifies that Edison should prepare a sediment management plan that identifies a schedule for completing any identified stabilization projects. Because there are no known project-related sources of sediment to the bypassed reach, we cannot establish a nexus to project purposes and therefore could not recommend that it be included in any license issued for the project. In its October 15, 2001, letter commenting on the draft EIS, the FS agreed that this element of its sediment management plan should be removed from the Section 4(e) condition, but the revised conditions in that letter retain this scheduling provision. During the teleconference, the FS stated that its primary interest was in providing a means to track sediment movement through the bypassed reach, regardless of the source. We indicated on pages 55 and 56 of the draft EIS that we considered our recommended native aquatic species management plan to be an appropriate means to define monitoring that could be used to quantify physical habitat changes, such as redistribution of sediments or evidence of increased erosion. Our conclusion remains unchanged.

#### *Communication Cable Right-of-Way and Access Roads*

Exposed areas, such as communication cable ROWs and unpaved access roads, can lack stabilizing vegetative cover and subsequently erode more easily than unexposed soil surfaces. Such erosion, if not controlled by best management practices (BMPs), can carry sediment to adjacent watercourses and ultimately to the San Joaquin River and other waterbodies crossed by the communication cable ROW and access roads.

Even though Edison proposes to remove most transmission lines and associated access roads from the project boundary, the Commission's March 9, 2001, Order

Amending License would retain in the project boundary the following: communication cables along a 10-mile-long corridor (approximately 60 acres, assuming a 50-foot-wide ROW) between the Big Creek No. 3 and BC#4 powerhouses; a 300-foot-long transmission line from the BC#4 powerhouse to the BC#4 switchyard; a 75-foot-long transmission line from the BC#4 dam switchyard (associated with the minimum flow unit) to its connecting point on the local distribution line; and all transmission facilities necessary to transmit power from the BC#4 powerhouse and the BC#4 dam minimum flow unit to Edison's distribution system.

Edison includes several measures designed to minimize or prevent erosion and sedimentation in its Transmission Line ROW Habitat Management and Maintenance Plan (Appendix E-13 of the license application). Specifically, this plan points out what types of regulatory approvals and consultations are needed prior to conducting maintenance work, specifies that off-road vehicle use in general and vegetative clearing near wetlands should be minimized, and includes FS policies regarding revegetation and other restoration projects. Prior to any access road maintenance activity, Edison would notify the FS of the time and location of the proposed work.

Edison includes additional measures designed to minimize access road erosion in its Road Management Plan (Appendix E-14 of the license application). Edison specifies in this plan that best management measures to reduce or prevent erosion would be developed on a case by case basis, but could include grading to conform to contours, retaining original drainage patterns, installing riprap, water bars, small concrete retaining structures, sediment fences, and sedimentation basins, and stabilizing slopes with straw or jute matting. Edison indicates that revegetation plans would be developed on a site-specific basis and in consultation with appropriate FS staff. In addition, Edison states that the FS, CA Fish & Game, FWS, and State Historic Preservation Officer (SHPO) are consulted on an as-needed basis regarding specific measures to protect environmental resources (e.g., water and air). Edison states that wind erosion would be reduced by revegetating exposed soil surfaces, intermittent use of dust-palliative chemicals, if appropriate, and use of lath fences or earthen berms in areas that are prone to wind erosion. Edison's proposed erosion and sedimentation control measures are designed to be proactive, which when implemented, should prevent problems from developing, and are not indicative of existing erosion problems.

The FS, as two revised Section 4(e) conditions, recommends that Edison develop and implement a transmission line corridor habitat management and maintenance plan and a transportation system management plan. Both of these recommendations would include measures designed to minimize the potential for erosion.

We agree that implementation of Edison's proposed measures to reduce erosion and sedimentation represent standard BMPs and should control erosion effectively if properly applied on a case by case basis. Although Edison now proposes to delete most of the transmission line ROW from the project boundary, these measures would also serve to minimize erosion and sedimentation on all project lands. We, therefore, make a preliminary recommendation that Edison replace its Transmission Line ROW Habitat Management and Maintenance Plan with a habitat and land use management plan that applies to all land within the project boundary of the new license. This plan would specify the types of regulatory approvals and consultations needed prior to conducting maintenance work; that off-road vehicle use and vegetative clearing near streams and wetlands should be minimized; and that planned maintenance projects should be consistent with FS policies regarding revegetation and other restoration projects. In addition, the plan should specify how potential sources of sedimentation within the project boundary of any new license issued for this project would be identified and stabilized. This plan would be developed in consultation with the FS and CA Fish & Game. We discuss other aspects of Edison's Transmission Line ROW Habitat Management and Maintenance Plan and our habitat and land use management plan in sections 3.3.3, Terrestrial Resources, 3.3.6, Recreation and Land Use, and 3.3.7, Aesthetic Resources.

We conclude that the access roads that would remain in the project boundary (as we discuss further in section 3.3.6, up to nine access roads [extending about 4.5 miles] would continue to serve project purposes) would represent the most likely source of project-related erosion and sedimentation. Therefore, we consider it appropriate for Edison to specify in its Road Management Plan when the FS and CA Fish & Game would be consulted regarding the appropriateness of its proposed implementation of site-specific BMPs. We also conclude that the actual effectiveness of proposed protective measures can only be determined by follow-up monitoring of specific sites that have been stabilized. We consider it to be appropriate that the Road Management Plan specify the nature of post implementation monitoring of erosion and sedimentation control measures.

We present the costs associated with both of these plans in section 4.0, Developmental Analysis, and make our final recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

### **3.3.1.3 Cumulative Effects on Water Use**

All flows from the projects in the BCS must pass through the BC#4 Project. Alterations in flow anywhere in the BCS could result in modified flows in the San

Joaquin River downstream of the BC#4 Project, thus potentially influencing consumptive water uses.

Downstream water use is heavily influenced by water rights, as discussed in section 3.3.1.1, and Edison is required to provide sufficient flows from the BC#4 Project to meet the needs of senior water right holders. BC#4 Project operations consist primarily of serving as a conduit in which flows from the upstream project in the BCS are passed downstream. The BC#4 Project has little ability to alter the overall timing or magnitude of releases to the San Joaquin River downstream of the project. Any changes in flows to the bypassed reach would divert water from the powerhouse to the bypassed reach or vice versa, but the quantity of water that would be available to downstream water users would remain unchanged regardless of conditions that would be associated with any new license that the Commission would issue for this project. We conclude that relicensing the BC#4 Project would have no cumulative effect on downstream water use.

**3.3.1.4 Unavoidable Adverse Effects: None.**

**3.3.2 Fisheries Resources**

**3.3.2.1 Affected Environment**

The fish community in both Redinger Reservoir and the Horseshoe Bend reach consists of a “native transition zone fish community,” defined as a warmwater community dominated by hardhead, Sacramento pikeminnow, and Sacramento suckers. The FS (1998) considers the hardhead to be a “management indicator species” for this native fish association. The FS states that management of hardhead as an indicator species may help prevent this species from a future designation as threatened or endangered, and is consistent with the SNF land and resource management plan. Rainbow trout are also present in the upper portions of the Horseshoe Bend reach.

The primary management objective for both Redinger Reservoir and the Horseshoe Bend reach is the protection and maintenance of the native transition zone fish community according to CA Fish & Game, SNF, and FWS. Surveys in 1959 (CA Fish & Game), 1985 (BioSystems, Inc.), and 1995 (ENTRIX Inc.) indicated that prevailing conditions (typically, low water velocity but with periodic high flow events, and variable water temperatures with high summer values occasionally exceeding 76°F) in the project area support viable populations of transition zone fish. The FS indicates that during drier water years spawning, incubation, and emergence of hardhead fry are expected during April, and during wetter years spawning, incubation, and emergence are expected to occur later in the year (letter from J. Gipsman, Attorney, U.S. Department of Agriculture, FS, to

the Commission dated October 15, 2001). The failure of several introduced species (for example, smallmouth bass and sunfish) to establish viable populations in the project area indicates that the current conditions are unfavorable to these introduced species. Native transition zone fish prefer relatively warm water temperatures. The preferred temperature for hardhead ranges from 75 to 82°F (Moyle, in press), and the preferred temperature for Sacramento pikeminnow is 79°F. Limited data suggests a preferred temperature for Sacramento sucker of about 74°F. In general, as flow increases, habitat for adult hardhead and Sacramento pikeminnow increases, but rearing habitat for both species decreases.

### Redinger Reservoir

Redinger Reservoir, created in 1951 as part of Edison's BCS, inundated approximately 5.25 miles of riverine habitat. Despite the change in habitat, the current fish community in the reservoir is dominated by native transition zone fish species, including Sacramento suckers, hardhead, and Sacramento pikeminnow (table 5). Nearly all fish were collected in shallow water, mostly in proximity to submerged boulders and aquatic vegetation.

Table 5. Species composition and relative abundance of fish collected in Redinger Reservoir, September 1995 (Source: Edison, 1997, as modified by staff).

Common name	Family	Latin name	Status	Number and % of total catch	
Hardhead	Cyprinidae	<i>Mylopharodon conocephalus</i>	Native	158	46.1%
Sacramento sucker	Catostomidae	<i>Catostomus occidentalis</i>	Native	104	30.3%
Sacramento pikeminnow	Cyprinidae	<i>Ptychocheilus grandis</i>	Native	31	9.0%
Prickly sculpin	Cottidae	<i>Cottus asper</i>	Native	22	6.4%
Bluegill	Centrarchidae	<i>Lepomis macrochirus</i>	Introduced	16	4.7%
Green sunfish	Centrarchidae	<i>Lepomis cyanellus</i>	Introduced	12	3.5%
			TOTAL	343	

In 1959, CA Fish & Game found over 97 percent of the fish collected in Redinger Reservoir were native species; hardhead and Sacramento sucker comprised 52 percent and 24 percent of the catch, respectively. Unlike most California reservoirs, introduced centrarchids, such as sunfish and largemouth bass, are not well established in Redinger Reservoir. The fish community in Redinger Reservoir is similar to that immediately upstream. Most of the reservoir shoreline is steep-sided and relatively deep. Relatively few areas provide habitat for young-of-year and juvenile fishes in Redinger Reservoir.

### **Horseshoe Bend Reach**

Resource agencies indicate that this river reach should be managed primarily for native transition zone fish. Further, they indicate that the reach should also be managed on an opportunistic basis for rainbow trout. The FS (1998) defines "opportunistic" as when conditions are suitable, rainbow trout could be stocked in the bypassed reach but no measures should be implemented that benefit coldwater species at the expense of the native fish species which occupy a transitional water temperature regime.

In winter 1985-86 and November 1995, quantitative fish population surveys were conducted in the bypassed reach, including electrofishing in running-water habitats and snorkeling in pools. The project area was separated into a cooler upper reach and a lower reach where summer mean daily water temperatures exceeded 68°F. During the 1995 survey, an attempt was made to resurvey as many of the 1985-86 sites as possible. This allowed for more direct comparison of potential changes in the fish community over the 10-year period. In 1995, 11 pools in the project reach were surveyed, compared to only three pools in 1985-86. Additional pools were sampled in 1995 to provide better coverage of this habitat type, which comprised over 75 percent of the bypassed reach. The relative abundance of most species was very similar between the 1985-86 and 1995 surveys (table 6). Hardhead comprised the majority of the fish in both surveys (64 percent in 1985-86 and 60 percent in 1995).

The percent contribution of Sacramento sucker showed a modest increase from 1985-86 to 1995. Between 1985-86 and 1995, slight changes were observed in the relative abundance of some species: rainbow trout increased; Sacramento pikeminnow and sculpin decreased. Trends in the abundance of brown trout, green sunfish, and threespine stickleback could not be assessed due to the small numbers of individuals collected in both 1985-86 and 1995 surveys. The structure of the current fish community in the bypassed reach is consistent with the management goals of the resource agencies.

Table 6. Fish distribution and relative abundance in the Horseshoe Bend reach of the San Joaquin River, 1985-6 and 1995 (Source: Edison, 1997, as modified by staff).

Species	Reach total						Upper reach		Lower reach	
	1985-6		1995		1985-6		1995		1995	
	Number	% Composition	Number	% Composition	Number	% Composition	Number	% Composition	Number	% Composition
Rainbow trout	53	5	100	10	42	6	11	2		
Hardhead	730	64	607	60	483	67	247	61		
Sacramento pikeminnow	145	13	51	5	108	15	37			
Sacramento sucker	55	5	208	21	37	5	18	4		
Sculpin*	143	13	34	3	49	7	94	23		
Brown trout	4	<1	1	<1	4	<1	0	0		
Threespine stickleback	1	<1	4	<1	0	0	1	<1		
Total	1,131	100	1,005	100	723	100	644	100		100

\* Includes both prickly and riffle sculpin.

Seven species and 361 individuals were reported from the 13 habitat units (two riffles, two runs, one boulder pocket water, one cascade, and seven pools) sampled in the upper reach, and seven species and 644 individuals were reported from the eight habitat units (two riffles, two runs, and four pools) sampled in the lower reach in 1995 (table 6).

The Horseshoe Bend reach is mostly pool and run habitat. Relative abundance of habitat types, expressed as percentage of reach length, was generally similar in surveys during an Instream Flow Incremental Methodology (IFIM) study in 1985 and relicensing studies during 1995:

<u>Habitat Type</u>	<u>1985</u>	<u>1995</u>
Pools more than 8 ft deep	56	63
Pools 4 to 8 ft deep	8	10
Run	18	11
Run strewn with 1- to 6-ft boulders	13	10
Other types (mostly shallower habitats)	5	6

During the period between the surveys, high flow events changed the morphology of the stream channel in a manner that increased the relative abundance of pool habitats and decreased the abundance of run habitats.

Fish distribution by habitat type was evaluated for the rainbow trout, hardhead, Sacramento pikeminnow, Sacramento sucker, and sculpin reported in the 1995 survey. All Sacramento pikeminnow, over 95 percent of the hardhead, and approximately 75 percent of the rainbow trout and Sacramento sucker were observed in pool habitats. Conversely, sculpin were relatively evenly divided between cascade, boulder pocket water, run, and riffle habitats but were not observed in pools.

Habitat use by fish species was relatively similar between 1985-86 and 1995 surveys for all species except rainbow trout and Sacramento pikeminnow. Rainbow trout appeared to use run and riffle habitats to a greater extent in 1985-86 than in 1995. Sacramento pikeminnow were reported in all habitats in the 1985-86 surveys but were limited to pools in the 1995 surveys.

### **3.3.2.2 Environmental Effects and Recommendations**

#### **Minimum Flow to the Bypassed Reach**

Edison proposes to maintain the current 3-cfs minimum flow between the dam and the confluence of Willow Creek with the San Joaquin River and a 20-cfs minimum flow downstream of that point.

The FS also specified this flow regime in its revised Section 4(e) conditions dated October 15, 2001. The FS based this recommendation on its conclusion that rearing habitat for hardhead seems to be limiting the population in the bypassed reach, and as flows in the reach increase, habitat for this life stage decreases (FS, 1998). In addition, the FS notes that temperature in the lower portion of the bypassed reach during the summer, when young hardhead are present, decreases with higher flow and becomes suboptimal for hardhead (FS, 1998). The FS concluded that 20 cfs provides a suitable mix of rearing and adult habitat for hardhead (FS, 1998).

The Conservation Coalition, in its June 13, 2000, letter to the Commission, does not recommend a specific minimum flow for the bypassed reach, but disagrees that Edison's proposed 20-cfs minimum flow downstream of the Willow Creek confluence, would provide sufficient habitat for rearing and for adults of the resident fish community, stating that it is "...inconsistent with the evolutionary history of this fish assemblage and contemporary scientific research in riverine ecological processes."

The Alliance recommends, in its January 13, 1998, letter to the Commission, that Edison be required to release "...optimum daily minimum flows that equal 60% of the average mean runoff." This would equate to a minimum flow of about 2,000 cfs. Later, the Alliance recommended that instream flow studies be conducted for rainbow trout at bypassed reach flows of 100, 500, 1,000, and 1,500 cfs (letter from J. Baiocchi, Consultant for the Alliance, to G.L. Rabone, Edison, dated December 13, 1999).

The current minimum flow regime provides habitat that supports viable populations of hardhead, Sacramento pikeminnow, and Sacramento sucker, which are the species targeted for management by the resource agencies. Edison's IFIM studies indicate that as flows increase, habitat decreases for young hardhead (considered by the FS to be the life stage that limits the population in the bypassed reach) and Sacramento sucker (table 7). Sampled populations of hardhead and Sacramento pikeminnow were dominated by young-of-year, based on our review of Edison's 1995 length-frequency distribution data. This suggests that lack of rearing habitat limits the maturation of these fish to adults or, that as they mature, individuals of both species may drop downstream to

more suitable habitat (e.g., Kerckhoff Reservoir). Therefore, we conclude rearing habitat most likely limits the populations of these species more than adult habitat. Habitat for rainbow trout fry also decreases with increased flows although habitat for juvenile and adult rainbow trout increases slightly with flows up to 60 cfs (flows above 60 cfs were not modeled).

Table 7. Percentage of change in weighted usable area in the bypassed reach for selected species of fish (Source: Edison, 1997; 1999c, as modified by staff).

Species	Discharge (cfs)						
	10	20 (baseline)	30	40	50	60	160
Adult hardhead	-13	0	13	25	38	50	155
Hardhead rearing	17	0	-9	-18	-25	-31	-39
Adult Sacramento pikeminnow	-12	0	11	20	28	34	82
Sacramento pikeminnow rearing	2	0	-4	-10	-15	-20	-29
Adult rainbow trout	-3	0	2	5	6	8	NA <sup>a</sup>
Juvenile rainbow trout	-2	0	1	1	1	1	NA <sup>a</sup>
Rainbow trout fry	3	0	-6	-11	-16	-21	NA <sup>a</sup>

<sup>a</sup> NA= Not available.

We also conclude that the higher the minimum flow to the bypassed reach, the less suitable the temperature becomes for those native transition zone species. For example, typical water temperature in the lower half of the bypassed reach during June, July, and August ranges from about 68°F to 73°F under the existing flow regime (based on Edison's response to our Additional Information Request [AIR] No. 8). With releases of 40 cfs, the modeled water temperature in the lower portion of the bypassed reach ranges from 64°F to 70°F, and with flows of 60 cfs, water temperature in the lower portion of the reach ranges from 63°F to 68°F. The preferred water temperatures for hardhead, Sacramento pikeminnow, and Sacramento sucker are 83°F, 79°F, and 74°F, respectively.

Based on physical habitat characteristics in the bypassed reach, the expected temperature regime in the bypassed reach, the stated resource agency management objective for the bypassed reach, and the fact that the existing native transition zone fish

community seems to be doing well under the existing flow regime in the bypassed reach, we conclude that Edison's proposed and the FS-recommended minimum flow regime would adequately protect the fishery resources in the bypassed reach.

### **Native Aquatic Species Management**

Edison proposes to develop, in consultation with the FS, FWS, and CA Fish & Game, a native aquatic species management plan. This plan would entail monitoring aquatic species habitat at 5-year intervals. The primary objective of Edison's plan would be to identify factors that could limit native transition zone fish species populations in the bypassed reach.

The FS also recommends that Edison develop and implement a native aquatic species management plan in consultation with the FS, FWS, CA Fish & Game, and SWRCB, to:

- (1) determine the status of the native aquatic species in the project area and identify fish, reptile, and amphibian species that need to be protected and managed;
- (2) identify measures needed for the protection and enhancement of native aquatic species in the project area; and
- (3) monitor native aquatic species in the project area, and their habitat, to determine the effectiveness of the protection and enhancement measures identified in item (2).

We conclude that implementing a native aquatic species management plan, such as the one proposed by Edison and the FS above, would provide site-specific data regarding the status of the native species in the project's bypassed reach and would provide a basis for making adaptive management decisions. We also conclude that monitoring native aquatic species and their habitats would be necessary to adequately assess the effects of any changes in the operating regime, such as implementation of scheduled whitewater boating releases (discussed in section 3.3.6, Recreation and Land Use), on the native species in the project's bypassed reach. Physical changes (such as those associated with periodic increased flows, i.e., increased water depth and redistribution of substrate or evidence of increased erosion) and human-induced changes (such as the effect of potential increased recreational use on sensitive species, e.g., whether recreational use is confined to designated parking areas and trails, or disperses to locations that could disturb plants and animal(s), or exacerbate shoreline erosion) could be measured by the proposed monitoring.

The effectiveness of any measures taken to reduce sediment input to the bypassed reach, discussed in section 3.3.1 (Water Quantity and Quality), also could be assessed by monitoring pools for sedimentation over time. Hardhead mature by the end of their second year, Sacramento pikeminnow by their third or fourth year, and Sacramento sucker during their fifth or sixth year (Wang, 1996). Therefore, within 5 years, at least one generation of these representative native transition zone fish is typically produced. Monitoring at 5-year intervals should be sufficient to provide an indication of whether populations of these species are stable, declining, or increasing (within the limitations of natural variability). Edison's and the FS's originally suggested 5-year interval between monitoring of aquatic populations could be sufficient to identify population trends and whether corrective actions should be implemented.

In response to our analysis and recommendations in the draft EIS, the U.S. Department of the Interior (Interior), by letter dated October 9, 2001, and SWRCB, by letter dated October 12, 2001, state that longer term ecological monitoring is necessary before making any decisions about scheduled whitewater releases. Furthermore, SWRCB states that Edison, in consultation with CA Fish & Game, FS, FWS, and SWRCB, should complete a peer reviewed native aquatic species management plan for Willow Creek, Redinger Reservoir, and the bypassed reach.

The Conservation Coalition, by letter dated October 5, 2001, disagrees with our conclusion that rearing habitat most likely limits populations of native fish species, such as hardhead, Sacramento pikeminnow, and Sacramento sucker. It believes that the bypassed reach provides little or no spawning habitat and marginal rearing habitat for the above mentioned native fish species and that most spawning and rearing habitat for these native fish is likely to be within Willow Creek and the reservoirs. The Conservation Coalition recommends that Edison complete a 2-year study of the native fish species to document variation between years in native aquatic species populations under existing conditions. The Conservation Coalition further suggests that Edison may need to release specific flows if a sufficient range of spill flows does not occur within this 2-year period.

The FS, in its October 15, 2001, letter to the Commission, states that hardhead fry, which it considers to be the limiting life stage for this species in the bypassed reach, may currently be adversely affected by high flows in above normal and wet water years. Consequently, the FS believes that releasing additional flows for whitewater boating during wet/above normal water years would not be as detrimental to hardhead fry as releasing high whitewater flows during dry/below normal water years, because this life stage would already be adversely affected during wet years. The FS also recommends that Edison monitor native aquatic species during the first 5 years from license issuance. During the December 19, 2001, clarification teleconference, the FS acknowledged that it

was unrealistic to expect Edison to begin monitoring immediately after license issuance, prior to the development of a monitoring plan. This monitoring would ensure adequate data collection to determine from site-specific information the effects on the native species from flows during wet/above normal years and dry/below normal years. The FS recommends that the monitoring plan associated with its recommendation be developed by Edison in consultation with CA Fish & Game, FWS, SWRCB, FS, university aquatic scientists, and the WBOC (including members of the Conservation Coalition) that we discuss in section 3.3.6.2.

Although Edison, in its October 16, 2001, letter to the Commission, continues to maintain that scheduled whitewater boating flow releases are not needed, it agrees that a 5-year baseline monitoring program of native aquatic species should be implemented before making any scheduled releases, particularly during below normal, dry, and critical water years.

We agree with the FS that during above normal and wet water years there could be poor year class survival of hardhead and other native fish. However, we also conclude that there is not enough site-specific information to be certain about the magnitude of this potential adverse effect. Because of this uncertainty about the potential effects of scheduled whitewater boating releases on native aquatic species, a more intensive monitoring of the bypassed reach for 5 years is warranted. Monitoring over a 5-year period should reveal the effects of whitewater flow releases on the native aquatic species, provided both wet and dry years occur during this period. At the end of the 5-year period, Edison would prepare a summary report of its findings as a basis for consultation with the technical committee that consulted on the design of the monitoring program. The final report, developed in consultation with the monitoring plan technical committee, would make recommendations about the need for additional monitoring, if different than the originally proposed 5-year intervals, and under what conditions scheduled whitewater releases should be implemented (including ramping rates and water year type provisions), if at all. Edison should include in the report an estimate of the energy and revenue consequences of implementing scheduled whitewater releases.

We agree that it is appropriate for Edison to consult primarily with the resource agencies in developing the native aquatic species management plan, because project operations should be consistent with agency management objectives. However, developing the monitoring program associated with this plan would benefit from participation by the Conservation Coalition to ensure that the whitewater boating community understands the basis for decisions that influence resources of interest to them. We therefore recommend that the Conservation Coalition be added to the technical committee that Edison facilitates to establish the monitoring program associated with the

native aquatic species management plan. The technical committee would be free to solicit additional technical input relevant to the development of the monitoring program, including academic experts. This technical committee would become the WBOC if scheduled releases are implemented.

We discuss other aspects of the native aquatic species management plan in section 3.3.3, Terrestrial Resources. The costs of developing and implementing this plan are presented in section 4.0, Developmental Analysis, and we make our final recommendation regarding this plan in section 5.3, Comprehensive Development and Recommended Alternative.

### **Upstream Fish Passage**

The FS considers anadromous salmonids to be extirpated from the San Joaquin River above the confluence of the Merced River, and no anadromous salmonids exist in the project vicinity. However, historically, anadromous salmon and steelhead appear to have run upstream to at least the vicinity of Mammoth Pool Dam (ESAP, 1985), which is upstream of Redinger Reservoir. The BC#4 dam would block continued travel of anadromous fishes to upstream locations if anadromous fishes were ever to reach the base of the dam. Therefore, in a preliminary Section 4(e) condition, the FS reserves the right to require upstream passage at the BC#4 dam for anadromous salmonids should passage above Friant and Kerckhoff dams, which are downstream of the BC#4 dam, ever be provided. Neither the FWS nor the NMFS have made any fish passage prescriptions for the BC#4 Project or reserved prescriptive authority pursuant to Section 18 of the FPA.

There is no indication in the record for this proceeding that any party is seeking fish passage at the Friant or Kerckhoff dams. Furthermore, no anadromous fishes are present at the base of the BC#4 dam, and it would only be speculation when and if they might be present. Therefore, we conclude that it is premature to address this issue. Should this situation change, consideration of providing upstream fish passage at the BC#4 Project could be evaluated in light of management goals for targeted salmonids and the existing native transition zone fish community. The standard fish and wildlife reopener clause, that would be included in any license issued for this project, would allow consideration of upstream salmonid passage if this should become a resource agency management objective.

In response to our draft EIS, the FS withdrew its Section 4(e) condition pertaining to upstream anadromous fish passage.

## **Fish Entrainment**

The Alliance recommends that the Commission evaluate the effects of entrainment of fish at the BC#4 powerhouse and that the Commission recommend that Edison install screening at the conduit intake to prevent entrainment of fish (letter from R.J. Baiocchi, Consultant to the Alliance, to the Commission, dated January 14, 1997).

The FS (1998) and CA Fish & Game<sup>8</sup> considered the potential for fish to be entrained at the project's intake and the effects any entrainment of fish might have on fishery resources in the project area. These resource management agencies concluded that entrainment should not affect the fish populations of Redinger Reservoir.

Redinger Reservoir is a relatively unproductive system where fish production is limited by low nutrient concentrations (i.e., low concentrations of nitrogen and phosphorous compounds) and steep shorelines. Species richness and abundance in Edison's 1995 fish survey was highest at a shallow, nearshore station where aquatic vegetation was abundant. The catch was especially low in open water; only three hardhead were collected in the deep water adjacent to the dam and representative of the species that could be susceptible to entrainment. No trout were collected in Redinger Reservoir.

The conduit intake is currently screened by a 3.2-inch clear-spaced bar rack that extends from the maximum water surface level at elevation 1,403 ft NGVD to below the intake invert elevation at 1,320 ft NGVD, and is located in open water, in front of the dam. At full pond, the center line of the intake is about 70 ft deep. We conclude that fry and juveniles (those life stages most vulnerable to entrainment) would not likely be in the vicinity of the intake because these life stages usually prefer shallow near-shore habitat. Furthermore, we conclude that although not designed to exclude fish, this bar rack could exclude some larger fish from entrainment either physically or behaviorally. The approach velocity at the intake structure ranges from about 0.9 to about 2.6 feet per second (fps), depending on the amount of flow entering the penstock. Large cyprinids, such as adult hardhead, have burst speeds that range from 4 to 14 fps, and large suckers, such as Sacramento suckers, have burst speeds that range from 5 to 10 fps (Bell, 1991). We therefore consider the fish most vulnerable to entrainment to be capable of avoiding flows at the intake by using burst speeds. We find no evidence that there are any effects of entrainment on fish populations in the vicinity of the BC#4 Project. Also, we conclude

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<sup>8</sup> Comments of D. Mitchell during December 16, 1997, scoping meeting, pp. 34 and 35 of transcript.

that continued project operations would not cause any substantial entrainment of fishes; therefore, we do not recommend any additional measures to minimize entrainment.

### **Whitewater Boating Flow Releases**

Edison does not propose to make any scheduled whitewater boating flow releases or to supplement spillage events with additional flow to create conditions that would be suitable for whitewater boating.

The Conservation Coalition, by letter dated June 12, 2000, and the FS, by letter dated June 15, 2000, both recommend that Edison implement scheduled weekend whitewater boating flow releases of 1,000 cfs and 1,500 cfs, respectively, from April through August, depending on the type of water year. Both parties also recommend that, when spillage occurs, Edison should supplement the spillage with flows that would enable whitewater boating. The FS further recommends that when whitewater boating flows occur, they should be ramped up at 150 cfs per hour and ramped down at 100 cfs per hour (see section 2.2.3, Mandatory Requirements). Details of the recommendations of both parties are presented in section 3.3.6.2, Recreation and Land Use.

Although habitat for native transition zone fish species at flows of 1,000 or 1,500 cfs was not modeled, habitat trends can be discerned from the information presented in table 6. We expect that habitat for hardhead and Sacramento pikeminnow rearing would decrease with these high whitewater flow releases. It is not possible to accurately model the response of adult habitat of these two species at such high flows. However, given that both species prefer deep pools for at least part of the day, and that few pools would likely exist with whitewater boating releases, we expect that habitat for adults could be suboptimal for the duration of whitewater release events.

As we previously discussed in our assessment of minimum flows to the bypassed reach, the more flow that is released to the bypassed reach, the less suitable the temperature regime becomes for the native transition zone fish community for which this reach is managed. In response to our AIR No. 11, Edison predicts that with a whitewater boating flow of 1,500 cfs, the water temperatures in the bypassed reach during June, July, and August would be reduced by 14.4° F, 12.4°F, and 8.6°F, respectively, from those of the current flow regime. Relatively sudden releases of cool water are likely to cause disorientation in warm-acclimated fish. Disoriented fish would be vulnerable to predation and more likely to be washed downstream because their ability to find hydraulic refuges would be inhibited.

The spawning seasons for hardhead, Sacramento pikeminnow and Sacramento sucker are centered about May and June (Wang, 1996) when high natural flow events from snowmelt and rainfall would typically occur. Eggs and yolk-sac larvae rest between bed elements and are generally protected from strong currents. Postlarvae and small juveniles would be present during July and August and susceptible to displacement by relatively sudden discharges. Macroinvertebrates could also be displaced by releases later in the season than currently occur. Scheduling recreational flow releases to be consistent with the pre-project hydrograph could minimize potential adverse effects on the native transition zone fish community. The natural habitat of these fishes is in streams that have high flows in spring and low flows in summer.

We reviewed 33 years of historic daily pre-project flow data from USGS gage number 11235000, located on the San Joaquin River, upstream of the confluence of Big Creek, including 1913 through 1915 and 1922 through 1951. This review enabled us to characterize the discharge conditions to which the native transition zone fish community were accustomed before BC#4 Project construction. These data are available to the public via the USGS Internet site (<http://water.usgs.gov/nwis/discharge> for USGS gage number 11235000). Pre-project flows are not the same as un-regulated flows, because upstream hydroelectric projects in the BCS influenced the flows at this gage. Flows in excess of 1,000 cfs at this gage would likely be in excess of 1,200 cfs at the BC#4 dam site, because of inflow from tributaries. Our review determined that few flow events comparable to releases envisioned for whitewater boating (between 1,000 and 1,500 cfs) occurred after mid-July. Specifically, flows in excess of 1,000 cfs occurred during only 17 of 33 years between July 20 and July 31. Flows in excess of 1,000 cfs during August occurred during only 8 of 33 years. Most of the water years when flows exceeded 1,000 cfs from July 20<sup>th</sup> to August 31<sup>st</sup> were either above normal or wet. Limiting whitewater boating flow releases to the period from mid-spring through the July 4<sup>th</sup> weekend should mimic the pre-project period of occurrence of high flows to which these populations are adapted.

We conclude that scheduled whitewater boating releases have the potential to adversely influence aquatic biota in the bypassed reach. Limiting such releases to May through early July should minimize the potential for adverse effects. However, there is uncertainty about the actual effects of such releases on the native transition zone fish community and amphibians and reptiles that may occur in the bypassed reach. For example, the FS asserts that, during above average or wet water years, high flows from spillage could already substantially reduce the year class success of native transition zone fish populations and that these populations may be sustained by year classes that are spawned during dry water years (letter from J. Gipsman, Attorney, U.S. Department of Agriculture, FS, to the Commission dated October 15, 2001). If the FS assertion is

correct, whitewater releases during May, June, or early July could have adverse effects on the native transition zone fish community. However, we note that, during 1995, a wet year, young native transition zone fish dominated Edison's collections, and the length-frequency distribution was similar to collections in 1985 and 1986, which were dry years. Therefore, we recommend that Edison develop its proposed native aquatic species management plan and implement the initial 5 years of associated monitoring prior to making any scheduled whitewater boating flow releases. This would enable an assessment of potential effects on aquatic species of most concern to the resource agencies. Stakeholders could then make informed decisions about the benefits and liabilities of whitewater releases and under what conditions, if any, whitewater releases should be implemented.

We also assessed the potential effects on aquatic biota of supplemental whitewater releases from flow augmentation during spillage. We reviewed 23 years of flow data from the BC#4 Project (1975 through 1997) to characterize the expected frequency of flow augmentation and the nature of spillage events that would trigger augmentation. The FS recommendation would entail augmentation of spills that occur from 9:30 a.m to 1:00 p.m. on Friday, Saturday, and Sunday between the Memorial Day and July 4<sup>th</sup> weekends such that flows do not decrease below 1,200 cfs. The FS did not specify what spillage flows would trigger augmentation, so we established a minimum spillage flow of 500 cfs as the augmentation trigger. Edison indicated that 500 cfs is the minimum boatable flow in the bypassed reach in a February 17, 1998, letter to the Commission. Consequently, boaters tracking bypassed reach flows would not plan a trip if spillage flows are predicted to be less than 500 cfs.

Our analysis revealed that flow augmentation would have only occurred during three weekends during the 23 years that we evaluated (during two wet water years and one above normal water year). All releases would have occurred on the receding side of the hydrograph. Generally, flows to the bypassed reach rapidly diminish from flows in excess of 1,200 cfs, to flows less than 500 cfs, which accounts for the infrequent occurrence of the need to augment flows during the narrow weekend time frame specified by the FS. The relative infrequency of conditions warranting flow augmentation should minimize any effects on aquatic biota. Because augmented releases would typically occur on the receding hydrograph, they would serve as a pause in the declining flow rate, thus affording an opportunity for fish and other aquatic biota to move towards the center of the channel and reduce the chances of stranding. We conclude that flow augmentation would have little effect on aquatic biota, and that any effects would most likely be beneficial.

We present our complete analysis of whitewater boating flow releases in section 3.3.6, Recreation and Land Use, and discuss the potential influences on terrestrial

resources, including amphibians and reptiles, in section 3.3.3. We discuss the cost of whitewater boating flow releases in section 4.0, Developmental Analysis, and make our final recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

### **3.3.2.3 Cumulative Effects on Native Transition Zone Fish**

Prior to construction of numerous dams at elevations up to about 4,000 ft in California, native transition zone fish communities were relatively common. However, this type of fish community is becoming increasingly rare in California. One possible reason for this is the creation of reservoirs that favor introduced species, such as centrarchids, which can outcompete the native fish. However, conditions in Redinger Reservoir, as well as the bypassed reach, do not favor introduced species. Currently, populations of native transition zone fish are thriving in both the reservoir and the bypassed reach. Actions that favor introduced fish species could have a negative cumulative effect on native transition zone fish.

The relicensing of the BC#4 as proposed by Edison is unlikely to have any cumulative effect on native transition zone fish. The favorable temperature regime in the bypassed reach would remain the same, and occasional spillage events would continue to provide flushing flows and prevent sediment accumulation that would degrade the quality of the bypassed reach habitat. We expect that this fish community is well adapted to such periodic high flows because such flows are characteristic of unregulated streams in which these species occur. The propensity of eggs and larvae to remain in the interstitial spaces of the coarse substrate where spawning occurs illustrates a trait in these species to tolerate high spring flows.

The FS and Conservation Coalition recommended that whitewater boating flow releases occur from May until early August, depending on the water year type. We consider releases after early July to represent a potential serious risk to the local native transition zone fish community. Young of all three species are expected to have emerged from the substrate by July and could be especially vulnerable to whitewater boating flow releases. Young fish, as well as some adults, could be flushed downstream to Kerckhoff Reservoir. Adults that are displaced downstream would likely take up at least temporary residency in the reservoir. Young fish would enter the reservoir when the local year class would also be active. The net result could be an artificially high density of young fish in the reservoir. The carrying capacity of the reservoir could be exceeded and young fish could be subject to increased predation. In the short term, young fish washed downstream could be at a competitive disadvantage because they would be acclimated to relatively warm summer temperatures, but the whitewater release would be substantially cooler,

potentially causing disorientation from cold shock. Both alternative whitewater release regimes would make the bypassed reach less suitable for introduced centrarchids, which could benefit the native transition zone fish community. Most centrarchid eggs and fry would be flushed from their nests and would be unlikely to survive. However, since few, if any, centrarchids currently inhabit the bypassed reach, the cumulative benefits to the native transition zone fish community that could be attributed to reduced centrarchid populations would be minor.

Our recommendation to monitor ecological responses to spillage during wet and dry years for 5 years before making specific recommendations regarding if and under what conditions whitewater releases should occur should allow sufficient data to be collected so that releases could be scheduled to minimize ecological effects.

#### **3.3.2.4 Unavoidable Adverse Effects: None.**

### **3.3.3 Terrestrial Resources**

#### **3.3.3.1 Affected Environment**

##### **Vegetation**

The generation facilities for the BC#4 Project are located in the San Joaquin River canyon in the Sierra Nevada foothills. The area around the generation facilities and on the steep slopes and rolling hills above San Joaquin River is vegetated by various phases of oak woodland. Oak woodland communities are primarily composed of interior live oak, blue oak, and foothill pine. The biomass of the understory in these communities is primarily composed of introduced grasses and forbs, but the species diversity of native species remains high despite the fact that they contribute far less biomass.

Riparian habitat can be very important to some wildlife. Riparian habitat provides essential food, cover, and water sources, as well as corridors for wildlife migration. In addition, wildlife diversity and abundance in riparian areas is often disproportionately high when compared to most terrestrial habitats. Riparian habitat occurs in the vicinity of the project in association with minor and major tributaries to the San Joaquin River and where natural springs occur. Dominant trees in these areas include white alder, Oregon ash, and Fremont cottonwood. Riparian habitat is not contiguous along the river or tributaries, but rather exists as scattered small pockets above the river upper banks and scour line. Riparian vegetation is limited along the shoreline at Redinger Reservoir due to steep banks and lack of soil substrate. The extent of riparian vegetation in the vicinity of the Horseshoe Bend reach and Willow Creek is limited by a lack of soil substrate and

flushing flows. A boulder and bedrock substrate is predominant in both areas. Riparian habitat in the Horseshoe Bend reach exists as scattered small pockets above the river upper banks and scour line. Riparian vegetation along Willow Creek consists of a narrow continuous band of trees and shrubs including willows and cottonwoods. Riparian areas along Willow Creek and in the Horseshoe Bend reach provide habitat for wildlife, but because riparian vegetation is limited, the area is unsuitable for many species that are restricted to riparian habitat.

Introduced plants in the project area include a number of noxious weeds, including the poisonous, spiny, aggressive yellow star-thistle, which currently exists about a mile to the north of Redinger Reservoir. Other noxious weeds in the project vicinity include Italian thistle, Spanish broom, Klamathweed, and Himalayan blackberry.

### **Wildlife**

The natural habitat in the San Joaquin River canyon supports a wide variety of wildlife species. Important game species in the area include mule deer, band-tailed pigeon, mountain quail, and wild turkey. Other furbearing mammals in the project area include bobcat, mountain lion, black bear, and California ground squirrel. The woodland and riparian habitat in the project vicinity is important habitat for numerous non-game resident and migratory bird species, including California towhee, acorn woodpecker, western kingbird, and western scrub-jay. Reptiles and amphibians known to occur in the vicinity of the project site include pacific treefrog, western fence lizard, and gopher snake. Edison provided a listing of all wildlife species that were observed or expected to occur on or in the immediate vicinity of the project in Appendix H of its license application. This listing includes a general indication of relative abundance, whether the species were actually observed, and the seasonality of birds that occur in the area.

### **Designated Natural Areas**

The Backbone Creek Research Natural Area (RNA) borders the San Joaquin River in the vicinity of Horseshoe Bend (figure 4). This area, within the SNF, was established by the FS to represent and protect the rare shrub carpenteria (*Carpenteria californica*). The RNA covers 430 acres, of which 262 acres support dense thickets of carpenteria. The carpenteria is distributed on the upper slopes away from the river in the mixed chaparral. The RNA is outside the designated project boundary; however, the Horseshoe Bend portion of the bypassed reach forms the northern boundary of the RNA and is influenced by flows released from the dam.

## FS Sensitive and State Listed Species

This section discusses FS sensitive and state listed species known to historically or currently occur in the project vicinity based on our review of FS (1998) and the California Natural Diversity Database (accessed by staff via Internet in 1999). The state listed endangered bald eagle is also a federally listed threatened species and, therefore, is discussed in section 3.3.4, Federally Listed Threatened and Endangered Species.

Carpenteria (*Carpenteria californica*) – Carpenteria, state listed as threatened, is an evergreen shrub occurring in the chaparral of eastern Fresno and Madera counties. The natural range of carpenteria is restricted to 50 square miles of the SNF. Plants tend to occur along streams and in draws where moisture accumulates. No populations of this species were detected within the project boundaries during botanical surveys conducted by Edison in 1995; the nearest population of carpenteria is located on the upper slopes of the Backbone Creek RNA, which borders the San Joaquin River in the vicinity of Horseshoe Bend. Therefore, this species is not discussed further.

Golden annual lupine (*Lupinus citrinus citrinus*) – This FS sensitive species grows on granite outcrops between an elevation of 1,800 and 5,000 ft. It is associated with oak woodland, chaparral, and ponderosa pine plant communities. No populations of this species were detected during botanical surveys conducted by Edison in 1995 within the project boundaries. The nearest occurrence is about 2 miles away, towards Jose Basin, and little habitat exists in the project area. Therefore, this species is not discussed further.

Slender-stemmed monkey flower (*Mimulus gracilipes*) – This FS sensitive species grows near granite outcroppings in chaparral. Plants are also found in burned areas away from outcrops after fires. No populations of this species were detected during botanical surveys conducted by Edison in 1995. The nearest known occurrence is about a mile from the project area, in the vicinity of the Auberry Indian Mission. Therefore, this species is not discussed further.

Relictual slender salamander (*Batrachoseps relictus*) – This FS sensitive species is known to occur in Fresno County, south to the Greenhorn Mountains and Kern River Canyon in Kern County. The relictual slender salamander is restricted mostly to mixed conifer forest areas and possibly other habitats near meadow edges and seeps, or on the surface of wet areas. No relictual slender salamander habitat is known to occur in the proposed project boundary. Therefore, this species is not discussed further.

Foothill yellow-legged frog (*Rana boylei*) – The foothill yellow-legged frog (FS sensitive) occurs in shallow, partly shaded streams. Preferred streams tend to be small to medium sized with riffles and at least some cobble substrate. No yellow-legged frogs were detected in the project area during general field surveys conducted by Edison in 1995. However, this species may not have been detected by Edison because land outside the proposed project boundary, including most of Willow Creek and the bypassed reach, was not surveyed. Foothill yellow-legged frogs were historically present in the upper portion of Willow Creek, about 7 miles upstream of the project, based on observations in 1970 (letter from J. Gipsman, U.S. Department of Agriculture, FS, to the Commission, dated October 16, 2001). Further, the lower portion of Willow Creek, in the project area, appears to have suitable habitat based on our observations during the July 1, 1999, site visit. During the site visit we observed shallow water shaded by willows and alders. Given the historical upstream population of yellow-legged frogs and the downstream suitable habitat in Willow Creek near the project area, we conclude that yellow-legged frogs may be present in Willow Creek in the vicinity of the project. The FS indicates, in its October 16, 2001, letter to the Commission, that a population of foothill yellow-legged frogs is present in Jose Creek, a tributary to the northern end of Redinger Reservoir.

Western pond turtle (*Clemmys marmorata*) – The Western pond turtle (FS sensitive) lives in rivers, streams, lakes, ponds, vernal pools, seasonal wetlands, and in intermittent streams where permanent pools exist. Adult turtles require slow-moving water with appropriate aerial and aquatic basking sites, such as logs, tree trunks, banks, ledges, and rocks. Habitat requirements of the western pond turtle also include a terrestrial component. Terrestrial habitats are used for oviposition, over-wintering, occasional seasonal use, and overland dispersal. Turtles are active on a year-round basis in both aquatic and terrestrial habitats. During field surveys conducted by Edison in 1995, pond turtles were observed at several locations on Redinger Reservoir and in Willow Creek (we have no indication of how many). Edison also concludes that this species may occur in the bypassed reach, although this reach was not surveyed.

American peregrine falcon (*Falco peregrinus anatum*) – The peregrine falcon, state listed as endangered, usually nests on steep cliff faces and forage in open areas where the birds that are preyed upon can be captured in flight. Peregrine falcons have been reported near Redinger Reservoir and may use project waters as foraging habitat. However, no suitable nesting sites are known to exist within the project area.

California spotted owl (*Strix occidentalis occidentalis*) – The California spotted owl is known to occur in dense, old-growth, multi-layered mixed conifer, Douglas fir, and oak woodland habitats from sea level up to 7,600 ft. Key habitat requirements for this species include blocks of mature forest with permanent water and dense, multi-layered

canopy cover for roost seclusion. During the breeding season, suitable nesting trees and snags are also required. The FS conducted intensive California spotted owl surveys from 1989 to 1992 throughout the SNF. Two California spotted owl Protected Activity Centers (PACs) (300-acre areas surrounding known nesting sites) abut the project boundary along the south shore of Redinger Reservoir. However, no known nesting sites or PACs occupy substantial portions of project lands.

Willow flycatcher (*Empidonax trailii brewsteri*) – The preferred habitat of the willow flycatcher, a state listed endangered and FS sensitive species, is large meadows (i.e., over 20 acres) with willow or alder complexes. Meadows as small as 0.6 acres and narrow riparian areas may also be used for nesting. Edison did not survey for this species but evaluated potential willow flycatcher habitat in the proposed project boundary. Edison concluded that marginally suitable habitat may be present along Willow Creek. The nearest nesting pair is known from Poison Meadow, approximately 10 miles from the project area. Given that this species has not been observed in the project area and only marginal habitat occurs along Willow Creek, we do not discuss this further.

Bats – Three FS sensitive bats, pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), and western red bat (*Lasiurus blossevillii*), could occur in the project area. Although bats were detected over Redinger Reservoir during Edison's 1995 surveys, none were identified to species and we have no information to indicate that the above three species are actually present (or would be affected by project operations).

### **3.3.3.2 Environmental Effects and Recommendations**

#### **Increased Recreational Use of Project Lands and Waters**

Increased visitation to Redinger Reservoir, Willow Creek, and the bypassed reach could affect riparian vegetation by trampling, and wildlife species by trampling amphibian egg masses or turtle nesting sites, poaching, and disturbing the normal activities associated with feeding, nesting, or mating.

Riparian habitat typically supports high wildlife diversity and can be used by a number of sensitive species. In areas that experience a high increase of recreational users, some animals would likely be disturbed or displaced as discussed above. The FS expressed concern about potential effects on western pond turtles and other wildlife if substantial increased recreational use should occur; specifically, disturbance to basking turtles, disturbance to females during nesting, and the possibility of removal of turtles from the area (letter from J.L. Boynton, Forest Supervisor, SNF, to J. McPheeters,

Northern Hydro Region Manager, Edison, dated March 17, 1999; letter from J.L. Boynton, Forest Supervisor, SNF, to W. Moody, General Manager, Edison, dated January 28, 2000).

Several of Edison's proposals and recommendations by other parties could increase recreational use in the area and disturb vegetation and wildlife as discussed above. Edison proposes to publicize the bypassed reach flows to increase public awareness of boating opportunities under current operations, and the FS concurs with this proposal. Edison proposes to enhance the existing recreational facilities at Redinger Reservoir and the FS concurs with this proposal. The FS and the Conservation Coalition recommend implementation of scheduled and supplemental whitewater boating flow releases which, when coupled with Edison's proposed flow information dissemination program could substantially increase recreational use in the area. Edison also proposes to make improvements to the Horseshoe Bend Trail and to support the construction of the San Joaquin River Trail in the vicinity of the project. These proposals and recommendations are discussed in detail in section 3.3.6.2, Recreation and Land Use.

The collective recreational enhancements summarized above could result in an increase in recreational use that could adversely affect terrestrial resources. The most likely consequence would be an increase in whitewater boating use of the bypassed reach, which could result in trampling of vegetation, disturbance and displacement of wildlife, and disruption of nesting behavior of turtles and birds. Edison proposes to quantify whitewater boater use of this reach by video monitoring with a camera mounted at the powerhouse. The FS also recommends recreational use monitoring to quantify changes in use over the term of the license. Edison also proposes to implement a native aquatic species management plan, discussed below, which would include monitoring reptiles and amphibians. These measures should assist Edison, resource agencies, and the Commission in determining the terrestrial resource effects of any additional recreation use. We discuss Edison's recreational use monitoring proposal and the FS recommendation in section 3.3.6.2, Recreation and Land Use.

As a recreational enhancement but also to direct whitewater boaters away from the immediate vicinity of sensitive riparian habitat along Willow Creek, Edison proposes to construct a general recreational river access trail near the junction of County Road No. 235 and Willow Creek and ending at the San Joaquin River near its confluence with Willow Creek. This trail should be effective in directing recreationists away from Willow Creek to the extent possible and thus minimize recreational users' effects on vegetation and wildlife. Although some vegetation and wildlife would be displaced during trail construction in upland habitat, the long-term benefit of avoiding unnecessary human

disturbance of riparian habitat would more than compensate for the short-term construction effects. We discuss this trail in section 3.3.6.2, Recreation and Land Use.

### **Native Aquatic Species Management**

Increased recreational use of the project area, namely additional whitewater boaters and trail users, could increase effects on reptile and amphibians, as discussed in the previous section. Flow releases for whitewater boating in the bypassed reach could also affect these species by washing away amphibian egg masses, eliminating suitable basking sites for turtles, and displacing young and adult frogs and turtles to downstream locations.

Edison's proposed and the FS's recommended development and implementation of a native aquatic species management plan is described and discussed in section 3.3.2.2, Fisheries Resources. The objectives of this plan would be to identify factors that could limit populations of aquatic species and opportunities to ensure the proliferation and success of native species in and adjacent to the bypassed reach. Aquatic species included in this plan, as proposed by Edison, would include reptiles and amphibians.

We conclude that the native aquatic species management plan would provide data to more accurately evaluate the effects of project-related activities on native aquatic species and help eliminate any uncertainty about the magnitude of the effects that project-related activities, such as increased recreational use, may have on native aquatic species. In addition, monitoring results could alert Edison and the FS to the need for implementing protective measures to eliminate or avoid any adverse effects of project operations and related activities on native aquatic species. However, such effects may not be limited to the bypassed reach, the geographical limit of this plan specified by Edison. Therefore, the geographical scope of this plan should be expanded to assess whether more whitewater boaters and trail users adversely affect native aquatic reptiles and amphibians in the bypassed reach and along the lower portion of Willow Creek from the gaging station to its confluence with the bypassed reach.

Edison does not specify what species of reptile or amphibian would be monitored as part of its plan. We recommend that Edison include monitoring for foothill yellow-legged frog and western pond turtle in its aquatic species management plan. We explain the basis for our conclusion that the above species should be monitored in our discussion of sensitive wildlife later in this section. The need for monitoring for additional aquatic species would be identified in consultation with the FS, FWS, and CA Fish & Game during the development of the final plan. We discuss the integration of the results of

monitoring associated with this plan with recommended whitewater boating flow releases in section 3.3.6.2, Recreation and Land Use.

### **Transmission Line Right-of-Way Habitat Maintenance**

Edison filed a Transmission Line ROW Habitat Management and Maintenance Plan with its license application (Appendix E-13) because at that time it proposed to include about 57 miles of 220 kV transmission line in the proposed project boundary. The purpose of this plan is to identify the special-status resources associated with the transmission lines, identify adverse conditions that may result from or occur during regular maintenance activities, and provide measures to avoid or compensate for these conditions. This plan consolidates a number of existing Edison programs that are designed to avoid or minimize environmental effects including the following: the Endangered Species Alert Program; the Environmental Training Program; the Raptor Protection Program; coordination of maintenance activities with the FS; and compliance with the California streambed alteration agreement program and the U.S. Army Corps of Engineers wetland permit program. A brief summary of each Edison program follows.

Edison's Endangered Species Alert Program is designed to provide Edison personnel with a means for identification of legally protected species and species that may become protected during the term of the license. Each protected species covered by the program is described in a manual that includes location maps, potential conflicts with project operations, and procedures to avoid conflicts.

Edison's Environmental Training Program is designed for technicians and line-workers and entails training meetings on a regular basis and on an as-needed, job-specific basis. Appropriate maintenance protocols in environmentally sensitive areas, permit conditions, and instructions on how to avoid adverse effects on biological resources are discussed during the meetings.

Edison currently implements a Raptor Protection Program intended to help protect and monitor susceptible raptors from electrocution or injury. This program includes the installation of equipment to discourage perching and nesting and help prevent raptor mortality.

Edison proposes to continue to coordinate with the FS for maintenance activities within the SNF to ensure that proper safeguards for special status species and wetlands are implemented. Besides coordination with local ranger districts, Edison proposes to continue its annual FS coordination meeting.

The FS, as a Section 4(e) condition, recommends that Edison develop and implement a transmission line corridor habitat management and maintenance plan. This plan would include a vegetation management plan, approved by FS, for the protection and maintenance of SNF resources associated with vegetation management near project facilities. The plan should also address terrestrial resources issues, such as access routes, season of operations, vegetation treatment (falling, limbing, topping), wildlife and botanical concerns, noxious weeds, and FS notification procedures. The FS Section 4(e) condition was based on the premise that 57 miles of transmission lines would continue to be included in the project boundary and under Commission jurisdiction.

Edison's proposed Transmission Line ROW Habitat Management and Maintenance Plan and the similar FS revised Section 4(e) condition would eventually be, in general, no longer applicable to the BC#4 Project because of the Commissions's March 9, 2001, Order Amending License that deleted all but 375 ft of the transmission lines from the existing license (Edison must meet certain conditions before portions of the transmission lines are deleted from the project; i.e., receive all necessary permits/approvals from the FS for the continued use of SNF lands). However, we conclude that two of the components of Edison's Transmission Line ROW Habitat Management and Maintenance Plan are equally applicable to the 618 acres of land that would remain in the project boundary after deletion of most of the transmission line ROWs; specifically, the Endangered Species Alert Program and the Environmental Training Program. We, therefore, make a preliminary recommendation that Edison incorporate these two programs into our recommended habitat and land use management plan, first discussed in the erosion and sedimentation portion of section 3.3.1.2, Water Quantity and Quality. We conclude that since bald eagle, osprey, California spotted owl, and goshawks are rare in the project area, and only about 375 ft of transmission lines would remain in the project boundary, it is not necessary for Edison to include its Raptor Protection Program in the habitat and land use management plan.

We discuss the costs associated with the habitat and land use management plan in section 4.0, Developmental Analysis, and make our final recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

### **Noxious Weed Control**

The FS considers the project area highly susceptible to noxious weed invasion. Several noxious weeds have already been identified by Edison in the vicinity of the project (FS, 1998). The FS states that maintenance activities within the project area provide constant opportunities for weeds to be transported into currently uninfested areas and that equipment and vehicles are vectors of noxious weed seeds. In addition, the FS

suggests that using impure seed or aggressive non-native species when planting for erosion control or wildlife habitat improvement may also create or exaggerate the problem. Without a noxious weed management plan, the FS states that noxious weeds such as yellow star-thistle are expected to be introduced in the general project area and ultimately reach the Backbone Creek RNA. The FS expects the negative effects of such an invasion to include reduction of wildlife habitat quality and quantity, degradation of habitat for sensitive plants, lowered native plant species diversity, and increased erosion (FS, 1998).

Edison has committed to annually discuss upcoming maintenance activities regarding noxious weeds. Edison also included the FS noxious weed management policy in its Transmission Line ROW Habitat Management and Maintenance Plan and that policy would be used to guide Edison's activities where its transmission lines cross SNF land.

The FS, as a revised Section 4(e) condition, recommends that Edison file a noxious weed management plan, approved by FS, for the purpose of controlling and containing the spread of noxious weeds. The FS recommends that the plan address the following:

- inventory, mapping, and monitoring (including an annual report documenting results);
- prevention strategies for invader plant species (such as cleaning equipment and use of weed free materials);
- treatment of new and established infestations; and
- education programs for project employees.

We do not consider it possible to completely eliminate the potential spread of noxious weeds resulting from maintenance activities, but implementation of a plan that meets the FS conditions, and includes the BMPs reflected in the FS policies for controlling noxious weeds, would reduce the threat substantially. Edison stated that it would use the FS policy regarding noxious weed management to guide its activities on SNF land. The components of the FS-recommended noxious weed management plan are consistent with the elements of the FS policy. The guidance regarding how Edison would address noxious weeds is currently in its Transmission Line ROW Habitat Management and Maintenance Plan, and nearly all transmission lines were deleted from the project license by the Commission's March 9, 2001, Order Amending License. However, noxious weeds can occur on all project lands, not just those associated with transmission lines. We, therefore, make a preliminary recommendation that Edison include a noxious weed management plan as a component of our previously recommended habitat and land use

management plan. This plan would include all lands within the project boundary of any new license issued for this project.

We discuss the cost of developing and implementing this plan in section 4.0, Developmental Analysis, and make our final recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

### **FS Sensitive and State Listed Species of Plants and Animals**

Edison proposes to continue to implement its Endangered Species Alert Program, described previously, to avoid effects on FS sensitive and state listed plants and animals. We discuss federally listed species in section 3.3.4, Federally Listed Threatened and Endangered Species.

The FS concludes that all threatened, endangered, proposed for listing, and sensitive plant and animal species would be protected by implementation of Edison's proposed protection practices, which includes surveys prior to maintenance activities and continued implementation of its Environmental Training Program and Endangered Species Alert Program (FS, 1998). Nevertheless, the FS, in a revised Section 4(e) condition, recommends that before taking actions to construct, operate, or maintain the project that may affect a FS sensitive species or its habitat, Edison should prepare a Biological Evaluation to assess potential effects on the species or its habitat. This evaluation should be submitted to the FS for approval, and mitigation measures may be required for the protection of the sensitive species.

We agree that, with a few modifications, Edison's implementation of the above plans (which we now recommend be included in a habitat and land use management plan) would protect FS sensitive and state listed species. We recommend that two species be addressed by Edison's native aquatic species management plan: foothill yellow-legged frog and western pond turtle, as discussed in the following text.

Foothill Yellow-legged Frog – Edison includes this species in its Endangered Species Alert Program.

Egg laying by foothill yellow-legged frogs occurs between late March and early June, following the period of high flow discharge resulting from winter rain and snowmelt. They deposit egg masses 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 occurring between July and

September. After metamorphosis, juveniles move upstream, probably to compensate for downstream drift (Jennings and Hayes, 1994).

A known historical population of foothill yellow-legged frogs occurred in upper Willow Creek, about 7 miles upstream of the project area, and suitable habitat occurs in the project area, along the lower portion of the creek. Increased recreational use could affect foothill yellow-legged frog by degradation of suitable habitat, disturbance of egg masses, tadpoles, and juveniles, and poaching or collecting by recreational users. If populations of this species should exist in the bypassed reach, scheduled or supplemental whitewater boating releases during May, June, or early July could destroy or wash egg masses or tadpoles downstream, away from preferred habitat.

We recommend this species be added to Edison's native aquatic species management plan. The plan should include surveys to identify occupied habitat, monitoring of effects from implementation of recommended license conditions, and, if appropriate, measures to avoid project-related effects on frog populations.

Western Pond Turtle – Edison includes this species in its Endangered Species Alert Program.

Western pond turtle mating typically occurs in April and May, and females move to upland locations to nest in May and June, though eggs may be deposited as early as late April or as late as early August. Eggs are deposited in a shallow nest excavated by the female, typically in substrates high in clay or silt. The nest may be as much as 400 meters or more from aquatic habitat, but it is often closer and can be as little as a few meters away. 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).

Western pond turtles have been observed at Redinger Reservoir and along the lower reaches of Willow Creek. Habitat for pond turtles occurs in the bypassed reach, although Edison did not conduct surveys in this reach. Edison does not propose, and no other party recommends, measures that would increase the level of recreational use of Redinger Reservoir. Consequently, project effects on pond turtles in the reservoir would remain unchanged and no additional measures are necessary. Increased flows and recreational activity associated with better publicity of bypassed reach flows and scheduled whitewater flow releases could affect turtles along Willow Creek and the bypassed reach in various ways, including disturbance of nesting habitat and active nest sites, disturbance of basking turtles, disturbance of overland movement to nesting and

overwintering habitat, and disturbance of hatchling turtles. Scheduled whitewater releases during May and June, and expected increased recreational use near Willow Creek, would occur during the peak period of pond turtle nesting. Increased flows could also render habitat unsuitable for turtles if areas of still and slow-moving water and shallow water areas with appropriate vegetation are disrupted. Poaching or collecting of turtles could occur as a result of increased recreational activity.

We recommend this species be added to Edison's native aquatic species management plan. The plan should include surveys to identify occupied habitat along lower Willow Creek and the bypassed reach, monitoring of effects from implementation of recommended license conditions, and, if appropriate, measures to avoid project-related effects on turtle populations.

American Peregrine Falcon – This species is included in Edison's Endangered Species Alert Program.

Peregrine falcons have been observed near Redinger Reservoir and may use the reservoir as foraging habitat. However, due to the lack of shallow water and riparian vegetation, the reservoir does not provide optimal foraging habitat and is only expected to be used occasionally. Peregrine falcons are not expected to be affected by increased recreational use of the reservoir or other proposed or recommended measures. We conclude that no additional measures to protect this species are needed.

California Spotted Owl – This species is included in Edison's Endangered Species Alert Program.

Two California spotted owl PACs are adjacent to the south shore of Redinger Reservoir. If nest sites are close enough to the shore, increased recreational use could cause disturbance to nesting pairs and their young during the breeding season (March 1 through August 30). However, the FS (1998) notes that project activities mostly occur outside of the PACs. We conclude that no additional measures specific to this species are needed.

Bats – The following bats are currently included in Edison's Endangered Species Alert Program: pallid, pale big-eared, spotted, and California mastiff.

Pallid bat, Townsend's big-eared bat, and western red bat may occur in the project area. These species may roost in project buildings or riparian habitat and oak woodland. Increased flows and recreational use are unlikely to affect these species, although maintenance of project buildings may cause disturbance to roost sites. We conclude that,

because pallid bats are already included in Edison's Endangered Species Alert Program, measures that Edison would implement to protect this species would also protect Townsend's big-eared bat and western red bat, if they should occur in the vicinity of the project. Therefore, no additional protective measures are needed.

### **3.3.3.3 Unavoidable Adverse Effects: None.**

## **3.3.4 Federally Listed Threatened and Endangered Species**

### **3.3.4.1 Affected Environment**

Four federally listed threatened species of plants and animals could potentially occur within the area affected by project operations based on our review of correspondence from the FWS (letter from W.S. White, Field Supervisor, FWS, to the Commission dated June 5, 1997), FS (1998), and the California Natural Diversity Database (accessed by staff via Internet in 1999). Potential occurrence is based on historic or current occurrence within or near the project boundary. We consider the following to represent our biological assessment for these four species pursuant to Section 7(c) of the regulations implementing the ESA. In addition to these four species, populations of the federally-listed threatened Central Valley steelhead occur in the project vicinity (letter from J.R. Bybee, Northern California Habitat Manager, NMFS, to the Commission, dated October 5, 2000). We discuss this species in section 3.3.4.3.

Mariposa Pussypaws (*Calyptridium pulchellum*) – This species is known from fewer than 10 occurrences in Mariposa, Madera, and Fresno counties. Habitat is granite gravel associated with granitic outcroppings, below 4,000 ft. Botanical surveys were conducted by Edison in 1995 in the project area and within 100 ft of generation and transmission facilities. No populations of this species were detected during these surveys, none are known to exist historically in the project area, and little suitable habitat exists in the vicinity of the project.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) – Historically, the valley elderberry longhorn beetle ranged throughout the Central Valley, from Redding in Shasta County to Bakersfield in Kern County. Valley elderberry longhorn beetles only occur where elderberry shrubs are present. Elderberries may occur at elevations below 3,000 ft throughout the San Joaquin River canyon. Edison states that elderberries are not known to occur adjacent to Edison facilities (except for the transmission lines, which are no longer part of the project). We consider it prudent to assume that potential habitat (elderberries) may occur throughout the project area.

California Red-legged Frog (*Rana aurora draytoni*) – There is no current or historical documentation of California red-legged frog occurring on the SNF, though historical occurrences were located nearby. There is no recent documentation of this species in the project’s geographic region. Potential habitat in the project area includes Willow Creek and the San Joaquin River. Optimal habitat consists of deep (greater than 2 ft), still, or slow moving water with permanent or nearly permanent pools for tadpole development and emergent and overhanging, dense, shrubby vegetation for adult refuges (FS, 1998; Jennings and Hayes, 1994). The FS conducted forest-wide amphibian surveys in both high and low elevation streams and meadows from 1992 to 1995 and did not locate any California red-legged frogs.

Bald Eagle (*Haliaeetus leucocephalus*) – Bald eagles are not known to nest within the region. In winter, bald eagles frequent a number of lakes and reservoirs in the SNF. Redinger Reservoir is infrequently used by this species, probably because bald eagles catch most of their fish prey in shallows, which are generally lacking in this reservoir (FS, 1998).

#### **3.3.4.2 Environmental Effects and Recommendations**

Mariposa Pussypaws – Edison found no populations of pussypaws and, therefore, proposes no specific measures pertaining to this species. No party has made any specific recommendations that pertain to this species.

This species occurs infrequently in the two counties in which the project is located (Fresno and Madera), it was not found during Edison’s surveys, and is not known in the vicinity of the project. There is no known suitable habitat for this species within the project boundary, therefore, we conclude that relicensing the BC#4 Project is likely to have no effect on this species. We sought concurrence with our conclusion regarding this species from FWS by letter dated September 27, 2001. FWS indicated concurrence with our conclusion by letter dated December 21, 2001.

Valley Elderberry Longhorn Beetle – Any activity that removes or damages elderberries could potentially affect the valley elderberry longhorn beetle. Conflicts between project operations and this threatened species are most likely to arise when vegetation trimming practices remove elderberry shrubs with stems greater than 1 inch in diameter.

Edison includes protective measures for the valley elderberry longhorn beetle in its Transmission Line ROW Habitat Management and Maintenance Plan. Specific measures include: update Edison’s Endangered Species Alert Program manual to include

information on valley elderberry longhorn beetles; conduct surveys for elderberries at or near work sites prior to maintenance activities; avoid elderberries when conducting maintenance activities; and if elderberries cannot be avoided consult with the FWS regarding appropriate protective measures.

FS recommends, in its June 15, 2000, letter to the Commission, that prior to taking any actions to construct, operate, or maintain project facilities that may affect a species of wildlife that is proposed for listing or listed under the federal ESA, or that may affect that species' critical habitat, Edison should prepare a biological assessment evaluating the potential effect of the action on that species and submit it to the FS prior to submission to the Commission and the FWS or NMFS. This recommendation would apply to the following two species, as well. Because the proposed licensing of this project is a Commission action, we consider it our responsibility to prepare a biological assessment of our proposed action. As we indicated at the beginning of this section, we consider this EIS to represent our biological assessment.

We agree that the measures proposed by Edison to protect the valley elderberry longhorn beetle should be effective if properly implemented. However, maintenance activities on all land in the project boundary could adversely affect this species. We, therefore, make a preliminary recommendation that Edison include its proposed protective measures in the habitat and land use management plan for all lands in the project boundary of any new license issued for this project.

We conclude that, based on the absence of known populations of valley elderberry longhorn beetles and elderberries within the project boundary and with implementation of Edison's proposed and our recommended protective measures, relicensing the BC#4 Project is not likely to have an adverse effect on this species. We sought concurrence with our conclusion regarding this species from FWS by letter dated September 27, 2001. FWS indicated that it disagreed with our conclusion that relicensing this project is not likely to adversely affect this species, by letter dated December 21, 2001. Consequently, we initiated formal consultation with FWS pursuant to Section 7 of the ESA by letter dated January 31, 2002. The Commission will address the findings of the FWS's Biological Opinion in the license order for this project, as appropriate.

California Red-legged Frog – Although historical occurrences of California red-legged frog are known from locations near the SNF, there is no historical or current documentation of this species on SNF and project lands. The paucity of preferred habitat (dense, shrubby, riparian vegetation associated with deep, still, slow moving pools) in the project bypassed reach would be unlikely to support this species, especially during years when there is natural spillage into this reach (any pools would be unlikely to be "still" or

“slow moving” under most spillage flows). We conclude that this species is not expected to occur in the project area and relicensing of the BC#4 Project would have no effect on this species. We sought concurrence with our conclusion regarding this species from FWS by letter dated September 27, 2001. FWS indicated that it disagreed with our conclusion that relicensing this project would have no effect on this species, by letter dated December 21, 2001. Consequently, we initiated formal consultation with FWS pursuant to Section 7 of the ESA by letter dated January 31, 2002. The Commission will address the findings of the FWS’s Biological Opinion in the license order for this project, as appropriate.

Bald Eagle – Bald eagles may be susceptible to transmission line electrocutions or collisions. Because bald eagles do not nest in the vicinity of the project, conflicts with nesting are not expected.

To avoid adverse effects on this threatened species, Edison proposes to continue to implement the Endangered Species Alert Program, which includes the bald eagle, and its Raptor Protection Program. The Endangered Species Alert Program includes identification and life history information about the eagle, identifies potential conflicts with Edison operations, maps known locations of eagles relative to Edison facilities, and lists procedures to follow for proposed activities that may affect eagles. Edison’s Raptor Protection Program includes installation of equipment to help prevent raptor mortality and implementation of procedures to avoid and report raptor mortality. These measures are consistent with published practices to protect raptors from transmission line effects.

All but 375 ft of the project transmission lines were removed from the project by the Commission’s March 9, 2001, Order Amending License. Therefore, although we encourage Edison to continue implementation of its Raptor Protection Program for its transmission line system, we consider it to be unwarranted for the minimal length of transmission line still included as part of the BC#4 Project.

Redinger Reservoir is only used infrequently by bald eagles, because it generally lacks suitable foraging areas (i.e., there are few open areas with shallow water). Consequently, we conclude that because bald eagle nesting does not occur in the project area, and direct contact with the 375 ft of transmission line that remains part of this project is unlikely, relicensing the BC#4 Project, with Edison’s proposed continued implementation of its Endangered Species Alert Program is likely to have no effect on this species. We sought concurrence with our conclusion regarding this species from FWS by letter dated September 27, 2001. FWS indicated that it disagreed with our conclusion that relicensing this project would have no effect on this species, by letter dated December 21, 2001. Consequently, we initiated formal consultation with FWS

pursuant to Section 7 of the ESA, by letter dated January 31, 2002. The Commission will address the findings of the FWS's Biological Opinion in the license order for this project, as appropriate.

### **3.3.4.3 Cumulative Effects on Central Valley Steelhead**

The NMFS indicates that because of the collective storage capacity of all the projects in the BCS, including the BC#4 Project, operations of all these projects could have a cumulative effect on the federally-listed Central Valley Steelhead (letter from J.R. Bybee, Northern California Habitat Manager, NMFS, to the Commission, dated October 5, 2000).

Populations of naturally-spawned Central Valley steelhead downstream of natural and man-made barriers to upstream migration have been listed as a threatened species under the ESA. Central Valley steelhead are anadromous forms of *Onchorhynchus mykiss irideus*. Nonanadromous forms (rainbow trout) may interbreed with anadromous steelhead. Available current information (NOAA, 1998) indicates naturally spawning steelhead in the California Central Valley are limited to the Stanislaus, Tuolumne, and Merced river tributaries and the mainstem of the San Joaquin River downstream of its confluence with the Merced River. The Merced River is nearly 100 miles downstream of the Millerton Reservoir. As we discussed in section 3.2.1, Geographic Scope, all available conservation water outflows from Millerton are used every year. Substantial reaches of the San Joaquin River downstream of Friant dam are completely dewatered during parts of the year (Bureau, 2000). Millerton also has the capability to store nearly all releases from upstream projects (water from simultaneous dam breaks at BC#4 and Kerckhoff Reservoir would still not cause overtopping of the Friant dam).

The BCS as a whole may cause relatively minor shifts in the timing and magnitude of releases to downstream locations. BC#4 Project operations consist primarily of serving as a conduit in which flows from upstream projects are passed downstream with relatively little ability to alter the overall timing or magnitude of these releases. However, the overriding capacity of Millerton Reservoir to store large volumes of water and the commitment of nearly all releases to irrigation and other consumptive uses would make any possible shift in BCS operations irrelevant downstream of Friant dam.

CALFED Bay-Delta Program (2000) has identified expansion of storage as a key element of habitat improvement and protection of water quality in the Central Valley. Enlargement of Millerton Reservoir has been identified as a possible alternative. A comprehensive study of alternatives is in progress. If this should occur, the importance of

upstream flow adjustments on releases downstream of Friant dam would be diminished even more. We conclude that relicensing the BC#4 Project would have no effect on Central Valley steelhead.

#### **3.3.4.4 Unavoidable Adverse Effects: None.**

### **3.3.5 Cultural Resources**

#### **3.3.5.1 Affected Environment**

The project is located within the traditional territories of the Monache (or Western Mono) and Foothill Yokuts tribes in the Sierra foothills. The Monache were geographically isolated and relatively unaffected by European contact until the second half of the 19th century. Prospectors for gold and other minerals in the 1850's were first to intrude into Monache territory, followed by stockmen, and loggers. Hydropower development began in 1898 with the construction of the plants on the Kaweah River by Edison's predecessor, Mount Whitney Power and Electric Company. The core components of the BCS were constructed between 1911 and 1929. Edison completed construction of BC#4 between 1949 and 1951.

Descendants of the Monache tribes reside near the BC#4 generation facilities and the transmission lines, in the community of North Fork and on Rancherias at Big Sandy and Cold Springs. The Sierra Mono Museum, located in North Fork, features large collections of native baskets and wildlife exhibits. Basketry is a living tradition among the Mono and the art of basketmaking continues to be passed down from generation to generation. Descendants of the Yokuts and other Native American tribes reside at the Tule River Indian Reservation near Tulare, adjacent to the Springville substation. Few other people reside in the immediate project area.

By 1977, Edison had removed a small cluster of employee housing and other support buildings, dating from the 1950's, associated with the BC#4 Project located within the eastern end of the existing project boundary. Only the concrete foundations of these structures survive. Edison proposes to revise the project boundary to remove this cleared land from the project boundary. The 40 Edison residences located at the western end of Redinger Reservoir are located within the project boundaries of the Big Creek No. 3 Project.

Edison prepared a comprehensive cultural resources report on the existing project area of potential effect (APE) (Taylor, 1995). Previous surveys included the areas of the BC#4 powerhouse and penstock, Big Creek No. 3/BC#4 220-kV transmission line, BC#4

wood-pole power/communication line, BC#4 flowline, Redinger dam and reservoir, and associated access roads. These surveys covered 75 percent of the project easements. New field surveys covered the remaining 25 percent of the project easements and resurveyed all project features except for Redinger Reservoir and dam. Survey team members walked transects spaced at 20 meter intervals along transmission line, power/communications line, and access road corridors and at 10 meter intervals in the areas of the powerhouse, penstock, and exposed portions of the flowline.

Twenty-one sites had been recorded at Redinger Reservoir and dam in 1950. However, these sites could not be re-evaluated during the 1995 survey because the reservoir was at maximum pool. The reservoir has never been drained to a level that would expose the sites recorded in 1950 prior to construction of the dam. Based on the 1950 survey report and the fact that these sites have been inundated for 45 years, Edison's 1995 report concluded that these 21 properties should not be considered eligible for listing in the National Register of Historic Places (National Register).

Based on the literature search and field surveys, the 1995 report also concluded that: (1) the project hydroelectric facilities are not eligible for inclusion in the National Register as contributing elements to the BCS; and (2) 24 of the archaeological sites defined by the various surveys of the project area are eligible for inclusion in the National Register (not including the 21 sites under the waters of the reservoir). These eligible sites are recorded as CA-FRE-424/425, CA-FRE-687/768, CA-FRE-1251, CA-FRE-1252, CA-FRE-1253, CA-FRE-1254, CA-FRE-1255, CA-FRE-1261, CA-FRE-1264, CA-MAD-64/65/66, CA-TUL-340, CA-TUL-341, CA-TUL-342, CA-TUL-343, CA-TUL-344, CA-TUL-347, CA-TUL-580, CA-TUL-827, CA-TUL-829, CA-TUL-831, CA-TUL-835, CA-TUL-837, CA-TUL-838, and CA-TUL-840. The SHPO concurred with these findings of the 1995 report (letter from Cheryl Widell, SHPO, Sacramento, CA, dated October 1, 1996). All but one of these sites (CA-MAD-64/65/66) are along the transmission lines and the access roads that Edison proposed, in its January 10, 2000 application for license amendment, to delete from the project boundary.

### **3.3.5.2 Environmental Effects and Recommendations**

The continued operation of the BC#4 Project could affect historic properties (historic structures and archaeological sites eligible for listing in the National Register). Table 8 summarizes Edison's assessment of the potential effects on and recommended treatment for all 24 historic properties identified in the APE. Only one of the 24

significant sites (CA-MAD-64/65/66) could be affected by continued operation of the project as amended.<sup>9</sup> Commission staff have determined that the relicensing of the BC#4 Project could adversely affect site CA-MAD-64/65/66. In accordance with 36 CFR 800.6(a)(1), the Commission notified the Advisory Council on Historic Preservation (Advisory Council) of this adverse effect finding by letter dated October 2, 2001, also providing the summary documentation specified by 36 CFR 800.11, and a copy of a CRMP developed in consultation with the California SHPO. The CRMP specifies procedures to minimize adverse effects on site CA-MAD-64/65/66 and other potentially significant properties that might be affected by continued project operation.

Table 8. Potential effects and treatment recommendations for historic properties located in the Big Creek No. 4 Project area of potential effect (Source: Edison, 1997, as modified by staff).

Site Number	Data Sets	Potential Effects	Recommendation
FRE-424/425	Subsurface deposit, milling features, midden, obsidian, chert debitage, dietary bone	No effect	
FRE-687/768	Subsurface deposit, milling features, lithic debitage, groundstone artifacts, midden, ceramics, beads, historic artifacts	Affected by ongoing maintenance of landowner's ranch roads also used by Edison to access project facilities <sup>a</sup>	Eliminate Edison access road grading activities within site boundaries

<sup>9</sup> The Commission's Order Amending License (94 FERC ¶62,202) deferred its decision pertaining to deleting access roads from the project boundary because recreational trail development on access roads are under consideration by us in this relicensing proceeding. The order also specified that the effective deletion date of the specified transmission lines would be the date Edison receives all necessary permits/approvals for the continued use of National Forest System lands. We are not considering recreational trail development in proximity to sites identified along the transmission lines. Site CA-MAD-64/65/66 is not only the one significant affected site which would remain within the project boundary, it is also the only such site on SNF land.

Site Number	Data Sets	Potential Effects	Recommendation
FRE-1251	Subsurface deposit, milling features, housepits, dietary bone, charcoal, obsidian debitage	Affected by ongoing maintenance of landowner's ranch roads also used by Edison to access project facilities <sup>a</sup>	Stabilize cutbank above maintenance access road as specified in the CRMP to reduce or prevent future erosion of cultural material
FRE-1252	Subsurface deposit, milling features, dietary bone, midden, diagnostic lithic artifacts, obsidian debitage	No effect	
FRE-1253	Subsurface deposit, milling features, obsidian debitage, charcoal, steatite and vessel fragments, beads, dietary bone	No effect	
FRE-1254	Subsurface deposit, milling features, obsidian and basalt debitage, steatite fragments and ovate milling elements	No effect	
FRE-1255	Subsurface deposit, milling features, obsidian debitage, steatite fragments, ovate milling elements	No effect	
FRE-1261	Subsurface deposit, milling features, dietary bone, midden, housepits, obsidian, basalt, and quartz debitage, <i>Olivella</i> bead	No effect	
FRE-1264	Subsurface deposit, milling features, obsidian and basalt debitage, dietary bone	No effect	
MAD-64/65/66 ( <i>Tessin</i> )	Subsurface deposit, milling features, obsidian debitage	Partially disturbed by telephone/transmission line, but not accessible by maintenance road. Site is on SNF land and would remain part of BC#4 Project after approval of 1/10/00 Amendment request.	Prohibit all Edison off-road vehicle activity in this area; when wooden pole needs replacement cut existing pole off at ground level and erect a new pole outside of site area

Site Number	Data Sets	Potential Effects	Recommendation
TUL-340	Subsurface deposit, milling features, charcoal, obsidian, quartz, and basalt debitage, steatite, bone, tooth enamel, scrap iron	No effect	
TUL-341 ( <i>Moi'Yak</i> )	Subsurface deposit, milling features, ashy midden, rock art, obsidian, quartz, and basalt debitage, bone, historic glass beads, <i>Olivella</i> beads, historic rock wall	No effect	
TUL-342	Subsurface deposit, milling features, rock art, obsidian, chert, and basalt debitage, dietary bone, steatite, ceramics, mussel shell	Affected by ongoing maintenance of transmission line access roads <sup>a</sup>	Eliminate Edison access road grading activities within site boundaries
TUL-343	Subsurface deposit, milling features, midden, obsidian, chert, and basalt debitage, dietary bone, ceramics	Affected by ongoing maintenance of landowner's ranch roads also used by Edison to access project facilities <sup>a</sup>	Eliminate Edison access road grading activities within site boundaries
TUL-344	Subsurface deposit, milling features, midden, housepits, groundstone artifacts, obsidian, basalt, chert, and quartz debitage, dietary bone, <i>Olivella</i> beads, mussel shell	Affected by ongoing maintenance of landowner's ranch roads also used by Edison to access project facilities <sup>a</sup>	Eliminate Edison access road grading activities within site boundaries
TUL-347	Subsurface deposit, milling features, midden, rock art, obsidian, basalt, chert, and quartz debitage, tooth, dietary bone, mussel shell	Affected by ongoing maintenance of transmission line access roads; partially disturbed by transmission tower <sup>a</sup>	Eliminate Edison access road grading activities within site boundaries; when transmission tower needs replacement cut existing tower off at ground level and erect a new tower outside of site area

Site Number	Data Sets	Potential Effects	Recommendation
TUL-580	Subsurface deposit, milling features, midden, obsidian, quartz, and basalt debitage, ceramics, dietary bone, glass and metal	No effect	
TUL-827	Subsurface deposit, milling features, quartz, obsidian, and basalt debitage, steatite vessel fragments, dietary bone	Affected by ongoing maintenance of transmission line access roads <sup>a</sup>	Eliminate Edison access road grading activities within site boundaries
TUL-829	Subsurface deposit, milling features, quartz, obsidian, basalt, and chert debitage, bone, dietary bone	No effect	
TUL-831	Subsurface deposit, milling features, midden, rock art, obsidian, basalt, and quartz debitage, ceramics, groundstone artifacts, mussel shell, dietary bone	No effect	
TUL-835	Subsurface deposit, milling features, midden, obsidian debitage, historic glass beads, other historic artifacts, charcoal, bone	No effect	
TUL-837	Subsurface deposit, milling features, dietary bone, basalt, obsidian, chert, and quartz debitage, charcoal, ceramics	Affected by ongoing maintenance of transmission line access roads <sup>a</sup>	Stabilize road banks and avoid present road margins during future road work as specified in the CRMP
TUL-838	Subsurface deposit, rock art, milling features, midden, housepits, obsidian, quartz, chert, and basalt debitage, fire affected rock, ceramics, steatite, charcoal, dietary bone	Partially disturbed by transmission tower but not accessible by maintenance road <sup>a</sup>	When transmission tower needs replacement cut exiting tower off at ground level and erected new tower outside of site area

Site Number	Data Sets	Potential Effects	Recommendation
TUL-840	Subsurface deposit, ashy midden, milling features, rock art, chert, basalt, quartz, and obsidian debitage, lithic artifacts, steatite vessel fragments, charcoal, dietary bone, portable mortar	Affected by ongoing maintenance of transmission line access roads <sup>a</sup>	Eliminate Edison access road grading activities within site boundaries

- <sup>a</sup> References sites located on private lands crossed by the BC#4 powerhouse to the Springville Substation transmission line, which was deleted from the project by the Commission's March 9, 2001, Order Amending License.

### **Cultural Resource Management Plan**

To ensure that relicensing would not have an adverse effect on the eligible archaeological sites (historic properties), Edison consulted with the California SHPO and the SNF and prepared a CRMP and filed it with the license application.

The CRMP submitted with Edison's application outlines specific treatment for the 11 historic properties which at that time were defined as likely to be affected by project operation (see table 8). With the elimination of the powerlines from the project boundaries, only one of those sites would be affected by the BC#4 Project. The CRMP provided to the Advisory Council and other consulting parties has been modified by Commission staff to reflect this. The treatments originally proposed for the 10 sites are, essentially BMPs and would assure that routine road maintenance does not further affect the sites.

The CRMP also sets forth procedures for consultation during routine Edison maintenance and operation activities, and for unforeseen circumstances requiring prompt emergency response. Edison would consult with the SHPO, and the SNF if on federal lands, concerning any previously unidentified cultural resources discovered at the project and would evaluate and protect any eligible sites pursuant to the CRMP. Edison would monitor and report to the Commission, SHPO, and consulting Native American groups on the need for additional treatment every 10 years during the license period.

In addition to site-specific treatment, Edison would follow programmatic treatment recommendations to avoid any unnecessary effects on historic properties including: (1) avoidance of the operation of vehicles and the movement of heavy equipment across historic properties or traditional cultural properties unless operation and movement occurs

on an existing roadway; (2) avoidance of road maintenance that may affect historic properties or traditional cultural properties; and (3) replacement of power poles presently installed within the site boundaries of historic properties in such a way that minimizes effects on them.

The SHPO concurred with the provisions of a draft MOA and CRMP and made editorial comments which Edison incorporated into the MOA and CRMP included with the license application (letter from Cheryl Widell, SHPO, Sacramento, CA, dated October 1, 1996). Commission staff have reviewed the CRMP and conclude that implementation of the CRMP would enable Edison to avoid or minimize adverse effects that might result from the continued operation of the project. Accordingly, the Commission and SHPO are in agreement on how to resolve potential adverse effects on historic properties from relicensing of the project. However, 10 of the 11 sites covered by specific treatment plans are crossed by deleted facilities.

The FS, in its revised Section 4(e) Condition No. 30, dated October 15, 2001, specifies that Edison shall implement the CRMP submitted in the license application and approved by the SHPO to protect cultural resources. The 10 sites that would be dropped from specific treatment plans in a revised CRMP are not on SNF lands. The FS would also have no authority to monitor and enforce long-term management practices for those sites (see below).

The Advisory Council, on October 23, 2001, responded to the Commission's letter documenting project effect. The Advisory Council found that their further participation in the consultation to resolve adverse effects was not needed in light of agreement on the CRMP. Filing with the Advisory Council an executed MOA to implement the CRMP would complete the Commission's compliance responsibilities under Section 106 of the NHPA. On November 29, 2001, the Commission's Director of the Office of Energy Projects signed the MOA implementing the CRMP and requested the SHPO's signature and the concurring signatures of other consulting parties (Edison, FS, the North Fork Rancheria, the Big Sandy Rancheria, the North Fork Mono Tribe, the Sierra Mono Museum, and Mono Nation). The Commission would fulfill its Section 106 responsibilities by filing an executed copy of the MOA prior to issuing a license for the project.

Because the implementing measures to protect historic properties affect project economics, we make our recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

## **Native American Concerns**

The North Fork Mono Tribe (letter from Honorable Ron W. Goode, Tribal Chairman, North Fork Mono Tribe, Clovis, CA, dated February 19, 1998) expressed concern about the costs associated with curation of artifacts from cultural surveys on Edison lands at the Sierra Mono Museum. Mr. Goode states that Edison paid \$100 per box for curation in the 1970's and early 1980's and that the real cost now is \$1,000 per box. The Museum would charge Edison \$650 a box and requests a donation of \$15,000 from Edison for this purpose. Mr. Goode indicated that the Museum would return the 200 boxes of uncurated artifacts to the SNF if Edison does not make other arrangements. Mr. Goode also requests that Edison provide power to the residents of Jose Basin who are currently without power.

The Big Sandy Rancheria Band of Western Mono Indians expressed concern about future disturbance at site CA-MAD-64/65/66 and requested that future replacement of the wooden power pole at the site not create any further disturbance (letter from Thane V. Baty, Tribal Chairman, Big Sandy Rancheria, Auberry, CA, to T. Taylor, Edison, Rosemead, CA, dated June 7, 1996). In addition, Big Sandy Rancheria requests Edison to drop power and supply residents on Jose Basin Road with electrical services.

Edison does not propose to provide a specific payment for the curation of artifacts collected during cultural resource surveys as requested by the North Fork Mono Tribe. Edison states that the operation of BC#4 does not create or increase cultural collections affiliated with the North Fork Mono Tribe which need housing or protection. However, Edison states that it will continue to explore options to help support the Sierra Mono Museum and will continue to consult with the SNF and North Fork Mono Tribe regarding the appropriate mechanism.

The cultural resource surveys conducted by Edison on SNF lands would have required a permit which would have specified the curation requirements for artifacts collected during the survey. The ownership of artifacts collected during cultural resource surveys typically resides with the land owner. Commission staff would consider any costs associated with the curation of artifacts resulting from the cultural resource surveys conducted in support of relicensing as relicensing costs that should be borne by Edison. However, according to Edison, the 200 boxes of uncurated artifacts were not collected during the cultural resource surveys conducted by Edison either prior to construction or in support of relicensing. Edison collected the artifacts during cultural resource surveys in support of the licensing of the Balsalm Meadows Project No. 67 in the mid-1980's (personal communication between Van Button, Federal Energy Regulatory Commission, and Tom Taylor, Staff Archaeologist, Southern California Edison

Company, on November 13, 2001). Because the artifacts in question are not related to the relicensing of the BC#4 Project, we do not recommend inclusion of this measure as a license condition. However, Edison states in its comments on the draft EIS that it will compensate the Sierra Mono Museum at the level recommended by Commission staff to cover the increased costs of curation.

Edison does not propose to provide a residential power drop in the Jose Basin as requested by the North Fork Mono Tribe and the Big Sandy Rancheria, and states that there is no correlation between the operation of BC#4 and the absence of power in the Jose Basin area which is within PG&E's service area. However, Edison states in its comments on the draft EIS that Big Sandy tribal members residing in the Jose Basin now have electric power.

### **3.3.5.3 Unavoidable Adverse Effects: None.**

## **3.3.6 Recreation and Land Use**

### **3.3.6.1 Affected Environment**

#### **Recreational Resources**

Developed recreational sites within 10 miles of BC#4 are primarily located on the region's lakes in the Pineridge Ranger District including Millerton Reservoir State Recreation Area and Kerckhoff Lake located on the San Joaquin River (figure 11). Kerckhoff Lake provides limited campground, parking, picnic, and launch facilities. Farther from the project are additional lakes in the region including Lake Edison and Florence Lake, located about 25 miles northeast and east, from the project facilities; Mammoth Pool Reservoir located about 15 miles north of project facilities; and Bass Lake located about 11 miles to the northwest.

The upper San Joaquin watershed is an integral piece of the Sierra Nevada recreational system, which includes Yosemite and Sequoia-Kings Canyon National Parks. Yosemite and Sequoia-Kings Canyon National Parks are located about 25 miles north and 32 miles east of the project area, respectively. Additional recreational opportunities in the nearby area include the Sierra Vista National Forest Scenic Byway located near North Fork, Shaver and Huntington Lakes, about 20 miles east of the project. The Byway is an approximately 93-mile scenic drive through the SNF.

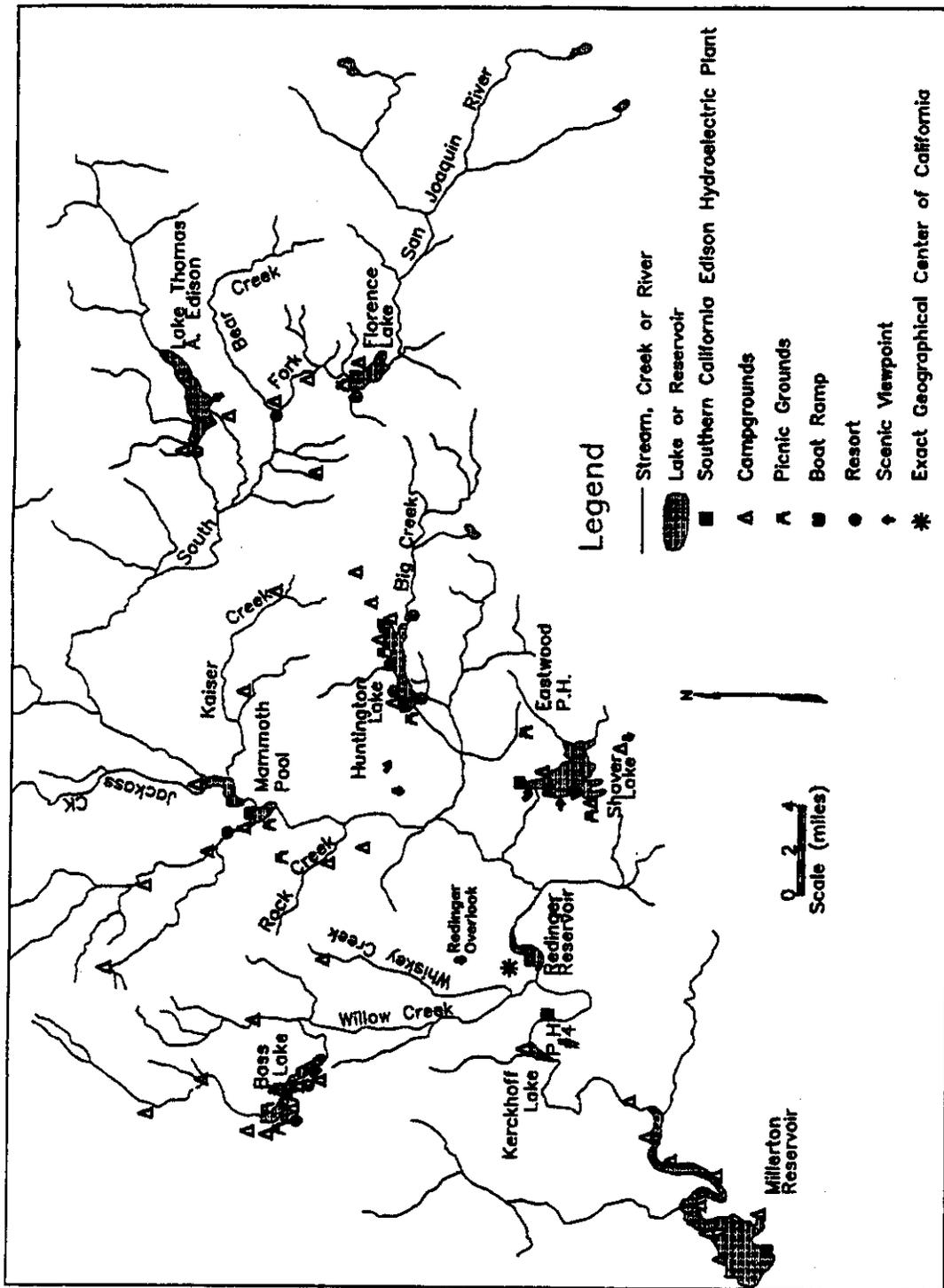


Figure 11. Recreation opportunities in the vicinity of the Big Creek No. 4 project (Source: Edison, 1997).

Whitewater boating occurs within the SNF and surrounding areas and consists primarily of kayaking on the San Joaquin River. Seven San Joaquin River runs are identified by Holbeck and Stanley (1988) and include: the Devil's Postpile Run on the Middle Fork San Joaquin River; several runs along the South Fork San Joaquin River between Paiute Creek and Mt. Tom; two runs between Mammoth Pool Dam and Redinger Reservoir along the San Joaquin River; and the Patterson Ben Run below Kerckhoff Reservoir. Most of these runs are Class V level of difficulty.

### *Flatwater Boating*

Redinger Reservoir is popular with recreationists for motorboating and waterskiing, with limited non-motorized boat use, fishing, and camping. Developed recreational facilities are concentrated on the north shore of the reservoir, in the vicinity of the BC#4 dam. There is no road access to the south shore. Recreational facilities consist of two boat launches (figure 12), parking areas, and sanitation facilities. Although the reservoir is owned and operated by Edison, the recreational facilities have been managed by the FS for the past 20 years.

The public boat launch facility is located at the west end of the reservoir upstream of the dam and consists of a concrete launching ramp, boarding floats, access driveway, restrooms, and two parking areas with a total capacity for about 62 vehicles and trailers. The main parking area has a capacity of 22 vehicle-trailers and the overflow parking area, located approximately 0.25 mile to the west, has a capacity for 40 vehicle-trailers. A second launch is located at the east end of the reservoir, on the south shore of Redinger Reservoir, upstream of Italian Creek and just downstream of the Big Creek No. 3 powerhouse. This launch is owned by Edison and used by employees to access project facilities for maintenance.

### *Trails*

There are two primary trails in the project vicinity: the San Joaquin River/French Trail and the Horseshoe Bend Trail.

Within the project vicinity, the San Joaquin River/French Trail is complete east of Italian Bar Bridge to Mammoth Mountain (figure 12). A portion of this trail occupies an access road that Edison proposes in its January 10, 2000, application to amend its license to delete from the project boundary because it is no longer part of the unit of development for this project. Trail infrastructure, including signage for trailheads, is limited to non-existent.

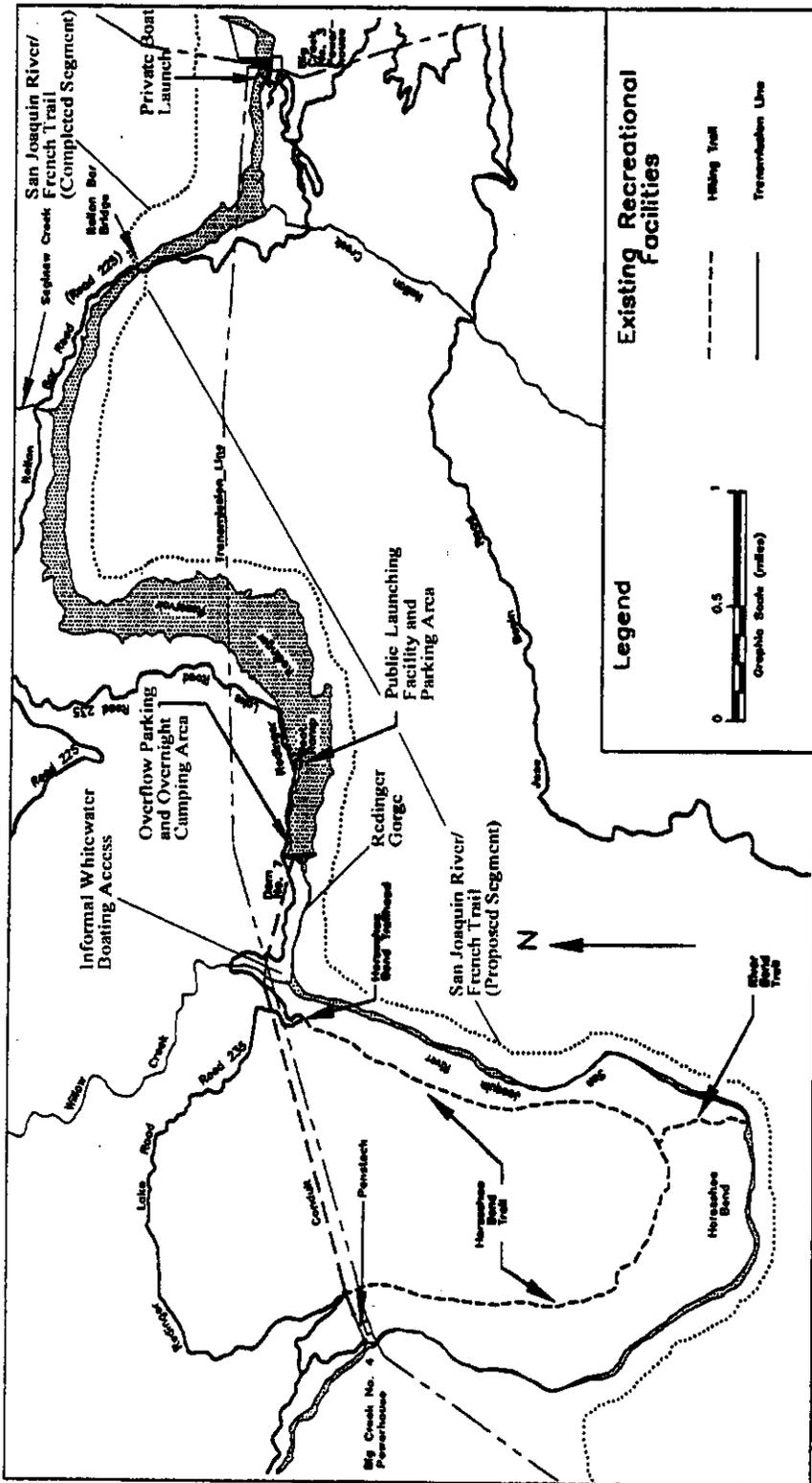


Figure 12. Recreation facilities in the Big Creek No. 4 project area (Source: Edison, 1997, as modified by staff).

The Horseshoe Bend Trail is located roughly parallel to the bypassed reach on the north side of the river. The trail is about 4.5 miles long and begins about 0.5 mile west of Willow Creek. The trail is also accessible from the Willow Creek area upstream of Redinger Lake Road. The parking area/trailhead is located near the new gate on the access road to the BC#4 powerhouse. A spur trail, referred to as the River Bend Trail, provides access from the Horseshoe Bend Trail to the river. The Horseshoe Bend Trail is in rough condition (FS, 1998). Specifically, there are currently no drainage structures in place to divert water to the side of the trail. The water cascading down the trail has, in places, caused substantial erosion, particularly in the steep areas of the trail. In addition, crossings of intermittent streams were not well constructed which has resulted in increased water flows to the trail during periods of heavy rain.

### *Whitewater Boating*

There are two riverine stretches, portions of which are within the project boundary, that are used by whitewater recreationists: Redinger Gorge and the Horseshoe Bend, both of which are below the BC#4 dam (figure 12).

The Redinger Gorge stretch is about 3,500-ft-long and located between the base of the dam and its confluence with Willow Creek. Access to Redinger Gorge is considered difficult. No roads descend to the channel and boaters must cross a large expanse of steeply sloping exfoliated granite during the last 60 ft of descent to the river. The upper 1,200 ft of the gorge is within the existing and proposed project boundary.

The Horseshoe Bend stretch is about 6.2 miles long and located between Willow Creek and BC#4 powerhouse. The last 400 ft of this run is within the existing and proposed project boundary (in addition, about 4,000 ft of the San Joaquin River downstream of the powerhouse is within the existing project boundary and about 275 ft within the proposed project boundary). Whitewater activities are dependent on the spills from the dam, which are tied to annual runoff. The Horseshoe Bend run is considered the most frequently boated reach of the San Joaquin River, according to "California Whitewater - a Guide to Rivers" (Cassady and Calhoun, 1995).

Access to the Horseshoe Bend reach consists of several undeveloped put-ins and take-outs. Typically, people use a narrow path from Road 235 to about 0.1 mile from the confluence of Willow Creek to put in. The primary take-out point is located on Kerckhoff Lake at the Smalley Cove Campground (FS, 1998).

Flow data for the Horseshoe Bend reach for water years 1972 to 1992 indicate that boatable flows were available between 20 and 40 percent of the time between April and

July. However, in most cases, the boatable flows are only available during above-normal and wet water years. During relatively dry years, few if any spills with boatable flows occur. Between 1985 and 1995, boatable flows occurred during only 3 years. Edison and the SJP determined that flows greater than 500 cfs are boatable. Edison, SJP, and AWA consider flows from 1,000 to 3,000 cfs to be optimal for intermediate to advanced paddlers, which would be a large percentage of the boating population (letter from C.E. Miller, Manager of Hydro Generation, Edison, to the Commission, dated February 17, 1998). Holbeck and Stanley (1988) consider the optimum boating flow to be 1,500 cfs, although they also indicate the reach can be boated at flows as low as 1,000 cfs. In the event of a high water year, such as water year 1982-1983, boatable flows were continually available from April to mid-September, ranging from 1,000 to 12,500 cfs according to information presented in Edison's application. According to AWA, at flows between 1,000 and 2,500 cfs, the Horseshoe Bend reach provides 6 miles of Class III boating, with two rapids rated Class IV. Between 2,500 and 8,000 cfs, the difficulty is Class IV to IV+. Above 8,000 cfs, the overall difficulty of the river becomes Class V to V+ (letter from John Gangemi, Conservation Director, AWA, to James Boynton, Forest Supervisor, FS, dated October 22, 1998).

Figure 8 provides an indication of the seasonality of flows in the bypassed reach. Flow information for numerous rivers throughout California, including sections of the San Joaquin River, can currently be obtained via an Internet site on "Recreational River Flows" (California Data Exchange Center [CDEC], maintained by the California Department of Water Resources [CDWR]). However, information for sections within the project boundary, or influenced by releases from the BC#4 dam, (over 6 miles of the San Joaquin River) is not currently available. The Internet site is used frequently by members of the boating community and contains flow and river stage information transmitted directly to a central data repository on many state rivers.

### *Camping*

There are no developed campgrounds on the reservoir. However, the FS allows limited informal camping near the dam and Willow Creek within specific boundaries in the parking area adjacent to the BC#4 dam. This area consists of space for camping and a single composting toilet.

### *Recreational Use*

Edison conducted a recreation study which included three surveys, the Redinger Reservoir User Activity Survey, the User Preference Survey, and the Horseshoe Bend Survey.

The Redinger Reservoir User Activity Survey revealed that the informal camping area near the dam receives substantial use, with the majority of use (between 80 percent and 100 percent capacity, or 20 to 25 vehicles) occurring on holiday weekends.

The User Preference Survey indicated that most recreationists visit the reservoir more than 10 days each year, typically staying 3 to 7 days; 79 percent of respondents usually camp at the reservoir; the average distance traveled was 151 miles; and 61 percent indicated satisfaction with current reservoir access conditions. The data also indicate that boating activities at the reservoir appear to be near or at facility capacity on holiday weekends and sometimes exceed facility capacity. This survey estimated that the boat launch received substantial use, with the parking area filled beyond capacity every holiday weekend and vehicles parked in the launching area obstructing its use.

The Horseshoe Bend Survey indicated that 71 people used the trail between July 23, 1995, and March 3, 1996. The survey indicated that the primary use of the trail is hunting access, horseback riding, llama training, dog training, hiking, camping, prospecting, and wildlife viewing. Peak use of the trail occurs in the spring for wildflower observation and during quail and turkey seasons.

Edison conducted a feasibility study to determine if video monitoring at the BC#4 powerhouse would be effective in quantifying boater use of the bypassed reach. The study results also provide an indication of current use of the Horseshoe Bend reach by boaters during the periods monitored. Monitoring was conducted from May 6 to September 7, 1998, and June 13 to July 4, 1999. In 1998, a wet water-year as defined by CDWR, whitewater boating occurred on 4 days of the 79 days that provided boating opportunities during the monitoring period. A total of 75 whitewater boaters used the reach during the monitoring period (an organized boating event accounted for 55 of these boaters). In 1999, an above normal water-year as defined by CDWR, whitewater boating occurred on 1 day of the 12 days that provided boating opportunities. Three whitewater boaters used the project reach during the 22-day, 1999 monitoring period.

### **Land Use**

Project facilities on public lands include the BC#4 dam and its intake facilities; all of the project conveyance system consisting of tunnels, a flowline, and a penstock; a powerhouse; and about 6 miles of transmission lines with at least a corresponding amount of access roads (all but 375 ft of transmission line, which were part of the BC#4 Project, no longer serve project purposes and are now non-jurisdictional, pending, in part, upon receipt of appropriate conditions by Edison from the FS). Lands in the project boundary adjacent to Redinger Reservoir are maintained primarily as open space and used for

recreational purposes. Privately held lands in the project boundary include private inholdings within the SNF (figure 13) (see table 3). As figure 13 suggests, Edison owns some, but not all, of the land within the project boundary. Land uses in the project vicinity include power generation, recreation, agricultural, residential, and natural resource management.

There are about 80 homes located within the project vicinity; 20 homes are within 2 miles north of the project facilities; 15 are situated between 1.25 and 2.5 miles south; 5 homes are located with 1 mile west of the BC#4 powerhouse; and about 40 Edison homes are located near the upper end of the reservoir, west of powerhouse No. 3.

### *Existing Roads*

Madera and Fresno counties, Edison, and the FS own and maintain roads within the project boundary. County roads are the primary access to the reservoir, specifically Road 225 (Italian Bar Road) and Road 235 (Redinger Lake Road) (see figure 13). Road 225 traverses land within the project boundary from northwest to southeast and Road 235 parallels the northern boundary of the project area (partially within the project boundary). Both of these roads are maintained by Madera County in the project vicinity. A portion of Road 225 is maintained by Fresno County once it crosses Redinger Reservoir into Fresno County. Edison maintains several roads throughout the project area to provide access to project facilities. To prevent unauthorized access, the roads leading to the BC#4 powerhouse and across the BC#4 dam are gated. The FS also maintains a number of unimproved access and fire roads on SNF lands within the project vicinity; some of these roads may be within the project boundary.

### *Plans and Policies*

The majority of non-transmission line-related lands within the project boundary are within the SNF (see table 3). Land management practices are detailed in the Land and Resource Management Plan for the SNF. This plan identifies three management prescriptions within the project area: "Front Country," "General Forest," and "Research Natural Areas." Front Country includes areas where wildlife and range management activities, with adequate protection of watershed values, are emphasized. General Forest includes lands generally available, capable, and suitable for timber production. RNAs include areas protected and managed for research in their natural condition (e.g., the Backbone Creek RNA).



Segments of the San Joaquin River upstream from the project area have been identified as being eligible for federal Wild and Scenic River status, specifically: the reach from Mammoth Pool Reservoir to the confluence of the Middle and North Forks San Joaquin River; the North Fork San Joaquin River from its confluence with the San Joaquin River to Twin Island Lake; the Middle Fork San Joaquin River from its confluence with the San Joaquin River to Thousand Island Lake; and the South Fork San Joaquin River from Florence Lake to Martha Lake. The San Joaquin River within or adjacent to the project area is not considered eligible.

Private land within the project boundary, is also used for grazing. This private land is within the jurisdiction of Madera and Fresno, counties (see figure 1 for county boundaries). The northernmost portion of the project area, from the middle of the San Joaquin River and Redinger Reservoir northward, is governed by the Madera County general plan, adopted in 1994. The project area is primarily designated as "Open Space." Uses include, but are not limited to, low-intensity agricultural uses, recreational uses, communication lines, reservoirs, and limited residential uses. Smaller areas are designated as "Agricultural Exclusive," and have uses similar to "Open Space," however there are greater provisions for residential uses.

A portion of the private land within the existing and proposed project boundary south of Redinger Reservoir is within Fresno County and governed by the Fresno County general plan, adopted in 1976, and currently being updated (personal communication, Kristen Sycamore, Louis Berger Group, Inc., with Carol Eldred, Fresno County Department of Development and Engineering, on March 15, 2000). Three primary land use designations apply to land within the existing project boundary: "Public Lands and Open Space," "Eastside Rangeland," and "Foothill Rural Residential." Public Lands and Open Space includes areas devoted to preservation of natural resources and non-intensive land uses. Eastside Rangeland applies to lands designated for agricultural-related activities; and Foothill Rural Residential areas are intended for rural homesites with minimum improvements, taking into consideration natural resource protection.

### **3.3.6.2 Environmental Effects and Recommendations**

#### **Recreational Resources**

##### *Redinger Reservoir Recreation and Public Access*

Edison proposes to make the following improvements at Redinger Reservoir:

- install a portable toilet facility at the informal camping area and at the public boat launch (installed during June 1998);
- install a new floating dock at the public boat launch (completed);
- place new rock slope protection along the lake shores adjacent to the left edge of the boat launch ramp (completed);
- establish a trash collection service at the recreational facilities; and
- install signage acknowledging California Department of Boating and Waterways' (CDBW) and FS's role in the improvements, operation and maintenance of the recreational facilities at Redinger Reservoir.

As a revised Section 4(e) condition, the FS recommends that Edison:

- purchase and install an additional toilet for the east end of the informal camping area;
- chip seal<sup>10</sup> the access road to the public boat ramp;
- plant at least 10 trees at locations designated by the FS;
- purchase and install two concrete picnic tables to be located on the former toilet pads in the vicinity of the public boat launch; and
- maintain, repair, and rehabilitate project recreational facilities that are within the project boundary, and any recreational facilities outside of the project boundary that are related to project purposes.

The public boat launch provides the only access to Redinger Reservoir. Edison's survey indicated that users strongly preferred the current level of development at Redinger Reservoir, rather than increasing the capacity of recreational facilities to accommodate additional visitors. The Edison-proposed and FS-recommended enhancements to the boat launch and informal camping area would enhance these facilities without expanding their capacity. Currently, there are no picnic tables in the vicinity of the boat launch and adding two tables would allow the public to enjoy this attractive setting.

The overflow parking and informal camping area only has one toilet, which is inadequate to accommodate the number of visitors to this site. We conclude that an additional toilet at the informal camping area is needed and would provide adequate toilet facilities for the visitors to this area.

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<sup>10</sup> Chip sealing is a method to selectively repair asphalt without having to resurface the entire area; it reduces the need for future maintenance.

Based on our July 1, 1999, site visit observations, the informal camping area has no trees that would offer substantial shade to campers or others using this area. The air temperature during the summer often exceeds 100°F. The FS-recommended tree plantings would provide some shade from the summer heat at the informal camping area and visually enhance the somewhat stark appearance of this area.

Hydroelectric project licensees are required to provide public access to project waters. The boat launch area and the associated overflow parking and informal camping area is the primary access to Redinger Reservoir. As such, Edison should be responsible for maintaining these facilities. Historically, the FS has carried out all cleaning and maintenance of the recreational facilities at Redinger Reservoir (FS, 1998). The FS discontinued its trash disposal activities in 1995 due to its cost, encouraging recreationists to pack out their trash. This request has met with mixed success. Edison's proposal to again provide trash disposal services is appropriate to ensure that the litter does not become an unwieldy problem at these sometimes heavily used facilities. We agree with the FS revised Section 4(e) condition recommending that Edison be responsible for maintenance, repair, and rehabilitation of these facilities.

We discuss the cost of these recreational enhancements in section 4.0, Developmental Analysis, and make our final recommendation regarding recreational enhancements in section 5.3, Comprehensive Development and Recommended Alternative.

#### *Redinger Reservoir Safety*

Edison proposes to help reduce potential hazards associated with public health and safety at the boat launch facility and camping area by implementing the following measures:

- install and maintain a solar-operated emergency telephone near the overflow parking and camping area with a list of emergency phone numbers;
- post signs around the reservoir to discourage excessive boating speeds and inform boaters of safe boating practices, in an effort to reduce the hazards associated with boating; Edison would consult with the CDBW to determine safe boating speeds for the reservoir; and
- post signs to discourage people from jumping off Italian Bar Bridge into the reservoir.

The FS also recommends implementation of Edison's proposed safety measures as part of a revised Section 4(e) condition.

Recreational facility capacity is reached on many weekends and exceeded on most holidays. Consequently, conflicts between users, which may cause accidents, can occur. Recreation on Redinger Reservoir primarily consists of waterskiing, jet-skiing, and powerboat use. These activities could be considered to be relatively high risk in terms of the potential for injury. Edison's proposed safety and directional signage would improve safety by limiting boat speed and helping to reduce user conflicts by informing recreationists of appropriate activities. Some of these signs are already in place. Edison's proposed emergency telephone would enable a more rapid response by emergency personnel in the event of an accident. This telephone also could serve recreational boaters that access the bypassed reach at nearby Willow Creek. We conclude that Edison should implement its proposed safety improvements following consultation with CDBW and the FS. We make our final recommendation regarding these measures in section 5.3, Comprehensive Development and Recommended Alternative.

### *Hiking Trail Improvements*

Edison proposes drainage improvements to the Horseshoe Bend Trail by constructing waterbars and rerouting several steep sections of the trail. The trail would be widened and graded. Signage would be installed to direct the public to the trailheads, discourage fire hazards (i.e., smoking and campfires), and inform the public about notable wildlife or plants along the trail.

As a revised Section 4(e) condition, the FS recommends reconstructing portions of the Horseshoe Bend Trail to provide hikers with more of a visual buffer from the powerhouse switchyard. The FS further recommends that the remainder of the trail between the powerhouse and County Road 235 should be reconstructed with signage as proposed by Edison. The FS also recommends that BMPs be incorporated into all construction and maintenance work to reduce erosion and protect water resources.

The Horseshoe Bend Trail begins and ends on County Road 235. During our December 19, 2001, teleconference, we asked the FS to clarify which portion of the trail it recommends that Edison reconstruct. The FS replied that its intent was to reconstruct the western portion of the trail to accommodate the visual screening. This portion of the trail is about 0.25 mile long.

During our July 1, 1999, site visit, we noted that about 50 yards of the trail is immediately adjacent to the switchyard chain link fencing near the powerhouse. We also noticed that the existing signs marking the eastern and western trail termini were small, illegible, and would be difficult for hikers not familiar with the trail to locate. The FS's recommendation to reroute portions of the Horseshoe Bend Trail away from the

powerhouse switchyard would create a more natural experience for hikers. Improved signage would reduce confusion about trailhead locations, and the provision of interpretative signage would educate and enhance the experience for recreationists. We concur that Edison's and FS's proposed enhancements to the Horseshoe Bend Trail would improve the safety of trail conditions, reduce trail erosion, and improve overall access for recreationists.

We encourage Edison to work with the FS to implement its proposed measures on the entire Horseshoe Bend Trail. However, we have been unable to establish a nexus of the Horseshoe Bend Trail with the project purposes. All but about a quarter of a mile of the trail is outside the existing project boundary, and it does not provide public access to project lands or waters. Without a nexus to project purposes, we do not recommend that Edison be required to implement its proposed trail improvements on the entire trail.

The entire Horseshoe Bend Trail is within the SNF and the FS would have jurisdiction over this trail. However, we do not recommend that FS Section 4(e) conditions be included in a license for a project unless they are applicable to project-related activities, facilities, and purposes. The component of the FS recommendation that pertains to providing more of a visual buffer to hikers in the vicinity of the BC#4 powerhouse switchyard is appropriately addressed in a VRP, discussed in section 3.3.7.2, Aesthetic Resources. This would include all measures needed to construct a new trail from the powerhouse to its western terminus (i.e., erosion control measures and signage). We conclude that reconstructing the trail elsewhere, and providing signage although needed, is not related to project purposes. The FS, in its October 15, 2001, letter to the Commission, agreed with our conclusion.

The San Joaquin Trail is partially complete in the vicinity of the project (see figure 12). Edison proposes to coordinate with the Trail Council and the FS to help complete the trail. Specifically, Edison proposes to assist the Trail Council with the planning of the trail and acquisition of an easement when an appropriate route is established. Edison proposes to keep the Commission updated through brief reports submitted on an annual basis regarding the progress towards finalizing the trail in the project vicinity.

The Trail Council recommends that Edison assist in the development of a trailhead for the existing San Joaquin River Trail terminus in the vicinity of Italian Bar Bridge and with acquisition of appropriate easements for the yet unconstructed portion of the trail in the vicinity of the project (letter from D. Redmond, President, Trail Council, to the Commission, dated December 30, 1997).

Edison's proposal to coordinate with the Trail Council and the FS to establish an appropriate easement and provide financial, planning, and construction support to the Trail Council would assist in completing the San Joaquin River Trail. This trail, when completed, could offer an important regional hiking opportunity, and we encourage Edison to continue its support of the Trail Council's San Joaquin River Trail as proposed.

Edison's transmission tower access road to the north of the reservoir and County Road 225 is part of the existing San Joaquin River Trail. Establishing a trailhead where the trail intersects County Road 225 would enhance public access to the trail and we encourage Edison to support this measure, provided appropriate easements can be obtained from Madera County. During our July 1, 1999, site visit, Edison indicated that it could support developing a trailhead at this location.

Edison proposes to delete from the project boundary the transmission line access road that is also part of the existing San Joaquin River Trail (in its January 10, 2000 application for amendment of license). We conclude that even if this access road is deleted from the project boundary, Edison would still maintain it, which would also serve to maintain this portion of the trail. We also conclude that although the setting of the San Joaquin River Trail is enhanced by views of Redinger Reservoir, the trail does not provide direct public access to project waters. Consequently, we do not recommend that the Commission retain this access road in the project boundary of the new license.

We have been unable to establish a nexus of the San Joaquin River Trail and project purposes. Most of the trail is, or would be, outside the existing and proposed project boundary and the trail would be a viable recreational resource regardless of the presence of the BC#4 Project. Consequently, although we encourage Edison to continue to work with the Trail Council to help develop this trail, we cannot require Edison to do so in any license issued for this project.

#### *Bypassed Reach Whitewater Boating Access and Flow Information Dissemination*

Edison proposes to establish and maintain an Internet site and flow phone that would provide real-time and forecasted flow information to boaters for the Horseshoe Bend whitewater run. Edison would publish flow data on the existing CDEC Internet site, which is well known to the boating community, and it would maintain and develop a dedicated Internet site for the Horseshoe Bend reach. Edison also would provide the same flow information about the Horseshoe Bend reach to recreationists by telephone (a so-called flow phone). The type of information to be included on the flow phone and Internet sites would be developed in consultation with whitewater recreation groups, including SJP, AWA, and FOR.

In a revised Section 4(e) condition, the FS recommends the establishment of an Internet site and flow phone to provide: (1) real-time flow data including data for the previous 7 days; and (2) scheduled dates (and updates) of whitewater flow releases. The FS also recommends construction of a general recreational river access trail as proposed by Edison and discussed in section 3.3.3.2, Terrestrial Resources. The FS specifically recommends that the trail be designed to protect sensitive resources and be suitable for carrying a 14-foot-long raft to the river (i.e., 6-ft-wide, with few obstacles, and controlled grades). The FS does not want to promote increased use of this area by adding increased parking (letter from J. Gipsman, Attorney, U.S. Department of Agriculture, FS, to the Commission, dated October 15, 2001). AWA makes recommendations that are similar to the FS's recommendations (letter from J.T. Gangemi, Conservation Director, AWA, to G. Rabone, Edison, dated December 20, 1999). Furthermore, the Conservation Coalition recommends that Edison install a staff gage downstream of the confluence of Willow Creek and the bypassed reach to allow boaters to visually estimate flows in Redinger Gorge and Horseshoe Bend (letter from J. Gangemi, Conservation Director, AWA, to the Commission, dated June 12, 2000).

The current lack of reliable streamflow information for Horseshoe Bend is a limiting factor to increased boater use of the run. Publicly accessible flow information would help maximize the opportunity to use natural spill events, when such events occur. Edison's proposed flow phone and Internet site would enhance access to flow information and predictions of future operating conditions for the Horseshoe Bend reach for the boating community. In response to our AIR No. 11, Edison worked with the CDWR to test the feasibility of providing real-time river flow and stage information for the Horseshoe Bend reach to the public. The Willow Creek USGS gaging station was equipped to transmit flow information to the CDEC Internet site on a trial basis. Edison concluded that the provision of real-time information is feasible. AWA indicated that this format of information transmittal would most likely be acceptable to the boating community (letter from J.T. Gangemi, Conservation Director, AWA, to G. Rabone, Edison, dated December 20, 1999). The existing USGS gaging station immediately downstream of the dam eventually also would be equipped with similar instrumentation which, when coupled with the flow information from Willow Creek, would provide boaters with bypassed reach and Redinger Gorge real-time flow information.

Boaters camping in the area, or traveling long distances to the run, may not have access to real-time flow information as available on the flow phone and Internet site. Additionally, sudden storm events or changes in releases from upstream projects could substantially increase flows in the bypassed reach over a short period of time. Thus, a staff gage downstream of the confluence of Willow Creek and the bypassed reach would be needed to provide boaters with a visual aid for estimating flows in the bypassed reach.

The visual gage would also provide boaters with a means for assessing the class of the whitewater in the bypassed reach, and help reduce the risk that boaters with insufficient information and skills would access the run. Therefore, we recommend installing a simple, static staff gage at a point downstream of the confluence of Willow Creek with the San Joaquin River. The gage should be legible from the whitewater boating staging area and should be marked in 500 cfs increments. The 500 cfs metric would bracket the transitions from Class III to Class IV to Class V, and provide an adequate level of information from which boaters could assess their ability to paddle the reach. The cost of installing this staff gage should be incidental.

Edison also proposes to construct a general recreational river access trail near the junction of County Road No. 235 and Willow Creek and ending at the San Joaquin River, near its confluence with Willow Creek, to provide better access to the Horseshoe Bend reach. The FS recommends constructing a general recreational river access trail as proposed by Edison.

The proposed trail would help to protect sensitive resources from adverse effects that could otherwise occur through increased use. In addition, the proposed trail would improve boater and rafter access to the whitewater run. The existing trail is narrow and steep and not well defined. It has an uneven surface with thick trail-side vegetation, and portions of the trail are steep and eroded. The existing access to the river is random and haphazard, which does not allow recreationists easy access to the river and could cause adverse effects on the terrestrial and riparian habitat in the area, such as vegetative trampling, soil compaction, erosion, increased sedimentation, and animal and plant harassment and disturbance. The proposed trail would enhance access by widening and resurfacing the existing trail and controlling the grade. During our July 1, 1999, site visit, we walked the proposed trail route and saw no evidence that the trail would require any disturbance of wetlands. It is likely that construction of this trail would entail ground-disturbing activity. If so, Edison's final design of this trail should include site-specific erosion and sedimentation control measures, developed in consultation with the FS. The proposed trail could help protect sensitive species, which may be in the area, from adverse effects from increased use of the area, by directing boaters and other recreationists away from areas that are frequented by riparian species. We discuss sensitive resources in the vicinity of Willow Creek in section 3.4, Terrestrial Resources.

We discuss the costs of providing flow information to the public and providing an enhanced access trail to the bypassed reach near Willow Creek in section 4.0, Developmental Analysis, and make our final recommendation regarding these measures in section 5.3, Comprehensive Development and Recommended Alternative.

### *Whitewater Flows in the Bypassed Reach*

Edison does not propose to include scheduled whitewater boating release flows as part of the licensing of this project. Edison proposes to maintain existing project operations and minimum instream flow releases, Edison claims that the Horseshoe Bend reach is a whitewater resource of local importance, as opposed to regional importance, and that numerous opportunities for whitewater recreation that provide a higher quality experience exist elsewhere in the region.

Edison proposes to monitor recreational boater use of the Horseshoe Bend reach during the potential boating season, April through August (through video monitoring) to provide information to allow resource agencies to: (1) assess the overall boating use of the reach; (2) assess potential environmental effects from increased visitation to the reach; and (3) evaluate whether additional management actions are needed to protect sensitive resources (letter from W.C. Moody, Edison, to the Commission, dated December 6, 1999).

Several commentors oppose Edison's proposal to maintain the existing flow regime for the Horseshoe Bend reach, including: the FS (letters from J. Gipsman, Attorney, U.S. Department of Agriculture, FS, to the Commission, dated June 15, 2000 and October 15, 2001); the Conservation Coalition (representing the AWA, FOR, SJP, and TU; letter from J.T. Gangemi, Conservation Director, AWA, to the Commission, dated June 12, 2000, and representing AWA, FOR, and SJP by letter dated October 5, 2001); and the Alliance (letter from R.J. Baiocchi, Consultant for the Alliance, to G.L. Rabone, Edison, dated December 13, 1999).

In its revised Section 4(e) condition, the FS recommends that Edison provide whitewater recreational flows of 1,200 cfs for the Horseshoe Bend reach beginning during the sixth year from license issuance. This would allow the ecological studies that it recommends during the 5 years following license issuance (described in section 3.3.3.2) to be completed (see section 2.2.3, Mandatory Requirements). The FS recommends scheduled flow releases from 9:30 a.m. to 1:00 p.m. on one to three, 3-day weekends (Friday, Saturday, Sunday) depending on water year type (the FS does not define water year; presumably, the FS water year type would be that designated early in the year by CDWR) according to the following schedule:

- Wet years:
  - ▶ Two, 3-day weekends, the 1<sup>st</sup> and 2<sup>nd</sup> weekend following complete cessation of spill for a minimum of 4 days

- Above normal years:
  - One, 3-day weekend, the 1<sup>st</sup> weekend following complete cessation of spill for a minimum of 4 days
- Critical dry, dry, and below normal years:
  - One, 3-day weekend to occur on Memorial Day weekend, middle of June, and the July 4<sup>th</sup> weekend

The FS provides for modifications to this schedule, based on recommendations of the WBOC, following approval by the FS and Commission. Releases would start with 1 day (Saturday) per weekend, with the additional days added in the subsequent year, if use exceeds 40 boats a day (1 raft would count as 2 boats, 1 kayak as 1 boat). A minimum of 1 day per weekend would be provided; however, the other 2 days of a maximum 3-day weekend with scheduled releases would be deleted from the flow schedule if use falls below 20 boats a day.

In addition, the FS recommends that, when there is spillage at the dam, spill should be augmented so that flows do not fall below 1,200 cfs in the project reach during the period of spill, on weekend days (Friday, Saturday, and Sunday), between 9:30 a.m. to 1:00 p.m., between Memorial Day weekend through July 4<sup>th</sup> weekend. When supplemental releases for whitewater boating are made, the FS indicates that initial ramping rates should be 150 cfs/hour up and 100 cfs/hour down. These rates would be evaluated as part of the native aquatic species management plan monitoring, discussed in section 3.3.2.2.

The FS recommends that Edison monitor recreational use annually from May 1 through August 31, through on-site boat counts or video monitoring. If video is used, the FS states that the accuracy of the video system should be verified initially, through onsite boat counts. Monitoring should be done using a stratified sampling design, to ensure 75 percent of weekend days, and 50 percent of weekdays are monitored during spill periods, and 100 percent of days during scheduled releases. The FS anticipates that monitoring would be accomplished in a cooperative manner between the FS and Edison, in the most cost effective manner, with Edison providing the funding.

The Conservation Coalition also recommends scheduled releases for whitewater recreation. The Coalition states that, under current conditions, flows sufficient for whitewater recreation do not occur on an annual or semi-annual basis, and whitewater recreation in the Horseshoe Bend reach is the exception rather than the norm (letter from

J.T. Gangemi, Conservation Director, AWA, to the Commission, dated June 13, 2000). The Conservation Coalition is most concerned with addressing the normal and dry years that dominate the period of record when no whitewater is available. It states strongly that Edison should mitigate for lost boating days by implementing an annual schedule of whitewater releases because, without such releases, BC#4 entirely eliminates boating opportunities in critically dry, dry, and below normal water years.

The Conservation Coalition indicates the Horseshoe Bend reach has the potential to offer outstanding whitewater opportunities. It recommends the schedule and volumes proposed by the FS, including the division of water year types coupled with spill augmentation (letter from J. T. Gangemi, AWA, J. Carville, FOR, and P. Martzen, SJP, to the Commission dated October 5, 2001).

The Alliance recommends that whitewater boating flows below the dam be included for the life of the project. It supports cooperation with intervenors, local, state, and federal resource agencies to determine appropriate flow levels (letter from R.J. Baiocchi, Consultant to the Alliance, to the Commission, dated January 13, 1998).

Edison's proposal to continue current project operations would not increase whitewater boating opportunities in the Horseshoe Bend reach (although the previously discussed proposal to publicize existing flows would enable more boaters to be aware of the existing opportunities).

The FS and Conservation Coalition recommendations for scheduled whitewater flow releases would increase the boating opportunities in the Horseshoe Bend reach substantially. At flows between 1,000 and 2,500 cfs, the Horseshoe Bend reach would provide 6 miles of Class III boating, with two Class IV rapids. Providing intermediate boating opportunities would complement existing whitewater boating opportunities upstream of the project reach which are primarily Class V level of difficulty (Expert/Extreme) with some runs rated as Class IV. Scheduled releases, as proposed by the FS and Conservation Coalition, would provide more reliable and available whitewater boating for intermediate through expert boaters during the boating season, April through August.

Both intervenor whitewater release recommendations include scheduled releases that may occur during late July or August. We do not recommend scheduled releases after July 4<sup>th</sup> without data to show that such releases would not be harmful to the aquatic ecosystem. Our analysis of the pre-project hydrograph of the river for a 33-year period indicates that high peak flows typically occur in May with high flows extending into June. Scheduled releases of 1,200 cfs after mid-July would generally not be consistent with the

pre-project hydrograph of the river to which the native aquatic species would have become acclimated (although during wet years, flows exceed 1,200 cfs in July and occasionally August) and could be detrimental to the flora and fauna of the Horseshoe Bend reach. Whitewater boating flow releases during July or August could wash native transition zone fish fry, frogs, and turtles downstream, and result in relatively sudden decreases in water temperature that could adversely influence native aquatic species (see sections 3.3.2 and 3.3.3, Fisheries and Terrestrial resources, for our discussion of the ecological effects of different flow regimes).

We consider a strong adaptive management approach to be an essential element of any whitewater release recommendation for several reasons: (1) the uncertainty in the number of boaters that would use the reach if scheduled releases were publicized (thus potentially only benefitting a limited number of persons at a relatively high lost generation cost); (2) the potential that a substantially greater number of recreationists than currently visit the area could be attracted to the bypassed reach thus conflicting with the designated SNF land use prescription for the area; and (3) the potential for adverse ecological effects on aquatic and riparian species from weekend releases of 1,200 cfs when weekday flows are 20 cfs. The whitewater release recommendations of the FS and Conservation Coalition could provide whitewater opportunities during the normally dry month of August. This would enhance regional recreational opportunities during this time when boating opportunities are uncommon. However, August scheduled releases would only occur during wet or above average water years, when there would have already been earlier opportunities for whitewater boaters during spill events.

The FS whitewater release recommendation is adaptive in that the releases start with only one day per weekend. Up to an additional 2 days of releases per weekend could occur, but only if usage exceeds 40 boats a day. Release days could be reduced if use falls below 20 boats a day. This would address the first concern that we raised in the previous paragraph. Allowing the release schedule to be adjusted based on recommendations of the WBOC that would be approved by the FS and the Commission would address the second concern that we raised. Allowing up to 5 years of ecological data to be collected prior to initiating scheduled whitewater releases would allow assumptions made in the release strategies to be tested, thus addressing our third concern in the previous paragraph.

The FS has previously expressed concerns that variable flow regimes that would result from recreational boating flow releases may have adverse effects on resources within the bypassed reach. The FS stated that such measures might be inconsistent with the SNF land and resource management plan, which includes land use prescriptions for land abutting the project's bypassed reach (Front Country) which specify that the primary

management of the land should emphasize wildlife and range management. In the EA for the original preliminary Section 4(e) conditions for this relicensing (FS, 1998), the FS stated that "...significant increases in recreational activities would not be consistent with Land and resource management plan direction (page 32)." In addition, the FS stated:

Increased visitation would increase the potential for adverse impacts to both environmental resources as well as the public....more visitation could likely cause damage to riparian and other vegetation as more people seek solitude in a more densely occupied area. Although it is not desired to prevent whitewater boating in Horseshoe Bend, the anticipated impacts described above could, at some level, affect wildlife resources (including aquatic species) which is not consistent with Forest Management direction (letter from J.L. Boynton, Forest Supervisor, SNF, to J. McPheeters, Northern Hydro Region Manager, Edison, dated March 17, 1999).

The FS continued to express concern about increased recreational use in the bypassed reach in its comments on Edison's response to our AIR No. 11, concerning whitewater boating: "The Sierra National Forest remains concerned about possible effects of increased public use of the lower Willow Creek corridor on western pond turtle in particular" (letter from J.L. Boynton, Forest Supervisor, SNF, to W. Moody, General Manager, Edison, dated January 28, 2000). In its October 15, 2001, letter to the Commission, the FS concern was again evident when it emphasized that there should be no expansion of the existing parking area when the proposed Willow Creek access trail is constructed.

Based on the above concerns, we consider a cautious, adaptive management approach to be appropriate if whitewater releases, in addition to the existing spillage events, are to be recommended. Our preliminary whitewater boating release recommendation, has the following components: (1) formation of a technical committee (which would become the WBOC) to develop a monitoring plan that establishes baseline ecological conditions and addresses the effects of spill events on the aquatic community; (2) ecological monitoring; and (3) scheduling and adjusting the annual release events. Figure 14 summarizes the relationships of these components for the first 9 years after license issuance. Scheduled releases after the ninth year would continue to be assessed in a similar manner through the term of the license.

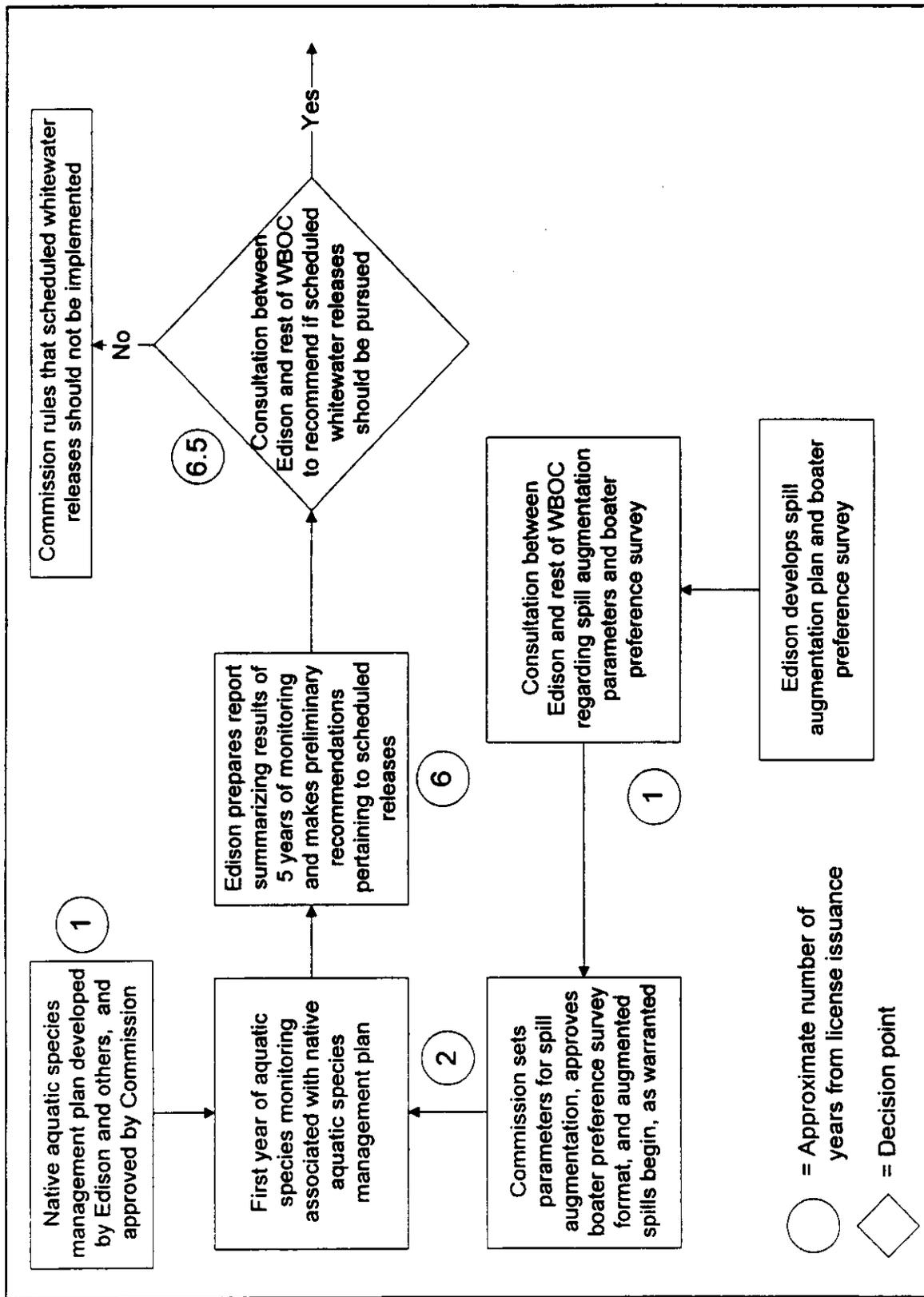


Figure 14. Summary of staff's alternative whitewater release recommendation (Source: Staff).

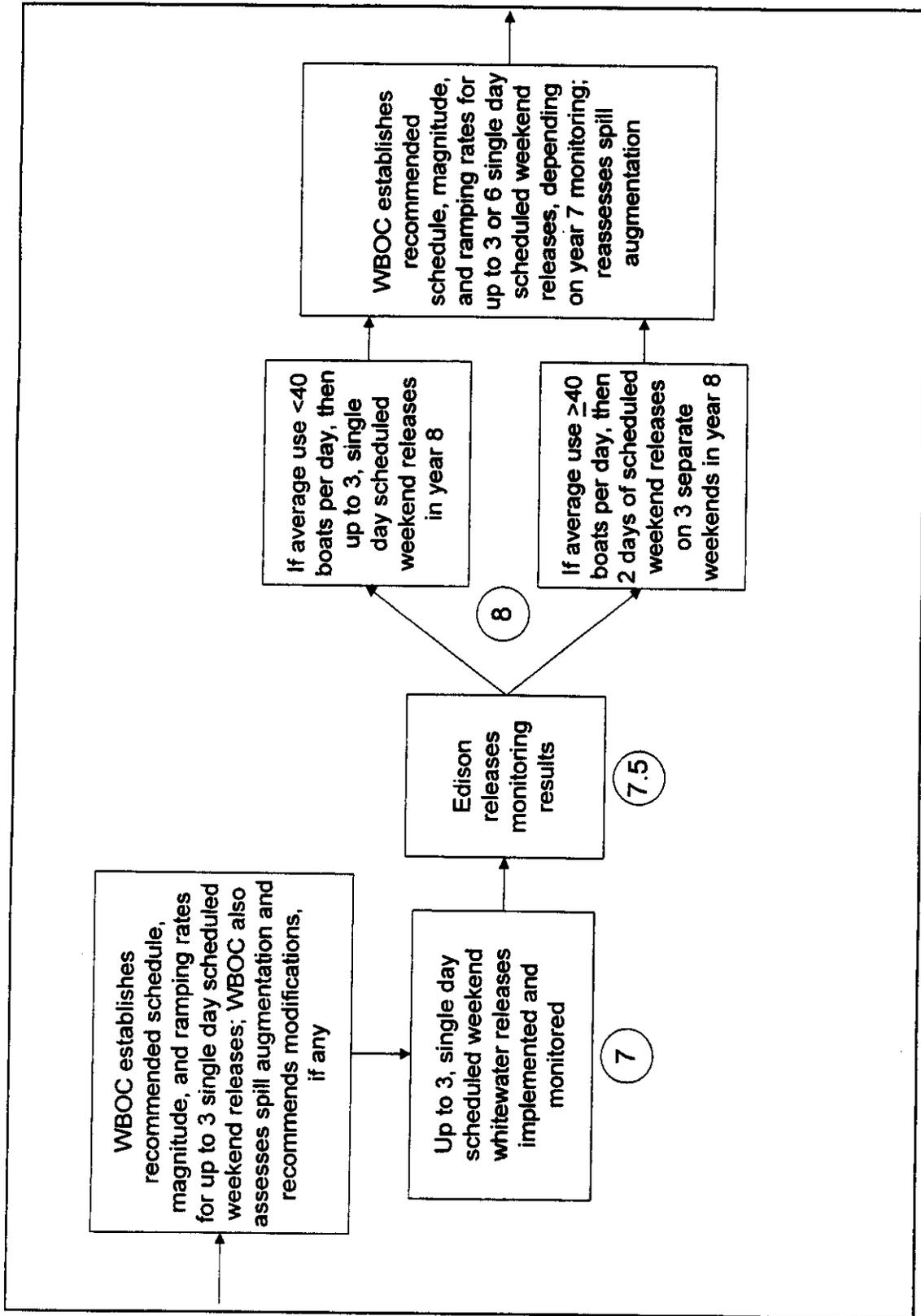


Figure 14. Summary of staff's alternative whitewater release recommendation (continued).

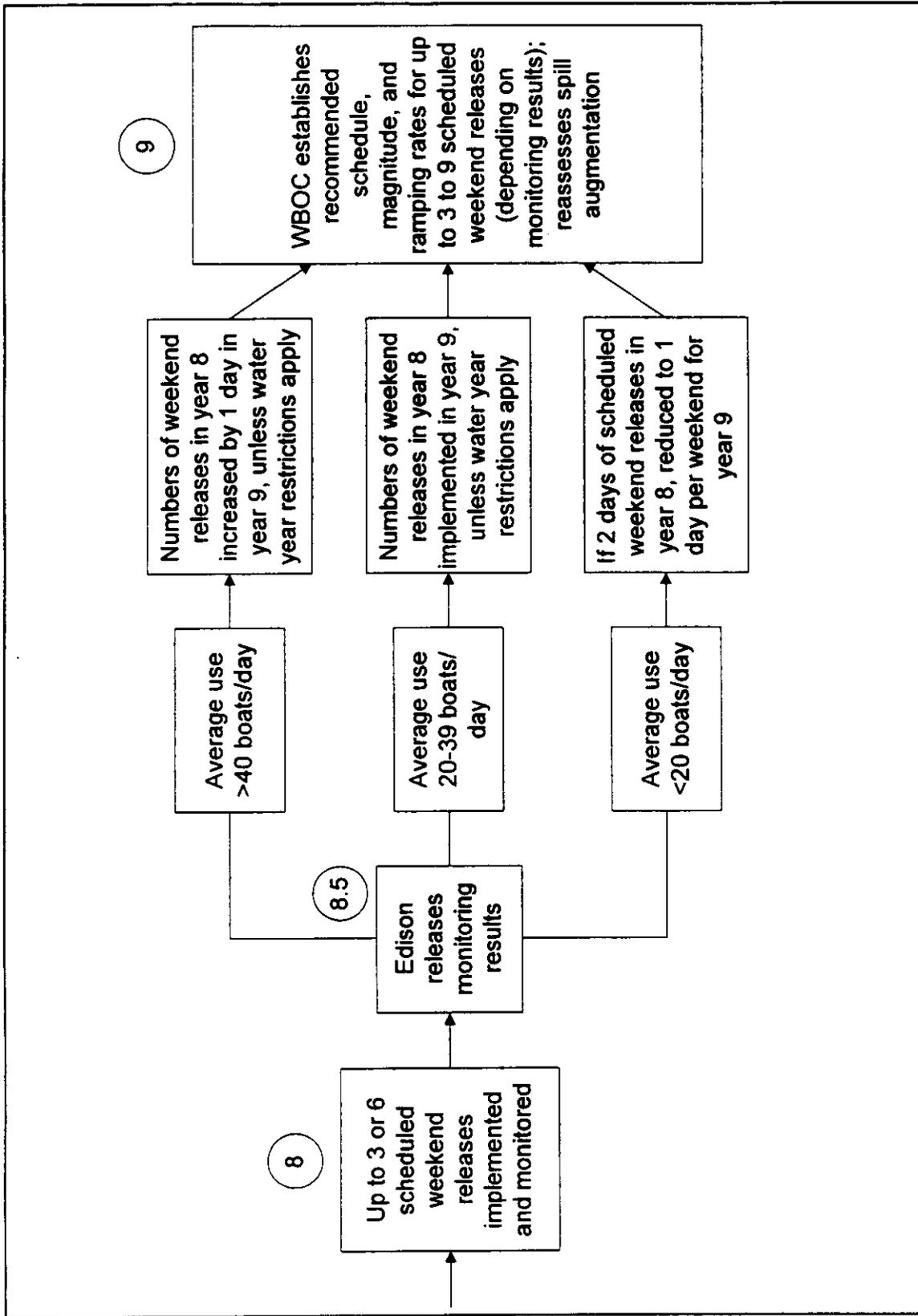


Figure 14. Summary of staff's alternative whitewater release recommendation (continued).

## Whitewater Boating Oversight Committee

Our recommendation includes the establishment of a technical committee (the WBOC) composed of representatives from Edison, FS, CA Fish & Game, FWS, SWRCB, and the Conservation Coalition (see section 3.3.2.2 for a further discussion of this committee). We consider it appropriate to create a forum where the sometimes competing interests of the aquatic ecosystem, whitewater boating community, SNF land use prescriptions, and hydroelectric generation can be collectively considered and appropriate recommendations made to the Commission. Edison would facilitate the formation of this committee during the development of monitoring studies that would be a part of the native aquatic species management. If a determination is made by the Commission that scheduled releases are not warranted, based on data compiled during the initial 5 years of ecological monitoring, then the WBOC would be disbanded.

## Ecological Monitoring

We consider it important to first clearly establish the natural resources that could be affected by altered flows to the bypassed reach prior to beginning any scheduled releases. Edison's proposed and the FS-recommended native aquatic species management plan, discussed in section 3.3.2, Fisheries Resources, and section 3.3.3, Terrestrial Resources, would provide a basis to establish an ecological baseline. The FS specifies that this plan should be developed within a year of license issuance and, given the potential sensitivity of some of the species included, we agree that this is a reasonable time frame for development of this plan. Edison proposed, and the FS originally recommended, that monitoring associated with this plan be conducted every 5 years. The FS revised recommendation specifies that intensive baseline monitoring be conducted during the first 5 years from license issuance. During the December 19, 2001, clarification teleconference, the FS acknowledged that it was unrealistic to expect monitoring to begin immediately after license issuance. We recommend that Edison begin the first of the monitoring efforts during the second year from license issuance and that this monitoring continue for 5 years in accordance with an approved monitoring plan (further discussed in section 3.3.2.2). This initial monitoring data would provide a baseline against which to compare subsequent monitoring results to determine what effect, if any, whitewater boating flows have on the ecosystem. The plan, as envisioned by Edison and the FS, would include supplemental monitoring beyond the intensive initial monitoring and assessments every 5 years of whether corrective, protective, or enhancement measures should be taken, based on the results of the monitoring. In addition, these data would provide ecological information for the WBOC to make specific recommendations about the magnitude and timing of recreational release events.

## Basis for Scheduling and Adjusting Annual Release Events

The WBOC would develop and recommend to the Commission the annual schedule for releases within criteria described below, and adjust the magnitude, timing, and ramping rates of the whitewater releases, if warranted. The WBOC would also develop a recommendation regarding whether or not scheduled whitewater releases should be adjusted by the water year type and whether or not certain time periods between April and August should be targeted for releases. The results of the initial 5 years of ecological monitoring, and any subsequent monitoring, would form the basis for this recommendation. Our recommended criteria for boating releases are designed to accommodate whitewater boaters, within a defined framework that should minimize conflicts between competing interests.

Whitewater releases, if implemented, would occur from 9:30 a.m. to 1:00 p.m., consistent with the FS recommendation, and consist initially of 1,200 cfs as measured at the confluence of Willow Creek and the San Joaquin River under our recommendation. The WBOC could recommend adjusting the release volume of subsequent events up to a maximum of 1,500 cfs or down to a minimum of 1,000 cfs, depending on the results of user satisfaction surveys discussed later. Our suggested timing for release events should provide an adequate window for completing the run. Due to slow ramping rates for whitewater boating flow events, as described in section 3.3.2, Fisheries Resources, boating opportunities would extend for 1 to 2 hours on either side of the release period, helping to ensure that boaters do not get stranded in a dewatered run. The WBOC could decide to modify our release criteria, but would need to provide its basis for any modifications to the Commission.

In order to quantify whitewater boater use, we recommend video monitoring of the Horseshoe Bend reach, consistent with the FS recommendation. This would provide a basis to assess whether the number of scheduled annual events is meeting the recreational demand. Video monitoring at the powerhouse should document boater use on the Horseshoe Bend reach because all boaters must pass the powerhouse before they reach a take-out point. Consistent with the FS recommendation, we recommend counting kayaks, canoes, and other small watercraft as 1 boat, and counting large craft, such as multi-person rafts, as 2 boats. We would make this recommendation even if scheduled whitewater releases are not implemented because Edison's proposed real-time flow information dissemination could still lead to a substantial increase in the existing level of use. Accurate use information is important for making future resource management decisions (e.g., is the monitored level of use consistent with FS land use prescriptions?). We anticipate that whitewater boating use of the bypassed reach with scheduled releases could be several times greater than during existing spill events. As previously discussed,

we recommend implementation of the flow information distribution system and the whitewater boater monitoring during the first year from license issuance. These measures would enable documentation of increased boater use that could be attributed to better availability of flow information prior to beginning scheduled releases. If scheduled releases are implemented, it is reasonable to expect yet another increase in boater use. We recommend that Edison continue to monitor whitewater boating use in the bypassed reach as it has done since 1998 until a boater monitoring plan is developed. This monitoring plan would be developed in consultation with the FS and Conservation Coalition and would specify the stratified random sampling design that would be used and the method of calibrating the video counts with counts made by field personnel. Calibration could be combined with the field work associated with our recommended recreational use monitoring, discussed later.

In preparing the release schedule, the WBOC would review the previous year's boater use information, the projected hydrology and energy demand for the coming season, and ecological monitoring survey information. We suggest that the WBOC meet in early April when Edison typically has information to enable forecasting of the upcoming type of water year (based on snow pack information). The goal of the WBOC should be to establish and publish the annual release schedule by April 15<sup>th</sup> of each year and notify the Commission of the schedule and parameters of each release. All releases would occur on weekends unless the WBOC notifies the Commission otherwise and the Commission approves the recommended change.

The number of release events in a year would be determined in accordance with guidelines established by the WBOC at the end of the initial 5 years of ecological monitoring, and approved by the Commission. We conclude that, without the data from the initial ecological monitoring, it is premature to specify that releases be confined to certain water year types or certain months of the boating season. However, we agree with the FS approach that up to three scheduled weekend whitewater release events per year would represent a reasonable improvement to the whitewater boating opportunities afforded by existing spill events. We also agree with the FS recommendation to start with a single, Saturday release that would be increased in 1-day increments (up to a maximum of 3 days) during subsequent years if boater use exceeds 40 boats per day. Furthermore, we agree with the FS that, if boater use falls below 20 boats a day, the number of weekend days should be decreased by one.

#### Spill Augmentation for Whitewater Boating

In the draft EIS, we did not recommend flow augmentation for whitewater boating when Redinger Reservoir is spilling, as recommended by the FS and Conservation

Coalition. Both parties were not specific about how much spillage would trigger augmentation. Spill conditions during weekends that would warrant augmentation are not accurately predictable more than a few days before occurrence. Flow augmentation, as outlined by the FS and the Conservation Coalition, may only benefit a small community of local paddlers who would be able to drive to Horseshoe Bend with relatively short notice.

However, in its October 15, 2001, letter responding to the draft EIS, the FS indicated that it was primarily interested in reducing flow variability by managing weekend spill events, when they occur. The FS now recommends that, if it is technically and logistically feasible, Edison should manage spills so that they do not drop below 1,200 cfs from 9:30 a.m. to 1:00 p.m. on weekends between Memorial Day and July 4<sup>th</sup>, which the FS claims would reduce flow variability during spills, and thus reduce ecological effects and avoid stranding weekend boaters.

In response to the FS comments on the draft EIS, we conducted a more detailed assessment of potential flow augmentation as a whitewater boating enhancement. For the purposes of our analysis, we assumed that flows would not be augmented unless average weekend spillage is at least 500 cfs. Edison identified 500 cfs as the minimum boatable flow in the bypassed reach in a letter to the Commission dated February 17, 1998. We reviewed 23 years of flow data from the BC#4 Project (1975 through 1997) to characterize the expected frequency of flow augmentation. Our analysis revealed that flow augmentation would have only occurred during three weekends during the 23 years that we evaluated (during two wet water years and one above normal water year). All releases would have occurred on the receding side of the spring runoff hydrograph. Generally, flows to the bypassed reach rapidly diminish from flows in excess of 1,200 cfs, to flows less than 500 cfs, which accounts for the infrequent occurrence of the need to augment flows during the narrow weekend time frame specified by the FS.

The infrequent occurrence of conditions that would warrant flow augmentation makes it difficult to predict the degree to which boaters would take advantage of augmented flows. With more readily available flow information for the bypassed reach via Edison's proposed and our recommended real time Internet site, boaters should be able to closely monitor flow conditions and plan their trips accordingly. Without flow augmentation, boaters may choose not to travel to the Horseshoe Bend Reach if the hydrograph has begun to recede, to avoid the potential of being stranded after having started the run. The assurance that flows would not decrease below 1,200 cfs during the FS specified time frames would guarantee that if the run was started during these periods, with proper planning, it could be completed. Therefore, flow augmentation, even if not actually implemented during a specific weekend, would still serve as an enhancement

because it would reduce the previous uncertainty about whether there would be sufficient flow to complete the 6.2-mile-long Horseshoe Bend run. Our more detailed analysis enables us to conclude that flow augmentation, if implemented, would not adversely affect aquatic biota, and could actually represent a minor enhancement (see our discussion of Whitewater Boating Flow Releases in section 3.3.2.2, Fisheries Resources). Therefore, augmented flows could be implemented shortly after the Commission approves a flow augmentation plan. Implementing flow augmentation relatively soon after license issuance could increase whitewater boating opportunities while more detailed ecological studies, that we conclude are needed to define when and if scheduled whitewater releases should be implemented, are conducted.

We recommend that Edison develop, in consultation with the FS, CA Fish & Game, and Conservation Coalition, a plan to provide augmented flows to the bypassed reach to ensure that flows do not fall below 1,200 cfs between 9:30 a.m. and 1:00 p.m. between the Memorial Day and July 4<sup>th</sup> weekends. The plan should specify: (1) the method of augmentation, ensuring, to the extent possible, that augmentation flows originate from warmer, surface water; (2) any relationships (constraints or opportunities) of augmented flow to project inflow; (3) if potential augmented flow events could be forecasted and publicized; and (4) the specific parameters associated with augmented flows (e.g., confirmation of spillage that would trigger augmentation and how ramping rates would be incorporated). The plan would be filed within 6 months of license issuance for Commission approval. The WBOC would include an assessment of whether spill augmentation should be modified in its report to the Commission on whether scheduled whitewater releases should be implemented, which was discussed previously. The component of the plan that specifies how Edison would release augmented flows should also be applicable to addressing how Edison would release scheduled whitewater flows, discussed previously.

#### Conclusions Regarding Whitewater Releases to the Bypassed Reach

Providing scheduled releases at the Horseshoe Bend reach would maximize potential whitewater boating opportunities that are currently underutilized and often nonexistent, depending on the water year. We conclude that providing up to 9 days of scheduled whitewater releases per year, along with the public notification system, would substantially enhance boating opportunities beyond existing conditions. Scheduled releases would provide a predictable Class III level of whitewater boating on the San Joaquin River for intermediate boaters, whereas other runs on the San Joaquin River are primarily Class V (with some Class IV) expert only runs. Depending on the findings and recommendations that originate after initial ecological monitoring, boaters could have scheduled releases during dry, normal, and wet water years. Further limited, but positive,

opportunities would be associated with augmented flows during unscheduled spill events. Flow augmentation could begin as soon as the second year from license issuance, if conditions warranting augmentation should occur, thus offering a whitewater boating enhancement while ecological assessments pertaining to scheduled releases are ongoing.

Because scheduled or augmented whitewater boating releases entails balancing environmental and economic considerations, we discuss the cost of the different alternatives in section 4.0, Developmental Analysis, and make our final recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

*Methods to Release Whitewater Flows to the Bypassed Reach*

In its response to our AIR No. 11, Edison indicated that if whitewater flow releases were to be required, it would be necessary to install a Howell Bunger valve at the dam to achieve the level of flow control that would be needed.

The FS, as a preliminary Section 4(e) condition, recommended that Edison research and install the most cost effective release system, at either the BC#4 dam or Mammoth Pool to provide controlled flow releases in the project reach of up to 1,500 cfs. The FS further recommended that Edison explore alternatives that would release water from near the surface of the reservoir, if this could be used to maintain warm water temperature objectives.

Edison has not conducted a detailed evaluation of whether operation of existing project features such as the Taintor gates could achieve whitewater releases with appropriate upramping and downramping rates. We agree with Edison that a Howell Bunger valve would be capable of making the target releases and would likely enable controlled ramping rates, specified in the previous subsection, to be achieved. However, we are not convinced that this is the most cost effective technology for making whitewater boating flow releases. With Edison's proposed real-time discharge data transferral capability at the existing USGS gage downstream of the dam, Edison should be able to closely monitor releases made by using the existing Taintor gates.

In its October 16, 2001, letter commenting on the draft EIS, Edison agreed that it may be feasible to make whitewater releases by using existing spillgates at the dam. The FS, in its October 15, 2001, letter to the Commission, withdrew its recommendation for Edison to research and install a cost effective release structure. Our previously discussed preliminary whitewater release recommendation would not require a scheduled release until the seventh year from license issuance. During the sixth year from license issuance, Edison would prepare a summary report of the results of 5 years of ecological monitoring

as part of the native aquatic species management plan discussed in section 3.3.2.2. This report would also make recommendations regarding if and when scheduled releases would occur. If scheduled releases are determined to be appropriate, we recommend that Edison specify how scheduled whitewater flow releases would be made in the 5-year summary report. We expect that Edison would be able to use the results of our previously discussed flow augmentation plan to address how scheduled flows would be released.

### *Recreational Use Monitoring*

In its revised Section 4(e) conditions, the FS makes a recommendation that Edison conduct a recreational survey and prepare a report on recreational resources once every 6 years, beginning in October 2002. The report should document changes in kinds of use and use patterns, user preferences in recreational activities, kinds and sizes of recreational vehicles, preference for day or overnight use of project facilities, and recreational user trends within the project area. The FS survey recommendation further specifies that the report should be consistent with Commission regulations as specified in 18 CFR Section 4.5.1(f) (which specifies the requirements for the Form 80 report). The report should be provided to the FS for review and comment prior to submitting it to the Commission.

The Commission already requires licensees, including Edison, to conduct a basic level of recreational monitoring. However, some of the FS-requested information, such as user preferences and kinds and size of recreational vehicles, is beyond that which is normally required by the Commission and therefore not included in typical Form 80 reports that are filed every 6 years. We consider acquisition of the types of information requested by the FS to be appropriate based on the need to assess compliance with FS management objectives for SNF land within the project boundary. There are already occasional instances when the existing capacity of parking lots at the boat launch and the overflow parking area are exceeded. This causes vehicles to obstruct the boat launch, making it unusable, and park on the shoulder of Redinger Lake Road, creating a potential safety hazard to motorists. Recreational enhancements that are included in the new license could attract additional recreationists to the area and eventually adversely influence the recreational experience of all. Documenting the quantity and quality of recreational use in the project area would enable informed management decisions to be made regarding project operations and facilities.

We also recommend that Edison, in consultation with the WBOC, develop a boater preference survey that could be administered to boaters during controlled releases (augmented or scheduled) and define when this survey would be implemented. The survey instrument and implementation schedule would be filed with the Commission for approval. This would form a basis for adjusting the initial flow releases of 1,200 cfs

either upward or downward. It could also reveal that different flows are preferred for different types of boating (e.g., rafting versus kayaking). This could lead the WBOC to recommend different release flows if more than one release per year is scheduled. We expect that Edison could administer this survey during the other recreational monitoring that we recommend, resulting in minimal incremental cost for this measure.

The Conservation Coalition, in its October 5, 2001, comments on the draft EIS, recommends that, after 3 years of boater preference monitoring, Edison should prepare a report, in consultation with the FS and Conservation Coalition, recommending the volume of whitewater releases for the remainder of the license term. We conclude that filing a report with the Commission that specifies the volume of whitewater releases that should be released for the remainder of the license term would eliminate the flexibility that we seek in allowing the WBOC to establish release schedules on an annual basis. It is appropriate to provide Edison with a degree of certainty about the range of flows that could be released if whitewater flows are implemented and, as previously mentioned, we set the range for scheduled releases between 1,000 and 1,500 cfs. We also include provisions for the WBOC to adjust this range, if needed and approved by the Commission. We do not agree that a report recommending whitewater release volumes for the term of the license is needed. We present the costs of recreational monitoring in section 4.0, Developmental Analysis, and make our final recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

## **Land Use**

### *Removal of Lands from the Project Boundary*

Edison proposes to remove 716 acres of public lands under the FS's jurisdiction from the project boundary. Edison also proposes to remove about 2,017 acres of private land from the project boundary (see table 3). FS lands include:

- about 123 acres associated with the 138 miles of transmission lines that Edison requested be removed from the project boundary in its January 10, 2000, application to amend the BC#4 Project license (addressed by the Commission's March 9, 2001, Order Amending License); and
- 592 acres associated with the land around Redinger Reservoir (reduced to 7 vertical ft above the 1,403-foot-high water elevation which generally equates to about 200 ft horizontally), the site of former employee housing at the BC#4 powerhouse, and the land around project facilities at the powerhouse (letter from C.E. Miller, Edison, to the Commission, dated February 17, 1998, and letter from W.C. Moody, Edison, to the Commission, dated November 8, 2000).

The 2,017 acres of private lands proposed to be excluded from the project boundary include 2,015 acres associated with the 132.6-mile BC#4 switchyard to Magunden transmission line and a small portion of the 5.8 mile BC#4 switchyard to Big Creek No. 3 switchyard transmission line (letter from W.C. Moody, Edison, to the Commission dated November 8, 2000). All lands associated with transmission lines were addressed in the Commission's March 9, 2001, Order Amending License.

NPS recommended that all existing recreation facilities be included in the project boundary and that Edison complete all previously agreed upon recreational enhancements (letter from J.J. Reynolds, Pacific West Regional Director, National Park Service, to the Commission, dated February 28, 1998).

The Commission would consider whether the land proposed for removal from the project boundary around Redinger Reservoir is necessary for continued operation of the project. If this land is determined to be beyond the project's unit of development, it would be deleted from the project boundary. However, all but about 2 acres of this land is within the SNF, and land use would continue to be governed by the applicable land use prescriptions of the SNF land and resource management plan.

The FPA requires hydroelectric project licensees to provide public access to project waters. In accordance with this law, the Commission would require that all recreation facilities that provide public access to project waters be included in the project boundary. We note that Edison's proposed new project boundary would exclude a portion of the boat launch parking lot and the nearby overflow parking lot from the new project boundary. This boat launch provides the only public access for flatwater boating on Redinger Reservoir. Both parking lots are a necessary component of facilities that provide public access to project waters, and thus serve project-related purposes. Therefore, we recommend that these parking lots and other recommended facilities that provide public access to project waters (i.e., the proposed boating access trail along Willow Creek), be retained (or including, if not within, the existing project boundary) in the project boundary with sufficient additional abutting land to allow for future expansion of these facilities, should this become a future FS objective (actions that could substantially increase recreational activities, such as increasing the capacity of the boat launch and overflow parking area, are not consistent with SNF land and resource management plan [FS, 1998]).

### *Maintenance of Roads within the Project Boundary*

Edison included in its license application a Road Management Plan, which is intended to address erosion issues and identify ownership and maintenance responsibilities (Appendix E-14). Edison proposes to coordinate with the FS, Fresno County, and Madera County to resolve maintenance issues related to roadways within the project boundary. Edison indicates in its Transmission Line ROW Habitat Management and Maintenance Plan (Appendix E-13 of the license application) that, prior to any maintenance activities on transmission line access roads on FS-administered land (which typically involves filling ruts or providing berms), the FS is notified of the time and location of the activity. However, Edison clearly states that it should not be responsible for maintenance of paved public roads; its use fees and county property taxes for project facilities should represent its reasonable contribution towards maintenance of county roads.

The FS recommends, as a revised Section 4(e) condition, that Edison complete a "transportation system management plan" within a year following license issuance. This plan would be approved by the FS and consist of a map showing all roads associated with the project and within the project boundary. In addition, through this plan Edison would identify road uses (i.e., recreation and facility access), provide surveys of road conditions including construction or reconstruction needs, safety issues, and jurisdictions (i.e., county and state). Several commentors mention the poor condition of roads within the project boundary, in particular, County Road 225 (Italian Bar Road), and County Road No. 235, and recommend that all roads used by the public should meet federal public safety standards (letter from R.J. Baiocchi, California Sportfishing Protection Alliance, to the Commission, dated January 13, 1998; letter from J. Krainock, Habitat Director, The Quail Unlimited Chapter of Fresno County, to the Commission, dated February 7, 1998).

Edison's Road Management Plan seems to fulfill most of the objectives of the FS-recommended transportation system management plan. It lists and maps 25 roads that are within the existing project boundary (at least in part) and the SNF, and identifies specific project facilities, if any, that are accessed by each road. It also identifies the condition and usage of each road. In some cases, ownership, maintenance, and whether the road is gated or open to the public is also indicated in Edison's existing plan.

Comments from the general public citing the poor condition of the project roads primarily refer to county road numbers 225 and 235. We consider maintenance of county roads within the project boundary to be the responsibility of the county, even though the roads also may provide access to Edison facilities.

We agree with Edison that it should not be responsible for maintaining paved, public, county roads that also provide access to project facilities. However, there are numerous other roads that seem to primarily provide access to project features. Edison acknowledges maintenance responsibilities for some of these roads in Table 1 of its Road Management Plan (specifically, Map ID Nos. 2, 3, 9, 12, 13, 14, and 15). The first four of these seven roads provide access to BC#4 facilities even with the deletion of the transmission lines specified in the Commission's March 9, 2001, Order Amending License (specifically, the powerhouse, the penstock, the dam, and the private boat ramp to access Redinger Reservoir; the other three roads seem to provide access to Big Creek No. 3 facilities). Edison seems to leave the maintenance responsibilities and ownership of other project-related roads in an ambiguous "to be determined in consultation with FS and Fresno and Madera counties" category. Roads that fall into this category include those identified by Map ID Nos. 4, 6, 7, 8, 20, 21, 22, 24, and 25. The first five access roads seem to provide access to BC#4 facilities even with the deletion of the transmission lines specified in the Commission's March 9, 2001, Order Amending License. Specifically, road 4 provides access to a microwave tower (used for project communications) and the water conduit ROW; roads 6 and 7 provide access to the water conduit ROW; road 8 provides access to the communication cable; and road 20 provides alternative access to the dam, and also provides fire protection access to land on the south side of Redinger Reservoir (which was blocked when the reservoir was filled). If Edison plans to continue to use any of these nine roads for project purposes (in addition to the seven roads for which it acknowledges maintenance responsibility), it should be responsible for maintenance of these roads, unless acceptable alternative arrangements are currently in place. If current ownership of these roads, which is not specified by Edison, precludes Edison from directly performing routine maintenance (e.g., if Edison's easement that grants access to private roads to perform maintenance on project features specifies that road maintenance is the responsibility of others), Edison should revise its Road Management Plan to specify the party that is responsible for maintaining these roads.

We recommend that Edison maintain the four roads that it identifies in its Road Management Plan as roads 2, 3, 9, and 12, plus the additional five roads that we specify (roads 4, 6, 7, 8, and 20) that are necessary for the continued operation of the BC#4 Project (unless maintenance by others is already specified). We estimate that collectively, these nine roads are about 4.5 miles long; all but about a half-mile are on FS land. We further recommend that Edison revise its Road Management Plan, in consultation with the FS, to clearly state the maintenance responsibility of each road that is used for project purposes as defined by the Commission's March 9, 2001, Order Amending License, and any order issuing a new license for this project, and submit it to the Commission for approval. Because Edison is currently maintaining all of these project roads, which

appear to be essential to project operation (as stated in its Road Management Plan), the cost of this recommendation should be incidental.

### **Fire Prevention and Response**

Edison proposes no specific fire prevention and response measures. However, Edison's existing Transmission Line ROW Habitat Management and Maintenance Plan (Appendix E-13 of the license application) contains several fire prevention measures. For example, in section 2.2.2 of the plan, Edison states that no routine maintenance is performed during August because of fire hazards. In section 2.2.4, Edison states that, where downed transmission lines pose a significant fire hazard, it proceeds with the repair of the lines and notifies the appropriate resource agencies of the emergency activities. In section 3.5.7, Edison states that, in accordance with CAL-OSHA General Order 95, vegetation that poses a flashover threat must be removed to eliminate fire hazard. In keeping with this regulation, Edison maintains a clearance around transmission lines of 30 ft. Vegetation is trimmed on an as-needed basis, as determined by aerial and ground inspections, to maintain this clearance.

FS makes a revised Section 4(e) recommendation that Edison should file with the Commission within 1 year of license issuance, a "fire prevention and response plan" developed in consultation with the FS. This plan would set forth the plan for prevention, reporting, control, and extinguishing of fires in the vicinity of the project. This plan also would be reviewed and revised at intervals of not more than 3 years.

Most large companies such as Edison have internal fire prevention and response plans that provide clear direction regarding measures to prevent fires and what should be done in the event that a fire occurs. It is clear that some elements of Edison's fire prevention plan have been incorporated into its Transmission Line ROW Habitat Management and Maintenance Plan. Considering that most of the proposed project lands (609 acres) are within the SNF and that grasslands (which tend to dry out during the summer, thus posing a natural fire threat) predominate in the project area, it would be prudent and proactive for Edison to develop and periodically review, in consultation with the FS, a fire prevention and response plan that encompasses all project lands included in any new license issued for this project. We make a preliminary recommendation that Edison include this plan in the overall habitat and land use management plan previously discussed in sections 3.3.1.2, Water Quantity and Quality, and 3.3.3.2, Terrestrial Resources. We present the cost of developing and reviewing this plan in section 4.0, Developmental Analysis, and make our final recommendation regarding a fire prevention and response plan in section 5.3, Comprehensive Development and Recommended Alternative.

### **3.3.6.3 Cumulative Effects on Whitewater Boating**

With the creation of Redinger Reservoir in 1951, about 5.25 miles of the San Joaquin River were converted from riverine conditions to flatwater. In addition, the five other major reservoirs of the BCS have converted a noticeable amount of additional free flowing river miles to flatwater. Similarly, diversion of natural flows away from the natural riverbed and bypassed reaches has resulted in a loss of available whitewater boating days. Due to a lack of historical use and flow data, as well as changes in the skill level, equipment, and popularity of whitewater boating, it is not possible to precisely quantify the amount or level of whitewater boating that would be in use if all of these unnatural conditions were not in place. Therefore, the BC#4 Project may have a cumulative effect on existing whitewater boating opportunities.

Edison's proposed increased availability of flow information would have a minor cumulative influence on regional whitewater boating patterns in that boaters may choose to visit the Horseshoe Bend reach more often if it is clear that flows would be sufficient for whitewater boating. This slight expected increase in boater use could deflect visitors from other more popular boating runs, thus representing a minor benefit.

The FS and Conservation Coalition's recommended scheduled and supplemental whitewater boating flow releases would seem to have the potential to draw the most boaters to the bypassed reach. There could be up to nine scheduled releases per year, plus augmented natural spill events with these alternative regimes and boaters would be aware of the frequency of releases with the publishing of real-time flow information on the Internet and flow phone. We conclude that there is insufficient ecological information available to make a specific recommendation regarding whether or not scheduled releases should be implemented. We recommend that, at the completion of ecological monitoring, Edison develop a report, in consultation with the WBOC, that recommends if, and under what conditions, whitewater releases should be implemented. We also conclude that spill augmentation could be implemented, and we recommend that Edison develop a spill augmentation plan. Once the Commission has sufficient information to rule on scheduled whitewater flows, it may determine that boating flow releases at a level comparable to the FS and Conservation Coalition are warranted, thus also generating increased boater use in the bypassed reach.

The FS, in its October 15, 2001, comments on the draft EIS, indicates that the most likely users of the bypassed reach would be boaters from the local communities of Fresno and Clovis, although more reliable flows could draw boaters from Sacramento and the San Francisco Bay area. According to the FS, other realistic alternatives to the local boating community are the Kaweah and Kings rivers. The Kaweah River boating season

ends in late June, and the Kings River boating season ends by late July. The closest alternative whitewater runs in the upper portions of the BCS are predominantly Class IV and V. Releases to the Horseshoe Bend reach would typically create Class III rapids. Although increased use of the bypassed reach by boaters could deflect some boaters from other locations, we conclude that the cumulative effect would be negligible. Only if scheduled releases are implemented in August, would the boating opportunities in the bypassed reach be the only opportunity available to the local boating community. Releases in August could then represent a more substantial cumulative benefit to the boating community. Our recommended bypassed reach boater monitoring plan would enable documentation of actual boater use, and our recommended recreational monitoring would provide a measure of the type of boaters that use the bypassed reach.

#### **3.3.6.4 Unavoidable Adverse Effects**

Some of Edison's proposed and our recommended recreation enhancements that entail earth-disturbing activities (i.e., construction of the Willow Creek boater access trail) could result in short-term temporary displacement of wildlife during construction. Some vegetation removal would also be likely, which would result in a long-term but minor loss of this habitat. Proposed and recommended recreational enhancements could increase the number of people that visit the area, which could result in long-term, mostly minor effects on wildlife and vegetation from human disturbance.

#### **3.3.7 Aesthetic Resources**

##### **3.3.7.1 Affected Environment**

Significant landscape features in the project area include the SNF, San Joaquin River, Redinger Reservoir, and the open rolling foothills located to the south and west of the project area.

The area surrounding Redinger Reservoir and extending westward consists of a steep, narrow river canyon characterized by a bare, rocky riverbank. Access to the reservoir is limited to several locations on the north shore as there is no road access to the south shore of the reservoir. The shoreline area is predominantly vegetated with grass and trees and there is limited shoreline erosion on the north and south shores. The reservoir is managed by Edison to maintain a relatively constant reservoir surface elevation and area. In the fall, outflows may exceed inflows resulting in a drop in reservoir elevation levels by about 50 ft or more, however, daily elevation level records indicate that this degree of drop is very rare, occurring less than 1 percent of the time during the fall.

Development along the reservoir consists of limited recreational support facilities (a boat launch, parking areas, and sanitation facilities) concentrated on the north shore near the BC#4 dam. The dam is a concrete structure with a crest length of about 875 ft and a height of 250 ft. It is similar in color to the surrounding rocks. Project conveyance facilities are located on the face of the dam including an intake tunnel which diverts water through a 2.1 mile-long system of tunnels and steel pipe, all of which is located underground, with the exception of 700 ft. The 700-foot segment is located on grade above Willow Creek and is a greyish tan color to blend with the surrounding environment.

A 220-kV transmission line extends 5.8 miles on lattice steel towers from the BC#4 powerhouse to the Big Creek No. 3 powerhouse. This line crosses over the reservoir in the vicinity of Road No. 235. The Commission, in its March 9, 2001, Order Amending License, deleted this transmission line from the existing project license.

Portions of the bypassed reach run through a gorge lined with nearly vertical walls and steep bedrock benches and large boulders. The typical flow in the bypassed reach is 20 cfs, which creates a series of small pools separated by large boulders (see section 3.3.2, Fisheries Resources, for a more detailed description of the bypassed reach). The larger boulders in the reach are partially underwater at this flow and the medium-sized boulders are generally submerged, the majority of which are located toward the edges of these pools. Vegetation in the bypassed reach generally consists of trees and smaller bushes. During spill events, flow in the bypassed reach can exceed 8,000 cfs, which submerges much more of the channel of the river and substantially alters the appearance of this reach.

South and west of the reservoir area, the character of the project area changes to open, rolling foothills characterized by grasslands, scattered oaks, and rural residential areas. A second 220-kV transmission line extends 132.6 miles from BC#4 powerhouse across forest lands and through rural areas to the switchyard at Magunden Substation. The Commission, in its March 9, 2001, Order Amending License, deleted this transmission line from the existing project license.

### **FS Visual Management System**

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, viewer sensitivity to scenic quality, distance zones, existing visual conditions, and visual quality objectives (VQOs) in order to determine visual compatibility of

projects within the forest. The majority of this project, as proposed by Edison, is on FS lands (see table 3), therefore, Edison used this system to evaluate the project with the surrounding area.

VQOs are measurable standards for identifying goals for how the forest should look in the future. Within the project boundary, the VQOs that apply are “Partial Retention” and “Modification.” According to the definition of “Partial Retention,” the character of the landscape is visually dominant over management activities which could occur. Project features within this VQO designation include all of Redinger Reservoir and the bypassed reach to about 1,000 ft downstream of the confluence of Willow Creek. “Modification” is defined that management activities may visually dominate the original character of the landscape. This VQO is applicable to the Horseshoe Bend area where project facilities (i.e., the penstock and dam) are visually evident, and at the BC#4 powerhouse.

Edison conducted a visual compatibility analysis to evaluate the effects of the project facilities on the VQOs for the project area. Edison concluded that the dam and visible portions of the flow conduit near Willow Creek are not consistent with the designated VQOs.

### **3.3.7.2 Environmental Effects and Recommendations**

The project’s dam and flow conduit are inconsistent with the FS’s VQOs. Other existing project facilities and any future facilities may be visually unappealing to visitors to the project area, and may be intrusive on the natural landscape. Edison does not propose specific measures to make the dam and penstock consistent with the FS’s VQOs. Edison does propose to consult with the FS when repainting project facilities to ensure that the color is less intrusive and more compatible with the natural surroundings. However, Edison does not provide a schedule for painting the existing facilities. Nor does Edison propose other measures, such as planting native vegetation in strategic locations to screen project facilities from visitors and to minimize the facilities’ visual intrusion on the natural landscape.

The FS recommends as part of its revised Section 4(e) conditions that Edison develop a VRP to be filed with the Commission within a year of license issuance. At a minimum, this plan should address clearings and project facilities like diversion structures, penstocks, pipes, ditches, powerhouses, other buildings, transmission lines, corridors, and access roads. The VRP should address colors, landscaping, and screening. The VRP would also provide a proposed mitigation and implementation schedule to make

sure the existing project facilities comply with the VQOs of the SNF land and resource management plan.

Currently, the existing project does not conform with the VQOs established in the SNF land and resource management plan. The two features that contrast with the VQOs are the dam and the penstock near Willow Creek. The existing color of the dam matches the bedrock and boulder substrate in Redinger Gorge and we do not consider the dam to be particularly obtrusive to the setting. Therefore, we do not consider it practical to try to devise methods to make the dam blend in with the natural environment. However, it may be practical to reduce the visual effect of the flow conduit by painting it an appropriate color and, perhaps, using vegetative screening techniques to shield the pipe from the view of most visitors to the area. We conclude that Edison's proposal to consult with the FS on paint color when repainting project facilities would ensure that the color would likely be consistent with the FS's VQOs for the area of the project's location.

We conclude that existing facilities, as well as proposed new facilities, such as the re-routed Horseshoe Bend Trail near the powerhouse and enhancements at Redinger Reservoir, (discussed in section 3.3.6.2, Recreation and Land Use) would also benefit from a coordinated approach to minimizing visual effects that the FS's proposed VRP would provide. We conclude that a VRP that considers practical methods to reduce visual effects of existing facilities, and minimizes visual effects of proposed and recommended new facilities, is warranted and should be included in the previously discussed habitat and land use management plan. We discuss the cost of developing this plan in section 4.0, Developmental Analysis, and make our final recommendation in section 5.3, Comprehensive Development and Recommended Alternative.

### **3.3.7.3 Unavoidable Adverse Effects: None.**

## **3.4 No-Action Alternative**

Under the no-action alternative, Edison would continue to operate the project under the terms and conditions of the existing license. Environmental measures proposed by Edison 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. There would still be a potential for adverse effects on rare or sensitive plant and animal species due to routine project maintenance because implementation of Edison's Endangered Species Alert Program is not required by the existing license. The existing license also contains no provisions for implementation of a CRMP, which could result in adverse effects on cultural resources that occur within the project boundary. The FS would continue to maintain the sole

public access to Redinger Reservoir and, over time, existing sanitation problems would likely be exacerbated. Whitewater boating in the bypassed reach would continue to be sparse with no publicity of when boatable flows are present. This would represent no change to existing whitewater boating opportunities.

### **3.5 Irreversible and Irretrievable Commitment of Resources**

Continued operation of the existing project would continue to commit most of the lands and waters previously developed for energy production. If the Commission agrees to reduce the size of the project area in the vicinity of Redinger Reservoir, land removed from the project boundary would be available for other uses. If the Commission agrees to expand the project boundary to facilitate project purposes, as we recommend for the Willow Creek general recreational river access trail, this land would be unavailable for other purposes. Effects on habitat changed due to construction of recreational facilities at the project would diminish in time with proper soil erosion control and revegetation techniques.

### **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 436.3 GWh 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 projects 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 Upper San Joaquin River.

## 4.0 DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the available water resources to generate hydropower, estimate the economic benefits of the project, and estimate the cost of various environmental protection and enhancement measures and the effects of these measures on project operations. Edison does not propose any modifications to project generation facilities, but it does propose several environmental and recreational enhancements, both structural and operational.

### 4.1 Power and Economic Benefits of the Project

The main purpose of the project is to provide power for Edison's customers. The BC#4 powerhouse provides peaking power during periods of peak demand. Edison has studied the existing project facilities, operation, and utilization of flows and concludes that the project as proposed would be developed to its optimal capacity; we concur with its assessment. The BC#4 powerhouse has a rated capacity of approximately 98.8 MW, and the average annual energy generation is 439.4 GWh.

Edison considers the BC#4 Project to be one of its Northern Region Hydroelectric Plants where it is listed as having a dependable operating capacity of 100.2 MW. Edison defines dependable operating capacity as "the capacity that may be available for system use from the individual resources listed, under favorable operating conditions." Dependable operating capacity may exceed the manufacturer's rated capacity for a certain duration. The Commission defines dependable capacity in terms of adverse hydrologic conditions. Appendix H(a)1 of the BC#4 license application indicates that Edison derates dependable operating capacity by 61 MW out of 1,011 total MW for its Northern Region to account for dry year conditions when flows may be less and reservoir levels lower. Applying that relative amount to 100.2 MW yields an adverse year rating of 94.2 MW, which we have assumed for the dependable capacity of the project for purposes of economic evaluation.

We base the value of project power benefits on the CEC estimates for market clearing prices for energy in the early 2000's. For the current year analysis, we use a value of 40.0 mills per kWh for energy (CEC, 2000). These values yield a reasonable estimate of project value for the purposes of our economic studies. These purposes are: (1) to provide a basis for measuring the economic benefits of continued project operation; and (2) to provide a basis for estimating the cost of replacing power for any environmental enhancements that would reduce project generation and/or capacity. Note that Edison's historical short run avoided cost of energy prices for September 1999 through August 2000 averaged 39.8 mill per kWh and is consistent with the CEC value.

By using these current costs over the course of a potential 30-year license, we do not assume future escalation of the various cost components included in the cost of project power or alternative power. Although we do not explicitly account for the effects inflation may have on the future cost of electricity, hydropower generation is relatively insensitive to inflation compared to fossil-fueled generators. This is an important economic consideration for power producers and the consumers they serve.

The current cost economic analysis is not entirely a first-year analysis in that certain costs, such as major capital investments, would not be expended in a single year. The maximum period we use to annualize such costs is 30 years. Also, some future expenses, such as tax and depreciation expenses, are known and measurable, and are, therefore, incorporated in our cost analysis. Table 9 summarizes the values that we use for key parameters in our analysis.

Table 9. Summary of key parameters for economic analysis of the Big Creek No. 4 Project (Source: Staff).

Parameter	Value
Period of analysis	30 years
Term of financing	20 years
Interest rate	8.0 percent
Discount rate	8.0 percent
Capacity value (base)	included in energy value
Power value (base, energy-plus-capacity)	40.0 mills per kWh

Table 10 summarizes the costs associated with relicensing the project under existing conditions (no action). Edison states, on page D-3 of the license application, that no new development costs are anticipated.

Table 10. Existing annual costs for the Big Creek No. 4 Project (Source: Staff).

	Capital cost (\$)	Annual cost (\$)	Total annualized cost (\$)
Net investment <sup>a</sup>	14,575,900		1,918,200
Operation and Maintenance (O&M) <sup>b</sup>	0	1,854,100	1,854,100
FERC fees	0	238,000	238,000
<b>Total</b>	<b>-</b>	<b>-</b>	<b>4,010,300</b>

<sup>a</sup> Edison provided the net investment in its response to AIR No. 2 dated July 8, 1999. The annualized cost was computed using assumptions in table 9; Edison did not provide relicensing cost data. This cost was assumed to be accounted for in the net investment cost item provided in AIR No. 2 dated July 8, 1999.

<sup>b</sup> Edison provided a 3-year average O&M cost of \$1,686,672 for 1993 through 1995. We weighted that cost to June 30, 1994, and escalated to a year 2000 basis for a value \$1,854,100 using the Gross Domestic Product Implicit Price Deflator.

Based on Edison's generation and hydrologic data from 1981 to 1995, the estimated average annual output of the project under current conditions is 439.4 GWh, and the dependable capacity is 94.2 MW. We consider these to be reasonable values. Operation of the BC#4 Project would provide annual power benefits of \$17,576,000, thereby yielding an annual net benefit of \$13,565,700 based on levelized costs \$4,010,300.

#### 4.2 Cost of Environmental Enhancement Measures

Any measures proposed or recommended by Edison, agencies, and the staff could affect project economics through costs (e.g., capital, O&M, plan development) or effects on power generation. Table 11 summarizes the costs associated with all non-energy measures. Most annual costs consist of O&M costs and capital costs with an applied capital recovery factor.

Table 11. Costs of non-energy-related measures for the Big Creek No. 4 Project  
(Source: Staff).

Environmental measure	Capital cost of enhancement (2000 \$)	Annual cost (2000 \$)	Total annualized cost (2000 \$)
Bypassed reach sediment management plan (Edison and FS condition No. 14) <sup>a</sup>	10,000 <sup>b</sup>	2,000 <sup>b</sup>	3,300
Native aquatic species management plan (Edison)	20,000 <sup>b</sup>	10,000 <sup>b</sup>	12,600
Native aquatic species management plan (FS condition No. 5, and staff)	350,000 <sup>b</sup>	10,000 <sup>b</sup>	56,100
Transmission Line ROW Habitat Management and Maintenance Plan (FS condition No. 13) <sup>c</sup>	10,000 <sup>b</sup>	2,000 <sup>b</sup>	3,300
Habitat and land use management plan (staff)	10,000 <sup>b</sup>	2,000 <sup>b</sup>	3,300
Noxious weed management plan (Edison, FS condition No. 15, and staff)	20,000 <sup>b,d</sup>	5,000 <sup>b,d</sup>	7,600
Implement CRMP to protect cultural sites (Edison, FS condition No. 30, and staff)	0	5,300 <sup>e</sup>	5,300
Assist in curation of artifacts (North Fork Mono Tribe)	14,300 <sup>f</sup>	0	1,900
Fire prevention and response plan (FS condition No. 12, and staff) <sup>g</sup>	5,000 <sup>b</sup>	200 <sup>b</sup>	900
Assist in completion of San Joaquin Trail in the Redinger Reservoir area (Edison and Trail Council)	39,200 <sup>e</sup>	2,100 <sup>e</sup>	7,300
Provide safety signs, emergency telephone, and refuse collection at Redinger Reservoir (Edison, FS condition No. 8, and staff)	33,900 <sup>e</sup>	2,600 <sup>e</sup>	7,100
Support completion of boat ramp facility improvements at Redinger Reservoir (Edison, FS condition No. 8, and staff)	33,900 <sup>e</sup>	2,100 <sup>e</sup>	6,600
Improve Horseshoe Bend Trail (Edison and FS condition No. 8)	21,200 <sup>e</sup>	5,300 <sup>e</sup>	8,100
Install Howell Bunger Valve in Dam No. 7 <sup>h</sup>	1,352,000 <sup>e</sup>	3,000 <sup>b</sup>	180,900
Internet site and flow phone (Edison, Conservation Coalition, FS condition No. 9, and staff)	25,000 <sup>b</sup>	3,000 <sup>b</sup>	6,300

Environmental measure	Capital cost of enhancement (2000 \$)	Annual cost (2000 \$)	Total annualized cost (2000 \$)
Monitoring of boater use of bypassed reach (Edison, FS condition No. 9, and staff)	60,000 <sup>b</sup>	5,000 <sup>b</sup>	12,900
Enhanced recreation survey (FS condition No. 7 and staff) <sup>i</sup>	10,000	10,000 <sup>b</sup>	11,300
Spill augmentation plan (staff)	15,000 <sup>b</sup>	0	2,000
Co. Road 235-Willow Creek to San Joaquin River Trail (Edison, FS condition No. 8, and staff)	15,000 <sup>b</sup>	2,000 <sup>b</sup>	4,000
Transportation system management plan (FS condition No. 10 and staff) <sup>j</sup>	10,000 <sup>b</sup>	0	1,300
VRP (FS condition No. 11 and staff)	10,000 <sup>b</sup>	0	1,300
Total annualized costs of non-energy measures (Edison proposed project)			81,100
Total annualized costs of non-energy measures (staff recommended)			126,000

<sup>a</sup> The proponent of the measure is indicated in parenthesis.

<sup>b</sup> Cost estimated by the Commission staff.

<sup>c</sup> Edison filed this plan in its license application and most measures should be included in existing O&M costs; costs shown reflect incremental measures recommended by FS. We recommend replacing this plan with the following habitat and land use management plan, but the incremental cost to develop and implement our plan would be similar to that of the FS.

<sup>d</sup> Edison agreed to use the FS noxious weed management policy to guide its ROW maintenance activities; we assume that Edison would agree to incur the cost of this plan, which is consistent with FS policy; we recommend that Edison implement this plan on all project land.

<sup>e</sup> Costs estimated by Edison.

<sup>f</sup> Cost estimated by the North Fork Mono Tribe.

<sup>g</sup> We assume that Edison already has appropriate fire prevention and control measures in place; the indicated costs are associated with packaging these procedures for inclusion in the habitat and land use management plan, and consulting with the FS on an annual basis.

<sup>h</sup> No party recommends installation of a Howell Bunger valve at this time; Edison indicates this may be the most effective means to make controlled whitewater releases from the dam.

<sup>i</sup> The cost to conduct recreational use monitoring for the Commission's Form 80 report should be included in Edison's O&M costs, since it is required of all licensees; the cost presented here is the estimated incremental cost to conduct enhanced recreational monitoring.

<sup>j</sup> Edison has already developed a Road Management Plan; these costs are to supplement the existing plan as recommended by staff and the FS.

Table 12 summarizes the energy costs associated with whitewater boating release regimes, based on lost energy generation revenues at a rate of 40.0 mills/kWh. No other proposed or recommended measure would influence the energy production of the project. We did not have access to Edison's operations models and developed estimates of lost generation based on spreadsheet evaluation implementing the FS proposal. We relied on the long-term estimate of annual generation for 1975 through 1997, available on Edison's BC#4 website ([http://www.sce.com/bigcreek/006b2b6\\_bc\\_no4.shtml](http://www.sce.com/bigcreek/006b2b6_bc_no4.shtml)). We applied the percentage of lost energy for that period to Edison's generation value of 439.4 GWh based on 1981 through 1995. The 1981 through 1995 period did not have the variety of flow conditions inherent in the longer period of record. We sorted each year as to its type of water year (critically dry, dry, below normal, above normal, and wet as defined by Edison). Our spreadsheet analysis allowed each whitewater season to be reviewed in the context of the type of water year. We conservatively assumed that the FS' recommendation to augment natural spills between Memorial Day weekend through July 4<sup>th</sup> weekend such that 1,200 cfs was released to the bypassed reach would be accommodated by diverting flow from the BC#4 powerhouse. We also assumed that scheduled whitewater releases would occur by reducing flow to the powerhouse and rerouting that flow down the bypassed reach.

Table 12. Energy benefit reduction associated with several whitewater boating release regimes (Source: Staff)

Environmental measure	Percent loss of annual energy	Lost annual generation (GWh)	Lost annual power benefit (2000\$)
Staff/FS recommended whitewater flow augmentation as detailed in FS condition 9 <sup>a</sup>	0.01	0.04	1,500
Staff <sup>b</sup> /FS recommended whitewater release; assumes the minimum of 1 day per event as detailed in FS condition 9 is implemented	0.24	1.03	41,300
Staff <sup>b</sup> /FS recommended whitewater release; assumes maximum of 3 days per event as detailed in FS condition 9 is implemented	0.71	3.10	124,000

<sup>a</sup> We assumed that the flows at the project between 1975 and 1997 would be representative of future conditions. We conservatively assumed that flow would be diverted from the powerhouse to augment flow in the bypassed reach whenever average weekend spill was between 500 cfs and 1,200 cfs from Memorial Day through the July 4<sup>th</sup> weekend.

<sup>b</sup> Our specific recommendation for scheduled whitewater releases would depend on the results of ecological monitoring. We have no reason to expect that, if implemented, the minimum and maximum number of releases would be different from those recommended by the FS.

### 4.3 Comparison of Alternatives

Table 13 is a summary of the costs, benefits, and net benefits for each of the alternatives. The proposed project alternative includes the environmental and recreational enhancements, both structural and operational, proposed by Edison. The staff-recommended alternative is the proposed project with the enhancements shown in tables 11 and 12 and labeled "staff." In the Comprehensive Development and Recommended Alternative section (section 5.3), we discuss both the economic and environmental basis for the staff-recommended alternative.

The measures that Edison proposes, summarized in table 11, would increase annual costs by \$81,100. Edison proposes no operational changes that would reduce annual generation. The resulting annual generation of 439.4 GWh would provide annual net benefits of \$13,484,600. This represents an overall reduction in annual net benefits of \$81,100 relative to the no-action alternative.

The staff's non-energy-related recommended measures (including those adopted from Edison and the FS) would increase annual costs by \$126,000. Under the minimum staff recommended approach of 1-day whitewater events, the associated operational changes would decrease annual generation by 1.07 GWh and would reduce annual power benefits by \$42,800. This represents an overall reduction in annual net benefits of \$168,800 relative to the no-action alternative. This assumes no Howell Bunger valve would need to be installed.

If the maximum number of staff-recommended whitewater release days (3 days per event) were implemented, the associated operational changes would decrease annual generation by 3.13 GWh and would reduce annual power benefits by \$125,500. This would represent an overall reduction in annual net benefits of \$251,500 relative to the no-action alternative. This assumes no Howell Bunger valve would need to be installed. Note that for the first year of operation, energy benefits would be as shown under Edison's proposal in table 13 for either staff alternative. There could be an additional minimal reduction in energy benefits during years two through six if spills are augmented during this time. Delaying implementation of the scheduled whitewater releases, which could be a recommended outcome of the analysis of the 5 years of ecological monitoring, would reduce the overall economic effect on Edison.

Table 13. Summary of costs, power benefits, and net benefits for the Big Creek No. 4 Project alternatives (Source: Staff).

	Annualized cost/ mills/kWh	Annual power benefit/mills/kWh	Annual net benefit/mills/kWh <sup>a</sup>
No-action	\$4,010,300 9.1	\$17,576,000 40.0	\$13,565,700 30.9
Edison's Proposal	\$4,091,400 <sup>b</sup> 9.3	\$17,576,000 40.0	\$13,484,600 30.7
Staff-recommended alternative - with single day event scheduled boating releases <sup>c</sup>	\$4,136,300 <sup>d</sup> 9.4	\$17,533,200 <sup>e</sup> 40.0	\$13,396,900 30.6
Staff-recommended alternative - with 3 day event scheduled boating releases <sup>f</sup>	\$4,136,300 <sup>d</sup> 9.5	\$17,450,500 <sup>g</sup> 40.0	\$13,314,200 30.5

<sup>a</sup> Obtained by computing the difference of the two preceding columns.

<sup>b</sup> Obtained by adding the annualized cost of the no-action alternative to the total annualized capital and O&M costs of Edison's proposed measures from table 11.

<sup>c</sup> If scheduled recreational releases are determined to be feasible after the sixth year from license issuance, the minimum number of days would be one per event.

<sup>d</sup> Obtained by adding the annualized cost of the no-action alternative to the total annualized capital and O&M costs of staff recommended measures from table 11.

<sup>e</sup> Obtained by adding the annualized power benefits of the no-action alternative to the total annualized cost of 1 day scheduled whitewater releases and flow augmentation from table 12.

<sup>f</sup> If all boater-use thresholds during scheduled releases are met, the maximum number of days would be three per event.

<sup>g</sup> Obtained by adding the annualized power benefits of the no-action alternative to the total annualized cost of 3-day scheduled whitewater releases and flow augmentation from table 12.

#### 4.4 Cumulative Effects on Hydropower Generation

Altering project operations at the BC#4 Project could potentially have a cumulative effect on generation at upstream hydroelectric projects, if Edison must adjust the flow distribution to compensate for changes at BC#4. Generation at the downstream Kerckhoff Reservoir Project could also be affected if the flow pattern of the San Joaquin River is altered by BC#4 Project operation.

With Edison's proposed project, there would be no decrease in generation from current conditions and, therefore, no change would be necessary at upstream BCS projects to offset the lost energy from project operations. A modest reduction in long-term average generation of 1 percent or less is likely under our recommended whitewater boating release regime. This may be partially offset if Edison further optimizes the operation of the BCS to avoid subsequent spill in conjunction with whitewater releases. The net discharge downstream of the BC#4 Project should remain the same regardless of whether or not scheduled whitewater releases are implemented; the ratio of flows from the powerhouse and the bypassed reach would shift. This would have no effect on generation at PG&E's downstream Kerckhoff Reservoir Project.

#### **4.5 Greenhouse Gas**

By producing hydroelectricity, the BC#4 Project displaces the need for other power plants, primarily fossil-fueled facilities, to operate, thereby avoiding some power plant emissions and creating an environmental benefit. If the electric generating capacity of the project were replaced with other fossil fuels, greenhouse gas emissions could potentially increase by 68,000 metric tons of carbon per year.

### **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 Edison's proposed action, staff's modifications of Edison's proposed action, and the no-action alternative (summarized in table 14), we recommend licensing the project for continued operation with some additions and modifications to Edison's proposal. This alternative includes the environmental measures that Edison proposes (see section 2.1.2, Proposed Environmental Measures), and the additional or modified measures that are listed in section 2.2.2 (Staff's Alternative). We developed the staff's alternative after evaluating Edison's proposal and recommendations and comments from resource agencies and other interested parties and individuals.

Table 14. Summary of environmental effects associated with Edison’s proposed action, staff’s alternative to the proposed action, and no action (Source: Staff).

Resource	Edison’s proposed action	Edison’s proposed action with additional staff-recommended measures	No action
Water quality	Implementation of a sediment management plan would identify and probably reduce sedimentation in the bypassed reach	Sediment could continue to wash into the bypassed reach from non-project sources at the historical rate unless voluntary corrective action taken by Edison and others; would flush downstream during natural and scheduled release events	Sediment would continue to wash into the bypassed reach at the historical rate; would flush downstream during natural release events (in flow exceeds the hydraulic capacity of the powerhouse)
	Implementation of ROW and road management plans should reduce sedimentation in streams crossed by access roads, although many measures already in place	Revising the Road Management Plan to clarify maintenance responsibilities could slightly reduce sedimentation compared to Edison’s proposal	Slight increased chance of sedimentation in streams crossed by access roads; Edison currently uses BMPs to control erosion
Minimum flows to bypassed reach	No change	No change	No change

Resource	Edison's proposed action	Edison's proposed action with additional staff-recommended measures	No action
Native aquatic and riparian species	Implementation of native aquatic species management plan would establish baseline parameters and enable population and habitat trends to be tracked, providing a basis for developing corrective actions, as needed	Potential increased risk to these species if scheduled whitewater releases are implemented; our recommendation to conduct intensive ecological surveys for 5 years prior to implementing scheduled releases should minimize this risk	No change to the community
Sensitive and rare plants and animals	Most would be protected by Edison's Endangered Species Alert Program	Similar to Edison's proposal	The existing license contains no provisions that would proactively protect sensitive rare plants and animals
	Native aquatic species management plan would identify protection opportunities for fish, reptiles, and amphibians	Our recommendation to include foothill yellow-legged frog and western pond turtle in the native species monitoring could ensure their protection from increased recreational use and scheduled whitewater releases	Sensitive plant and animal populations may not be identified and thus would be more vulnerable to inadvertent adverse effects

Resource	Edison's proposed action	Edison's proposed action with additional staff-recommended measures	No action
Cultural resources	Implementation of CRMP should ensure protection of most cultural resources	Similar to Edison's proposal	Provisions in the CRMP for protection of cultural resources may not be implemented
Flatwater boating opportunities	Proposed phone, toilets, signage, and trash collection at the boat launch and overflow parking area would enhance public safety and the quality of experience; capacity of facilities would continue to periodically be exceeded which could lead to conflicts between recreationists and the environment	Similar to Edison's proposal	FS would maintain sole access to Redinger Reservoir as funding allows; litter and other sanitation problems likely to be exacerbated over time

Resource	Edison's proposed action	Edison's proposed action with additional staff-recommended measures	No action
Whitewater boating opportunities	Enhanced flow information availability and improved bypassed reach access could result in a slight increase in whitewater boating use; proposed video monitoring of boater use would provide a measure of whether use becomes unacceptably high	If implemented, our recommended scheduled whitewater releases would likely increase use over Edison's; however, if potential ecological effects are unacceptable, releases would not be implemented; spill augmentation would also enhance existing opportunities	Sparse usage during natural spill events would continue
Hiking opportunities	Support for the development of the San Joaquin River Trail would enhance this regional resource; improvements to the Horseshoe Bend Trail including correction of drainage problems and better signage would reduce erosion and make this trail a more attractive destination	San Joaquin and portions of the Horseshoe Bend Trail (east of the powerhouse) development could be enhanced with Edison's voluntary support; the Horseshoe Bend Trail from the powerhouse to its western terminus would be rebuilt and enhanced	San Joaquin Trail development in new areas may stall; Horseshoe Bend Trail would be difficult to locate and not realize its potential as a recreational enhancement

Resource	Edison's proposed action	Edison's proposed action with additional staff-recommended measures	No action
Recreational monitoring	Whitewater boater monitoring would generate relevant data for management decisions; recreational use at Redinger Reservoir would only be superficially measured with Form 80 reporting requirements	Enhanced recreational monitoring would provide an accurate measure of use and user preferences throughout the project area; if scheduled releases are implemented, boater preference surveys would enable optimization of opportunities; consultation with the FS would enable consideration of overall management objectives in recreation-related decisions	Recreation use throughout the project area would be superficially monitored, providing minimal information to support management decisions
Access road maintenance responsibilities	Road Management Plan clarifies some responsibilities; others remain ambiguous for others; could lead to access problems and increased erosion	Road maintenance responsibilities clarified	Article 13 of existing license requires Edison to stabilize areas affected by the O&M of the project, if deemed necessary by the Regional Forester; although this would apply to access roads, specific maintenance responsibilities are ambiguous

Resource	Edison's proposed action	Edison's proposed action with additional staff-recommended measures	No action
Fire prevention and response	Existing plans cover some aspects, but does not appear to be consolidated; could lead to delayed responses in emergencies and increased fire damage	Packaging fire-related measures in a single plan with updates every 3 years would enable iterative improvements to be made to the plan, taking advantage of Edison's and the FS's collective experiences	Article 18 of the existing license requires Edison to install such special facilities and take such special precautions for the control and prevention of fire as the Regional Forester may require. There is no requirement that these protective measures be consolidated into a fire prevention and response plan
Aesthetic resources	When project facilities need painting, FS consultation on color would better enable obtrusive elements to be muted	A VRP that considers color and screening opportunities in a coordinated manner would slightly enhance the visual setting for SNF visitors	No visual enhancements would be required

Resource	Edison's proposed action	Edison's proposed action with additional staff-recommended measures	No action
Relationship to upstream projects	Similar to existing conditions	Our recommended reopener clause would enable relicensing decisions at upstream projects that influence BC#4 flows in the bypassed reach to be incorporated into the BC#4 license	No change

## 5.2 Cumulative Effects Summary

We initially identified water use, native transition zone fish (hardhead, Sacramento pikeminnow, and Sacramento sucker), whitewater boating, and hydropower generation as resources that could be cumulatively affected by the proposed relicensing of the BC#4 Project. We also included Central Valley steelhead in our cumulative effects analysis in response to a letter from the NMFS (letter from J.R. Bybee, Northern California Habitat Manager, NMFS, to the Commission dated October 5, 2000).

Because consumptive water use and hydropower generation are both forms of water use, we combine our summary of cumulative effects for these two types of resources. We conclude in sections 3.3.1.3 and 4.4 of this EIS that although our recommended scheduled whitewater releases, if implemented, and spill augmentation could alter the ratio of flows released from the powerhouse compared to flows in the bypassed reach, the net flow in the San Joaquin River downstream of the BC#4 powerhouse is likely to remain the same if the proposed project is licensed with our recommended measures. Consequently, there would be no cumulative effect on downstream water uses and hydropower generation. Edison may choose to optimize operation of the upstream hydropower projects in the BCS system to shift periods when flows in excess of 20 cfs would occur to the bypassed reach (as measured downstream of the Willow Creek confluence) from when they would normally occur, under current operations, to periods when whitewater releases are scheduled. This could reduce lost generation associated with scheduled releases at the BC#4 to a small degree and may alter generation at upstream projects to a very minor extent. We anticipate opportunities for

Edison to use upstream project operations to manipulate the timing of releases to the BC#4 bypassed reach to be infrequent.

We conclude in section 3.3.4.3 that, regardless of whether the project is licensed as Edison proposes, as we recommend, or as other entities recommend, there would be no cumulative effects on Central Valley steelhead. The nearest known spawning habitat for this anadromous form of rainbow trout is nearly 100 miles downstream of the Millerton Reservoir. Millerton Reservoir is operated by the Bureau primarily for irrigation purposes throughout the southern portion of the Central Valley. All releases from the BC#4 Project, even an instantaneous dam break, could be contained by Millerton Reservoir. All releases from Millerton Reservoir are, therefore, under the control of the Bureau.

Licensing the BC#4 Project as proposed by Edison would have no cumulative effect on the native transition zone fish community as we discuss in section 3.3.2.3. Our recommended scheduled whitewater releases, if implemented could displace some young and adult fish of this community from the bypassed reach to downstream locations (e.g., Kerckhoff Reservoir). Here they would supplement the existing populations of similar fish and compete for available food and space. Although such displacement would be more than what currently occurs, it would still be less than would occur during this time frame if the San Joaquin were not regulated by hydroelectric projects, and we anticipate that the species of fish that comprise this community are adapted to such occasional high flow events. We conclude that any adverse cumulative effects on the native transition zone fish community from licensing the project as we recommend would be minor.

Edison's proposal to increase the availability of flow information to the public could serve to deflect boaters from other more popular whitewater runs, having a minor positive cumulative effect on regional whitewater boating opportunities by dispersing boaters to more sites. Increased publicity coupled with scheduled whitewater releases could further deflect boaters from other sites to the Horseshoe Bend reach, enhancing the cumulative benefit even more. However, as we discuss in section 3.3.6.3, we consider the overall cumulative benefit to whitewater boating opportunities from licensing the project with our recommended measures to be relatively minor.

### **Cumulative Effects Analysis of the Big Creek System**

The FS makes a revised Section 4(e) recommendation that Edison conduct a cumulative effects analysis for BC#4, including all power projects in the BCS. Numerous other parties have requested that the Commission also conduct such a basinwide cumulative analysis. As we previously mentioned, the BC#4 Project serves as a funnel

for the various upstream project operations and flow releases. The ability of releases from BC#4 to be modified in any substantial way is heavily constrained by downstream water rights. The complexity of the operating regimes of the upstream projects and the various alternative flow diversion routes that are possible would seem to lend itself to a basinwide cumulative analysis for the upstream projects. Such an analysis is being conducted as part of the unified, collaborative relicensing process for these upstream projects. However, we do not consider there to be much of an opportunity for BC#4 to have a substantive influence on the upstream portions of the basin.

However, we recognize that the conclusion of the on-going upstream relicensing effort cannot be predicted at this time. Because the BC#4 Project is considered to be a component of the BCS, we consider it appropriate to recommend that a reopener clause be included in the license for the BC#4 Project that would allow adjustments to project operations that may become apparent during the relicensing of the upstream projects. However, we conclude that the only element in any new license issued for the BC#4 Project, that could be subject to the influence of the other projects in the BCS, is the quantity and timing of flows to the bypassed reach. Therefore, we recommend that the reopener clause be restricted to potential alteration of flow releases to the bypassed reach from the BC#4 dam. The Commission has sufficient authority within its standard license articles to reopen any license that may be issued for the BC#4 Project, if tradeoffs of approved measures at upstream projects should pertain to the BC#4 Project.

### **5.3 Comprehensive Development and Recommended Alternative**

Based on our independent review and evaluation of the proposed actions with the additional staff-recommended measures, 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 Edison 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.

We recommend including the following environmental measures in any licenses issued for this project:

- **Develop a native aquatic species management plan, in consultation with the FS, FWS, CA Fish & Game, and SWRCB to include a monitoring program, developed in consultation with the above entities and the Conservation Coalition, to assess populations and habitat conditions for 5 years following approval of the plan, and at subsequent 5-year intervals. This plan should include: identification of limiting factors for native transition zone fish species in the bypassed reach, such as duration, frequency, and volume of sediments suspended and deposited in the reach; amount and quality of spawning habitat in the reach; the availability of adequate types and amount of food; the frequency, duration, and volume of flow in the reach; and water temperature. The plan should also be designed to assess, at a minimum, the effects of project operations on the foothill yellow-legged frog and western pond turtle.**
- **Maintain a 3-cfs minimum flow between the dam and the confluence of Willow Creek with the San Joaquin River, and maintain that quantity of water necessary to, with the water from Willow Creek, provide a flow of 20 cfs between the confluence and the powerhouse.**
- **Develop and implement a habitat and land use management plan for all project lands that incorporates appropriate components of Edison's Transmission Line ROW Habitat Management and Maintenance Plan (erosion and sedimentation control measures, the Endangered Species Alert and Environmental Training programs, and the FS's policy on noxious weed management, incorporated into a noxious weed management plan); the overall plan would also include a fire prevention and response plan, and a VRP (that includes provisions for reconstructing the Horseshoe Bend Trail from the powerhouse to its western terminus at County Road 235, to facilitate visual buffering).**
- **Implement the MOA, implementing the project CRMP, as appropriate, for land within the project boundary of the new license.**
- **Establish and maintain an Internet site and flow phone that would provide real-time and forecasted flow information pertaining to the bypassed reach.**
- **Construct a general recreational river access trail near Willow Creek to improve access to the bypassed reach (in consultation with the FS).**

- Develop a flow augmentation plan, in consultation with the FS, CA Fish & Game, and Conservation Coalition, and implement the Commission-approved plan.
- Implement an adaptive management approach to scheduled whitewater boating releases.
- Install a staff gage in the bypassed reach marked in 500 cfs increments that would be visible from the whitewater staging area near the confluence of Willow Creek.
- Develop and implement a plan to monitor boater use of the bypassed reach with a video camera at the powerhouse.
- Provide safety signs at Italian Bar Bridge, boat ramp, and camping areas (in consultation with the FS), solar-operated emergency telephones near the overflow parking and camping areas, speed limit signs at the boat launch (in consultation with the FS), and trash collection at Redinger Reservoir.
- Conduct enhanced recreational use monitoring that includes a boater flow preference survey.
- Update Edison's Road Management Plan (Appendix E-14 of the license application) to more clearly specify ownership and maintenance responsibilities of project access roads that remain in the project boundary according to any order issuing a new license, when Edison would consult with the FS and CA Fish & Game regarding the appropriateness of proposed site-specific BMPs, and how post-implementation monitoring would be addressed.
- Include a reopener clause that would allow modification of flows to the bypassed reach, as needed, in accordance with the relicensing of the other projects in the BCS.

Implementation of these measures would protect and enhance water quality, fisheries, terrestrial, cultural, and recreational 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 Edison include: (1) developing and implementing a habitat and

land use management plan; (2) measures associated with implementing an adaptive management approach to whitewater boating releases; (3) enhanced recreational use monitoring; and (4) revisions to the existing Road Management Plan. We discuss our rationale for each below.

### **5.3.1 Developing a Habitat and Land Use Management Plan**

Edison's Transmission Line ROW Habitat Management and Maintenance Plan was developed prior to its proposal to delete nearly all transmission lines from the proposed project. Although this plan should continue to be an effective tool for Edison to manage its transmission lines, the Commission determined in its Order Amending Licence, that all but 375 ft of Edison's transmission lines are not necessary for project purposes. However, several components of Edison's Transmission Line ROW Habitat and Maintenance Plan (specifically, erosion and sedimentation control measures, and when approvals and consultation with resource agencies regarding appropriate BMPs are necessary, the Endangered Species Alert and Environmental Training programs, and the FS policy on noxious weed management) would still be applicable to the 619 acres of land that would remain in the project boundary as proposed. We, therefore, recommend that Edison consolidate those measures and programs that would be applicable to all project lands into a single habitat and land use management plan. One element of the plan would be a specific component that specifies measures that would be taken to manage noxious weeds that are consistent with FS policies. Edison indicates that it would use FS noxious weed control policies in its maintenance operations, which we estimate would decrease the net annual benefit of the project by \$7,600. Many of the components of our recommended plan have already been developed separately by Edison, but we estimate that the total cost of repackaging these separate elements into one plan would be about \$10,000, and that expanding its implementation to all project lands could reduce the net annual benefit by an additional \$2,000 per year compared to Edison's proposed project. The total increased annualized cost of our recommendation would be \$3,300. Given the reconfigured nature of the project since the license application was filed, we consider the need to develop a new habitat and land use management plan to warrant the expected cost. We recommend that this plan be developed in consultation with the FS, CA Fish & Game, and FWS.

The FS makes a revised Section 4(e) recommendation that Edison develop a fire prevention and response plan. Much of the project area consists of grasslands that become very dry during the summer, as we discuss in section 3.3.6. This is one of the reasons why Edison does not schedule routine maintenance on the transmission line ROW during August. Project operations have the potential to ignite accidental fires by

maintenance practices. Fires on project lands caused by non-project factors (e.g., lightning, careless smoking, and improper campfire practices) still would call for a coordinated response. Given the fire-prone nature of the area, it seems reasonable that Edison should have a targeted fire prevention and response plan in place, to serve as a reference to both Edison and the FS, for land in the SNF. The FS also recommends that this plan be updated at least every 3 years in consultation with the FS. We consider this to be a reasonable recommendation because it would enable incorporation of lessons learned from experiences at other Edison projects and the FS, from elsewhere in the SNF and other national forests in the region. We assume that Edison has most likely already developed most of the components of this plan as either internal documents or as part of other existing plans (the ROW management specifies a number of measures designed to minimize fire hazards). Therefore, we included a modest initial cost of \$5,000 to develop the plan (assuming that existing information could be repackaged) and incorporate it into the overall habitat land use management plan, and an annual cost of \$200 (to cover consultation with the FS at 3-year intervals). The total annualized decrease in net annual benefit for this specific measure would be about \$900 and worth the environmental and public protection that it would facilitate.

Edison's proposal to coordinate with the FS regarding color when project facilities need to be repainted would serve to provide a degree of harmony between structures and the surrounding natural environment. However, as discussed in section 3.3.7, Edison's analysis indicated that certain project features are inconsistent with the FS designated VQOs. We, therefore, consider it appropriate to take a more comprehensive view of measures that could be implemented to reduce the visual effects of project features. Measures that should be considered besides paint color coordination include vegetative and other types of screening. Relocating the segment of the Horseshoe Bend Trail, that currently is adjacent to the powerhouse, to provide a vegetative buffer to hikers should also be included under this plan. The cost of our recommendation to develop a VRP that considers practical measures to minimize visual effects should be modest (we estimate about \$10,000) and we expect that most of the measures that would be implemented could be considered routine maintenance. The incremental annualized cost of this measure would be about \$1,300. We estimate that the total decrease in the net annual benefit associated with our recommended habitat and land use management plan would be \$5,500 compared to Edison's proposed project. We conclude that the benefits of implementing a habitat and land use management plan would be worth the cost.

### **5.3.2 Measures Associated with Implementing an Adaptive Approach to Whitewater Boating Releases**

We have determined that there is a regional need to implement scheduled whitewater boating releases to the bypassed reach. Reaches suitable for whitewater boating upstream of the BC#4 Project are primarily Class V and therefore attractive to a limited number of advanced and expert boaters (see section 3.3.6). Both the FS, as a revised Section 4(e) condition, and the Conservation Coalition strongly endorse making scheduled and supplemental whitewater boating releases. Although there is apparently a demand for whitewater releases, we conclude that scheduled releases have the potential to adversely affect the native transition zone aquatic community in the bypassed reach (see section 3.3.2). This type of community is becoming increasingly rare in California.

We recommend a conservative, adaptive approach to phasing in whitewater boating flow releases. Prior to implementing regularly scheduled whitewater releases, we recommend implementation of a study to establish a baseline of potentially affected plants and animals. This would be accomplished by the first 5 years of our recommended native aquatic species management plan. Based on these monitoring results and other data already collected by Edison, a report would be developed in consultation with the technical team that consulted during the preparation of the monitoring plan. The report would contain a recommendation to the Commission regarding if, and under what conditions, scheduled whitewater releases should be implemented. The Commission would use the report as its basis for deciding the nature of scheduled whitewater releases. The cost of designing and implementing this initial monitoring is expected to be high (we estimate \$350,000, but it could easily be higher) because of the expected need to use multiple sampling techniques during both wet and dry years. The sampling effort should be robust to generate a reasonable amount of confidence in the representativeness of the results.

If the results of the ecological and other related studies indicate that aquatic and riparian biota and habitat would not be exposed to unacceptable risk, then we would recommend that scheduled releases be phased in gradually. The number of releases per year would be linked to the boating use during the previous year. The minimum number of scheduled releases in a year, if releases are implemented would be 3 (1 day on 3 separate weekends) and the maximum number of releases would be 9 (3 days on 3 separate weekends). We estimate that the annual reduction in net annual benefits of making the minimum scheduled releases would be about \$41,300 or 1.03 GWh; the reduction in power benefits with the maximum number of releases would be about

\$124,000 or 3.10 GWh. Details of our proposed scheduled whitewater boating flows are presented in section 3.3.6.

We conclude that it is feasible for Edison to manage existing spill events to enhance existing whitewater boating opportunities by ensuring that once spills reach boatable flows, they remain at boatable flows until the spill stops. We recommend that Edison develop a spill augmentation plan, in consultation with the FS, CA Fish & Game, and Conservation Coalition, and file the plan with the Commission that specifies how augmentation would be implemented and the parameters that would trigger implementation of spill augmentation. The portion of the plan that specifies how augmented flows would be released would also be applicable to the assessment of implementation of scheduled whitewater releases, that would be submitted to the Commission 6 years from license issuance. We estimate that the annual cost of developing and implementing this plan would be about \$3,500. Flow augmentation would serve as a whitewater boating enhancement while monitoring to determine whether scheduled releases should be implemented is ongoing. Implementing spill augmentation would enhance boating opportunities beginning in the second year from license issuance, regardless of whether scheduled releases are implemented beginning in the seventh year from license issuance. We therefore consider the cost of this component of our whitewater boating release recommendations to be warranted.

Overall the incremental annual costs of establishing augmented and scheduled whitewater flows (including 5 initial years of ecological monitoring, implementing spill augmentation, and implementing from 0 to 9 releases) would range from about \$47,000 to \$171,000. Edison's proposals related to whitewater boating (enhance dissemination of bypassed reach flow information, monitor boating use of the bypassed reach, and construct a general purpose access trail to the bypassed reach) would add another \$23,200 to the annual cost associated with bypassed reach boating. Much of these costs entail measures that would serve to protect aquatic and riparian biota and provide data regarding whether the recreational usage of the reach is within the ecosystem's capacity. We consider the recreational enhancement that could be achieved with such scheduled releases coupled with the level of ecological protection built into our recommended measures to be worth the cost.

### **5.3.3 Enhanced Recreational Use Monitoring**

The Commission requires all hydroelectric project licensees to conduct periodic recreation use inventories of project recreational facilities. Consultation with resource agencies regarding the results of the monitoring is not required. The BC#4 Project is

located in a portion of the SNF where the FS manages the land to foster wildlife habitat protection while not excluding recreational use. Excessive recreational use would not be consistent with the designated land use prescription for this area. Recreational users interviewed by Edison express a desire to not expand the capacity of the existing recreational facilities. However, on certain weekends the capacity of these facilities is greatly exceeded creating potential for conflicts between recreationists and with the natural resources.

The FS recommends, as a revised Section 4(e) condition, that Edison conduct substantially more detailed recreational use and user preference data than would be necessary under the Commission's regulations, including boater preference surveys to provide data for decisions regarding release flows. There is a need to balance the level of service to the recreationists with the delicate nature of the natural environment. Our recommended augmented or scheduled whitewater releases, if implemented, coupled with Edison's proposal to better publicize bypassed reach flows could result in a substantial increase in recreational use of the area. This more detailed information on recreational use would serve as a viable decision making tool in terms of how the area should be managed. The estimated \$11,300 annual incremental cost associated with this measure is warranted to monitor the evolving recreational scene at this project.

The FS also recommends that reports documenting the monitoring be prepared every 6 years, consistent with the Commission's Form 80 reporting interval. We recommend that the reports be developed in consultation with the FS, CA Fish & Game, and FWS, and submitted to the Commission for approval.

#### **5.3.4 Revisions to the Existing Road Management Plan**

Edison's existing Road Management Plan was developed in response to a FS request to clearly establish roads for which Edison had maintenance responsibilities. The existing plan clarifies the status of some of the roads that provide access to existing project facilities, but nine access roads are listed as having ownership and maintenance responsibilities that are "to be determined" after consultation with the FS and the county in which the roads are located (see our discussion in section 3.3.6). Our recommendation for Edison to assume maintenance responsibilities, either directly or indirectly, for those roads where the responsible party is ambiguous and that are required for the continued operation of the BC#4 Project, is consistent with the FS original request and its revised Section 4(e) condition recommending the development of a transportation system management plan. Our estimated total cost for revising the existing plan to include only those roads necessary for operation of the project as licensed (which we estimate to be a

total of nine) would be about \$10,000 (annualized to \$1,300) which would cover finalizing the plan and consultation with the FS prior to submitting it to the Commission for approval. We consider this cost to be justified because the overlapping interests in these roads (Edison, FS, the counties, and private landowners) could lead to necessary maintenance work being foregone and the roads slipping into disrepair. If an emergency developed that required immediate access to project facilities (e.g., fire, threat of dam failure, medical emergency) impassable roads could represent a threat to the public well being and safety.

#### **5.4 Conclusions Regarding Access Roads and Project Boundaries**

The Commission's March 9, 2001, Order Amending License deleted all but 375 ft of the transmission lines from the project license, but deferred to this licensing proceeding its decision pertaining to deleting access roads and modifying the project boundary for non-transmission line-related project features. We provided our basis for our recommendations pertaining to access roads and project boundaries in section 3.3 of this EIS. We summarize our conclusions in this section.

We conclude that all access roads associated with only the transmission lines deleted from the project by the Commission's March 9, 2001, Order Amending License should also be deleted from the project. Based on our review of Edison's Road Management Plan and the project record (discussed in section 3.3.6.2, Recreation and Land Use), we conclude that the following access roads would continue to provide project-related purposes (using Edison's designations from table 1 and figure 1 of Appendix E-14 of the license application): 2; 3; 4; 6; 7; 8; 9; 12; and 20. We estimate the total length of these roads to be about 4.5 miles. Project features that these roads provide access to include: the powerhouse; the microwave tower used for project communications; the penstocks and flow conduit; the newly designated communications cable; the dam; and a private boat ramp used by Edison to perform maintenance on Redinger Reservoir. Unless evidence to the contrary is provided, Edison should be responsible for the maintenance of these roads. We recommend that Edison update its Road Management Plan, in consultation with the FS, to include maintenance responsibilities for all access roads used for project purposes as defined in any license that the Commission may issue for this project.

We recommend that the project boundary be modified to include all features that are necessary for the continued operation of the BC#4 as defined in any new license issued for this project. Based on our review of environmental factors on the record for this project, we make the following specific recommendations:

- the oil storage tanks in the 220-kV switchyard that Edison proposes to delete from the project boundary should also be deleted from the project boundary because they do not provide oil to transformers that would remain in the project boundary and therefore these tanks are not needed for project purposes (as discussed in section 3.3.1.2);
- the land required for Edison's continued operation of the three discharge gages used to measure flows from the dam, the powerhouse, and Willow Creek are needed to ensure compliance with minimum flow recommendations and should be included in the project boundary (as discussed in section 3.3.1.2);
- the land required for the construction of the Willow Creek general recreational river access trail would serve project purposes and should be included in the project boundary (as discussed in sections 3.3.3.2 and 3.3.6.2); and
- the parking lot associated with the Redinger Reservoir public boat launch and the nearby overflow parking lot, portions of which Edison proposes to remove from the project boundary, are necessary to provide public access to project waters, and should be retained in the project boundary, along with sufficient abutting land to allow for future expansion of these facilities should this become a FS objective (as discussed in section 3.3.6.2).

## **5.5 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, neither CA Fish & Game nor FWS filed any recommendations.

## 5.6 Consistency with Comprehensive 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 39 comprehensive plans that address various resources in California; nine are applicable to this project.<sup>11</sup> We found no inconsistencies of the proposed project with our recommendations and the nine applicable comprehensive plans.

We also considered the Water Quality Control Plan, Central Valley Region, Sacramento River and San Joaquin River Basins (CRWQCB, 1994). We conclude that the proposed action is consistent with this plan.

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<sup>11</sup> (1) California Department of Parks and Recreation. 1980. Recreation outlook in Planning District 2. Sacramento, California. April 1980. 88 pp. (2) 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. (3) California Department of Water Resources. 1994. California water plan update. Bulletin 160-93. Sacramento, California. October 1994. Two volumes plus executive summary. (4) California State Water Resources Control Board. 1975. Water quality control plan report. Sacramento, California. Nine volumes. (5) California-the Resources Agency. Department of Parks and Recreation. 1983. Recreation needs in California. Sacramento, California. March 1983. 39 pp. and appendices. (6) 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. (7) Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. May 1986. 19 pp. (8) Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, DC. 11 pp. (9) Forest Service. 1992. Sierra National Forest land and resource management plan. Department of Agriculture, Sonora, California. March 1992. 97 pp. and appendices.

## **5.7 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 BC#4 Project is an action that falls within this NEPA mandate.

Per the Fish and Wildlife Coordination Act<sup>12</sup> the Commission has consulted with the FWS and CA Fish & Game on preventing loss or damage to fish and wildlife resources and on developing and improving water resources.

In addition, Section 10(a) of the FPA<sup>13</sup> 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. Edison has consulted with appropriate stakeholders relevant to the BC#4 Project.

Moreover, the Commission, the SHPO, and the Advisory Council would execute an MOA for protecting historic properties that will satisfy the Commission's obligations under Section 106 of the NHPA.<sup>14</sup>

In the following sections, we describe the project's compliance with Section 401 of the CWA, the Coastal Zone Management Act (CZMA), Section 18 of the FPA, and the ESA.<sup>15</sup>

### **5.7.1 Section 401 of the Clean Water Act - Water Quality Certification**

On February 14, 1997, Edison applied to the SWRCB for WQC for the BC#4 Project. Edison withdrew its application for WQC on February 11, 1998, and reapplied

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<sup>12</sup> 16 U.S.C. §§661 *et seq.*

<sup>13</sup> 16 U.S.C. §803(a).

<sup>14</sup> 16 U.S.C. §470(f).

<sup>15</sup> 16 U.S.C. §1531, as amended.

on July 23, 1998. Edison again withdrew its application on July 21, 1999, and reapplied on May 8, 2000. This application was withdrawn on March 13, 2001, and Edison reapplied by letter dated May 1, 2001. The SWRCB received this request on May 8, 2001, beginning the 1-year period to act on the request. The Commission would not issue a license for this project unless the SWRCB had issued a WQC or waived its authority to do so.

### **5.7.2 Coastal Zone Management Act**

Under Section 307(c)(3)(A) of the CZMA,<sup>16</sup> the Commission cannot issue a license for a project within or affecting a state's coastal zone, unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of receipt of the applicant's certification.<sup>17</sup>

The BC#4 Project is not located within the state-designated CZMA, which extends from a few blocks to 5 miles inland from the sea ([www.ceres.ca.gov/coastalcom](http://www.ceres.ca.gov/coastalcom)), and relicensing the project would not affect California's coastal resources. Our assessment is that the project is not subject to California coastal zone program review and that no coastal zone consistency certification is needed for this project.

### **5.7.3 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 BC#4 Project have been filed by Commerce or Interior.

### **5.7.4 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. Four federally listed threatened species of plants and animals could potentially occur within the area affected by project operations: Mariposa pussypaws, valley elderberry longhorn

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<sup>16</sup> 16 U.S.C. §1456(3)(A).

<sup>17</sup> JDJ Energy Company, 69 FERC ¶62,034 (1994).

beetle, California red-legged frog, and bald eagle. We concluded that the recommended relicensing of the project is not likely to have an adverse effect on valley elderberry longhorn beetle and, in the case of Mariposa pussypaws, California red-legged frog and bald eagle, no effect. We sought concurrence with our conclusion regarding these species from FWS by letter dated September 27, 2001. FWS indicated that it disagreed with our conclusion that relicensing this project: (1) would have no effect on California red-legged frog and bald eagle and (2) would not likely have an adverse effect on valley elderberry longhorn beetle, by letter dated December 21, 2001. Consequently, we initiated formal consultation with FWS pursuant to Section 7 of the ESA, by letter dated January 31, 2002. The Commission will address the findings of the FWS's Biological Opinion in the license order for this project, as appropriate.

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## **APPENDIX A**

**APPENDIX A  
COMMENTS ON THE BIG CREEK NO. 4 PROJECT  
DRAFT ENVIRONMENTAL IMPACT STATEMENT**

The Commission issued its draft EIS for the proposed relicensing of the Big Creek No. 4 Project on August 16, 2001, and requested that comments be filed within 60 days from the issuance date (i.e., by October 16, 2001). The following entities filed comments pertaining to the draft EIS. We summarize the comments received, provide responses to those comments, and have modified the text of the final EIS, as appropriate. The comments are grouped for convenience by resource topic.

<b>Entity</b>	<b>Date of Letter</b>
U.S. Army Engineer District, Sacramento, Corps of Engineers (COE)	September 26, 2001
American Whitewater Affiliation, Friends of the River, and San Joaquin Paddlers (Conservation Coalition)	October 5, 2001
California State Water Resources Control Board (SWRCB)	October 12, 2001
U.S. Department of the Interior (Interior)	October 15, 2001
State of California, Governor's Office of Planning and Research, State Clearinghouse	October 5, 2001
U.S. Department of Agriculture, Forest Service (FS)	October 15, 2001
Southern California Edison (Edison)	October 16, 2001

**Procedural and General**

**Comment:** Edison disagrees with the Commission's determination that relicensing the BC#4 Project could constitute a major federal action significantly affecting the quality of the human environment. This determination resulted in the preparation of an EIS rather than an Environmental Assessment.

**Response:** Based on comments received during the scoping process, we considered it more appropriate to prepare an EIS.

**Comment:** Edison suggests that we change the first sentence in section 2.1 of the EIS to read: "Edison proposes to continue operating the project with no modifications in project

operations and several non-operational measures to enhance the environment.” The draft EIS does not include “no” at the indicated location.

**Response:** We made the suggested change to the final EIS.

**Comment:** The FS comments that figure 3 in the draft EIS is somewhat confusing. Edison notes that we should add Tunnel No. 1 between Huntington Lake and the Big Creek No. 1 powerhouse to the figure.

**Response:** As noted, Edison is the source of this figure. This is a schematic diagram, which preserves the upstream to downstream order of the BCS, but does not necessarily reflect the geographical orientation of the projects. We added a note to this effect to the figure, and we added Tunnel No. 1.

**Comment:** The Conservation Coalition objects to our adaptive management proposal granting sole decision-making power to Edison in year one, and requests that the Commission convene a stakeholder technical team instead to develop and conduct scientific analyses to evaluate interaction of flows with the native fish assemblage.

**Response:** The intent of this comment is unclear. There is no recommendation in the draft EIS that grants Edison sole decision-making power for any Commission recommendations. The Commission retains the final authority to determine any conditions of any license that would be issued for the BC#4 Project. Our recommendations in the draft EIS included stakeholder consultation, as appropriate, for all decision points. Our revised recommendations in the final EIS include similar consultation.

**Comment:** The Conservation Coalition states that relicensing of BC#4 must be delayed to coincide with the relicensing of Edison’s six other upstream projects currently being evaluated in an ALP. It further requests that BC#4 should be included in the collaborative watershed effort for four of the upstream projects. It also recommends that the Commission issue a temporary license for the BC#4 Project that specifies interim instream flow measures (including regularly scheduled releases from Redinger Lake for whitewater recreation in the Horseshoe Bend bypassed reach) while the BCS ALP is being completed.

**Response:** The Commission provided its reasons for not delaying the relicensing of the BC#4 Project in its SD2, issued on February 5, 1999. Specifically, we noted that any license issued for the BC#4 Project could be conditioned to accommodate any future

basin-wide management decisions, including measures that could result from the ongoing ALP for upstream projects. Section 15 of the FPA states that, if the Commission does not act on an applicant's relicense application before the original license expires, the Commission is required to issue an annual license with the same terms and conditions as the existing license, until such time as the Commission takes final action on the relicense application. Delays in the BC#4 relicensing process would therefore delay the implementation of Edison's proposed, and our recommended, environmental measures without sufficient justification.

**Comment:** Edison feels that the FS should be encouraged by the Commission to submit its final Section 4(e) conditions within 60 days of the due date for comments on the draft EIS and allow for public comment prior to our preparation of the final EIS.

**Response:** There is no regulation that would require the FS to submit its final Section 4(e) conditions before preparation of the final EIS. The only requirement is that the FS submit its proposed schedule for issuing its final Section 4(e) conditions. In its letters submitting both its preliminary and revised Section 4(e) conditions, the FS notes that it plans to file its final Section 4(e) conditions 90 days after the release of our final EIS, thus meeting this requirement.

**Comment:** Edison considers a number of the FS Section 4(e) conditions to be inappropriate and duplicative of the Commission's administrative and regulatory control over the project.

**Response:** Our EIS addresses only environmental issues that are applicable to project licensing. In the EIS, we identify those FS Section 4(e) conditions that we consider to be administrative and therefore outside the scope of this EIS.

**Comment:** The State of California, Governor's Office of Planning and Research, State Clearinghouse, comments that no state agencies provided any comments on the draft EIS during the review period and that, therefore, the project is in compliance with its review requirements for draft environmental documents pursuant to the California Environmental Quality Act.

**Response:** The SWRCB provided comments on the draft EIS directly to the Commission by letter dated October 12, 2001.

**Comment:** Edison asks that the EIS be revised to recommend that the Commission issue a 50-year license for the BC#4 Project.

**Response:** We made no recommendation in the draft EIS pertaining to the term of any new license that may be issued for the BC#4 Project. The Commission makes this determination in the Order issuing the new license, if a new license is issued. In section 3.2.2 of the EIS, we define the temporal scope of our cumulative effects analysis. This temporal scope has no bearing on the actual term of the license that the Commission may issue.

### **Cumulative Effects**

**Comment:** The FS and Interior reiterate their previous recommendation that the BC#4 Project should be included in a watershed approach to the BCS, and state that they want to be sure that the project is a part of an overall management and resource protection strategy in the entire system. Both agencies comment that the reopener clause should not be restricted to potential alteration of flow releases to the bypassed reach from the BC#4 dam because this project may provide additional opportunities for mitigation of basin-wide cumulative effects. Therefore, they request a more general reopener clause that allows for additional recreational enhancements, ecological monitoring efforts, and implementation of any basin-wide management plan or strategy developed as part of the BCS ALP. Edison agrees with our conclusion in the draft EIS that an additional cumulative effects analysis, as described in the FS recommendation for a basinwide analysis, is unnecessary because of the location of the BC#4 in relation to the rest of the BCS.

**Response:** The Commission's position on reopener articles to address cumulative effects, as documented in a December 14, 1994, policy statement, requires any reopener articles to define the purpose of the reopener as specifically as possible based on the record at the time of license issuance. Our recommended bypassed reach flow reopener is based on the information that is available to us about potential outcomes of the ALP for the upstream projects. Although FS and Interior suggest that other resource areas besides bypassed reach flows could be influenced in a cumulative manner and identified in a basin-wide analysis, no specifics are provided on how these resources could be cumulatively affected. If the ALP should identify any tradeoffs that affect the BC#4 Project, based on the basinwide analysis that Edison is apparently conducting as part of that proceeding, the Commission has sufficient authority through its standard reopener articles to amend the BC#4 Project license accordingly. Any proposed license amendment would require a separate proceeding (distinct from this licensing proceeding) and order from the Commission.

**Comment:** Edison states that a reopener condition for flows to the bypassed reach is not needed because the operation of upstream projects is unlikely to affect BC#4 bypassed reach flows within Edison's control. Edison states that licensing of upstream projects in the BCS would not alter the EIS analysis regarding what flows are appropriate for the BC#4 bypassed reach.

**Response:** We cannot predict what changes to the operation of the upstream projects may result from the ongoing ALP process. However, an example of a potential tradeoff that could entail BC#4 bypassed reach flows is the recommendation of the FS and the Conservation Coalition that spill events be augmented to ensure that flows to the bypassed reach remain above 1,200 cfs during certain time frames. It may be possible to facilitate this flow augmentation (increase the frequency or duration of boatable flows) by modifying the operating regimes of the upstream projects.

**Comment:** The Conservation Coalition does not support our conclusion that cumulative effects should only be considered in the relicensing of the other projects in the BCS.

**Response:** We did not conclude that cumulative effects should only be considered in the relicensing of the other projects in the BCS. In section 3.2 of the EIS, we identified those resources that potentially could be cumulatively affected by the relicensing of the BC#4 Project. We address these resources in sections 3.3.1.3, 3.3.2.3, 3.3.4.3, 3.3.6.3, and 5.2 of the EIS. In certain cases, we conclude that cumulative effects could result from the licensing of the upstream projects, but not from the BC#4 Project.

**Comment:** Our discussion in section 3.3.2.3 of the draft EIS pertaining to cumulative effects on native transition zone fish indicated that scheduled whitewater releases during July and August could flush fry, and perhaps older fish, downstream to Kerckhoff Reservoir. The Conservation Coalition comments that there are no data to support this statement and that we should refrain from such gross speculation. It further states that data collected during the relicensing proceeding indicate that there is little spawning habitat in the bypassed reach and therefore fry are not likely to be present.

**Response:** The Conservation Coalition is correct that there are no data to support our statement of what could happen to native transition zone fish with scheduled whitewater releases. Scheduled whitewater releases have not yet been implemented, so there are no related data. The difficult aspect of obtaining data to support this statement, by conducting trial whitewater releases, is that if the data collected support the statement, the study itself would have caused an adverse effect on this fish community by displacing fish out of the bypassed reach. As we indicated on page 54 of the draft EIS, fish collections

by Edison in 1995 were dominated by young (fish less than 75 millimeters long) native transition zone fish (see figure 3-8 on pages E-3-42 and E-3-43 of the license application). There is no question that young fish are present in the bypassed reach, and these fish could be vulnerable to whitewater boating release effects.

### **Water Quality and Quantity**

**Comment:** Edison comments that our characterization of the San Joaquin River watershed above Redinger Reservoir as “highly regulated” puts the BCS in the wrong context because most of the BCS operations involve only water from the South Fork of the San Joaquin River, which itself represents only about a quarter of the total runoff in the watershed.

**Response:** Our characterization of the watershed as “highly regulated” is based on the fact that the Mammoth Pool reservoir regulates flows from the entire San Joaquin River watershed upstream of that location. However, we also acknowledge that there is no hydroelectric regulation of the flow in the watershed on the North and Middle Forks of the San Joaquin River. We therefore have modified the sentence in question in section 3.3.1.1 to read: “Much of the San Joaquin watershed above Redinger Reservoir is highly regulated... .”

**Comment:** Edison comments that our estimated average annual inflow to Redinger Reservoir (3,300 cfs) is incorrect.

**Response:** Our recalculated average annual inflow to Redinger Reservoir is 2,400 cfs. We corrected the text of section 3.3.1.1 accordingly.

**Comment:** Edison comments that our statement that Edison entered in the Mammoth Pool Agreement “to meet some of the larger rights” is awkward and confusing. Edison suggests changing the word “larger” to “senior.”

**Response:** We made Edison’s suggested change to section 3.3.1.1.

**Comment:** On page 42 of the draft EIS, we recommend that the land required for the operation of the four gaging stations that currently measure project flows be included in the project boundary. Edison states that the four gages are within the existing project boundary. The Conservation Coalition states that the project boundary should be expanded to include the gaging stations at the dam, powerhouse, and Willow Creek.

**Response:** The Commission would make its determinations regarding project boundaries in any new license order that may be issued for this project.

**Comment:** The SWRCB comments that Edison should, in consultation with the CA Fish & Game, FWS, FS, and SWRCB, complete a peer reviewed and agency approved native aquatic species management plan that includes a gaging program to ensure compliance with minimum instream flow releases at the BC#4 dam.

**Response:** Edison already has a USGS supervised gaging plan in place to document compliance with existing minimum flow requirements. This plan would continue to be appropriate for any new license issued for the BC#4 Project.

**Comment:** Edison disagrees with our assessment in the draft EIS that the two circuit breaker oil tanks within the 220-kV switchyard should remain in the project boundary. We concluded that, because some of this oil could be used to cool the transformer banks next to the powerhouse, as well as the transformers in the 220-kV switchyard, these tanks served project purposes. Edison states that the oil storage tanks within the non-project 220-kV switchyard described in the SPCC plan provides transil oil for the non-project circuit breakers in the switchyard and therefore these tanks should not be included in the project boundary. Edison states that an oil storage tank supporting project equipment is located adjacent to the powerhouse.

**Response:** In its March 9, 2001, Order Amending License, the Commission approved the removal of the 220-kV switchyard from the BC#4 Project license, but not the transformer banks at the BC#4 powerhouse. We interpret Edison's comment to mean that none of the transformer oil in the tanks within the 220-kV switchyard support the transformer banks at the powerhouse. Therefore, these tanks do not serve project purposes, and we have a basis for recommending that the storage tanks in the switchyard can be removed from the project boundary. We modified section 3.3.1.2 of the EIS accordingly.

**Comment:** Edison comments that its proposal to develop a sediment management plan should not be interpreted to mean that it should implement large-scale stabilization measures on lands adjacent to Redinger Reservoir and the bypassed reach.

**Response:** We added text to section 3.3.1.2 of the EIS to further clarify Edison's proposal.

**Comment:** The FS agrees with our recommendation that Edison should not need to develop a schedule for sediment management measure implementation because there

have been no sources of sediment to the project bypassed reach that are attributed to project operations. However, the FS retained this recommendation in its revised Section 4(e) condition number 16.

**Response:** As we note in the EIS, we cannot require Edison to implement any measure that does not have a nexus to project operation. Because there are no identified sources of sediment that are project-related, we cannot recommend that Edison develop a schedule for implementing non-project-related stabilization measures.

### **Fisheries and Aquatic Resources**

**Comment:** The Conservation Coalition comments that we failed to objectively evaluate instream flow-related issues for the Horseshoe Bend Reach of the San Joaquin River. It requests an independent analysis of flow-related issues focused on the interaction between whitewater flows and habitat, especially for native fish species and amphibians. The FS comments that whitewater flow releases have the potential for incremental, additive, and cumulative impacts on the established native species populations.

**Response:** On January 11, 1999, we issued an AIR to Edison that requested an evaluation of Edison's proposed whitewater boating measures (AIR #11). In its December 6, 1999, response, Edison also presented an assessment of the effects of whitewater releases on aquatic biota. We requested that this evaluation be developed in consultation with appropriate stakeholders. We left open the possibility that this evaluation could involve field studies as well as an assessment of existing data. We did not specifically require Edison to implement a controlled release study to evaluate the interaction of whitewater flows and aquatic habitat because we believed that the releases associated with such a study could adversely affect the native aquatic species in the bypassed reach. If resource agencies had requested such releases during our required consultation, our concerns would be unfounded. However, during Edison's documented consultation with the resource agencies (CA Fish & Game and the FS), concern was expressed about the effects of whitewater releases on biota (e.g., notes from teleconferences on May 12, 1999, in Edison's December 6, 1999, response to AIR No. 11). Although the FS and SWRCB both indicated a desire to accommodate increased boating opportunities with scheduled whitewater releases, they also expressed concern for the existing native transition zone fish community. The approach we take in the final EIS, discussed in subsequent responses, is to first acquire relevant ecological information during wet and dry years to form a basis for evaluating risks and benefits associated with scheduled releases. Once this information is obtained, scheduled releases may be implemented.

**Comment:** The SWRCB disagrees with the characterization that the Horseshoe Bend Reach fish community is a “natural” warmwater community. It also cites data from Cech et al. (1990) indicating that hardhead are relatively intolerant of the low DO levels found at higher temperature levels, which may in fact limit their distribution.

**Response:** On page 48 of the draft EIS, we defined the fish community in both Redinger Reservoir and the Horseshoe Bend reach as a “native transition zone fish community,” which is a warmwater community dominated by hardhead, Sacramento pikeminnow, and Sacramento sucker. Our terminology is consistent with the description provided by the FS (letter from J. L. Boynton, FS, to W. Moody, Edison, dated January 28, 2000). We did not characterize the community in Horseshoe Bend as “natural,” although the paucity of introduced fish species that frequently dominate other California waters could lead one to conclude that this fish community is more natural than others (without judging whether or not the community composition is driven by project operations). It is not relevant that hardhead are intolerant of low DO. There is no evidence that DO levels in any project waters would limit hardhead populations (see table 4 in the EIS).

**Comment:** The SWRCB comments that the way the juvenile habitat data are represented in the draft EIS gives the false impression that flows that are beneficial to adults would adversely affect other native species life stages. The Conservation Coalition states that minimum flows to the bypassed reach should optimize adult, rather than spawning and rearing habitat. The Conservation Coalition sites inconsistencies in predicted habitat, based on IFIM studies, and the relative abundance of young native species, as a basis to discount the validity of Edison’s habitat assessments relied upon in our draft EIS. The Conservation Coalition states that the Commission, the FS, and Edison are relying on an inferior method (IFIM) to model the relationship between flow and fish density. The Conservation Coalition also cites a personal communication with a recognized fisheries expert who believes there is little, if any, rearing habitat in the Horseshoe Bend reach and that most spawning and rearing habitat is in Willow Creek and the upstream reservoirs. The Conservation Coalition and SWRCB state that the management objective for the native species between the BC#4 dam and the confluence with Willow Creek should be minimum instream flow releases that focus on adult rather than juvenile habitat (SWRCB then cites table 3-11 in the license application to support this statement). The SWRCB specifies that the inflow from Willow Creek should not be used to account for part of the minimum flow required to protect adult habitat in the Horseshoe Bend reach.

**Response:** The SWRCB does not provide any basis for how the draft EIS habitat analysis gives false impressions regarding the effects of changing flows on native species.

Table 7 in the EIS is an effective means of presenting the consequences of different flows downstream of the Willow Creek confluence. IFIM techniques are recognized by most resource agencies as a reasonable tool to quantify habitat. All current instream flow techniques have some shortcomings. We provided our basis for why we consider rearing habitat to be the limiting factor for native species on page 54 of the draft EIS. Our revised recommendation, in section 3.3.2.2 of the final EIS, to conduct 5 years of monitoring to provide baseline data for the native aquatic species management plan, would enable collection of additional data on limiting factors. During our recommended 5-year monitoring, there should be relatively high flows, from spillage during wet years, and low flows during dry years, that would enable assessments of flows that are not readily predicted by IFIM methods. For example, habitat during spills could not be readily measured for safety reasons, but the consequences of spills on aquatic species populations could be monitored following spill events.

The Conservation Coalition and SWRCB provide no basis for why habitat in the portion of the bypassed reach between the dam and the confluence with Willow Creek should have flows that support adult native species. This reach, Redinger Gorge, is described in the recreational resources section of the EIS as a 3,500-ft-long reach with difficult access. Our site visit observations revealed a high gradient with numerous cascades. This reach has never been sampled for biota, and is not amenable to instream flow habitat evaluations. Although some native fish may reside in this reach, it is not appropriate to have the limited habitat in this short reach dictate the minimum flows that are released to the entire 6.2 mile-long Horseshoe Bend portion of the bypassed reach. Table 3-11 in the license application, cited by the SWRCB, quantifies habitat in the Horseshoe Bend reach, not the Redinger Gorge reach, and it is not relevant to making a determination of appropriate minimum flows in the reach from the dam to the confluence with Willow Creek.

**Comment:** The SWRCB comments that Edison should, in consultation with the CA Fish & Game, FWS, FS, and SWRCB, complete a peer reviewed and agency approved native aquatic species management plan for Willow Creek, Redinger Reservoir, and the Horseshoe Bend reach of the San Joaquin River. The plan should include a species and aquatic habitat monitoring program. The Conservation Coalition reiterates this comment, stating that Edison must work collaboratively with stakeholders in developing study methodologies to investigate whitewater release events.

**Response:** The SWRCB's and the Conservation Coalition's comments are consistent with our recommendation in section 5.3 of the draft EIS. However, we initially did not include the SWRCB as a consulted agency in the development of the native aquatic

species management plan because CA Fish & Game offered state representation, and this agency would be free to consult with SWRCB, as needed. However, based on SWRCB's comments, we have added SWRCB as a consulted entity in the development of this plan.

**Comment:** The SWRCB, Interior, the Conservation Coalition, Edison, and the FS express concern that our approach to establishing baseline conditions, described in the draft EIS, may not be sufficient to evaluate the effects of whitewater boating on the aquatic ecosystem. They conclude that more extensive ecological baseline monitoring is needed. Edison believes that monitoring should focus on the native species themselves, and habitat monitoring should only be considered if substantial changes are observed in the physical environment.

**Response:** Because proposed and recommended project operations are not likely to affect native species in Redinger Reservoir, we do not recommend monitoring of native species in Redinger Reservoir, unless it is tied to assessing populations in the bypassed reach. However, we agree that more extensive monitoring to determine the ecological baseline is needed to evaluate the effects of whitewater releases on the aquatic ecosystem and modified section 3.3.2.2 of the EIS accordingly.

**Comment:** The Conservation Coalition believes that our statement on page 58 of the draft EIS "...that few pools would likely exist with whitewater releases..." (which we characterized as likely to be suboptimal for adult hardhead and Sacramento pikeminnow) is not consistent with our statement on page 52 of the draft EIS that: "During the period between surveys (between 1985 and 1995), high flow events increased the relative abundance of pool habitats and decreased the abundance of run habitats." The Conservation Coalition claims that, at flows between 1,000 and 1,500 cfs, the pools in the bypassed reach simply increase in size and depth and velocities remain relatively constant, thus suitable for adult transition zone fish species. The Conservation Coalition asks us to remove references to suboptimal habitat with whitewater flows without substantiating evidence.

**Response:** There is no inconsistency in these two statements. The first indicates that, when flows in the bypassed reach are increased from about 20 cfs to between 1,000 and 1,500 cfs, relatively abundant pool habitat would most likely be diminished with whitewater boating flows. Edison, in its February 25, 2000, response to AIR's 7 and 8, observed that, at high flows in 1995, many pools became runs due to increased velocity. The second statement explains the increase in pool habitat from 64 percent of the bypassed reach during 1985 habitat mapping to 73 percent of the bypassed reach during 1995 habitat mapping. The mapping was conducted under comparable flow conditions.

Our statement indicates that, between 1985 and 1995, there were sufficiently high flow events to alter the channel morphology such that more pools and less run habitat was present with similar flows. We added additional text to section 3.3.2.1 of the EIS to further clarify this statement. We also changed the word “would” to “could” in the following statement: “...we expect that habitat for adults would be suboptimal for the duration of whitewater release events.” Our recommended ecological monitoring would provide evidence to prove or disprove this statement.

**Comment:** The Conservation Coalition comments that, on page 59 of the draft EIS, we speculate “on the impact of whitewater releases on displacement of benthic macroinvertebrates due to scour.” The Conservation Coalition concludes that “it is highly unlikely that flows proposed for whitewater releases will cause displacement of benthic macroinvertebrates.” It supports this statement by stating that “catastrophic drift” associated with scoured macroinvertebrates only occurs when flows are high enough to move bedload, and that bedload in the bypassed reach would not be moved by flows of 1,000 to 1,500 cfs.

**Response:** On page 59 of the draft EIS, the only reference to macroinvertebrates is the following sentence: “Macroinvertebrates could also be displaced by releases later in the season than would naturally occur.” We changed the phrase “than would naturally occur” to “than currently occur” in the final EIS to acknowledge that natural flows in the bypassed reach of the San Joaquin River have not occurred over 50 years and therefore are not relevant to the existing macroinvertebrate community. We made this statement regarding what could happen to macroinvertebrates to support our recommendation for additional monitoring in the following paragraph. Our recommendation in the draft EIS was that Edison should first monitor the aquatic species of most concern to resource agencies because of the uncertainty associated with what would happen to the native aquatic community (which would include macroinvertebrates, a source of food for the resident fish community) if scheduled whitewater releases are implemented. We modified our recommendation in section 3.3.2.2, based on comments received on the draft EIS, to include 5 years of monitoring of the aquatic community prior to deciding on implementation of scheduled releases. Data could then be collected during wet and dry years, and the responses of the aquatic community to spill events (including whether boating flows elicit macroinvertebrate downstream drift) assessed.

**Comment:** The FS presents many details on the native transition zone fish community life histories and then questions portions of our conclusion that limiting whitewater releases to the period from mid-spring through July 4<sup>th</sup> would mimic pre-project flows to which these populations are adapted. The FS states that, although the general timing of

such releases would be consistent with the unregulated simulated hydrograph derived by the FS, the “yo-yo effect” of peak flows up to 1,500 cfs followed by low flows of 20 cfs that would occur with scheduled releases is not consistent with the natural hydrograph. During dry years, the FS comments that spawning likely occurs in early April, thus spilling after mid-April may affect incubation, emergence, and development. Edison states that, during drier years, conditions in the bypassed reach are favorable for young and adult native species, most likely resulting in increased recruitment during dry water years. Consequently, Edison states that scheduled releases during below normal, dry, and critical water years should be avoided. In wet years, spawning, incubation, and fry emergence would occur later in the year. The FS states that fry would be in the reach during our recommended scheduled release period and not protected from high flows.

**Response:** We reviewed the FS life history information and found it to be consistent with what we presented in the draft EIS. However, the potential correlation of dry water years with earlier hardhead spawning was not previously on the record for this proceeding, and not available in the literature that is available to us. We revised section 3.3.2.1 of the final EIS to reflect this potential linkage of water year types to the timing of spawning. If during dry years, fry emerge from spawning gravel by early May, we agree that there could be adverse effects if scheduled whitewater releases occur during May, June, and early July. However, the FS revised Section 4(e) condition 9-3 would have the most scheduled whitewater releases (up to 9 days) between the Memorial Day weekend and the July 4<sup>th</sup> weekend (up to 3 or 6 days of releases could occur during above normal and wet years, respectively). This strategy seems inconsistent with the FS premise that hardhead fry would be most susceptible to adverse effects of scheduled whitewater releases after fry emergence.

We agree that the “yo-yo” effect on flows with any scheduled whitewater releases would not necessarily be consistent with sustained high flows that would have generally occurred during wet spring months under pre-project conditions. However, the native transition zone fish community would be more likely to have mechanisms to protect themselves during high spring flows, even if they are pulsed rather than sustained, than during the summer, when flows are typically lower. We also note that, when data from several years are combined to present the average flows during the year, flash flow events (rapid increases and decreases in flow) that occasionally occur during the spring during specific years are masked. Such specific events could resemble, at least to a degree, the “yo-yo” effect that the FS references.

**Comment:** The FS comments that our recommendation to provide scheduled whitewater releases from May to early July, because it would minimize potential adverse effects on

the native transition zone fish community, is not consistent with our statements on page 59 of the draft EIS that indicate that scheduled releases could result in a sudden decrease in water temperatures and have the potential to adversely influence aquatic biota.

**Response:** Our draft EIS analysis is consistent. Our intent was to document our concern that scheduled whitewater releases have the potential to decrease the prevailing water temperature in the bypassed reach and thus adversely affect aquatic biota and measures that we concluded could minimize these effects. We also acknowledge in the draft EIS that there is uncertainty about the actual effects of releases. This uncertainty was the basis for our recommendation to conduct additional ecological monitoring before implementing scheduled releases. We continue to conclude that, in spite of the information provided by the FS, there is still uncertainty regarding the effects of whitewater releases on aquatic biota. Our recommended 5-year monitoring program should reduce this uncertainty.

**Comment:** The Conservation Coalition comments that our statement on page 59 that post larvae and small juvenile fish could be susceptible to displacement by “sudden” discharges incorrectly associates whitewater releases with effects more closely aligned with flood releases. The Conservation Coalition also states that we ignored the ramping rates that it recommended.

**Response:** Our use of the word “sudden” in this context is a relative term. Even with the ramping rates specified by the FS (ramped up at 150 cfs per hour), it would take less than 8 hours for flow in the bypassed reach to go from 20 to 1,200 cfs during a boating flow release. Figure 4 in the October 15, 2001, FS letter commenting on the draft EIS illustrates what we mean by “sudden.” We added the word “relatively” in front of the phrase “sudden release” and “sudden discharges,” in section 3.3.2.2 of the final EIS.

**Comment:** The Conservation Coalition and FS disagree with our conclusion on page 59 of the draft EIS that few “high flow events” occurred after mid-July based on our analysis of pre-project flows. The Conservation Coalition indicates that this conclusion is inconsistent with figure 5 in the draft EIS, which shows average inflows to Redinger Reservoir of over 2,000 cfs during August and September. The Conservation Coalition comments that our basis for recommending that whitewater releases only occur from mid-spring to the July 4<sup>th</sup> weekend is based on our misinterpretation of the natural hydrograph, and our conclusion to restrict scheduled releases to this time frame is erroneous. The FS presents the results of its paired basin analysis to simulate unregulated, natural flows that could be expected to occur at the BC#4 Project. The FS used 23 years of USGS data (1960 through 1982) from the nearby Kings River watershed (see figure 1 of the EIS for

the location of the Kings River relative to the San Joaquin River) in its analysis. The FS concludes that during all above normal and wet years and some below normal water years (14 out of 23 years), flows greater than 1,000 cfs would have extended into early August.

**Response:** Our analysis on page 59 of the draft EIS was based on pre-BC#4 Project flows for 33 years between 1913 and 1951, not the unregulated flows that the FS simulated. We analyzed pre-project flows to determine the hydrological conditions to which the native transition zone fish community in the bypassed reach had become accustomed. Upstream hydroelectric projects in the San Joaquin Basin provided some regulation of flows during this pre-project period. We added text to section 3.3.2.2 of the final EIS to clarify this difference between our analysis and that of the FS. We also added text to support our conclusion that few flow events comparable to recommended recreational releases (over 1,000 cfs) occurred after mid-July. Flows in excess of 1,000 cfs occurred during only 17 of 33 years between July 20 and July 31, and flows in excess of 1,000 cfs occurred during August in only 8 of 33 years. Those years when flows over 1,000 cfs extended into late July and August were usually above average or wet water years. The results of our analysis are not that dissimilar from that of the FS, even though we used a different period of record and evaluated pre-project, rather than unregulated, conditions. The interpretation of the results in the context of the fish community is the key difference between the analyses. Inflow to Redinger Reservoir, shown on figure 5 of the EIS, is not a valid surrogate for the unregulated hydrograph. As stated in section 2.1.1.1 of the EIS, water stored in upstream reservoirs in the BCS is used to supplement natural runoff beginning in mid-summer.

**Comment:** The FS concludes that water year type must be taken into account when considering whitewater release effects on the native transition zone fish community. The FS and Edison state that the potential for adverse effects from whitewater releases is substantially less during above normal and wet years because spills would have already frequently occurred, and effects on the species of concern would already have occurred. The FS expects the effects from high flows during wet years to vary between limited development in the young-of-year life stage to complete loss of the year class. This premise forms the basis for the FS revised scheduled whitewater releases in late July and early August for wet and above average years. Edison comments that whitewater releases should not continue past the first weekend after spill ceases in wet and above normal years (if scheduled releases are implemented) to minimize potential harm to recently spawned embryos and native fish larvae. However, the FS also states that an adaptive approach to scheduled whitewater releases, including monitoring for a minimum of 5 years before scheduling releases, would help verify assumptions and reduce uncertainty over possible ecological effects of releases during both spill and non-spill years. Edison

supports the collection of 5 years of baseline data so that objective decisions about risks associated with whitewater releases can be assessed.

**Response:** We have no basis to either agree with or refute the FS and Edison conclusion that whitewater releases during late July or early August during above normal or wet water years would minimize effects on the native transition zone fish community. Water year type may be an important factor for the year class success of fish populations in the bypassed reach. However, if most of the spawning and rearing for the native fish populations occurs in Willow Creek, as the Conservation Coalition hypothesizes, rather than in the bypassed reach, or if year class strength is comparable during wet years and dry years (as seemed to be the case with the length-frequency distribution of fish collected in 1985 and 1986, dry years, compared to that of 1995, a wet year), water year type may have little if any influence. Scheduled releases during dry years could then meet a recreational whitewater demand when there are few other regional whitewater boating opportunities. Although releases during late July or early August in wet years would also meet recreational boating demands, spill events earlier in the year already would have provided boating opportunities, and the perceived value of supplemental scheduled releases may be less. We agree with the FS that it is important to verify the assumptions that could influence the native transition zone fish community if scheduled releases are implemented. We therefore recommend 5 years of ecological monitoring, at which point sufficient information should be available to make a recommendation about scheduled releases. Currently, we conclude that there is insufficient information available to make this determination. We modified the text of sections 3.3.2.2 and 3.3.6.2 accordingly.

**Comment:** The FS comments that monitoring associated with the native aquatic species management plan should include other aquatic species that may be present.

**Response:** The consulted parties would develop the details of monitoring associated with the native aquatic species management plan. When there is reason to do so, we specify species that should be included in the plan. Other species to be monitored would be identified during the development of the plan.

**Comment:** The Conservation Coalition is opposed to our sequential approach in the draft EIS assessing the potential for implementing scheduled whitewater releases. The Conservation Coalition states that, by having Edison be responsible for developing the native aquatic species management plan and implementing associated monitoring, there is a significant conflict of interest that would make collection of objective data and conducting an unbiased assessment difficult.

**Response:** The only entity that the Commission has jurisdiction over when enforcing the terms of any new license is the licensee (in this case, Edison). We ensure that plans and assessments conducted by the licensee are unbiased by requiring consultation with appropriate resource agencies and, in some cases, NGOs. We rely on the documentation of this consultation to reveal that plans and assessments have been developed in an unbiased manner. Our approach in this EIS is consistent with the Commission's approach in other licensing proceedings.

**Comment:** The Conservation Coalition, SWRCB, Edison, and the FS disagreed with our recommendation in the draft EIS that, if after the initial year of ecological monitoring, scheduled whitewater releases were still considered to be consistent with maintaining native aquatic species populations, a single release of 1,500 cfs should be made, and ecological monitoring conducted before, during, and after the event. This approach would not account for the effects of natural variability, or differences that may be associated with different water year types. All parties recommended multiple years of ecological monitoring instead.

**Response:** We modified sections 3.3.2.2 and 3.3.6.2 to replace our initial recommendation with 5 years of ecological monitoring. We note that no party recommended multiple years of ecological monitoring associated with their initial whitewater release recommendations.

**Comment:** The SWRCB cites data from Cech et al. (1990) indicating that hardhead selected temperatures between 63 and 70°F (rather than the 83°F that we cite in the draft EIS). The SWRCB states that hardhead are relatively intolerant of the low DO levels found at higher temperature levels, which may in fact limit their distribution.

**Response:** The preferred temperature for hardhead that we cite in the draft EIS is attributed by Edison in its license application to Knight (1985). Moyle (in press) cites a slightly lower preferred temperature range of 75 to 82°F for hardhead, and we modified the EIS to reflect this preferred temperature range. Moyle comments that, although hardhead in a natural thermal plume in the Pit River selected water temperatures between 63 and 70°F, this was the warmest temperature available to these fish. Therefore, we do not consider the observations of Cech et al. to represent water temperatures preferred by hardhead. In the final EIS, we recommend 5 years of data collection in the bypassed reach that would enable evaluation of hardhead distribution under different temperature and flow conditions. It is not relevant to point out that hardhead are intolerant of low DO. There is no evidence that DO levels in any project waters would limit hardhead populations (see table 4 in the EIS).

**Comment:** The Conservation Coalition comments that Edison's temperature modeling, which predicts that increases in flow would result in unfavorable water temperatures for the native transition zone fish community, is not supported by data in table 4 of the EIS. The Conservation Coalition states that Edison's temperature model does not predict actual water temperature measured in the field and the Commission should disregard Edison's temperature modeling in exchange for actual field data collection. The SWRCB states that there are no site-specific data to support the assumption that increased minimum flows from the BC#4 dam would reduce water temperatures in the bypassed reach to the extent that it would affect the native fish assemblage.

**Response:** Table 4 in the EIS does not support or refute the accuracy of Edison's water temperature modeling. This table presents water temperature data under the existing operating conditions. We assessed the temperature modeling results that Edison presented in its license application and were not satisfied that the 1985 modeling results were valid. Consequently, we issued an AIR to Edison requesting evidence that its model accurately predicted the effects of changing flow on water temperature. In its response to item 8 of our AIR, dated July 8, 1999, Edison presented new data that included validation data of predicted versus measured temperature comparisons, using data collected in 1995. Edison's model accurately predicted the actual temperature values measured in the bypassed reach (see figures AIR 8-1 and AIR 8-2 of Edison's AIR response). We see no reason to discard Edison's revised temperature modeling. As indicated above, we now recommend 5 years of ecological monitoring before implementing scheduled releases. We expect that additional temperature measurements would be a component of this monitoring plan. This could further verify Edison's predicted lower temperature with higher flows in the bypassed reach.

**Comment:** The Conservation Coalition disputes our conclusion that decreased water temperature associated with whitewater releases could limit spawning by the native transition zone fish community because Edison's data to support this conclusion relies on cold water released from the lower outlet valve on Redinger Reservoir. The Conservation Coalition states that whitewater releases would be made from the warmer surface water and thus would be far more suitable for native fish in the bypassed reach.

**Response:** Edison's water temperature data from Redinger Reservoir during 1995, a wet water year, strongly indicate that under wet year conditions Redinger does not stratify (see table AIR 8-3 of Edison's July 8, 1999, response to our AIR; the maximum difference during June, July, or August between surface water and lower outlet water temperature is about 1°F). Consequently, there would be little difference in the

temperature of water released from the lower outlet valve compared to water released from surface gates. Edison's predicted water temperature regime, presented in table AIR 8-5 of its AIR response, accounts for the minimal difference in temperature that would occur with initial releases from the lower outlet that shift to surface releases when flows exceed 45 cfs (the maximum capacity of the lower outlet valve). During a dry water year, there may be some stratification of Redinger Reservoir, but the bypassed reach water temperature would be governed primarily by the warmer water temperature of Willow Creek, except during whitewater releases (which would originate primarily from surface water of Redinger Reservoir). We continue to conclude that scheduled whitewater releases would reduce the prevailing water temperature in the bypassed reach and could limit spawning by resident fish. As discussed earlier, the FS points out that whitewater releases during dry years could be detrimental to the native transition zone fish community. We agree. The 5-year ecological monitoring that we now recommend would enable water temperature data to be collected during wet and dry years, and the responses of the fish community to these conditions could be assessed.

**Comment:** Edison disagrees with the FS preliminary 4(e) condition that would reserve the FS' authority to require fish passage at the BC#4 dam, should fish passage be provided at downstream dams. The FS agreed with our conclusions in the draft EIS and deleted this recommendation from its revised 4(e) conditions.

**Response:** As we noted in the draft EIS, the standard fish and wildlife reopener article, which would be included in any license that would be issued for this project, would enable the issue of anadromous fish passage at the BC#4 dam to be addressed, if the need should arise during the term of the license.

### **Terrestrial Resources**

**Comment:** The FS suggests that we reference, and attach as an appendix to the EIS, Edison's list of wildlife expected to occur in the project area.

**Response:** We added text to section 3.3.3.1 that references Edison's list of wildlife species that are expected to occur in the project area. We did not reproduce the 17 pages of wildlife species as listed in Appendix H of Edison's license application. The license application is an integral element of this proceeding to which the reader can refer, as needed.

**Comment:** Edison asserts that the FS recommendation to develop a transmission line corridor habitat management and maintenance plan should be deleted because the project

has no transmission line corridors to apply a management and maintenance plan. The FS comments that our recommended habitat and land use management plan should address all items in the FS' 4(e) conditions recommending development of a transmission line corridor habitat and maintenance plan.

**Response:** The FS recommendation includes sound environmental practices that are applicable to all project lands, not just transmission line corridors. Our analogous recommendation for Edison to develop a habitat and land use management plan, which would include all lands within the project boundary of any new license that the Commission may issue, is appropriate. Because the FS would be consulted during the development of this plan, it could verify that the plan addresses issues that it considers appropriate. In addition, although the Commission approved the deletion of nearly all of the transmission line corridors within the SNF, the effective date of this deletion is when the Commission receives all necessary permits and approvals from the FS for the continued use of National Forest System lands (paragraph D of the March 9, 2001, Order Amending License to Remove Certain Transmission Facilities from Project License). Edison has not yet filed these approvals with the Commission. Until such approvals are filed by Edison, the transmission corridors within the SNF remain in the project boundary and therefore subject to the habitat and land use management plan.

**Comment:** The FS indicates that foothill yellow-legged frogs are not currently known to occur in Willow Creek, although this species was collected in Willow Creek in 1970. The FS also notes that a population of this species is present in Jose Creek, which is a tributary of Redinger Reservoir.

**Response:** We added the information provided by the FS to sections 3.3.3.1 and 3.3.3.2 of the EIS.

**Comment:** The FS comments that the EIS should discuss peregrines, California spotted owls, and sensitive bats. It states that our decision not to discuss them in the environmental effects and recommendations section is not appropriately based on absence of species or habitat.

**Response:** We added text to section 3.3.3.2 of the EIS in response to the FS comment.

**Comment:** The COE notes that project access trail construction and boat ramp improvements may result in the discharge of dredged or fill material into U.S. waters. If such discharge occurs, Edison would have to obtain COE approval prior to start of such work. The COE also requests that the EIS include consideration of alternatives that avoid

impacts on wetlands or other waters of the United States and that the applicant make every effort to avoid project features that require the discharge of dredged or fill material into waters of the United States.

**Response:** Commission staff walked the proposed route for the proposed Willow Creek general access trail and found no evidence that dredging or filling of wetlands or other waters would be needed for trail construction. The purpose of the trail is primarily to avoid effects on sensitive riparian habitat along Willow Creek. Edison, in its October 16, 2001, letter to the Commission commenting on the draft EIS, notes that it has already contributed to completion of improvements to the boat ramp at Redinger Reservoir and no further work on the ramp is planned. Consequently, the proposed measures at Redinger Reservoir should not require a dredge and fill permit under Section 404 of the Clean Water Act. However, hydroelectric project licensees are not excused from the need to acquire any additional state or federal approvals that may be needed for project operations, as appropriate.

**Comment:** Edison states that the proposed Willow Creek general access trail would be outside the project boundary, would accommodate recreational use that is not project induced, and could have negative environmental effects on native aquatic species from the increased usage that such a trail would attract.

**Response:** As noted in the previous response, the purpose of the general recreational access trail, proposed by Edison and recommended by the FS and our staff, is to protect sensitive resources from effects that would otherwise occur through increased use. We conclude in section 5.4 of the EIS that this general access trail would serve project purposes and recommend that it be included in the new project boundary for any license that may be issued.

**Comment:** The SWRCB disagrees that on-water recreationists are more likely to take protected or sensitive aquatic resources than any other user group and states that this discussion should be removed from our analysis. The Conservation Coalition comments that it is highly unlikely that whitewater boaters would poach or collect turtles and that they would most likely help to protect native species from consumptive users. The Conservation Coalition suggests that a strong effort should be made to educate the public about proper behavior to minimize user effects on habitat; this could be accomplished through signage, pamphlets, and publications.

**Response:** At no place in the draft EIS did we state or imply that on-water recreationists are more likely to take protected or sensitive aquatic resources than any other user group.

On page 66 of the draft EIS, we did reference a concern that the FS expressed on two different occasions that increased recreational use could result in disturbance and poaching of turtles and other wildlife. The FS concern is valid, which is why we included lower Willow Creek in the geographic scope of the native aquatic species management plan. This plan could also require educational initiatives so that the public is less likely to disrupt natural resources. However, it is most appropriate for the resource agencies that would be consulted during the development of this plan to define specific implementation of measures to achieve the management goals.

**Comment:** The Conservation Coalition objects to our statement on page 67 of the draft EIS that: “Flow releases for whitewater boating in the bypassed reach could also affect these species by washing away amphibian egg masses, eliminating suitable basking sites for turtles, and displacing young and adult frogs and turtles to downstream locations.” The Conservation Coalition claims that release events would not substantially increase velocities in the pool habitat frequented by these native species and that frogs and turtles will not be displaced downstream. It also states that, in all probability, whitewater release events will increase the available pool habitat for these species.

**Response:** The purpose of the statement in the draft EIS to which the Conservation Coalition refers is to provide support for our recommendation that Edison should develop and implement a native aquatic species monitoring plan, including monitoring to accurately evaluate the effects of project-related activities. It seems intuitive that, if flows in the bypassed reach increased from 20 cfs to between 1,000 and 1,500 cfs, the water velocities in the bypassed reach pools would also increase. Edison, in its February 25, 2000, supplemental filing in response to AIR 7 and 11, noted that: “During high flows in 1995, many pools became runs due to increased velocities and velocities along the stream margins increased much more rapidly away from the water’s edge than under normal release flows, thereby decreasing boundary habitats. Higher flows also resulted in the inundation of many shallow bed elements...(page 11-13).” The Conservation Coalition provides no data to support its conclusion that whitewater releases would increase pool habitat for turtles and amphibians. Our recommendation in the final EIS to monitor native aquatic species for 5 years would provide data to assess the consequences of potential whitewater releases (both positive and negative).

**Comment:** The FS indicates that the EIS may be acceptable as a summary of a Biological Evaluation of FS sensitive species, but that it is not adequate for the site-specific analysis needed for any O&M measures or other recreational pursuits associated with any new license. Edison comments that it already has an excellent corporate

program for ensuring compliance with state and federal endangered species laws and no further action is necessary.

**Response:** We indicated in the draft EIS that our recommended native aquatic species management plan and habitat and land use management plan should provide sufficient information for Edison to prepare any needed Biological Evaluations for FS sensitive species. As indicated on page 55 of the draft EIS, a specific objective of the native aquatic species management plan would be to “identify measures needed for the protection and enhancement of native aquatic species in the project area,” which would include FS sensitive species. Our recommended habitat and land use management plan would include incorporation of Edison’s Endangered Species Alert Program and Environmental Training Programs. Both existing programs are designed to identify and avoid potential conflicts with sensitive species and project operations, and to indicate when consultation with the FS is needed. These measures are sufficient to address any site-specific evaluations of O&M and recreational measures that could affect FS sensitive species. However, if the FS wishes to recommend additional measures to protect sensitive species, it would be free to do so during consultation that is a recommended part of development of both the native aquatic species management and the habitat and land management plans.

**Comment:** Edison states that the noxious weed control measures discussed on page 70 of the draft EIS should only be related to project-induced actions on project lands.

**Response:** On page 71 of the draft EIS, we recommend that a noxious weed management plan be included in the habitat and land use management plan and that it include all lands within the project boundary of any new license that may be issued for this project.

**Comment:** The FS notes that Edison should not only consult with the FS but with all appropriate agencies (e.g., FWS and CA Fish & Game) in the development of a pesticide use plan.

**Response:** Pesticides could be used to control noxious weeds and therefore would be included as an element of our recommended noxious weed management plan, which would be a component of our recommended habitat and land use management plan. In section 5.3.1 of the EIS, we recommend that this plan be developed in consultation with the FS, CA Fish & Game, and FWS.

## **Threatened and Endangered Species**

**Comment:** The Conservation Coalition believes that we speculated on page 76 of the draft EIS when we supported our conclusion that relicensing the BC#4 Project would have no effect on the threatened California red-legged frog with the following statement: “The paucity of preferred habitat (riparian vegetation and deep, slow moving pools) in the project bypassed reach would be unlikely to support this species, especially during years when there is natural spillage into this reach (any pools would not be “still” or “slow moving” under most spillage flow).” The Conservation Coalition concludes that, because it is necessary for boaters to paddle across extensive pool areas to maintain downstream travel during flows equivalent to those requested for whitewater releases, there are extensive, still pools. Consequently, the Conservation Coalition concludes that there is potential California red-legged frog habitat in the bypassed reach, and we cannot conclude that they do not occur in the project area.

**Response:** Please see our previous response that pertains to whether increasing flows from 20 to up to 1,500 cfs would increase water velocities in the pools in the bypassed reach. In the draft EIS, we said that there is a paucity of preferred habitat for California red-legged frog in the bypassed reach for the following reasons. California red-legged frog preferred habitat is characterized by dense, shrubby, riparian vegetation associated with deep (over 2 ft), still or slow-moving water. On page 62 of the draft EIS we point out that the extent of riparian vegetation in the vicinity of the Horseshoe Bend reach is limited by lack of soil substrate and flushing flows. We also noted that riparian vegetation near the bypassed reach exists as scattered small pockets above the river upper banks and scour line. We added language to sections 3.3.4.1 and 3.3.4.2 of the EIS to emphasize that the preferred habitat is dense, shrubby, vegetation in association with deep, slow moving pools. We continue to conclude that such habitat is scarce, if not absent, along the bypassed reach. Our conclusion that this species is not expected to occur in the project area is not only based on the paucity of habitat, but on the absence of this species from the entire SNF, based on surveys conducted by the FS from 1992 to 1995, and the lack of recent occurrences in the geographic region surrounding the project.

**Comment:** The FS comments that the EIS may be sufficient as a summary of a Biological Assessment, but does not appear to address effects of project O&M. Edison comments that it already has an excellent existing program to ensure compliance with the federal Endangered Species Act and no further action is required.

**Response:** Please see our previous response to the FS’ similar comment pertaining to Biological Evaluations and FS sensitive species.

## **Recreational and Land Use Resources**

**Comment:** Edison comments that it has already contributed to the completion of the boat ramp facility improvements in cooperation with the FS and CDBW. Therefore, this provision should be excluded from the project license.

**Response:** In its license application, among Edison's proposed recreational enhancements were the installation of a new floating dock at the public boat launch and placement of new rock slope protection along the lake shore adjacent to the boat launch ramp. We listed these two measures in section 3.3.6.2 of the draft EIS. During our July 1, 1999, site visit it was clear that these two measures have been completed. We added a parenthetical statement to this effect to the final EIS. We did not list either of these two measures in section 5.3 of the EIS, Comprehensive Development and Recommended Alternative. However, we continue to recommend that Edison complete the additional boat ramp facility improvements specified in the EIS and reiterated in the FS revised Section 4(e) conditions. These include: purchase and install a second toilet for the informal camping area; chip seal the access road to the boat ramp; plant at least 10 trees; purchase and install two concrete picnic tables; and maintain the boat ramp facility, including trash collection services.

**Comment:** The preliminary FS Section 4(e) conditions recommended that Edison relocate the Horseshoe Bend Trail in the vicinity of the BC#4 powerhouse, and reconstruct the remainder of the trail. The FS and Edison agree with our conclusion in the draft EIS that, with the exception of the portion of the Horseshoe Bend Trail that is adjacent to the powerhouse, there is no nexus of this trail to project purposes. However, in its revised Section 4(e) conditions, the FS continues to recommend that Edison reconstruct the remainder of the Horseshoe Bend Trail.

**Response:** As we specified in the draft EIS, we cannot specify that Edison implement improvements to this trail in any new license that may be issued for this project if there is no nexus to project purposes, even though the improvements may be needed. Our analysis and conclusions regarding this issue remain unchanged. During a December 19, 2001, teleconference, the FS clarified its recommendation by stating that its intent is to accommodate the relocation of the trail from the powerhouse to the western terminus of the trail, to provide a better visual buffer from the powerhouse.

**Comment:** Edison states that the FS should eliminate its requirement for Edison to construct the San Joaquin Trail outside the vicinity of the powerhouse.

**Response:** The FS has made no recommendations pertaining to the San Joaquin Trail. As shown on figure 12 of the EIS, existing and proposed routes for the San Joaquin Trail do not come close to the BC#4 powerhouse.

**Comment:** Edison comments that its offer to assist the FS in the completion of the San Joaquin Trail in the Redinger Reservoir area was limited to the granting of an easement on project or Edison-owned lands. Edison states that it is not proposing to provide labor to help construct the trail.

**Response:** Our portrayal of Edison's proposal was based on page E-5-38 of the license application. Edison states that it would not only assist in acquiring appropriate easements for the San Joaquin Trail, but "...assist the Council with funding and construction of the trail when a trail is established by providing crews as needed to assist with trail construction." Edison had allocated \$17,000 for planning and consultation and \$20,000 for labor and material associated with trail construction.

**Comment:** The Conservation Coalition comments that, on page 91 of the draft EIS, we combined all water years in our characterization of the 20 to 40 percent frequency of the occurrence of boatable flows between April and July. This gives the impression that boatable flows are present on an annual basis. The Conservation Coalition states that the project entirely eliminates boating opportunities in critically dry, dry, and below normal water years. Between 1985 and 1995, boatable flows occurred during only 3 years, and only during short and unpredictable durations.

**Response:** We agree that our characterization of how often boatable flows occur between April and July could be interpreted to mean that such flows occur on an annual basis. We modified the text of section 3.3.6.1 to indicate that most boatable flows only occur during wet or above normal water years.

**Comment:** In its license application and its December 6, 1999, response to our AIR number 11, Edison proposed to establish an Internet site and flow phone to better inform whitewater boaters of existing recreational opportunities in the bypassed reach. In its comments on the draft EIS, Edison states that it has already established and maintains an Internet site that provides real-time and forecasted flow information pertaining to the bypassed reach. Edison claims that this Internet site makes the flow phone unneeded and redundant. The FS retains its recommendation for the establishment of a flow phone in its revised Section 4(e) conditions.

**Response:** Edison does not explain why the flow phone that it proposed in its license application and in late 1999 as a needed recreational enhancement is no longer needed. The Internet site was established on a trial basis during 1999, and Edison continued to propose its flow phone. Restricting project flow information to only the Internet assumes that all potential whitewater boaters have access to the Internet. Although this may be true of many boaters, we are not prepared to conclude that all potential boaters have Internet access readily available to them on either a temporary or permanent basis. The flow phone would provide an alternative source of flow information for the boating public.

**Comment:** In its license application and reiterated in its December 6, 1999, response to our AIR number 11, Edison proposes to implement a long-term monitoring program to document whitewater boating recreation demand in the bypassed reach during the potential boating season. In its comments on the draft EIS, Edison agrees that the FS recommended approach of using a stratified random sampling design to monitor boater use of the bypassed reach would be statistically valid and more cost-effective than its proposed method (100 percent review of videotape monitoring of recreational boater use of the bypassed reach). The FS continues to recommend this approach in its revised 4(e) conditions, along with a verification procedure of on-site boat counts. The Conservation Coalition agrees with the FS approach. However, in its comments on page 105 of the draft EIS, Edison states that it opposes a requirement that Edison fund any monitoring of recreational use of the project bypassed reach because such use is not project related. Instead, Edison states that the FS should monitor recreational use within the SNF.

**Response:** Edison's comments appear to conflict with its own proposal. We agree that monitoring of recreational use of the bypassed reach could be achieved by using a stratified random sampling design, as the FS recommends. We modified section 3.3.6.2 of the EIS to recommend that Edison continue to monitor whitewater boating use in the bypassed reach as it has done since 1998 until a boating monitoring plan is developed. Project operations have a substantial influence on when spillage occurs and consequently on when whitewater boating opportunities exist. Therefore, it is appropriate that Edison continue to be responsible for monitoring recreational use in the bypassed reach to provide a basis for assessing whether this project-related recreational use is consistent with the objectives of the SNF Land and Resource Management Plan.

**Comment:** Edison points out that it has monitored whitewater boater use of the bypassed reach for two full boating seasons. The last season monitored gave boaters bypassed reach flow information via the Internet. Edison states that, except for one highly publicized event, about four boats per year used the bypassed reach even though more

than 100 days of boating opportunity were available. Edison claims that asking ratepayers to pay higher rates so that a few people can enjoy whitewater boating is an unwise tradeoff and does not maximize the public benefits of the project.

**Response:** In the draft EIS, we set a relatively high bar for determining whether whitewater releases should be implemented and if so, for increasing the number of releases in a particular year. We are now convinced that additional ecological information is needed before scheduled whitewater releases would be implemented. Our recommended report prepared after 5 years of ecological monitoring would contain a recommendation on whether or not scheduled releases should be implemented and if so, the conditions for the releases. The report would also specify the energy and revenue consequences of implementing scheduled whitewater releases based on current market conditions. This should provide the Commission with a sufficient basis for assessing whether releases are warranted. We modified section 3.3.2.2 to describe the report that would form the basis for the Commission's decision on whitewater releases.

**Comment:** The SWRCB comments that a recreational use monitoring program should be required and that monitoring should occur during natural and manufactured whitewater releases. The SWRCB indicates that the monitoring plan should be developed in consultation with the FS and Conservation Coalition.

**Response:** Edison initially proposed to monitor 100 percent of the recreational boater use of the bypassed reach with video cameras. In its comments on the draft EIS, Edison suggested that a stratified random sampling design would be more cost effective than its originally proposed 100 percent monitoring. We modified section 3.3.6.2 of the final EIS to recommend that Edison continue to monitor 100 percent of the boater use of the bypassed reach as it has done since 1998 until a boater monitoring plan is developed. This plan would be developed in consultation with the FS and Conservation Coalition.

**Comment:** The FS points out that it does not wish to add increased parking at the site of the proposed Willow Creek general access trail because additional parking could promote increased use. The FS indicates that the recommended recreational use surveys could be used to determine if there is a need for commercial whitewater rafting services to reduce the number of vehicles in this area by providing shuttle buses.

**Response:** We added text to section 3.3.6.2 of the EIS to reflect the FS concern. Our recommended monitoring of boater use of the bypassed reach and recreational resource surveys would document the level of recreational use relative to capacity of the Willow

Creek access area and whether measures to control public access, such as contracting with commercial whitewater rafting services, are warranted.

**Comment:** Edison agrees with our conclusion in the draft EIS that the FS preliminary 4(e) condition that would require Edison to file recreational reports every 10 years is not consistent with the Commission's requirement that such reports be filed every 6 years and would be duplicative. Edison also claims that there is no justification for providing the recreational report to the FS before providing it to the Commission.

**Response:** The FS revised 4(e) conditions modified the recreational monitoring reporting interval. As we indicated in section 5.3.4 of the draft EIS, the BC#4 Project is within a portion of the SNF where the designated land use prescription may not be consistent with excessive recreational use. It is appropriate for the Commission to have FS input on the recreational monitoring reports to assess whether project operations are consistent with the SNF land management plans, and, if not, what corrective actions are appropriate.

**Comment:** The SWRCB requests that Edison conduct a whitewater controlled flow study, including an assessment of ramping rates to protect river recreationists or aquatic resources. The FS specifies that monitoring associated with the native aquatic species management plan should address ramping rates, and Edison agrees with the FS approach. The FS also recommends implementation of a visitor survey during the first several flow events to determine user satisfaction and perceptions related to minimum and optimum whitewater releases. The Conservation Coalition makes a similar recommendation, except that it specifies that user satisfaction surveys be conducted during the initial 3 years of scheduled whitewater releases.

**Response:** We now recommend that Edison design a boater preference survey, in consultation with the FS and Conservation Coalition, that could be administered during scheduled and augmented releases. The frequency of this survey would also be defined during survey development. We modified the text of section 3.3.6.2 of the EIS accordingly. We agree with the FS that ramping rates could be assessed during monitoring associated with the native aquatic species management plan and that a specific study to assess whitewater boating flows is not needed.

**Comment:** In the draft EIS, we characterized flows that would be associated with potential scheduled whitewater releases as "high flow events." The SWRCB suspects that there is a significant difference in the effects of the flows required for scheduled whitewater boating releases and "high flow events" that occur in the BCS. The Conservation Coalition comments that, throughout the draft EIS, we mistakenly

characterize whitewater releases as high flow events. The Conservation Coalition believes that a review of either the regulated or unregulated hydrographs would reveal that flows between 1,000 and 1,500 cfs (those flows needed for recreational boating) are actually moderate flows and that our characterization of boating flows unnecessarily polarizes the fishery versus recreation issue, blinding stakeholders from evaluating the issue objectively by using sound scientific evidence.

**Response:** We consider an increase in the prevailing flow in the bypassed reach from 20 cfs to 1,000 cfs or 1,500 cfs to represent a high flow event. That does not mean that higher flows are not released to the bypassed reach under regulated or even unregulated conditions. However, given the sensitivity that has been expressed about our terminology, we did a global review of the EIS for “high flow events,” and changed this phrase to “whitewater boating flow releases,” as appropriate, with the understanding that such releases could be from 1,000 to 1,500 cfs.

**Comment:** The SWRCB states that, for non-spill recreational releases, Edison should be required to develop a recreational release schedule in consultation with whitewater interests and appropriate state and federal agencies. It states that this schedule should agree with any ongoing aquatic resource studies or monitoring programs analyzing the effects of whitewater releases.

**Response:** The SWRCB’s recommendation is consistent with our recommendations in the EIS.

**Comment:** The FS comments that the number of scheduled whitewater releases should be based on an estimate of social carrying capacity. The FS goal is to provide an experience for boaters that would avoid a feeling of overcrowding, and it considers that an adaptive approach to establishing the number of days of scheduled releases is appropriate, because this ensures that flows are not allocated to whitewater if these flows are not being used by boaters. To allow the number of weekend days to be adjusted upwards to meet its goal, the FS revised 4(e) condition provides for adding a day (up to a maximum of 3 days per weekend) if 40 boats per day are counted in the bypassed reach during scheduled releases (80 percent of the estimated carrying capacity for the reach). Downward adjustments of weekend release days (to a minimum of 1 day per scheduled weekend) would be made if use falls below 20 boats per day (40 percent of the estimated carrying capacity). The Conservation Coalition supports the adaptive management triggers recommended by the FS for increasing or decreasing release days.

**Response:** We incorporated the FS triggering concept into our whitewater boating recommendation in the EIS. We agree that, if scheduled whitewater boating releases are implemented, it is appropriate to minimize the number of releases until public demand for the releases is demonstrated. Excessive releases could result in unnecessary potential effects on the aquatic ecosystem and would decrease project generation with unproven public benefits. The FS Section 4(e) condition would allow adjustments to the number of releases that are commensurate with the level of documented recreational use. Section 3.3.6.2 of the EIS incorporates the FS triggering criteria as a basis for adjusting the number of annual events if scheduled whitewater releases are implemented.

**Comment:** Edison comments that the FS preliminary 4(e) condition recommending that whitewater releases occur from 9:00 AM to 4:00 PM is not necessary to provide recreational boating opportunities. Edison concludes that a release from 10:00 AM to 1:00 PM could accomplish the same objective. The revised FS 4(e) condition specifies that releases occur between 9:30 AM and 1:00 PM.

**Response:** In the draft EIS, we recommended that whitewater releases, if implemented, should occur between 10:00 AM and 2:00 PM, consistent with the Conservation Coalition recommendation. We adjusted our recommendation in section 3.3.6.2 of the final EIS to reflect the time frame specified in the revised 4(e) condition. Gradual ramping rates that would be in effect at the beginning and end of whitewater releases would extend the period of boatable flows. In addition, our recommended WBOC could recommend adjusting the timing of whitewater releases if our time frame is insufficient to accommodate boating opportunities.

**Comment:** Edison comments that, during recent discussions with the FS, it was identified that flows as high as 1,500 cfs may not be needed for recreational boating opportunities. The FS and Edison state that acceptable boating flows may be between 1,000 and 1,500 cfs. The FS indicates that information recently received by the boating community indicates that 1,200 cfs is the safest level of flow for intermediate boaters. The FS adjusted its whitewater flow recommendation to begin at 1,200 cfs, subject to subsequent modification based on user survey results. The Conservation Coalition and SWRCB support the schedule and volume of flows recommended by the FS, and the Conservation Coalition states that, although a variable release regime would enable accommodation of different types of watercraft, Edison should not need to release more than 1,500 cfs.

**Response:** Based on information provided by the FS, we modified our recommendation in section 3.3.6.2 of the EIS to indicate that, if scheduled whitewater releases are

implemented, the initial release would be 1,200 cfs as measured downstream of the confluence of Willow Creek. The previously discussed whitewater user preference survey would be a basis for adjusting release flows, if necessary. We established the range of potential adjustment to be between 1,000 and 1,500 cfs, unless the WBOC recommends and the Commission approves a different release range. The survey results would also be the basis for the WBOC to recommend variable releases, if more than one scheduled release is implemented during the boating season. In the final EIS, we recommend not finalizing the timing of any whitewater release until 5 years of ecological monitoring are completed.

**Comment:** In the draft EIS, we expressed concern with the FS and Conservation Coalition's recommendation that, when spills occur, flows should be augmented such that flows do not drop below 1,000 cfs. In response to this concern, the FS commented that the objective of its flow augmentation was to manage spill events to reduce flow variability and avoid stranding boaters, if technically and logistically feasible. The Conservation Coalition comments that our initial concerns could be addressed by more accurately defining the conditions warranting augmentation. Edison comments that it agrees with our conclusion in the draft EIS that augmented spillage is not warranted, but if required, augmentation would not need to extend beyond 10:00 AM and 1:00 PM on designated weekends.

**Response:** Although we now have a clearer understanding of the FS objectives for spill augmentation, our original concerns about enforcement ambiguity and potential adverse effects on aquatic biota are not addressed. With the FS revised flow augmentation recommendation, spillage of 1 cfs could trigger augmentation by 1,199 cfs. Such rapid increases, even with ramping, could increase, not decrease flow variability. We did not recommend flow augmentation in the draft EIS and therefore do not consider it appropriate for us to define conditions that warrant spill augmentation, as the Conservation Coalition suggests. However, if appropriate guidelines are established, spill augmentation could enhance whitewater boating opportunities. We therefore modified section 3.3.6.2 of the final EIS to recommend that Edison, in consultation with the FS, CA Fish & Game, and Conservation Coalition, develop a plan to implement flow augmentation. This plan would specify how augmented releases would be implemented and the parameters that would be associated with augmented releases.

**Comment:** The FS (on page 12 of its comment letter) disagrees with our conclusion that flow augmentation, if implemented, would only benefit local boaters. However, on page 13 of its comment letter, the FS states that "...the most likely users of this run (meaning the bypassed reach) are primarily local, meaning the communities of Fresno and Clovis,

although reliable flow will also certainly draw boaters from the Sacramento and Bay Area.” The FS concludes that, if boaters were assured that flows would not drop below a boatable range during periods of natural spill, then they would only need to evaluate whether spill flows are likely to increase to an unboatable range. With these conditions, the FS believes that boaters in the entire Bay Area and Central Valley could use this boating opportunity.

**Response:** Our conclusion in the draft EIS was based on the uncertainty associated with when flow augmentation would be implemented rather than sustaining existing spillage that is within a boatable range. As noted in the previous response, spillage of 1 cfs could trigger augmentation of more than 1,000 cfs. Because we consider it difficult to predict when spillage events at the BC#4 dam would occur that would trigger flow augmentation, this action would benefit primarily local boaters. However, as indicated above, with appropriate guidelines in place (e.g., spillage should initially reach boatable flows before being sustained by augmentation), we recognize that spill augmentation could enhance regional boating opportunities, and we recommend that Edison develop a spill augmentation plan.

**Comment:** Edison disagrees with our recommendation that a whitewater release structure feasibility evaluation is necessary. Edison believes that if scheduled releases are required, it could be feasible to make the releases from the existing spill gates at the dam as suggested in the draft EIS. Edison proposes that the Commission only require Edison to evaluate what types of instrumentation and operational changes would be needed to conduct a one-time release for test purposes.

**Response:** We modified our recommendations pertaining to scheduled whitewater flow releases based on comments on the draft EIS. We now recommend that Edison conduct 5 years of baseline ecological monitoring before initiating any scheduled whitewater releases. Data from this monitoring would serve as a basis for developing a report, in consultation with the FS, CA Fish & Game, FWS, SWRCB, and Conservation Coalition, that recommends to the Commission whether or not scheduled whitewater releases should be implemented. If the recommendation of the report is to implement scheduled releases, then Edison would also specify in the report how such releases would be made. We expect Edison to draw on the analysis that it would conduct in developing the flow augmentation plan, tempered with actual experience, in its assessment of how scheduled releases would be made. The Commission could approve the recommendations of the report or make modifications to the recommendations, as warranted by the record. We modified section 3.3.6.2 to reflect our revised recommendation.

**Comment:** Interior requests that it be included as a consulting party in any whitewater release strategy in the recreation plan for the BCS.

**Response:** Any recreation plan that pertains to the upstream projects of the BCS is subject to a separate, ALP proceeding. On pages 112 and 151 of the draft EIS (sections 3.3.6.2 and 5.3.3, respectively), we include the FWS as a participant in the WBOC for the BC#4 Project, which would help develop whitewater release strategies for this project. We continue to recommend that FWS participate in the WBOC in the final EIS.

**Comment:** The FS indicates that, on page 109 of the draft EIS, we state that in year one the native aquatic species management plan would be developed by Edison and “others.” The FS recommends that these others be identified and include the same parties that would decide if whitewater releases should be implemented.

**Response:** Page 109 of the draft EIS is the first page of figure 14, a flow diagram intended to illustrate the adaptive approach to implementing whitewater boating releases. We described in detail the entities with whom we recommend Edison consult during preparation of the native aquatic species management plan discussion on page 165 of the draft EIS. Consulted parties would include the FS, FWS, CA Fish & Game, and, based on comments received on the draft EIS, SWRCB. Resource agencies are appropriate entities for resource management consultation. We added the Conservation Coalition when consultation involves decisions pertaining to resources of interest to this NGO.

**Comment:** The FS comments that it is hard to predict what the demand for the whitewater boating in the bypassed reach will be over the term of any new license that may be issued. However, demand is not expected to decrease, and the FS expects boating opportunities to be used by the public, especially if made available in mid- to late summer, when other opportunities in California are scarce. The Conservation Coalition, commenting on section 3.3.6.3 disagrees with our statement that advanced and expert boaters would likely seek alternative Class IV and V runs, because releases to the bypassed reach would create mostly Class III rapids. The Conservation Coalition notes that upstream Class IV and V rapids would be dewatered when scheduled releases are implemented at the bypassed reach, and thus this reach would be the only available local boating opportunity.

**Response:** We modified section 3.3.6.3 to delete our suggestion that most advanced level boaters would be likely to seek more challenging runs. We also added information provided by the FS. Until the exact nature of scheduled releases is determined, it is

difficult to be definitive regarding the potential cumulative effects of relicensing the project on whitewater boating.

**Comment:** Edison comments that figure 13 in the draft EIS incorrectly shows the majority of Redinger Reservoir as privately held land. Edison notes that, except for one part of the reservoir near the dam, the land is all part of the SNF.

**Response:** As the caption for figure 13 shows, Edison's license application is the source of this figure. Specifically, the private lands shown on figure 13 are exactly as shown on figure 6-1A of Edison's license application (page E-6-3).

### **Cultural Resources**

**Comment:** Edison indicates that our assumption is incorrect that artifacts referenced by the North Fork Mono Tribe in comments filed under this proceeding pertain to the BC#4 Project. Edison states that the artifacts have no relationship to pre-construction or the current licensing proceeding. Therefore, Edison proposes to compensate the Sierra Mono Museum to the level proposed in the draft EIS but outside the relicensing process.

**Response:** We modified section 3.3.5.2 of the EIS to reflect Edison's clarification.

**Comment:** In the draft EIS, we noted that the North Fork Mono Tribe and Big Sandy Rancheria requested that Edison provide a residential power drop to Tribal members in the Jose Basin. Edison states that Big Sandy Tribal residents in the Jose Basin now have electric power, to the best of Edison's knowledge.

**Response:** We modified section 3.3.5.2 of the EIS to reflect Edison's comment.

### **Aesthetic Resources**

**Comment:** Edison agrees that the VRP specified in the FS preliminary 4(e) condition is too broad and goes beyond what is reasonable. Edison also comments that planting vegetation near the penstock and flowline could create maintenance problems, interfere with safety and engineering inspections, and could provide fuel if forest fires occur in the area.

**Response:** Our recommended VRP would facilitate identification of practical measures to ensure that project features meet the VQO's of the SNF, to the extent feasible while not jeopardizing the safety of the project.

## **Developmental Resources**

**Comment:** Edison comments that section 1.2 of the draft EIS incorrectly states that Edison owns 14,500 MW of generating capacity. Edison notes that, in early 1998, it sold off its natural gas-fired power plants and now has only 5,048 MW of generation.

**Response:** Our source for Edison's generating capacity in the draft EIS was Exhibit H of Edison's license application. We updated section 1.2 of the final EIS to reflect Edison's correction of its license application.

**Comment:** Edison points out that the average annual generation for the BC#4 Project (presented in table 1 of the EIS), is not consistent with the range of generation presented in the executive summary and the value presented in section 2.1.1.2 of the draft EIS (439.4 GWh). Edison claims that annual generation is now 449.9 GWh.

**Response:** We recognize that average annual generation for a project can change over time. The value that we presented for BC#4 in table 1 came from a publication published by the Commission in 1992, as did the other average generation values for the rest of the projects in the BCS. Our intent was to show the relative contribution in annual generation of each project in the BCS using comparable data. However, because the value presented in this table conflicts with values presented elsewhere in the EIS, we modified this value to 439 GWh. We use 439.4 GWh as the average annual generation of the existing project in our developmental analysis, consistent with the value that Edison presented in Exhibit B of the license application and confirmed by Edison in its December 7, 1999, response to our AIR. The range of annual generation with our recommendations in the executive summary of the draft EIS (438.7 to 436.9 GWh) is consistent with 439.4 GWh. To maintain a comparable economic basis in the final EIS, our developmental analysis continues to use 439.4 GWh as the average annual generation for the project.

**Comment:** Edison points out that, in the future, the BC#4 Project and the rest of the BCS may not be operated to provide peaking power, but on an "economic basis" to keep costs of purchaser power as low as possible.

**Response:** We recognize that the changing electric market in California may affect Edison's future operating mode for the BC#4 Project. Such changes would be constrained by the conditions of any license that may be issued for this project, however, unless the Commission approves a license amendment to accommodate future changes proposed by the licensee.