



**Federal Energy
Regulatory
Commission**

**Office of
Energy Projects**

March 2003

FERC/FEIS – 0147F

Final Environmental Impact Statement



North Umpqua Hydroelectric Project, Oregon (FERC 1927)

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

FERC/FEIS-0147F

**FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF ENERGY PROJECTS**

**FINAL ENVIRONMENTAL IMPACT STATEMENT
NORTH UMPQUA HYDROELECTRIC PROJECT (NO. 1927)
OREGON**

Applicant:

PacifiCorp

Additional copies of this Final Environmental Impact Statement
may be ordered from:

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Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

March 2003

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

TO THE PARTY ADDRESSED

Attached is the Final Environmental Impact Statement (FEIS) for the North Umpqua Hydroelectric Project (No. 1927), located on the North Umpqua River in Douglas County, Oregon.¹

The FEIS documents the views of the Federal Energy Regulatory Commission (Commission) staff regarding the relicensing of the hydroelectric project. Before the Commission makes a decision on relicensing, it will take into account all concerns relevant to the public interest. The FEIS will be part of the record from which the Commission will make its decision.

Any Commission Order on the proposed action and alternatives considered in this FEIS will be subject to the Commission's rehearing process under 18 CFR 385.713. Requests for rehearing must be filed within 30 days of the date of issuance of the Commission order.

Attachment: Final Environmental Impact Statement

¹This FEIS may be viewed and printed from the Commission's website at www.ferc.gov. After accessing the website, click on the "FERRIS" link and then "General Search." Enter the docket number excluding the last three digits (P-1927) in the docket number field and the appropriate date range. For assistance, call 1-866-208-3676 (toll free), TTY (202) 502-8659, or e-mail ferconlinesupport@ferc.gov.

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COVER SHEET

- a. Title: North Umpqua Hydroelectric Project (FERC Project No. 1927), Oregon
- b. Subject: Final Environmental Impact Statement
- c. Lead Agency: Federal Energy Regulatory Commission
- d. Abstract: On January 30, 1995, PacifiCorp filed an application for a new license for the existing 185.5-megawatt (MW) North Umpqua Hydroelectric Project No. 1927, located on the North Umpqua River, in southwestern Oregon. The project, including its transmission lines, occupies 2,842 acres of federally owned lands administered by the U.S. Forest Service (2,725 acres) and the Bureau of Land Management (117 acres) and 438 acres of non-federally owned land.

PacifiCorp proposes to implement a Settlement Agreement that was developed using a collaborative approach implemented after the filing of the final license application. The Settlement Agreement sought to resolve all issues associated with issuance of a new license for the project regarding fluvial geomorphic processes, aquatic and riparian habitat connectivity, instream flows, reservoir and forebay management, water quality, anadromous fish passage and off-site mitigation, terrestrial species connectivity, and wildlife entrapment. Amendment No. 1 to the Settlement Agreement modified measures related to gravel augmentation and restoration and creation of spawning habitat downstream of Soda Springs dam. Non-governmental organizations (NGO) initially participated in the settlement discussions. The NGOs withdrew from the negotiations in September 2000.

Staff has considered comments on the draft environmental impact statement from the Forest Service; Department of the Interior; Environmental Protection Agency; Oregon Departments of Environmental Quality, Fish and Wildlife, Geology and Mineral Industries, and Water Resources; a number of environmental groups and individuals; PacifiCorp; and the Settlement Agreement

parties. The FEIS concludes that the project should be granted a new license in accordance with the Staff Alternative, which includes all of the conditions of the Settlement Agreement, and the following additional staff recommendations for PacifiCorp to: (1) submit plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement (see section 2.3.1 for a list of these plans) to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation; and (2) resume operation of the existing gage at Boulder Creek (USGS gage #14316495), post real-time flow data on the internet for this gage and all the project gages described in the Settlement Agreement to provide recreational boaters with accurate flow information, and provide notice to the public of scheduled maintenance releases at the project developments. Staff also recommends that, in developing the plans mentioned under item 1 above, PacifiCorp consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

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- f. Transmittal: This final environmental impact statement, prepared by the Commission's staff on the hydroelectric license application filed by PacifiCorp for relicensing the North Umpqua Hydroelectric Project (FERC No. 1927), is being made available to the public on or about April 11, 2003, as required by the National Environmental Policy Act of 1969² and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR Part 380).

² National Environmental Policy Act of 1969, as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, §4(b), September 13, 1982).

FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)³ and the U.S. Department of Energy (DOE) Organization Act⁴ 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 waterpower 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) . . .⁵

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.⁶

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

⁴ Pub. L. 95-91, 91 Stat. 556 (1977).

⁵ 16 U.S.C. §803(a).

⁶ 16 U.S.C. §803(g).

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ACRONYMS AND ABBREVIATIONS

ABA	Aquatic Biology Associates
ACHP	Advisory Council on Historic Preservation
ACS	Aquatic Conservation Strategy
ADA	Americans With Disabilities Act
amsl	above mean sea level
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
ARPA	Archaeological Resources Protection Act
AWA	American Whitewater Affiliation
BA	biological assessment
BLM	U.S. Department of the Interior, Bureau of Land Management
BMP	Best Management Practice
BO	Biological Opinion
°C	degree Celsius
CEP	Conservation Easement Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
CPOM	coarse particulate organic matter
CRMP	Cultural Resources Management Plan
CWA	Clean Water Act
dbh	diameter
DEIS	draft environmental impact statement
DO	dissolved oxygen
DSM	demand-side management
ECP	Erosion Control Plan
EFH	essential fish habitat
EIA	Existing Information Analysis
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
°F	degree Fahrenheit
FERC	Federal Energy Regulatory Commission
FERRIS	Federal Energy Regulatory Records Information System
Forest Plan	Northwest Forest Plan
FPA	Federal Power Act

FS	U.S. Department of Agriculture, Forest Service
ft/hr	feet per hour
FWS	U.S. Department of the Interior, Fish and Wildlife Service
FY	fiscal year
IFIM	Instream Flow Incremental Methodology
Interior	U.S. Department of the Interior
kV	kilovolt
kVA	kilovolt ampere
kW	kilowatt
kWh	kilowatt-hour
LSR	Late-Successional Reserve
LWD	large woody debris
mg/L	milligrams per liter
ML	Richter Magnitude
mm	millimeter
MW	megawatt
MWh	megawatt-hour
MOU	Memorandum of Understanding
MSA	Masnuson-Stevens Fishery and Conservation Act
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NFS	National Forest System
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRF	nesting, roosting, and forging
NRHP	National Register of Historic Places
NTU	nephelometric turbidity units
NWPP	Northwest Power Pool
OAR	Oregon Administrative Rules
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
O&M	operation and maintenance
ONHP	Oregon Natural Heritage Program
ORNL	Oak Ridge National Laboratory
ORV	Outstandingly Remarkable Value
OSPRD	Oregon State Parks & Recreation Department
OWRD	Oregon Water Resources Department
PA	Programmatic Agreement

PCB	polychlorinated biphenyls
pH	a measure of acidity and alkalinity of a solution on a 7-point scale
PM&E	protection, mitigation, and enhancement
P. L.	Public Law
RCC	Resource Coordination Committee
RM	river mile
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
RRMP	Recreation Resources Management Plan
RVD	recreation visitor days
SEC	Securities and Exchange Commission
SH	State Highway
SHALSTAB	a slope stability model
SHPO	State Historical Preservation Office or Officer
SNA	Spatial Niche Analysis
SR	State Route
Stat.	Statute
STMP	Stream Temperature Monitoring Plan
SUA	Special Use Authorization
TCP	traditional cultural property
TDG	total dissolved gases
TMDL	Total Maximum Daily Loads
TMP	Transportation Management Plan
TNK	total Kjeldahl nitrogen
U.S.C.	U.S. Code
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VMP	Vegetation Management Plan
VQO	Visual Quality Objectives
VRM	Visual Resource Management
VRMP	Visual Resource Management Plan
WQMP	Water Quality Management Plan
WUA	weighted usable area

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EXECUTIVE SUMMARY

On January 30, 1995, PacifiCorp filed an application for a new license for the existing 185.5-megawatt (MW) North Umpqua Hydroelectric Project No. 1927 (North Umpqua Project), located on the North Umpqua River, in southwestern Oregon about 60 miles east of the city of Roseburg. The project, including its transmission lines, occupies 2,842 acres of federally owned lands administered by the U.S. Forest Service (2,725 acres) and the Bureau of Land Management (117 acres) and 438 acres of non-federally owned land. Subsequent to filing the license application, PacifiCorp entered into settlement discussions with state and federal agencies and non-governmental organizations (NGOs). The NGOs initially participated in the settlement discussions but withdrew from the discussions in September 2000 because an agreement could not be reached. In October 2000, the remaining parties, consisting of PacifiCorp and the state and federal resource agencies, agreed to continue discussions. A Settlement Agreement was completed and filed with the Commission on June 21, 2001.

PacifiCorp proposes to implement the Settlement Agreement which sought to resolve all issues associated with issuance of a new license for the project regarding fluvial geomorphic processes, aquatic and riparian habitat connectivity, instream flows, reservoir and forebay management, water quality, anadromous fish passage and off-site mitigation, terrestrial species connectivity, and wildlife entrapment. An amendment to the Settlement Agreement was filed on November 4, 2002, that revises and modifies sections of the Settlement Agreement concerning gravel augmentation and restoration and creation of spawning habitat below Soda Springs dam. The Section 401 Water Quality Certificate granted by the State of Oregon Department of Environmental Quality on June 28, 2002, requires additional measures to protect and enhance water quality.

This final environmental impact statement (EIS) evaluates the potential natural resource benefits, the environmental impacts, and the developmental costs associated with relicensing the North Umpqua Project. The issues addressed in this final EIS include the effects of the project on: (1) erosion and sediment control; (2) instream flows, ramping, and fish passage; (3) terrestrial connectivity; (4) threatened and endangered species; (5) aesthetics; (6) cultural resources; and (7) recreation.

In this final EIS, we, the Commission staff, assess the effects of operating the project: (1) with no changes or enhancements to present facilities or operations (*No-Action Alternative*), (2) operating the project as proposed by PacifiCorp under the terms of the Settlement Agreement (*Proposed Action—Settlement Agreement*), (3) operating the project under terms recommended by various Conservation Groups (the *NGO*

Alternative), and (4) operating the project under the terms of the Settlement Agreement with two additional recommendations by staff (*Staff Alternative*).

NO-ACTION ALTERNATIVE

Under the No-Action Alternative the North Umpqua Project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement (PM&E) measures would be implemented. We use this alternative to establish the environmental conditions for comparison with the proposed action and other alternatives. With an average generation of about 957,400 megawatt-hours (MWh), the existing project costs about \$22.0 million annually to operate, has power benefits of about \$43.8 million, and has net annual benefits of about \$21.8 million, or 22.8 mills/kilowatt-hour (kWh).

PROPOSED ACTION—SETTLEMENT AGREEMENT

Under the proposed action, PacifiCorp would implement the Settlement Agreement that includes various measures to protect, mitigate, and enhance the resources of the upper North Umpqua River system. The Settlement Agreement, which was filed on June 21, 2001, was intended to resolve all issues associated with issuance of a new license for the project regarding fluvial geomorphic processes, aquatic and riparian habitat connectivity, instream flows, reservoir and forebay management, water quality, anadromous fish passage and off-site mitigation, terrestrial species connectivity, and wildlife entrapment. Amendment No. 1 to the Settlement Agreement, filed on November 4, 2002, modified provisions for gravel augmentation and for restoration and creation of spawning habitat in the Soda Springs bypassed reach and downstream of Soda Springs dam in the mainstem North Umpqua River and its tributaries. The parties to the Settlement Agreement included PacifiCorp, U.S. Department of Agriculture's Forest Service, U.S. Department of the Interior's Fish and Wildlife Service and Bureau of Land Management, U.S. Department of Commerce's National Marine Fisheries Service, and the State of Oregon's Departments of Environmental Quality, Fish and Wildlife, and Water Resources. Several NGOs participated in the settlement process, but withdrew from the negotiations in September 2000. Issues that are addressed under the proposed Settlement Agreement include:

- erosion and sediment control;
- restoration of fluvial geomorphologic processes;
- water quantity and quality
- avian protection;
- sensitive species and survey and manage species;
- threatened and endangered species;

- instream flows and ramping;
- restoration and enhancement of habitat for anadromous and resident fish species;
- reservoir and forebay management and mitigation;
- aquatic connectivity;
- vegetation management;
- wetland and riparian habitats;
- wildlife barriers and entrapment;
- cultural resources;
- recreation facilities and management;
- project effects on the Wild and Scenic River;
- whitewater boating;
- aesthetic impacts of project facilities and operations;
- transportation management; and
- power generation.

Implementation of the Settlement Agreement measures could cost about \$29.4 million annually, with power benefits of about \$39.7 million and a net annual benefit of about \$10.3 million or \$12.6 mills/kWh. The project would generate about 820,900 MWh of energy annually, a reduction of 136,500 MWh from the current generation.

NGO ALTERNATIVE

The NGO Alternative incorporates recommendations from various groups, including Umpqua Watersheds, Umpqua Valley Audubon Society, Steamboaters, the North Umpqua Foundation, Oregon Natural Resources Council, American Rivers, Pacific Rivers Council, Oregon Trout, and WaterWatch of Oregon (referred to collectively as the Conservation Groups). The Conservation Groups submitted alternative recommendations to many of the measures included in the Settlement Agreement. The most significant differences in these recommendations from the Settlement Agreement are that the NGO Alternative would:

- restore fish passage at Soda Springs dam by removing the dam instead of installing a fish ladder and screens;
- provide fish passage at Slide Creek dam rather than provide mitigation for off-site habitat enhancement;
- provide on-site mitigation in lieu of fish passage at other project diversions rather than funding off-site habitat restoration, enhancement, and protection for anadromous and resident fish species;
- operate the project as a run-of-river system rather than as a peaking facility, and require much greater instream flow releases than under the Settlement Agreement; and

- cover and/or bury extensive portions of canals and pipelines to remove barriers to wildlife movement and reduce wildlife entrapment rather than rely on constructing more wildlife bridges and underpasses and increasing their width.

Implementing the NGO Alternative measures would increase project costs by about \$7.9 million over the No-Action Alternative. Annual project costs could be about \$29.9 million, with power benefits of about \$31.0 million, resulting in a net annual benefit of \$1.1 million or 1.8 mills/kWh. Annual power generation under the NGO Alternative is estimated to be 602,400 MWh, a reduction of 355,000 MWh from the No-Action Alternative.

STAFF ALTERNATIVE

The Staff Alternative would include all of the provisions of the Settlement Agreement along with two additional recommendations.

Staff recommends that plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement would need to be submitted to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation. These plans include:

- the erosion control plan, including any plans or amendments to plans for implementing waterway drainage on any flume segment where it is not feasible to meet the 30-minute goal of draining the waterway (Settlement Agreement section 14.1);
- all plans for implementing, monitoring, and evaluating the Slide Creek Bypass Reach Habitat Enhancement Project (Settlement Agreement section 8.2), the Gravel Augmentation Program (Settlement Agreement section 7.2, as amended), and the North Umpqua Habitat Restoration/Creation Project (Settlement Agreement section 8.3, as amended);
- final plans for providing wildlife crossings and underpasses, which should include specific locations of the crossings and underpasses, monitoring methods, and criteria for deciding if additional crossings would be required (Settlement Agreement section 11.3);
- the study plan for reevaluating instream flows pertaining to the Clearwater No. 2 bypassed reach (Settlement Agreement section 5.2);
- the anadromous fish monitoring plan for the Slide Creek full-flow reach (Settlement Agreement section 6.2.1);

- postconstruction evaluation plans for upstream and downstream fish passage at Soda Springs, Lemolo No. 2, and Fish Creek dams (Settlement Agreement sections 4.1.1, 4.1.2, 4.3.1, 4.3.2); and
- site-specific plans for enhancing, restoring or creating riparian habitats and wetlands (Settlement Agreement sections 10.5, 11.5, and 21.5).

We recommend that, in developing these plans, PacifiCorp consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

Second, staff recommends that PacifiCorp resume operation of the existing gage at Boulder Creek (USGS gage #14316495), post real-time flow data on the internet for this gage and all the project gages described in the Settlement Agreement to provide recreational boaters with accurate flow information, and provide notice to the public of scheduled maintenance releases at the project developments.

The Staff Alternative could cost about \$29.4 million annually, with power benefits of about \$39.7 million and a net annual benefit of about \$10.3 million or 12.5 mills/kWh. The project would generate about 820,900 MWh of energy annually, a reduction of 136,500 MWh from the current generation.

CONCLUSION

We recommend the Staff Alternative because: (1) the project would provide a significant (820,900 MWh) and dependable source of electrical energy for the region; (2) the project would avoid the need for an equivalent amount of fossil-fuel-fired, electric generation and capacity, thereby continuing to help conserve these nonrenewable energy resources and reduce atmospheric pollution; and (3) the environmental PM&E measures proposed under the Settlement Agreement, combined with the modifications recommended by staff, would adequately protect and enhance environmental resources and mitigate impacts of the project.

The overall benefits of this alternative would be worth the cost of proposed environmental measures and would outweigh the consequences of the other alternatives or license denial.

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1. PURPOSE OF ACTION AND NEED FOR POWER

On January 30, 1995, PacifiCorp filed an application for a new license for the existing 185.5-megawatt (MW) North Umpqua Hydroelectric Project No. 1927 (North Umpqua Project). The project is located on the North Umpqua River, in southwestern Oregon about 60 miles east of the city of Roseburg (figure 1-1). The project consists of eight dams and their associated facilities (referred to as “developments”) (table 1-1) located above the Soda Springs powerhouse and tailrace at river mile (RM) 69.3 on the North Umpqua River and on its two major tributaries, the Clearwater River and Fish Creek.

Table 1-1. North Umpqua Project Developments. *Source:* PacifiCorp, 1985.

Development	River ^a	Location (River Mile)		Elevation (feet)		Dam height (feet)	Length of waterway (feet)	Rated capacity (MW)
		Dam	Powerhouse	Dam	Powerhouse			
Lemolo No. 1	NU	93	88.5	4,148.5	3,318	120	23,648	29
Lemolo No. 2	NU	88.5	77.3	3,325.0	2,450	25	73,478	33
Clearwater No. 1	CW	8.1	4.9	3,875	3,212.2	17	17,900	15
Clearwater No. 2	CW	4.9	0	3,212	2,425.5	18	32,404	26
Toketee	NU	75.4	73.4	2,430	1,987	58	8,219	42.5
Fish Creek	FC	6.6	0	3,507.7	1,992	6	28,020	11
Slide Creek	NU	73.2	71.2	1,982	1,811	30	10,027	18
Soda Springs	NU	69.8	69.3	1,807	1,697	77	168	11
Total								185.5

^a NU=mainstem North Umpqua River; CW=Clearwater River; FC=Fish Creek.

On June 21, 2001, PacifiCorp filed an offer of settlement between PacifiCorp and state and federal agencies describing the terms and conditions under which PacifiCorp and the agencies would support the Commission’s issuance of a new license (PacifiCorp 2001a). The offer includes a Settlement Agreement (PacifiCorp 2001a) with the stated

Figures

Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-13, 2-15, 2-16, 2-18, 2-19, 2-21, 3-2, 3-6, 3-129, and 3-143

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purpose of resolving all issues associated with obtaining a new license for the project and achieving the following management goals as specified in section 3 of the Settlement Agreement:

1. *Fluvial geomorphic processes:* maintain and/or restore the geomorphic processes characteristic of the watershed to maintain habitat for native species and promote the long-term ecological health of the North Umpqua River watershed. These objectives reflect the guidelines of the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan (Forest Plan).
2. *Aquatic and riparian habitat connectivity:* maintain ecological processes and habitat in a condition sufficient to support interconnected and well-distributed populations of native species in the North Umpqua River watershed. This goal includes maintaining and/or restoring aquatic and riparian connectivity across the landscape on lands under the jurisdiction of the Forest Plan.
3. *Instream flows:* maintain and/or restore flows that sustain well-connected and functional riparian and aquatic habitats to which the native aquatic and riparian community are adapted.
4. *Reservoir and forebay management:* for recreational fisheries, maintain and/or restore aquatic habitat to support productive trout fisheries. Maintain a catch rate of 0.5 trout per angler-hour in Lemolo Lake (ODFW 1980). For still-water amphibians, create an environment that supports healthy populations in project reservoirs and forebays or, if this is infeasible, in other areas of the watershed.
5. *Water quality:* (a) manage the hydroelectric facilities in a manner that maintains and/or improves water quality in the watershed; (b) meet water quality standards and antidegradation requirements, and protect beneficial uses; (c) meet the water quality objectives defined in the ACS of the Forest Plan, including the goal to "maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical and chemical integrity of the ecosystem, benefitting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities."
6. *Anadromous fish passage and off-site mitigation:* maintain and/or restore native anadromous fish populations.
7. *Terrestrial species connectivity and wildlife entrapment:* maintain terrestrial species connectivity so that movement, dispersal, migration, and interbreeding among subpopulations of all terrestrial wildlife species can occur. Create a waterway system that minimizes effects on populations of wildlife species in the project vicinity and that minimizes wildlife entrapment-related injury and mortality of individuals.

Eight entities are party to the Settlement Agreement: PacifiCorp, U.S. Department of Agriculture's Forest Service (FS), U.S. Department of the Interior's Fish and Wildlife Service (FWS) and Bureau of Land Management (BLM), U.S. Department of Commerce's National Marine Fisheries Service (NMFS), and the State of Oregon's Departments of Environmental Quality (ODEQ), Fish and Wildlife (ODFW) and Water Resources (OWRD). Several non-governmental organizations (NGOs) participated in the settlement process. These NGOs included: American Rivers, Pacific Rivers Council, Oregon Trout, WaterWatch of Oregon, Umpqua Watersheds, Umpqua Valley Audubon Society, Umpqua Fisherman's Association, Oregon Natural Resources Council, and Steamboaters.⁷

The Settlement Agreement represents the culmination of discussions that began in 1997 among PacifiCorp, state and federal agencies, and the NGOs. During these discussions, the North Umpqua Resource Management Team was created which directed the preparation of the *North Umpqua Cooperative Watershed Analysis Synthesis Report* (Stillwater Sciences, Inc. 1998a). In July 2000, PacifiCorp, the state and federal agencies listed above, the Douglas County Board of Commissioners, and the NGOs agreed to enter into a consultation process following the Commission's alternative licensing procedures, with a goal of reaching a settlement agreement by the end of September 2000. Although much was accomplished, this goal was not achieved, and the NGOs withdrew from the settlement discussions. In October 2000, PacifiCorp and the state and federal agencies formally agreed to continue the settlement discussions. These discussions led to the eight parties entering into a Settlement Agreement which was filed with the Commission on June 21, 2001.

Section 21 of the Settlement Agreement establishes a Resource Coordination Committee (RCC) consisting of representatives from the parties to the Settlement Agreement to oversee coordination and decision making concerning implementation of Settlement Agreement protection, mitigation, and enhancement (PM&E) measures. The dates for implementing specific PM&E measures referred to in this final EIS (section 2.2.2) are based on the information provided in the first RCC annual report (PacifiCorp 2002e).

⁷ Various groups of NGOs have identified themselves in one or more filings with the Commission as "the Conservation Groups." For purposes of this EIS, we consider the Conservation Groups to include: American Rivers, Oregon Natural Resources Council, Oregon Trout, Pacific Rivers Council, Steamboaters, The North Umpqua Foundation, Umpqua Valley Audubon Society, Umpqua Watersheds, and WaterWatch of Oregon.

On November 4, 2002, PacifiCorp filed Amendment No. 1 to the Settlement Agreement on behalf of the parties to the Settlement Agreement that revises and modifies sections related to gravel augmentation, restoration and creation of spawning habitat below Soda Springs dam, and implementation of minimum instream flows in the Soda Springs bypassed reach (PacifiCorp 2002f). Subsequent references to the Settlement Agreement in this EIS are intended to include the Settlement Agreement as modified by Amendment No. 1.

1.1 PURPOSE OF ACTION

The Federal Power Act (FPA) provides the Commission with the exclusive authority to license non-federal water power projects on navigable waterways and federal lands. The Commission must decide whether to relicense the project and what conditions should be placed on any license issued. In deciding whether to authorize the continued operation of the hydroelectric project and related facilities in compliance with the FPA and other applicable laws, the Commission must determine that the project will 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 (e.g., flood control, irrigation, and water supply), the Commission must give equal consideration to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat); the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

To ensure that the Commission makes an informed decision and to comply with the National Environmental Policy Act (NEPA), Commission staff prepared a draft environmental impact statement (EIS) and issued it for public and agency comment on May 1, 2002 (section 1.6). Staff have reviewed the comments received on the draft EIS and have prepared this final EIS which incorporates revisions in response to the comments and additional information provided as deemed appropriate.

In this final EIS, we assess the environmental and economic effects of four alternatives: (1) continuing to operate the project as it currently operates with no additional mitigation or enhancement measures (*No-Action Alternative*), (2) operating the project consistent with the Settlement Agreement and as proposed by PacifiCorp (*Proposed Action*), (3) operating the project as recommended by the Conservation Groups (*NGO Alternative*), and (4) operating the project as proposed in the Settlement Agreement with modifications recommended by staff (*Staff Alternative*). Other alternatives considered, but eliminated from detailed analysis, included: (1) federal government

takeover of the project, (2) issuing a non-power license, and (3) project retirement. Significant issues addressed in this final EIS include: (1) erosion and sedimentation control; (2) modifications to instream flows, ramping, and fish passage; (3) barriers to wildlife movement and terrestrial connectivity; (4) potential impacts to threatened and endangered species; (5) aesthetics; (6) cultural resources; and (7) recreation.

1.2 NEED FOR POWER

PacifiCorp serves about 1.5 million retail customers in portions of six western states—California, Idaho, Oregon, Utah, Washington, and Wyoming. The company owns or has interests in electric generating plants with a total plant nameplate capacity of 8,269 MW (PacifiCorp 2002g). Nearly 87 percent of this capacity is thermal electric—6,586 MW coal, 505 MW natural gas, 52 MW biomass, and 26 MW geothermal. With the exception of about 33 MW from wind turbines, the remainder of PacifiCorp's system is hydropower. PacifiCorp's total hydroelectric capacity is 1,068 MW and represents about 13 percent of the company's generation capacity. Nearly all of this capacity is located in Washington and Oregon. Under average water conditions, PacifiCorp expects its hydropower and thermal capacity to contribute about 6 percent and 66 percent, respectively, to total system energy requirements. The balance is supplied by long-term purchase contracts, and interchange and other purchase arrangements. During 2002, however, PacifiCorp's hydro and thermal resources supplied only 4.9 percent and 62.6 percent, respectively, of total energy requirements, with the remaining 32.5 percent made up with purchased power (PacifiCorp).

The company's North Umpqua Project has a capacity rating of 185.5 MW and consists of eight developments (table 1-1). Seven of the eight developments contain a single generating unit, while the Toketee Development has three turbine-generator sets. Historically, the North Umpqua Project has been operated to maximize peak power. Based on a weighted average of median, high, and low water years, the project has generated 957,400 megawatt hours (MWh) annually—693,100 MWh on-peak and 264,300 MWh off-peak. This annual generation represents about 1.3 percent of total PacifiCorp energy sold. Under current operating conditions, the project's on-peak generation is a smaller fraction (68 percent) of total project generation. If the project is operated in a run-of-river mode, the fraction of on-peak generation would be about 58 percent of total generation (PacifiCorp 2001a).

In the project's reservoirs and forebays, silt has accumulated over time and has greatly reduced storage volumes—21 percent in reservoirs and 32 percent in forebays (PacifiCorp 1995a). The capacity shown in table 1-1 is about 12 percent less than the

original project design. Further, there has also been a gradual decline in turbine-generator efficiency. PacifiCorp's RAMPP-6 analysis⁸ identifies a number of upgrades that can be made to the project; however, these upgrades are not expected to increase generation (PacifiCorp 2001c). Instead these upgrades are intended to preserve usability of the system given expected additional constraints on streamflow and reservoir levels as a result of the upcoming relicensing.

The North Umpqua Project is within the Western Electricity Coordinating Council's Northwest Power Pool (NWPP) area. PacifiCorp's generating resources are interconnected through its own transmission lines or by contract through the lines of others. Within the region, all generating resources are managed on a coordinated basis to maximize load carrying capability and system efficiency.

In PacifiCorp's service territory, retail energy sales have grown at a compound annual rate of 2.1 percent since 1995 (PacifiCorp 2001b). Continued increases in demand depend on numerous assumptions about population and economic growth as well as the impact of demand-side management (DSM) programs. PacifiCorp actively participates in numerous DSM programs to reduce current and projected energy shortages. Among these DSM activities are energy exchange programs, voluntary curtailment programs for irrigation customers, and residential usage incentives. In addition, PacifiCorp has increased prices or requested price increases, which have the effect of reducing the rate of electricity consumption. Considering its DSM programs, PacifiCorp is forecasting load on its system to grow by 2 percent annually over the next 20 years (PacifiCorp 2003b).

PacifiCorp in its filing with the Securities and Exchange Commission (SEC) has stated that it is accelerating efforts to bring new generation on line (PacifiCorp 2001b). These efforts are due, in part, to an expected continuation of low hydro resource availability and increased demands for providing fish protection flows in the Pacific Northwest. PacifiCorp expects to need an additional 4,000 MW of new capacity by 2013 (PacifiCorp 2003b), while continuing DSM efforts that are deemed cost-effective.

If licensed, the power from the North Umpqua Project would continue to be useful in meeting PacifiCorp's needs as well as meeting part of the local and regional need for power. The project displaces fossil-fueled electric power generation that the regional

⁸ RAMPP stands for PacifiCorp's Resource and Marketing Planning Program, an integrated resource planning analysis prepared periodically.

utilities currently use, and thereby conserves nonrenewable fossil fuels and reduces the emission of noxious byproducts caused during the combustion of fossil fuels (PacifiCorp 2003b).

1.3 INTERVENTIONS AND PROTESTS

On July 3, 1995, the Commission issued a notice of the application for a new license filed by PacifiCorp for the North Umpqua Project. The notice established September 1, 1995, as the deadline for filing motions to intervene in the proceedings. The following parties filed motions to intervene:

<u>Intervenor</u>	<u>Date Filed</u>
Department of the Interior	August 23, 1995
Steamboaters	August 31, 1995
American Rivers, Pacific Rivers Council, WaterWatch of Oregon, Umpqua Watersheds, and Oregon Natural Resources Council	November 13, 1995
National Marine Fisheries Service	July 12, 1996
Oregon Department of Justice	March 22, 2000
North Umpqua Valley Audubon Society	May 5, 2000
American Whitewater Affiliation	July 24, 2001

Only the Department of the Interior and the Steamboaters filed motions to intervene by the deadline. Late intervenor status was granted by the Commission to American Rivers et al. on January 2, 1996; to NMFS on September 25, 1996; to the State of Oregon on May 5, 2000; to North Umpqua Valley Audubon Society on May 11, 2000, and to American Whitewater Affiliation (AWA) on August 16, 2001. AWA's filing was a motion to intervene in opposition. In its submittal, AWA stated that it could not support the Settlement Agreement because it fails to make provision for whitewater boating flows, flow information, or access to reaches directly affected by hydropower project operations.

In letters filed on June 21 and 24, 2002, the U.S. Department of Agriculture and the North Umpqua Foundation, respectively, submitted motions to intervene.

1.4 AGENCY CONSULTATION

On November 15, 2000, the Commission issued a notice that the application was ready for environmental analysis and solicited comments, recommendations, terms and conditions, and prescriptions by March 1, 2001. The responding entities and the dates of their comments are listed below:

<u>Entity</u>	<u>Date Filed</u>
National Marine Fisheries Service	February 28, 2001
U.S. Forest Service	February 27, 2001
State of Oregon	March 1, 2001
U.S. Department of the Interior	March 1, 2001
American Rivers, Oregon Natural Resources Council, Umpqua Watersheds, Umpqua Valley Audubon Society, Steamboaters, Pacific Rivers Council, Oregon Trout, and WaterWatch of Oregon (the Conservation Groups)	March 1, 2001

Reply comments were submitted by PacifiCorp, the FS, and jointly by Umpqua Watersheds and Oregon Natural Resources Council by letters filed April 16, 2001. The State of Oregon filed comments on May 23, 2001, in response to PacifiCorp's reply comments.

After the filing of the Settlement Agreement, the Commission issued a notice of the Settlement Agreement on June 27, 2001, requesting that comments be filed by July 27, 2001, and reply comments by August 11, 2001. The following entities filed comments in opposition to the Settlement Agreement:

<u>Entity</u>	<u>Date Filed</u>
America Whitewater Affiliation	July 24, 2001
Umpqua Watersheds, Umpqua Valley Audubon Society, Steamboaters, The North Umpqua Foundation, and Oregon Natural Resources Council	July 26, 2001
American Rivers, Pacific Rivers Council, Oregon Trout, and Water Watch of Oregon	July 27, 2001

In addition, the following entities filed reply comments to the Conservation Groups' July 26 and July 27, 2001, comments:

<u>Entity</u>	<u>Date Filed</u>
State of Oregon	August 10, 2001
U.S. Forest Service	August 13, 2001
U.S. Fish and Wildlife Service	August 13, 2001
National Marine Fisheries Service	August 13, 2001
PacifiCorp	August 13, 2001

Because the filing of the Settlement Agreement led to various inconsistencies among the terms and conditions previously submitted by the resource agencies⁹ and the agreed-upon terms of the Settlement Agreement, on October 11, 2001, the Commission issued a notice requesting that revised recommendations, terms and conditions, and prescriptions be filed within 30 days. The deadline for filing was subsequently extended to December 11, 2001. The following entities filed revised comments, recommendations, and terms and conditions in response to this notice:

<u>Entity</u>	<u>Date Filed</u>
U.S. Forest Service	November 13, 2001
Oregon Department of Fish and Wildlife	December 4, 2001
Bureau of Land Management	December 12, 2001
U.S. Fish and Wildlife Service	December 26, 2001
National Marine Fisheries Service	December 11, 2001
American Whitewater Affiliation	December 10, 2001

On June 21, 2002, the FS filed revised draft Section 4(e) terms and conditions with their comments on the draft EIS. On August 23, 2002, Interior filed modified Section 10(j) fish and wildlife recommendations for (1) restoration of anadromous fish habitat to

⁹ For purposes of this section, resource agencies include FWS, NMFS, FS, and ODFW.

include specific recommendations for the development of the Soda Springs Bypass Reach Alluvial Restoration Project, consistent with section 8.3 of the Settlement Agreement (which was subsequently amended), and (2) avian collision and electrocution hazards to reflect the outcome of a recent Endangered Species Act (ESA) Section 7 consultation with the FS and PacifiCorp regarding an interrelated and independent action associated with the operation of the North Umpqua Project powerline and power distribution facilities maintenance program being implemented by PacifiCorp. A final biological opinion on this consultation was issued on July 25, 2002, incorporating reasonable and prudent measures to minimize and avoid the incidental take of bald eagles.

On November 4, 2002, PacifiCorp filed Amendment No. 1 to the Settlement Agreement on behalf of the Settlement Agreement parties revising sections 5.1, 7.1, 7.2, and 8.3.¹⁰ On February 3, 2003, PacifiCorp filed an explanatory statement supporting the amendment. On February 6, 2003, the Commission noticed the amendment and solicited comments, reply comments, and any revised recommendations, terms and conditions, and prescriptions. The following entities filed revised comments, recommendations, and terms and conditions in response to this notice:

Entity	Date Filed
State of Oregon	March 6, 2003
U.S. Forest Service	March 7, 2003
National Marine Fisheries Service	March 7, 2003
U.S. Fish and Wildlife Service	March 7, 2003
PacifiCorp	March 7, 2003
Oregon Water Resources Department	March 11, 2003
Oregon Department of Environmental Quality	March 13, 2003

In their filings, the state of Oregon, ODEQ, OWRD, FS, NMFS, and FWS modified their previously filed recommendations, terms and conditions, and prescriptions to incorporate the provisions of Amendment No. 1 to the Settlement Agreement or indicated that no modification was needed. In its March 7, 2003, filing, PacifiCorp provided responses to NGO comments on the draft EIS economic analysis and

¹⁰ On December 16, 2002, the NGOs filed comments on the "proposed" amendment to the Settlement Agreement.

Amendment No. 1 (NGO comments filed on November 18 and December 16, 2002, respectively).

1.5 SCOPING PROCESS

To identify significant issues to be addressed in the EIS, Commission staff initiated a formal scoping process in April 1996. A Notice of Intent to prepare an environmental impact statement and to conduct public scoping meetings was issued on April 30, 1996, and two public scoping meetings were held in Roseburg, Oregon, on June 6, 1996.¹¹ Staff distributed a document entitled "Scoping Document 1," that summarized the major issues identified in the review of the license application. This first scoping document was issued on April 26, 1996, and circulated to federal, state, and local agencies, organizations, individuals, and other parties interested in participating in and contributing to the scoping process for the North Umpqua Project.

On April 11, 1997, staff distributed a second document entitled "Scoping Document 2," that revised and responded to comments that had been filed on the initial scoping document. This second scoping document also responded to oral and written statements that were presented at two public scoping meetings held in Roseburg, Oregon on June 6, 1996. In Scoping Document 2, staff identified the following environmental resource areas as those that would be affected by the proposed action and alternatives: geology and soils, water quality and quantity, fish and other aquatic resources, terrestrial resources, threatened and endangered species, cultural resources, aesthetic resources, recreation, and land use.

1.6 COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The draft EIS was distributed on May 1, 2002, and comments were requested from the public and government agencies by June 24, 2002.¹² Comment letters were received from 19 entities, including 3 federal government agencies, 3 state government agencies,

¹¹ Notice of the scoping meetings was published by the Commission in the *Federal Register* [Vol. 61, No. 91, p. 21177] on May 9, 1996, and in the *Roseburg News-Review* on May 9 and May 16, 1996.

¹² The draft EIS was noticed by the Environmental Protection Agency (EPA) in the *Federal Register* [Vol. 67, No. 91, p. 31801] on May 10, 2002.

4 non-governmental organizations, 7 individuals (representing one or several people), PacifiCorp, and the parties to the Settlement Agreement. NGOs and individuals unanimously favored adoption of the NGO Alternative, indicating that it would have greater potential to restore ecosystem processes and protect environmental resources. The parties to the Settlement Agreement and PacifiCorp objected to the staff recommended measures for: (1) incorporating effectiveness monitoring into plans and programs and (2) providing notice and specific flow information when scheduled maintenance and other releases at project developments could provide additional boating opportunities. Although the parties to the Settlement Agreement did not object to the other staff recommendations, they recommended that the Settlement Agreement be adopted without modification.

The comments received on the draft EIS and staff responses are presented in Appendix A. Revisions have been made to the draft EIS text and analysis as deemed appropriate by staff in response to the comments, and these changes have been incorporated into the text of this final EIS.

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2. PROPOSED ACTION AND ALTERNATIVES

This section describes the proposed action and alternatives considered. Section 2.1 describes the No-Action Alternative under which the North Umpqua Project would continue to operate with the current license conditions. This alternative provides the current conditions against which other alternatives are compared. Section 2.2 describes the proposed action of issuing a new license that adopts the terms and conditions of the Settlement Agreement, as amended. Section 2.3 describes modifications to the proposed project that include: (1) the Staff Alternative with additional recommendations to the measures included in the Settlement Agreement, and (2) the NGO Alternative with recommendations provided by the Conservation Groups. Section 2.4 discusses other alternatives that were considered but were eliminated from detailed evaluation in this EIS.

2.1 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the North Umpqua Project would continue to operate under the terms and conditions of the existing license, and no new environmental PM&E measures would be implemented.¹³ We use this alternative to establish the environmental conditions for comparison with the proposed action and other alternatives. A description of the existing facilities and their operation is presented in the following sections.

2.1.1 General Description of Existing Facilities and Operations

The 185.5-MW North Umpqua Project is located on the west side of the central Cascade mountain range in Douglas County, Oregon, about 60 miles east of the city of Roseburg. The project's watershed is almost completely within the Umpqua National Forest, although project transmission lines cross BLM and private lands (figure 2-1).

¹³ PacifiCorp has undertaken a number of actions (e.g., gravel augmentation downstream of Soda Springs dam) before a new license is issued. These actions would, therefore, be part of the current project.

Figures

Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-13, 2-15, 2-16, 2-18, 2-19, 2-21, 3-2, 3-6, 3-129, and 3-143

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Constructed between 1947 and 1956, the project consists of a series of dams and canals that divert water to eight power developments (table 1-1) located above and including the Soda Springs powerhouse and tailrace at RM 69.3 on the North Umpqua River and two of its major tributaries, the Clearwater River and Fish Creek (figure 1-1). The project includes eight powerhouses, eight dams, and a total waterway¹⁴ length of 37.3 miles (21.7 miles of canal, 9.8 miles of flume, and 5.8 miles of penstock and tunnels). Two major reservoirs, Lemolo Reservoir and Toketee Lake, provide water storage. Seven of the eight power plants consist of a single outdoor generating unit, while the eighth power plant, Toketee, contains three indoor turbine-generators.

The project includes 117.5 miles of transmission line in seven segments. Five of the segments interconnect plants and switching stations within the project; the other two transmission line segments deliver power from the project to PacifiCorp's Dixonville substation. The project also includes staff housing and support facilities and 36 miles of access roads.

The North Umpqua Project operates in a peaking mode, generating more electrical energy during high demand (i.e., peak) periods, typically from 6 a.m. to 10 p.m. To maximize efficiency, the generating units are normally maintained at low generating levels or are shut down during off-peak hours. Soda Springs development, which is used for re-regulation of flows from upstream developments, is operated on a continuous basis, releasing a baseflow determined by the operator based on ambient watershed runoff estimates and the goal of maintaining a relatively stable flow to the North Umpqua River below the Soda Springs powerhouse. Clearwater Nos. 1 and 2 and Lemolo No. 2 developments usually are operated on a continuous basis because of the limited storage capacity in these developments. The Lemolo No. 1 development is also operated continuously although at very low generating levels during non-peak times. Lemolo Lake is the primary source of water (storage) for shaping flows to daily peaking operations for downstream developments.

¹⁴ To be consistent with the License Application and other filings for the North Umpqua Project, we use the term waterway to refer collectively to those diversion structures that convey water between the dam and the powerhouse.

Figures

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Figures

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Figures

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Figure 2-7 shows a schematic diagram of the relationship of the eight developments to one another.

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Project scheduling seeks to provide generating capacity as required by the system load. Storage capacity is utilized at each of the reservoirs and forebays to allow the impoundments to fill during off-peak hours and release stored water and available inflow during system on-peak hours.

Although all reservoirs and forebays have some storage capacity that allows them to fill during off-peak hours, the total storage available from all eight developments is relatively small compared to the flow through the project with the exception of Lemolo Reservoir. Consequently, significant fluctuations in stage and discharge typically do not occur. In addition, peak output has decreased since the project was built due to siltation in most forebays and reservoirs. Because of the small storage available throughout the project, operation on a seasonal basis is essentially run-of-river, with the exception of storage in Lemolo Reservoir, which allows spring capture and fall release of approximately 3 percent of the average annual Lemolo Reservoir inflows. Siltation in most of the reservoirs and forebays has reduced the ability to vary water levels and reduced the project's peaking potential.

2.1.2 Lemolo No. 1 Development

The Lemolo No. 1 Development is the most upstream development on the North Umpqua River, located about 1 mile downstream of the river's confluence with Lake Creek. The development consists of a diversion dam, an 11,752-acre-foot impoundment known as Lemolo Reservoir, 16,310 feet of canal and flumes, 7,338 feet of steel penstock, and a powerhouse on the North Umpqua River at the mouth of Warm Springs Creek, 4.5 miles downstream of the dam at Lemolo Reservoir.

Figures

Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-13, 2-15, 2-16, 2-18, 2-19, 2-21, 3-2, 3-6, 3-129, and 3-143

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The 120-foot-high dam, a rockfill structure with an upstream concrete facing and a 106-foot spillway, impounds Lemolo Reservoir. The lake has a normal maximum water surface elevation of 4,148.5 feet above mean sea level (amsl), a normal maximum water surface area of 419.1 acres, and a total storage at normal maximum water surface of 11,752 acre-feet. The principal tributaries entering Lemolo Reservoir are the North Umpqua River, Pool Creek, Lake Creek, and Spring River.

The Lemolo No. 1 waterway consists of 16,310 feet of open channel conduit extending from Lemolo dam to the penstock intake. Water for the waterway comes from Lemolo Reservoir (PacifiCorp 2002c). The intake includes an intake tower with access bridge, a 164-foot-long power outlet conduit, and a 61-foot-long power outlet discharge and control structure. The intake tower houses a trashrack and wheel-type intake gate. A side channel spillway, immediately downstream of the control structure just below the dam's downstream face, prevents inflows to the waterway in excess of its capacity. The existing capacity of the waterway is 561 cfs.

Water is released to the steel penstock via a concrete intake structure. The intake is protected from overfilling by a 145-foot-long spillway that discharges through a channel to the North Umpqua River. The forebay at the penstock intake has no active storage at a normal maximum water surface elevation of 4,076.6 feet amsl. The penstock extends 7,338 feet from its intake to the powerhouse, and its diameter varies from 9.7 feet near the intake to 7.0 feet at the powerhouse.

The powerhouse is a reinforced concrete structure of the outdoor generator style. It houses a single turbine-generator with a turbine centerline elevation of 3,318.0 feet amsl. The rated capacity of the combined turbine-generator set is 29,000 kilowatts (kW) at 565 cfs and 710 feet net head. There are three single phase 11.5/125-kilovolt (kV) transformers rated at 10,175 kilovolt ampere (kVA) each. Power from the transformers is delivered on Line 53 to the Clearwater switching station, 12 miles from the Lemolo No. 1 powerhouse. The Lemolo No. 1 powerhouse is not shut down during seasonally off-peak periods because it is difficult to restart it without causing water to spill at the forebay.

The existing FERC license requires a year-round instream flow of 25 cfs in the Lemolo No. 1 Development bypassed reach between RM 93 and RM 88.5. This flow is provided by leakage through the dam abutments and the discharge from the 12-inch valve in the lower dam sluice outlet. The existing U.S. Geological Survey (USGS) gage #14313500, 0.4 miles downstream of the dam, effectively measures these flows and documents the instream flow in the bypassed reach.

Lemolo Reservoir has an existing active storage capacity of 11,079 acre-feet, the largest storage volume of any of the project developments. This capacity is equal to about 12.8 days of storage based on average North Umpqua River flows at the dam site. Storage in Lemolo Reservoir is used to control floods, to increase power generation during the late fall when energy demand is relatively high, and occasionally to augment flows in the North Umpqua River when flows at the Copeland gage (below the Soda Springs Development) drop below 600 cfs.

2.1.3 Lemolo No. 2 Development

The Lemolo No. 2 Development is the second plant on the North Umpqua River. It consists of a diversion dam approximately 190 feet downstream of the Lemolo No. 1 powerhouse that impounds a small pond, 69,503 feet of canal and flumes, a 230.6-acre-foot forebay, 3,975 feet of penstock, a 71-foot-high surge tank, and a powerhouse on the North Umpqua River about 3,500 feet upstream of Toketee Lake (RM 77.3).

Figures

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The head gate for the Lemolo No. 2 canal is operated by the elevation of the Lemolo No. 1 afterbay, and flow into the canal is controlled by releases from the upstream

Lemolo No. 1 power plant. Uncontrolled flow from Warm Springs Creek and other incidental surface runoff downstream of Lemolo No. 1 also add to Lemolo No. 2 canal flows. The development generates power at very low levels during the off-peak period.

The 25-foot-high diversion dam is a concrete gravity structure with a free crest spillway topped by flashboards. A concrete intake structure, an instream release outlet, and a fish ladder are incorporated in the dam. At a normal maximum water surface elevation of 3,325.0 feet amsl, the impoundment formed by the diversion dam has an area of 1.4 acres, but there is no active reservoir storage.

The Lemolo No. 2 waterway is an open channel, mixed construction conduit [a concrete flume (9,931 feet), a gunite-lined canal (49,352 feet), a concrete and rock flume (6,465 feet), and a steel flume (3,755 feet)] and an invert siphon consisting of 486 feet of pipeline extending from the diversion dam to the forebay. The intake includes a 122-foot-long tapered concrete intake bay with inoperative fish screens¹⁵ and fish bypass, trashrack, Tainter gate, and side channel spillway. The waterway formerly intercepted seven side streams [i.e., Helen, Potter, Spotted Owl (formerly Fern), Karen, Deer, Thorn, and Mill Creeks] along its length. These streams have recently been reconnected to the North Umpqua River, and their diversion infrastructure would be removed in accordance with section 10.4 of the Settlement Agreement (PacifiCorp 2002c). Existing capacity of the Lemolo No. 2 waterway is 637 cfs.

The Lemolo No. 2 forebay is an open excavated reservoir with a compacted clay liner and an embankment levee on the downhill side. The forebay is protected from overfilling by a 240-foot-long spillway that discharges to Toketee Lake. The forebay's active storage capacity and area are 159.2 acre-feet and 24.2 acres, respectively, at a normal maximum water surface elevation of 3,184.5 feet amsl.

Water is released to the Lemolo No. 2 penstock via a concrete intake structure with a trashrack and a 12.1-foot by 10.7-foot wheel-type intake gate. The penstock extends 3,975 feet from the forebay to the powerhouse. The penstock diameter varies from 10.5 feet near the forebay to 7.3 feet at the powerhouse. A surge tank 71-feet tall is included in the penstock system to limit pressure rise in the penstock during turbine-generator shutdowns.

The powerhouse is a reinforced concrete structure of the outdoor generator style. It houses a single turbine-generator with a turbine centerline elevation of 2,450.0 feet amsl.

¹⁵ Shortly after construction, the rotary drum fish screens at the intake were found to be ineffective and were taken out of service.

The rated capacity of the combined turbine-generator set is 33,000 kW at 655 cfs and a rated head of 705 feet. Lemolo No. 2 has three single phase 11.5/125 kV transformers rated at 11,579 kVA each. Power from the transformers is delivered on Line 55 to the Clearwater switching station, 1.4 miles from the powerhouse.

The existing FERC license requires a year-round instream flow of 25 cfs for the Lemolo No. 2 Development bypassed reach between RM 88.5 and RM 77.3. This instream flow is provided by: (1) spillway leakage that is dependent upon the pond level, (2) water released through the fish ladder gate that is maintained in the fully open position, and (3) auxiliary flow provided by regulation of a valve that releases water from the screening facility headworks via the auxiliary water flow valve. Four staff gages determine the instream flow below the diversion: No. 1 in the fish ladder; No. 2 on the concrete stub wall just downstream of the spillway; No. 3 on the wall of the auxiliary water supply pool at the fish ladder entrance; and No. 4, the primary gage that measures the total flow below the Lemolo No. 2 diversion, 600 feet downstream from the diversion on a large boulder in a natural stream section.

2.1.4 Clearwater No. 1 Development

The Clearwater No. 1 Development is the uppermost development on the Clearwater River, a tributary to the North Umpqua River that has its confluence near Toketee dam. The development consists of a diversion dam about 8.1 miles upstream of Toketee Lake that impounds Stump Lake, 13,037 feet of canal and flumes, a 120.8-acre-foot forebay, 4,863 feet of penstock, and a powerhouse discharging directly into the Clearwater No. 2 diversion.

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The 17-foot-high diversion dam is an earthfill structure with an upstream riprap face and free crest concrete spillway. At a normal maximum water surface elevation of 3,875.0 feet amsl, Stump Lake has an area of 11.8 acres with a total capacity of 30.2 acre-feet.

A concrete intake structure is incorporated into the dam near the right abutment. The intake includes a 21-foot concrete intake structure with a trashrack, a timber gate, and a skimming side channel spillway that prevents inflows to the waterway in excess of its capacity. The waterway is an open-channel conduit extending from the Stump Lake dam

to the forebay. The conduit consists of gunite-lined canal (12,578 feet), concrete flume (342 feet), and concrete road culvert (117 feet). The existing capacity of the waterway is 228 cfs.

The forebay, an open excavated reservoir with a compacted clay liner, is protected from overfilling by a side channel spillway that discharges into Mowich Creek, a tributary to the Clearwater River. The forebay's active storage capacity and area are 100.6 acre-feet and 16.3 acres, respectively, at normal maximum water surface elevation of 3,862.0 feet amsl.

Water is released to the penstock via a concrete intake structure with a trashrack and a 7.0-foot by 8.9-foot wheel type intake gate. The penstock extends 4,863 feet from the forebay to the powerhouse and has a diameter that varies from 6.7 feet near the forebay to 5.0 feet at the powerhouse.

The Clearwater No. 1 powerhouse, a reinforced concrete structure of the outdoor generator style, is located at RM 4.9 on the Clearwater River approximately 5 miles upstream of Toketee Lake. It houses a single turbine-generator with a turbine centerline elevation of 3,212.2 feet amsl. The rated capacity of the combined turbine-generator set is 15,000 kW at 350 cfs and a rated head of 616 feet. Clearwater No. 1 has two single-phase 6.9/76.2-kV transformers rated at 5,888 kVA each and one single-phase 6.9/76.2-kV transformer rated at 5,555 kVA. Power from the transformers is delivered via line 57 to the Clearwater switching station, 5.1 miles from the Clearwater No. 1 powerhouse.

The currently required instream flow for the bypassed reach of the Clearwater No. 1 Development is 5 cfs year-round. It is provided from a rectangular opening in the diversion flashboards that is sized to provide 5 cfs with Stump Lake at full pond level and leakage through other sections of the flashboards. USGS gage #14314500, located 900 feet downstream of the diversion dam, monitors instream flow.

The maximum hydraulic capacity and best gate capacity of the Clearwater No. 1 unit are greater than the capacity of the Clearwater No. 2 diversion, and the Clearwater No. 1 powerhouse can only operate at its design capacity if water is spilled at the Clearwater No. 2 diversion. Thus, diversion flows through the Clearwater No. 1 powerhouse are typically limited to avoid spilling water at the Clearwater No. 2 diversion.

2.1.5 Clearwater No. 2 Development

The Clearwater No. 2 Development, downstream of Clearwater No. 1, consists of a diversion dam at the mouth of Mowich Creek that impounds a small reservoir, 31,235 feet of canal and flumes, a 70.7-acre-foot forebay, 1,169 feet of penstock, and a powerhouse on the North Umpqua River at Toketee Lake.

The 18-foot-high diversion dam is located on the Clearwater River 5 miles upstream from its confluence with Toketee Lake and 140 feet downstream of the Clearwater No. 1 powerhouse. The dam consists of a concrete buttress on a concrete slab with a free crest spillway and has a concrete intake structure and sluice outlet. The small impoundment created by the dam has a surface area of 1.2 acres at normal water surface elevation of 3,212.0 feet amsl with no active storage.

The Clearwater No. 2 diversion intake includes a 26-foot-long concrete intake bay with trashrack, a sliding-type steel gate, and side channel spillway. The waterway consists of 31,235 feet of open channel conduit and extends from the diversion dam to the forebay. It contains concrete culvert (88 feet), concrete flume (8,864 feet), concrete and rock flume (2,852 feet), gunite-lined canal (18,599 feet), rock flume (359 feet), and steel flume (473 feet). The existing capacity of the Clearwater No. 2 waterway is 341 cfs.

The forebay is an open excavated reservoir with an embankment levee on the downhill side and a compacted clay lining. The forebay active storage capacity and area are 49.5 acre-feet and 8.6 acres, respectively, at the normal maximum water surface elevation of 3,179.5 feet amsl.

Water is released to the penstock via a concrete intake structure with a trashrack and 7.5-foot by 9.6-foot wheel type intake gate. The penstock extends 1,169 feet from the forebay to the Clearwater No. 2 powerhouse with a diameter that varies from 7.2 feet near the forebay to 6.3 feet at the powerhouse.

The powerhouse, a reinforced concrete structure housing a single turbine-generator, is of the outdoor generator style with a turbine centerline elevation of 2,425.5 feet amsl. The rated capacity of the combined turbine-generator set is 26,000 kW at 485 cfs and a rated head of 722 feet. Clearwater No. 2 has three single phase 11.5/125-kV transformers

Figures

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rated at 10,196 kVA each. Power from the transformers is delivered to the Clearwater switching station, 0.3 miles from the powerhouse, via Line 55-1.

The currently required instream flow for the Clearwater No. 2 bypassed reach is 5 cfs year-round. It is provided by an opening in the flume sidewall just below the diversion dam. The flow is controlled by water elevation in the impoundment above the diversion dam. In 1990, a staff gage was installed about 0.4 miles downstream of the diversion to monitor instream flows. This development is operated at very low flows during off-peak hours to avoid daily shutdowns.

2.1.6 Toketee Development

The Toketee Development, which includes Toketee Lake, the second largest reservoir on the mainstem of the North Umpqua River, is located at the confluence of the Clearwater and North Umpqua rivers. It consists of: (1) an embankment dam on the North Umpqua River that impounds the 1,051-acre-foot Toketee Lake; (2) 6,994 feet of pipe and tunnel; (3) a single 1,067-foot-long penstock that near its downstream end splits into three sections, each 158 feet

long; and (4) a three-unit powerhouse on the North Umpqua River approximately 2 miles downstream of Toketee Lake and about 1.25 miles downstream of Toketee Falls.

Toketee dam is 58 feet high and consists of an earthfill, center clay core structure, with a 310-foot-long ungated concrete s-shaped spillway section in the dam and a 20-foot gated sluiceway.

The intake for the Toketee waterway includes a 79-foot concrete intake structure with a trashrack, a fixed-wheel intake gate, and a sluice outlet with a low-level outlet gate and a sluice conduit. The waterway, which extends from Toketee dam to the exit of the tunnel, consists of: (1) 1,664 feet of wood stave pipe (1,664 feet); (2) 1,250 feet of concrete-lined tunnel (1,000 lineal feet at the upstream end and 250 lineal feet at the downstream end); and (3) 4,080 feet of unlined tunnel. Rated capacity of the Toketee waterway is 1,425 cfs.

Figures

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Toketee Lake serves as the forebay for the Toketee Development. Active storage capacity and area are 144 acre-feet (PacifiCorp 2002c) and 96.9 acres, respectively, at normal maximum water surface elevation of 2,430.0 feet amsl.

The penstock leading to the Toketee powerhouse ranges from 11 to 12 feet in diameter. It begins at the exit from the tunnel and extends downstream 1,067 feet to a point where it splits into three, 6.3-foot-diameter penstocks that continue an average length of 158 feet to the powerhouse. The penstock system includes a 128-foot-high surge tank that limits pressure rise in it during turbine-generator shutdowns.

Toketee Lake provides active storage to regulate flow through the Toketee powerhouse. The Toketee powerhouse, which is a reinforced concrete substructure with a steel superstructure enclosed by metal siding, houses three turbine-generators. It is of the indoor style with a turbine centerline elevation of 1,987.0 feet amsl. Installed capacity of the combined turbine-generator sets is 42,500 kW at 1,350 cfs and a rated head of 440 feet. Toketee has nine single phase 6.9/132 kV transformers rated at 5,555 kVA each. Power from the transformers is delivered to the Toketee switching station, adjacent to the powerhouse.

The existing FERC license requires a year-round instream flow of 25 cfs for the bypassed reach between Toketee Lake and the Toketee powerhouse (RM 75.4 to 73.4 on the North Umpqua River). A portion of the instream flow release at the Toketee diversion is controlled by the reservoir water elevations. It comes from drains in the apron at the base of the dam's spillway section. Under an agreement between PacifiCorp and ODFW leakage flows are acceptable in meeting instream flow requirements since they are augmented by naturally occurring additions between Toketee dam and Toketee Falls. About 300 feet downstream of the dam, the discharge enters a concrete box and weir structure where a staff gage is located. Toketee Falls, a 75-foot-high waterfall on the mainstream of the North Umpqua River (RM 74.6), was the historical (i.e., pre-project) natural barrier to upstream passage of anadromous fish, but under current conditions anadromous fish cannot access this reach. The current barrier to upstream passage of anadromous fish is Soda Springs dam.

2.1.7 Fish Creek Development

The Fish Creek Development consists of: (1) a diversion dam; (2) 25,662 feet of canal and flumes; (3) an 110.3-acre-foot forebay; (4) 2,358 feet of penstock; and (5) a powerhouse on the North Umpqua River between the Toketee powerhouse and the Slide Creek diversion dam.

The Fish Creek diversion dam is located approximately 6 miles upstream of the creek's confluence with the North Umpqua River. The dam is a 6.5-foot-high concrete gravity structure with free crest spillway. A fish ladder and a sluiceway are incorporated into the dam. The dam and fishway were rebuilt in 1989 to provide improved fish passage and to eliminate the use of wooden flashboards that historically contributed to long periods of reduced power diversions when they washed out. There is no active storage in the Fish Creek diversion impoundment at the normal water surface elevation of 3,057.7 feet amsl.

Figures

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The Fish Creek intake is located northwest of the dam at the end of the impoundment. The intake is a concrete structure with a trashrack and two 5.3-foot by 4.3-foot slide gates. The waterway consists of 25,662 feet of open channel conduit (178 feet of timber flume, 1,689 feet of steel flume, 8,513 feet of concrete flume, and 15,282 feet of gunite-lined canal) extending from the Fish Creek diversion dam to the Fish Creek forebay. The existing capacity of the waterway is 177 cfs.

The Fish Creek forebay is an open excavated reservoir with a soil embankment and a compacted clay liner. It is protected from overfilling by a spillway that empties into a lined and unlined channel that discharges into the North Umpqua River. The active storage capacity and area of the forebay are 83.4 acre-feet and 9.3 acres, respectively, at the normal maximum water surface elevation of 3,025.5 feet amsl.

Water is released to the penstock via a 22-foot-long concrete intake structure with trashrack and slide gate. The penstock, with a diameter that varies from 4.5 feet near the forebay to 3 feet at the powerhouse, extends 2,358 feet from the forebay to Fish Creek powerhouse.

The Fish Creek powerhouse is of the outdoor generator style. It is a reinforced concrete structure housing a single turbine-generator with a turbine centerline elevation of 1,992.0 feet. The rated capacity of the combined turbine-generator set is 11,000 kW at 155 cfs and a rated head of 995 feet. The development has three single phase 6.9/125 kV transformers rated at 4,333 kVA each. Power from the transformers is delivered to

Line 42, a collector transmission line between the Soda Springs powerhouse substation and the Toketee switching station.

Under the existing FERC license, the instream flow required in the bypassed reach of Fish Creek is 20 cfs from April 1 through Labor Day and 10 cfs from the day after Labor Day through March 31. The fish ladder is designed to pass 10 cfs through its entrance slot and provides a portion of the instream flow. The additional 10 cfs of instream flow required during the summer period is provided through a supplemental water bypass released at the entrance pool of the fish ladder. A staff gage installed in pool No. 1 of the fish ladder (i.e., the first downstream pool) verifies instream flow. There is also an existing USGS gage (#14316000) on Fish Creek about 2 miles downstream from the diversion.

The small reservoir at the Fish Creek diversion dam has no active storage, but the Fish Creek forebay does. Water is delivered to the forebay via the development's flume and canal system. The forebay reregulates water from off-peak to peak demand periods. The powerhouse is effectively operated in a daily peaking regime, running at high efficiency during high demand periods and being shut down at night except during high runoff periods when off-peak generation prevents water spilling. Because reregulation for peaking occurs at the forebay, instream flows in Fish Creek do not fluctuate diurnally.

2.1.8 Slide Creek Development

The Slide Creek Development is located on the North Umpqua River downstream of Toketee Falls, between the Fish Creek powerhouse and Soda Springs Reservoir. The development consists of: (1) a diversion dam located 900 feet downstream of the Toketee powerhouse; (2) 9,653 feet of canal and flumes; (3) 374 feet of penstock, and (4) a powerhouse on the North Umpqua River approximately 1.3 miles upstream of Soda Springs dam.

Figures

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The Slide Creek diversion dam is a 30-foot-high, concrete gravity structure with three integral spillway gate sections. A concrete intake structure is incorporated into the right abutment of the dam. The reservoir behind the dam has a gross storage capacity of

43.0 acre-feet, with no active storage, and a surface area of 2.0 acres at the normal water surface elevation of 1,982.0 feet amsl.

The Slide Creek intake includes a 73-foot-long concrete intake with trashrack and a 20-foot-wide Tainter gate. Downstream of the intake, a 190-foot-long side channel spillway discharges excess flows to the North Umpqua River. The waterway is an open-channel conduit of mixed construction (1,921 feet of concrete and rock flume, 3,396 feet of two-wall concrete flume, and 4,336 feet of concrete-lined canal) extending from the Slide Creek dam to the penstock. The existing capacity of the waterway is 1,500 cfs.

The forebay structure has no storage capacity. Water enters the penstock via a concrete intake structure with a trashrack and a 20-foot-wide steel Tainter gate. The intake is protected from overfilling by a 300-foot spillway that discharges directly to the North Umpqua River. The 12-foot-diameter penstock extends 374 feet from the intake to the Slide Creek powerhouse.

The powerhouse, located near the mouth of Slide Creek, is a reinforced concrete structure housing a single turbine-generator of the outdoor generator style, with a turbine centerline elevation of 1,811.0 feet amsl. The rated capacity of the combined turbine-generator set is 18,000 kW at 1,500 cfs and a rated head of 169 feet. The Slide Creek Development has three single-phase 6.9/125-kV transformers rated at 7,060 kVA each. Power from the transformers is delivered to Line 42, a collector transmission line between the Soda Springs powerhouse substation and the Toketee switching station.

Currently required instream flow for the Slide Creek Development bypassed reach is 25 cfs year-round. An opening at the base of the flume immediately downstream of the dam releases the instream flow for the bypassed reach. The opening is sized to provide the instream flow with the reservoir at the lowest operational level. A staff gage is located on the North Umpqua River about 600 feet downstream from the diversion.

The Slide Creek Development has no active diversion reservoir or forebay capacity. Thus, it operates in a run-of-river mode, following discharges from the upstream Toketee and Fish Creek developments. Flow through the turbine is continuously adjusted to maintain a set water level in the penstock forebay at the end of the Slide Creek canal. Flows above the canal's capacity spill over the diversion dam.

2.1.9 Soda Springs Development

The Soda Springs Development is the farthest downstream development of the North Umpqua Project. It consists of: (1) a diversion dam on the North Umpqua River about 1.3 miles below the mouth of the Slide Creek powerhouse that impounds a 412-acre-foot reservoir; (2) 2,112 feet of steel pipe flow line; (3) a surge tank; (4) 168 feet of steel penstock; and (5) a powerhouse on the North Umpqua River about 1.5 miles downstream of the mouth of Medicine Creek.

Figures

Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-13, 2-15, 2-16, 2-18, 2-19, 2-21, 3-2, 3-6, 3-129, and 3-143

Public access for the above information is available only through the Public Reference Room, or by e-mail at

public.reference@ferc.gov.

The 77-foot-high Soda Springs dam is a 309-foot-long thin arch type structure reinforced with concrete, located at RM 69.8 on the mainstream of the North Umpqua River. The reservoir formed by the diversion dam has an active storage capacity and area of 307.4 acre-feet and 31.5 acres, respectively, at the normal maximum water surface elevation of 1807.0 feet amsl. The reservoir is protected from overfilling by a 72-foot-long spillway section with two gates and a 20-foot-wide gated trash sluice section that discharge into the North Umpqua River.

The concrete intake is an integral part of the dam. It is 41 feet long with a trash rack and a steel fixed-wheel intake gate. The waterway consists of 2,112 feet of 12-foot-diameter steel pipe extending from the diversion dam to the surge tank. A 3-foot-diameter air stack, approximately 1,200 feet downstream from the dam, provides pressure and vacuum relief for the pipeline. The bypassed reach on the North Umpqua River, approximately 0.5 mile in length, is short compared to other bypassed reaches of the North Umpqua Project. ODFW operates a facility in the vicinity of the Soda Springs powerhouse in which they hold up to 300 adult spring chinook salmon during the summer.

Diverted water is released to the 12-foot-diameter penstock via a concrete intake structure. The penstock extends 168 feet from the 82-foot-high surge tank to the Soda Springs powerhouse. The surge tank limits pressure rise in the penstock during turbine-generator shutdowns.

The powerhouse, of the outdoor generator style, is a reinforced concrete structure housing a single turbine-generator with a turbine centerline elevation of 1,697 feet amsl. The rated capacity of the combined turbine-generator set is 11,000 kW at 1,500 cfs and a rated head of 107 feet. The Soda Springs Development has three single phase 6.5/132-kV transformers rated at 4,333 kVA each. Power from the transformers is delivered to the Soda Springs substation, located adjacent to the Soda Springs powerhouse.

The currently required instream flow for the bypassed reach is 25 cfs year-round, except that 8 cfs from that may be diverted to the ODFW fish-holding ponds located adjacent to the powerhouse. The 8 cfs delivered to the ODFW facility is provided through a valve on the penstock near the surge tank. A slide gate located near the base of the dam provides the Soda Springs instream flow. A staff gage located 0.25 mile downstream of the dam is used to monitor instream flows in the bypassed reach.

Soda Springs Reservoir provides storage capacity, which is used to ensure the discharge in the North Umpqua River at Copeland downstream of the Soda Springs development, is maintained at a minimum of 600 cfs or the natural inflow of the river, whichever is less. Sedimentation in the reservoir has reduced the active storage to 307.4 acre-feet. Ramping rates downstream of the powerhouse have been limited in the past to 4 inches per hour and 12 inches per day. Since 1996, PacifiCorp has voluntarily reduced the ramping rate to 1.2 inches per hour (PacifiCorp 2002c). Actual flow data are provided in section 3.3 of this EIS.

2.1.10 Transmission Facilities

The North Umpqua transmission system includes 117.5 miles of transmission lines and three switching stations. Power from the North Umpqua Project is transferred to the regional electrical grid at the Dixonville substation near Roseburg (figure 2-1). Lines 39, 42, and 46 provide a 115-kV loop configuration that interconnects the switching stations located at the Toketee and Clearwater developments with substations at Soda Springs and in Dixonville, Oregon.

Line 39 begins at the Toketee switching station and is 49.1 miles long. Line 46 begins at the Soda Springs switching station and is 42.5 miles long. They both generally follow the North Umpqua River in a westerly direction to the Dixonville substation. Line 39 also provides power to the Glide substation.

Line 42 connects the Soda Springs substation and Toketee switching station with radial collector lines 42-1 and 42-2 from the Slide Creek and Fish Creek powerhouse, respectively. In addition to being a collector transmission line for lower project developments, Line 42 is used as a link for power transmission from all the power plants to Dixonville in the event that Line 39 or 46 fails.

All transmission lines associated with the project use predominantly wood pole "H" frame structures. These are generally two pole wood "H" frames with some three pole wood "H" frames at angles and dead-ends.

The project includes the Toketee and Clearwater switching stations and a substation at Soda Springs. The structures at all of the substations are lattice type painted or galvanized steel. The Toketee switching station is a major collection point on the loop transmission system that consists of Lines 39, 42, and 46. The switch yard is located in a small fenced area above the powerhouse and contains a 115-kV single bus and two circuit breakers for isolating Lines 39 and 42. Line 51 is connected to the common bus through a manual disconnect switch.

The Clearwater switching station, located near the Toketee Ranger Station in a 0.75-acre fenced yard, is the terminus of the collector transmission lines from the upper project developments (i.e., Lemolo No. 1, Lemolo No. 2, Clearwater No. 1, and Clearwater No. 2). Lines 53, 55, 57, and 55-1 are radial collector lines from Lemolo No. 1, Lemolo No. 2, Clearwater No. 1, and Clearwater No. 2, respectively. Line 51 transmits all the power that arrives at the Clearwater switching station on to the one at Toketee. The station consists of two 115-kV single buses and four circuit breakers.

The Soda Springs substation separates the Line 42 collector transmission line for the lower project developments from Line 46. The Soda Springs substation consists of a 115-kV single bus with one circuit breaker. The substation is located west of and adjacent to the Soda Springs powerhouse.

2.1.11 Support facilities

Toketee Village is a building complex located near the Toketee and Fish Creek powerhouses that includes the Toketee Control Center, nine staff homes, water treatment facilities, and an oil storage building. The Toketee Control Center is staffed 24 hours a day and provides control of remote plant operations. The center serves as project headquarters and provides office space for the hydro area manager, area maintenance superintendent, area operator, and North Umpqua control operator.

Clearwater Village, located on the eastern shore of Toketee Lake near the mouth of the Clearwater River, includes 10 project staff homes, a guest cottage, two bachelor's cottages, a bunkhouse, and a meeting hall. The village also includes a mess hall, cook's housing, shop buildings, warehouses, parking garage, and a fueling station.

Operator's residences are also provided at the Lemolo Nos. 1 and 2, Clearwater No. 1, and Slide Creek Developments. These houses are generally located near the powerhouses of the respective developments.

2.2 PROPOSED ACTION—SETTLEMENT AGREEMENT ALTERNATIVE

The Settlement Agreement is the proposed action evaluated in this EIS. The comprehensive Settlement Agreement, filed on June 21, 2001, sets forth the measures that PacifiCorp proposes to undertake during the term of the FERC license for the project.¹⁶ Additional measures to protect and enhance water quality would be required under the § 401 Water Quality Certificate issued June 28, 2002. An amendment to the Settlement Agreement was filed on November 4, 2002, revising sections 5.1, 7.1, 7.2, and 8.3 of the Settlement Agreement to extend the area for restoring and creating salmonid spawning habitat below Soda Springs dam. Proposed operations and environmental measures are described below.

2.2.1 Proposed Project Operation

The project would continue to operate in much the same manner as described for the No-Action Alternative—to allow peak energy production while minimizing impacts on water quality and aquatic resources. Instream flows would, however, be increased substantially over existing conditions (see table 2-1). Maintenance activities would be scheduled as much as possible during periods of high natural flow seasons because water normally diverted by the project is returned to natural stream channels adding to what is typically an already high flow situation, thereby mimicking the natural hydrograph.

PacifiCorp would continue to operate the Soda Springs Development as a "re-regulating" facility to capture and regulate water flowing from the project's upper developments, thus allowing more efficient use of water resources for energy production. In essence, the upper project developments would continue to operate daily during the peak energy period and shutdown overnight during the off-peak period. During the off-peak period, water stored in Soda Springs reservoir would be used to maintain the required flows to the river below the project. When the upper developments are brought back on-line during the peak energy period, Soda Springs reservoir would be refilled.

¹⁶ The parties to the Settlement Agreement recommend a license term of 35 years.

Table 2-1. Recommended instream flows (cubic feet per second) for the No-Action Alternative, the Settlement Agreement, ^a ^b and the Non-Governmental Organization Alternative.

Alternative	Lemolo No. 1	Lemolo No. 2	Clearwater No. 1	Clearwater No. 2	Toketee	Slide Creek	Soda Springs	Fish Creek
January through March								
No-Action Alternative	25	25	5	5	25	25	25	10
Settlement Agreement	50	50	30 (40) ^c	40 ^c	60	50-240 ^d	95 (275) ^e	50 (130) ^d
NGO Alternative	130	170	120	128	200 ^f -275 ^g	125 ^h -400 ⁱ	300 ^h full flow ^j	160
April								
No-Action Alternative	25	25	5	5	25	25	25	20
Settlement Agreement	60	60	60	60 ^c	60	50-240 ^d	95 (275) ^e	50-130 ^d
NGO Alternative	130	170	120	128	200 ^f -275 ^g	125 ^h -400 ⁱ	300 ^h full flow ^j	160
May								
No-Action Alternative	25	25	5	5	25	25	25	20
Settlement Agreement	70	70	60 ^c	60 ^c	60	80-240 ^d	95 (275) ^e	50-130 ^d
NGO Alternative	150	170	120	128	200 ^f -275 ^g	125 ^h -400 ⁱ	300 ^h full flow ^j	160
June								
No-Action Alternative	25	25	5	5	25	25	25	20
Settlement Agreement	80 ^c	70-145 (70) ^c	60	60 ^c	80	80-240 ^d	95 (275) ^e	80-130 ^d
NGO Alternative	150	170	120	128	200 ^f -275 ^g	125 ^h -400 ⁱ	300 ^h full flow ^j	160
July								
No-Action Alternative	25	25	5	5	25	25	25	20
Settlement Agreement	100 (80) ^c	80-180 (80) ^c	40 ^c	40 ^c	80 ^c	80-240 ^d	95 (275) ^e	80-130 ^d
NGO Alternative	130	120	120	128	150 ^f -275 ^g	100 ^h -400 ⁱ	300 ^h full flow ^j	full flow

Table 2-1.Continued.

Alternative	Lemolo No. 1	Lemolo No. 2	Clearwater No. 1	Clearwater No. 2	Toketee	Slide Creek	Soda Springs	Fish Creek
August								
No-Action Alternative	25	25	5	5	25	25	25	20
Settlement Agreement	80	80	40	40 ^e	80	80-240 ^d	95 (275) ^e	80-130 ^d
NGO Alternative	130	120	120	128	150 ^f -275 ^e	100 ^h -400 ⁱ	300 ^h full flow ^j	full flow
September								
No-Action Alternative	25	25	5	5	25	25	25	10
Settlement Agreement	80	80	40	40 ^e	80	80-240 ^d	95 (275) ^e	80-130 ^d
NGO Alternative	130	120	120	128	150 ^f -200 ^e	100 ^h -400 ⁱ	250 ^h full flow ^j	full flow
October								
No-Action Alternative	25	25	5	5	25	25	25	10
Settlement Agreement	80	80	30 (40) ^j	40 ^e	80	80-240 ^d	95 (275) ^e	80-130 ^d
NGO Alternative	130	120	120	128	150 ^f -200 ^e	100 ^h -400 ⁱ	250 ^h full flow ^j	full flow
November								
No-Action Alternative	25	25	5	5	25	25	25	10
Settlement Agreement	50	50	30 (40) ^j	40 ^e	60	50-240 ^d	95 (275) ^e	50-130 ^d
NGO Alternative	130	170	120	128	150 ^f -275 ^e	100 ^h -400 ⁱ	300 ^h full flow ^j	80
December								
No-Action Alternative	25	25	5	5	25	25	25	10

Table 2-1.Continued.

Alternative	Lemolo No. 1	Lemolo No. 2	Clearwater No. 1	Clearwater No. 2	Toketee	Slide Creek	Soda Springs	Fish Creek
December (continued)								
Settlement Agreement	50	50	30 (40) ^j	40 ^c	60	50-240 ^d	95 (275) ^e	50-130 ^f
NGO Alternative	130	170	120	128	200 ^g -275 ^h	125 ⁱ -400 ^j	300 ^k full flow ^l	80

^a Unless indicated otherwise, fish passage flows for the Settlement Agreement would be implemented by the first anniversary of the license or by 2005, whichever is earlier.

^b Prior to the license becoming final or by 2004, whichever is earlier, the parties to the Settlement Agreement would reconsider instream flows and may make adjustments to those listed in this table.

^c Prior to implementation of these flows, FS's Spatial Niche Analysis for the Clearwater No. 2 bypassed reach would be reevaluated. If, based on that reevaluation, PacifiCorp, FS, ODFW, and USFWS agree in writing to modifications in these instream flow levels, such modifications would become effective instead of the ones listed in this table.

^d Would be implemented by the seventh anniversary of the new license after anadromous fish passage is established.

^e Would be implemented in 2005.

^f Without passage at Slide Creek dam.

^g If passage at Slide Creek dam is provided.

^h Years one to five of license, prior to Soda Springs dam removal.

ⁱ After Soda Springs dam removal in year five of the license.

^j First number reflects final § 401 requirements (see Exhibit A, ODEQ 2002); numbers in parentheses reflect original Settlement Agreement conditions.

2.2.2 Proposed Environmental Measures

The environmental measures to be implemented under the Settlement Agreement are summarized below, grouped according to resources. Numbers in parentheses refer to sections of the Settlement Agreement or to the Memorandum of Understanding (MOU) between PacifiCorp and the Oregon Fish and Wildlife Commission that is attached to the Settlement Agreement.¹⁷ Conditions of the § 401 Water Quality Certificate are discussed in section 2.2.3.

¹⁷ This MOU for Fish Passage between the Oregon Fish and Wildlife Commission and PacifiCorp (dated March 2001) is incorporated as Attachment E to the Settlement Agreement. It addresses the waiver of a statutory requirement to provide for fish passage at the Slide Creek, Toketee, Clearwater Nos. 1 and 2, and Lemolo No. 1 dams. In lieu of providing fish passage at these dams, the MOU requires PacifiCorp to fund PM&E measures for anadromous and resident salmonids both within the project area and in adjacent areas. Although the MOU is officially between the Oregon Fish and Wildlife Commission and PacifiCorp, we refer to it in this EIS as the ODFW MOU to be consistent with the terminology of the Settlement Agreement.

Geology and Soils

Erosion and sediment control (sections 9.4 and 14)

- By April 2003, PacifiCorp would finalize and implement the draft erosion control plan,¹⁸ including determining the feasibility of specific measures related to erosion control of reservoir banks and areas subject to reservoir fluctuations.¹⁹
- PacifiCorp would construct a system to drain any section of the Fish Creek, Lemolo No. 2, and Clearwater No. 2 project waterways within 30 minutes of a flume failure. If such a system is not feasible for any waterway segment, PacifiCorp would identify the most effective alternative drainage system feasible for any waterway segment, PacifiCorp would identify the most effective alternative drainage system feasible for that segment. Construction of a shutoff and drainage system would be completed for Fish Creek within 1 year after the license becomes final and for the others within 3 years.
- In the event of an accidental spill or discharge from a waterway system or other erosive event, or should the emergency shutdown system be tripped, PacifiCorp would, within 24 hours of the event, notify appropriate agencies, coordinate an emergency response, and begin to plan and implement site-specific remediation.
- Should an accidental spill or discharge from the waterway system or other erosive event occur, or should the emergency shutdown system be tripped, PacifiCorp would:
 - Immediately notify and consult with the FS upon discovery of any such events.
 - Notify the Oregon Emergency Response System within 24 hours of an event with a verbal report on location, duration, and effect on water quality and aquatic life. If PacifiCorp observes or suspects that fish or wildlife or their habitat may be harmed, it would immediately notify and consult with the hydropower coordinator and watershed biologist at ODFW's Roseburg office.

¹⁸ The parties to the Settlement Agreement agreed to revise the date for completion of the erosion control plan to April 2003 (table 3.4-1, *North Umpqua Hydroelectric Project, P-1927-008; Resource Coordination Committee, Settlement Agreement Protection, Mitigation, and Enhancement Measures, 2001–2002 Annual Report, PacifiCorp 2002e*).

¹⁹ Although not explicitly stated in the Settlement Agreement, the parties to the Settlement Agreement stated in their June 24, 2002, response to staff recommended alternative for project relicensing that the scope and content of the erosion control plan and monitoring plan for erosion sites located within the project boundary would address shoreline erosion in reservoirs.

In no case would such contact occur later than the next business day.

Additionally, PacifiCorp would provide an annual report to ODEQ and ODFW by March 1 for the preceding calendar year.

- Coordinate emergency response to waterway failure or other erosive event, and the subsequent remediation planning and implementation process would be initiated within 24 hours of the event. PacifiCorp would develop site-specific plans for remediation of any failure in consultation with, and approved by, the FS, ODFW, and ODEQ. Content of these plans is more fully described in section 14.3.3 of the Settlement Agreement.
- Commencing upon the effective date of the Settlement Agreement, PacifiCorp began developing site plans for prevention and remediation of erosion for 31 actions at high-priority erosion sites and 27 actions at medium-priority erosion sites identified in schedule 14.4, in consultation with the FS, ODFW, and other interested agencies. Criteria to be used for determining appropriate remediation would be those found in the Umpqua National Forest Land and Resource Management Plan, chapter IV, Soil Productivity, 1990, using a least cost, fit-to-site approach. PacifiCorp would not implement such plans prior to FS review and approval. Remedial actions at all high- and medium-priority erosion sites would be implemented according to schedule 14.4.
- PacifiCorp is developing plans to prevent and remedy erosion at 31 high- and 27 medium-priority erosion sites. These plans would be implemented upon completion of an erosion control plan in April 2003 in accordance with Schedule 14.4, which sets forth specific dates by which such measures are to be completed. PacifiCorp is also implementing a program to evaluate currently ranked erosion sites and to identify new ones. If monitoring identifies a new high-priority erosion site, PacifiCorp would implement a site-specific remediation plan as soon as possible.
- PacifiCorp would provide a performance bond with an upper limit of \$1 million to ensure proper and timely remediation if it is determined that site-specific performance criteria are not being met.
- PacifiCorp would perform high-level analyses of potential seismic and geologic hazards facing the project.

Fluvial geomorphic processes (section 7)

- PacifiCorp would develop an implementation plan (within 90 days of Amendment No. 1) and a monitoring plan (within 60 days of finalizing the implementation plan) to provide gravel augmentation below Soda Springs dam in consultation with the FS, ODEQ, NMFS, FWS, and ODFW. The implementation plan would provide for a one-time pulse of about 4,000 tons of gravel below Soda Springs dam in the fall

of 2003. An estimated 20 tons of gravel is anticipated to augment each of up to five sites about seven times during the term of the new license.

- PacifiCorp would provide passage of sediment past Slide Creek dam using existing facilities (e.g., opening floodgates during periods of high flow), coordinating such passage with downstream restoration projects to ensure they realize anticipated benefits.
- PacifiCorp would continue the current practice of passing woody debris that enters Soda Springs and Slide Creek reservoirs. When the license becomes final or 2004, whichever comes sooner, PacifiCorp would develop a plan for passing woody debris past the Soda Springs and Slide Creek dams without modifying existing facilities.
- Upon license issuance, PacifiCorp would design tributary reconnections, and modify Clearwater No. 1 dam at Stump Lake to allow passage of sediment and woody debris during high-flow events.
- PacifiCorp would add large woody debris to East Fork Rock Creek (ODFW MOU section VI).

Water Quantity, Water Quality, and Aquatic Resources

Instream flows for fish and other aquatic species (section 5)

- PacifiCorp would implement the minimum instream flows shown in table 2-1 by the dates indicated. To monitor compliance with those flows, PacifiCorp would install and maintain gage stations by the date the license becomes final or 2002, whichever occurs earlier.
- PacifiCorp would continue to divert up to 8 cfs from the Soda Springs penstock tap for use at the ODFW salmon-holding pond located adjacent to the Soda Springs bypassed reach.
- To make the Lemolo No. 2 full-flow reach an extension of the Lemolo No. 2 bypassed reach, PacifiCorp would reroute the discharge from Lemolo No. 2 powerhouse to the Toketee Reservoir by the sixth anniversary of the new license.
- PacifiCorp would design the Soda Springs dam fish passage facilities to discharge flows upstream of the restored Soda Springs bypassed reach.
- PacifiCorp would supplement the instream flow regime for the Toketee bypassed reach with water from the Clearwater No. 2 bypassed reach flowing from the Clearwater River through the reconnection.

Ramping (section 6)

- By the sixth anniversary of the new license, PacifiCorp would reroute the peaking flows from Lemolo 2 powerhouse out of the Lemolo 2 full-flow reach using a

partially buried pipe to direct the water to the Stinkhole area located above Toketee Reservoir and below the Lemolo 2 powerhouse. The Stinkhole area would be recontoured to expand the existing wetland complex and to create side pools for wetland development and still-water habitat. The wetland would fill up in high flows and not completely dewater during low flows. (section 6.1)

- By the seventh anniversary of the new license, PacifiCorp would have developed and implemented an approved monitoring plan for the Slide Creek full-flow reach to evaluate the effects of current ramping rates and emergency shutdowns at the Slide Creek powerhouse on spawning or migratory movement of anadromous salmonids. If the monitoring shows adverse effects, generation units at the Toketee powerhouse would be brought into operation individually at 1-hour intervals.
- There would be no ramping restrictions in the Toketee full-flow reach.
- PacifiCorp would perform the following measures below the Soda Springs powerhouse for the Wild and Scenic River reach:
 - Unless studies show that proposed additional fluctuations would not adversely affect aquatic resources and that agency resource goals for the reach can be achieved under a more flexible ramping regime:
 - operate the project at flows below 1,600 cfs to prevent ramping in the reach;²⁰
 - limit ramping in the reach at flows above 1,600 cfs to 0.1 feet per hour and 6 inches per day; and
 - implement no changes to the operational regime described above unless agreed to by all parties.
 - Measure stage changes resulting from project operation at USGS gage #14316500 near Copeland Creek.²¹
 - To follow anticipated natural flow events in the watershed when Soda Springs dam is not spilling water, use all reasonable efforts to limit flow changes in the Wild and Scenic River reach below Soda Springs powerhouse to 5 percent change per hour from then current base conditions, with a goal not to exceed 0.1 feet per hour, as many times a day as necessary to follow the anticipated natural flow event. During draft or refill of Lemolo Reservoir, use all reasonable efforts to limit flow changes in the reach to 5 percent change per day from then current base flows, not to exceed 0.1 feet per day.

²⁰ Subject to a 5 percent or less variation in base flow attributable to equipment limitations at Soda Springs powerhouse.

²¹ The gage location to serve as the compliance point for the Wild and Scenic River flows could be changed upon agreement of all parties.

- Implement necessary measures to ensure that ramping criteria for the reach are maintained during emergency situations, including, but not limited to, installing a new bypass valve or improving the existing bypass valve at the Soda Springs or Slide Creek powerhouses.
- Commencing immediately and continuing until the first anniversary of the license, PacifiCorp would make all reasonable efforts to limit ramping in the Soda Springs bypassed reach to a target of 0.2 feet per hour and in all other bypassed reaches to a target of 0.5 feet per hour. After the first anniversary of the license, PacifiCorp would eliminate all ramping in the eight bypassed reaches, except during project maintenance and emergency shutdowns. No later than the first anniversary of the new license, a more restrictive ramping regime would apply during maintenance and emergency shutdowns.
- Commencing no later than the first anniversary of the new license, PacifiCorp would minimize impacts in bypassed reaches during planned project maintenance by:
 - taking into consideration the time of year and length of shutdown;
 - planning project maintenance using the guidelines in Appendix D to the Settlement Agreement so that resulting high flows would, as much as is feasible, coincide with the high-flow period of the natural hydrograph, with priority given to performing maintenance on Lemolo 2 to coincide with the high-flow period for Lemolo 2 bypassed reach;
 - planning project maintenance so as to prevent water-quality standard violations; and
 - adhering to the following ramping regime:
 - if salmon fry less than or equal to 60 millimeters (mm) in length are present (approximately March 1 through June 30), no ramping would occur during daylight hours (1 hour before sunrise to 1 hour after sunset) and ramping would not exceed 0.2 feet per hour during night hours;
 - if salmon fry are not present, but fry of resident trout or steelhead are present (approximately May 1 through August 31 for steelhead and June 1 through September 30 for trout), ramping would not exceed 0.2 feet per hour during daylight hours and 0.2 feet per hour during night hours;
 - if neither fry of salmon, resident trout, or steelhead are present (approximately October 1 through February 28), down-ramping would not exceed 0.2 feet per hour and up-ramping would not exceed 0.5 feet per hour.
 - The ramping regime outlined above would be monitored through the gaging plan required under section 5.5 and may be modified upon written agreement by PacifiCorp, ODFW, NMFS, ODEQ, FWS, and FS.

- Commencing on the first anniversary of the new license, PacifiCorp would adhere to the ramping restrictions identified in section 6.6.d in the event of emergency shutdowns to the extent possible in view of potential risks to employee safety and environmental risks such as dewatering the Wild and Scenic River reach and creating erosion problems from canal overspill. This ramping regime may be temporarily modified, however, if required by operating emergencies beyond the control of PacifiCorp, and for short periods upon agreement among PacifiCorp, ODFW, ODEQ, FWS, FS, and NMFS.
- PacifiCorp would ensure that ramping criteria established in accordance with section 6.4 for the Wild and Scenic River reach are maintained during emergency shutdowns. PacifiCorp would implement necessary measures to achieve this requirement, including, but not limited to, installing a new bypass valve or improving the existing bypass valve at the Soda Springs powerhouse by the date the new license becomes final or 2004, whichever is earlier. (section 6.8)
- PacifiCorp would evaluate, in consultation with the parties, whether the current bypass flow configuration at Slide Creek powerhouse is sufficient to prevent adverse impacts to aquatic resources during emergency shutdowns. Based on the results of this evaluation, the parties would determine whether additional measures are warranted at Slide Creek powerhouse to prevent potential adverse impacts during emergency shutdowns. If adverse impacts are occurring, PacifiCorp would install a new emergency bypass valve at Slide Creek powerhouse, or other project facilities modifications that PacifiCorp may propose that would equally mitigate the adverse effects.

Fish passage (section 4)

- By the seventh anniversary of the license a vertical-slot fish ladder for upstream passage of adult salmonids and lamprey at Soda Springs dam would be tested and functioning. A fish-viewing window and video camera system would be included to monitor fish passage.
- PacifiCorp would provide tailrace barriers at the Soda Springs and Slide Creek powerhouses by the first and fifth anniversaries of the license, respectively.
- PacifiCorp would continue to maintain the existing fishways at the Fish Creek and Lemolo No. 2 diversions and, by the second year after license issuance, would modify the existing Lemolo No. 2 fishway to comply with current state standards for providing upstream passage of resident trout. PacifiCorp would continue to reevaluate and modify the facility until optimum performance for that design is achieved.

- PacifiCorp would provide or improve downstream fish passage facilities as follows:
 - Install a fish screen at the Fish Creek intake by the second anniversary of the license—the screen would be reevaluated and modified until optimum performance is achieved.
 - Modify the trash rack at the Toketee dam intake by the fifth anniversary of the license to minimize downstream movement of trout longer than 5 inches.
 - Provide facilities at Soda Springs dam by the seventh anniversary of the license consisting of fish screens, a trap for evaluating screen performance and accommodating long-term monitoring of the downstream migrant population, and modifications to the spillway to improve downstream fish passage.
 - Mitigate unavoidable mortality associated with downstream fish passage at Soda Springs dam, Fish Creek dam, and all project diversions where downstream screening facilities are not constructed through other PM&E measures, including the use of mitigation funds (section 19).

Mitigation in lieu of new fish passage facilities (section 4)

- In lieu of constructing fish passage at Slide Creek dam, PacifiCorp would provide mitigation and funding to benefit migratory fish populations on-site or in proximity to the project (section 19.1, ODFW MOU section VI).²²
- In lieu of installing fish ladders at Toketee, Clearwater Nos. 1 and 2, and Lemolo No. 1 dams, PacifiCorp would provide benefits to fish and wildlife in the upper North Umpqua River Basin (section 19.1).

Mainstem North Umpqua anadromous fish spawning habitat enhancement (section 8, as amended)

- Before 2002, PacifiCorp would complete a baseline habitat survey of current spawning habitat from the Slide Creek powerhouse upstream to the confluence with Fish Creek. Within 1 year of license issuance or 2005, whichever is earlier, PacifiCorp would enhance or create approximately 6,000 square feet of spawning habitat in this area by placing new boulders or repositioning existing boulders to trap bedload mobilized by Fish Creek. Implementation and monitoring plans for

²² Three off-site mitigation measures are proposed in the MOU during the first year of the license: upgrading the Rock Creek diversion dam fishway, adding large woody debris to East Fork Rock Creek, and purchasing conservation easements for riparian protection in portions of the Rock Creek Basin. In addition to these three measures, large woody debris enhancements and conservation easements would also be initiated in upper Canton and East Fork Pass Creeks.

the Slide Creek boulder enhancement project were to be completed by September 2002, and initial placement of boulders would be done by September 2003.

- PacifiCorp would create 1,200 to 1,500 square feet of spawning habitat in the Soda Springs bypassed reach (amended section 8.3). Additional spawning habitat would be restored or created in other locations in the mainstem North Umpqua River and its tributaries below Soda Springs dam. PacifiCorp would prepare in consultation with the resource agencies a feasibility assessment analyzing the feasibility, costs, and benefits of restoring or creating spawning habitat at various locations in the North Umpqua River and its tributaries below Soda Springs dam and an implementation plan for habitat restoration and creation. After review of the draft implementation plan by the resource agencies, PacifiCorp would submit the final implementation plan to the resource agencies and the Commission and perform the habitat restoration or creation measures. Within 60 days of completion of the final implementation plan, or as agreed in writing by PacifiCorp and the agencies, PacifiCorp, in consultation with the agencies, would conduct a baseline habitat survey of spawning habitat at the selected habitat restoration or creation sites, under existing flow and channel conditions. The baseline habitat survey would be completed prior to initiation of in-water construction of habitat restoration or creation measures. Monitoring plans would be implemented to determine whether the expected quantity and quality of spawning habitat were being created.

Reservoir and forebay management (section 9 and 19.2)

- At license issuance or 2004, whichever is earlier, PacifiCorp would provide a one-time payment of \$10,000 to ODFW to fund development of a rainbow trout brood stock to supply hatchery fish. For the term of the license PacifiCorp would fund the production of approximately 15,000 catchable hatchery rainbow trout annually (sections 9.1 and 9.2).
- PacifiCorp would consult with interested parties to determine appropriate augmentation of base flows below Soda Springs powerhouse for spawning Chinook salmon (section 9.3).
- PacifiCorp would continue to salvage live fish from project waterways during maintenance shutdowns and relocate them in consultation with ODFW (section 9.4).
- When the license becomes final, PacifiCorp would provide \$100,000 each year to: (1) develop and implement a monitoring and adaptive management plan on the potential predation of anadromous salmonid juveniles by non-native predator species in Soda Springs Reservoir and (2) monitor and evaluate the success of the reintroduction of anadromous fish populations in the North Umpqua upstream of Soda Springs dam (section 19.2).

- After the license is finalized, PacifiCorp would provide \$15,000 to \$30,000 each year to monitor brook and rainbow trout populations in the upper North Umpqua watershed, support a brook trout control and reduction program in that area, or provide in-proximity rainbow trout habitat enhancement programs (section 9.6, and ODFW MOU section VI).
- PacifiCorp would provide funds in the first year of the license to purchase conservation easements in portions of Rock Creek Basin to increase riparian protection (ODFW MOU section VI).

Aquatic connectivity (sections 7.5, 10, and 15.6)

- At license issuance, PacifiCorp would reconnect the Clearwater River with the North Umpqua River to allow a portion of the Clearwater 2 bypassed reach flows to travel down the original Clearwater River channel to the confluence of the North Umpqua River downstream of Toketee dam. The reconnected channel would be designed to permit the movement of fish, amphibians, and macroinvertebrates between the North Umpqua River and the upper Clearwater River and to allow passage of sediment and woody debris during high flow events.
- During the second year after license issuance, PacifiCorp would construct a structure that would permit the movement of amphibians and macroinvertebrates (but not fish) across the dam at Stump Lake, but would not significantly alter the function or operation of the diversion structure (section 10.2).
- Within the first year after license issuance, PacifiCorp would remove diversion structures on Helen, Spotted Owl, Karen, Thorn, Mill, and White Mule Creeks to restore fish movement and riparian processes. Within this first year, PacifiCorp would also remove the diversion structure at Potter Creek and modify the diversion structure at Deer Creek to return flows to those stream channels, provide for passage of gravel and woody debris at those locations, and ensure fish movement is not impaired or prevented at them.
- By the second anniversary of license issuance or 2006, whichever is earlier, PacifiCorp would restore riparian habitat along White Mule Creek below FS Road 2610 to its confluence with the North Umpqua River. On a schedule determined by the Resource Coordination Committee, PacifiCorp would restore riparian habitat affected by the project at Potter Creek to the confluence with the North Umpqua River. Restoration measures would include plantings of native species and integration with erosion-control measures (section 10.5).

- PacifiCorp would reconnect Priority 1 and 2 intercepted tributaries and drainages²³ within, respectively, the sixth or eleventh year after license issuance by passing the drainages across canals or underneath flumes. The reconnections would accommodate a 100-year flood event and provide connectivity for riparian and aquatic species. Underpasses or coverings would accommodate the flood-prone area up to a distance of 150 feet. PacifiCorp would replace culverts associated with aquatic site reconnections with road fords or drivable dips, where feasible. Reconnections of intercepted streams associated with highly eroded areas would be incorporated into site designs for erosion control measures.
- PacifiCorp would replace or remove inadequately sized culverts under roads and along or adjacent to waterways associated with Priority 1 and 2 aquatic sites on a schedule to be included in the Transportation Management Plan (TMP). PacifiCorp would inventory other culverts on project lands to identify those which require modifications to allow fish passage and/or to pass a 100-year flood. Within 5 years of license issuance, PacifiCorp would upgrade culverts requiring modifications for fish passage barriers, and within 11 years, would upgrade those culverts requiring modifications to accommodate a 100-year flood.

Terrestrial Resources

Wildlife and wetlands (section 11)

- Within 1 year after license issuance, or 2004, whichever is earlier, PacifiCorp would increase the width of 29 existing big-game bridges across project waterways to 36 feet and provide suitable habitat components on crossing surfaces to facilitate use by all terrestrial species.
- Within 2 years after license issuance, or 2006, whichever is earlier, PacifiCorp would excavate at least nine wildlife underpasses beneath project penstocks.
- Within 3 years after license issuance, or 2007, whichever is earlier, PacifiCorp would develop a plan to evaluate the effectiveness of wildlife crossings. The plan would be implemented when existing wildlife crossing are upgraded or new crossings are installed. Based on the monitoring results, PacifiCorp may install up to five additional crossings by the fifth anniversary of the license.
- Within 4 years after license issuance, PacifiCorp would install 34 new 36-foot-wide wildlife crossings at locations that would maximize opportunities for wildlife movement. Prior to finalizing locations, PacifiCorp would search for Survey and Manage Species within 200 feet of the waterway system to identify areas where wildlife crossings would maximize benefits to rare, endemic species.

²³ These sites are listed in schedule 10.6 attached to the Settlement Agreement.

- By the eleventh anniversary of the license, PacifiCorp would enhance or create new wetlands at eight locations. Locations for wetland enhancement or creation include near the campgrounds at Lemolo Lake (by the first anniversary of the new license), Stump Lake (by the second anniversary of the new license), Fallen Mountain Creek in the vicinity of the historic channel (by the fourth anniversary of the new license), expanded Lemolo 1 forebay (by the fifth anniversary of the new license), and Stinkhole area (by the sixth anniversary of the new license). PacifiCorp would enhance or create an additional three wetlands by the eleventh anniversary of the new license at locations to be determined in consultation with the FS and ODFW. Potential locations for these additional three wetlands include Ranawapiti, Fallen Mountain Creek, and Lemolo Reservoir and other areas surrounding Toketee Reservoir. (section 11.5)

Vegetation management (sections 9.4 and 12)

- Until license issuance, current vegetation management practices would be continued. By April 2003, PacifiCorp would develop a vegetation management plan (VMP) to be implemented after license issuance (PacifiCorp 2002e). The plan would include weed control and specific measures for revegetation of banks and areas subject to reservoir fluctuations.
- In 2001, PacifiCorp began implementing measures to control and prevent the spread of noxious weeds with emphasis on known populations of these species (section 12.2).

Protection of birds (section 13)

- PacifiCorp would continue to implement existing measures (e.g., Agreement for Management of Birds on Power Lines dated February 18, 1988) to minimize adverse interactions between project power lines and birds. Any pole involved in a bird fatality would be retrofitted or rebuilt to increase safety for large perching birds. In addition, all new and rebuilt poles would be constructed following guidelines in *Suggested Practices for Raptor Safety on Powerlines: The State of the Art in 1996*.
- PacifiCorp would conduct operation and maintenance activities in the project area following the most current spatial and temporal guidelines for avian protection. Unless otherwise agreed upon between PacifiCorp and the FS, activities within 400 meters of active raptor nests would be conducted outside the nesting season unless nesting failure has been confirmed by the FS. Planning for and scheduling of these activities would be coordinated by the RCC.

- PacifiCorp would comply with conditions outlined in the Rattlesnake Rock peregrine falcon and the Toketee Lake bald eagle nest site plans (FS 1992, 2000c) when using helicopters to survey transmission lines.
- PacifiCorp would follow the existing Agreement for Management of Birds on Powerlines (PacifiCorp, ODFW, and FWS 1988), which promotes cooperation between PacifiCorp and the ODFW and FWS and includes procedures for dealing with bird mortality and problem nests. Records of dead birds found near project facilities would be kept in a database and annual reports that summarize program activities would be submitted to the FS.

Cultural Resources (section 18)

- The Cultural Resources Management Plan (CRMP) would be finalized by 2003. The CRMP would describe protection and mitigation measures for archaeological and historic resources and define the consultation process. A Programmatic Agreement, consistent with the terms and conditions of the CRMP, would be developed by FERC, the State Historic Preservation Office (SHPO), Advisory Council on Historic Preservation (ACHP), FS, BLM, and PacifiCorp to implement the CRMP.²⁴ Upon implementation of the CRMP, PacifiCorp would conduct a monitoring program of known cultural resources and project activities as detailed in the CRMP.
- PacifiCorp would continue to coordinate all operations and maintenance actions through the FS and BLM prior to issuance of a new license. A program for coordinating operations and maintenance would be established in the final CRMP.
- Before any ground-disturbing activities, PacifiCorp would conduct archaeological site discovery surveys in accordance with the *Umpqua National Forest Heritage Inventory Strategy* (FS April 2000, as amended).
- PacifiCorp would protect, restore, or recover data from archaeological sites as provided in site-specific plans approved by the SHPO, FS, and BLM. The schedule for recovery of known sites would be established in the final CRMP.
- PacifiCorp would provide public outreach, interpretive displays, and cultural resource sensitivity training to PacifiCorp personnel.

²⁴ The Cow Creek Band of the Umpqua Tribe of Indians was the only tribal organization to sign the PA.

Recreational Resources (sections 9.3 and 17)

- In April 2003 (PacifiCorp 2002e), PacifiCorp would finalize the Recreation Resources Management Plan (RRMP) to include site-specific plans and incorporate the following provisions:
 - Beginning in 2004, PacifiCorp would (1) reimburse FS for operation, maintenance, and replacement of recreation facilities at sites identified in the RRMP; (2) provide funds for public information programs and visitor center operations and monitoring; and (3) pay FS for law enforcement related to recreation activities within project boundaries. The funding would be sufficient to maintain the recreation facilities at minimum FS standards for health and cleanliness, safety and security, setting responsiveness, and condition.
 - If the FS has Congressional approval to retain fees collected at PacifiCorp-funded facilities, the fees would be directly spent on either maintenance or capital improvements at that facility or as directed by Congress. Funds collected, less overhead retained and expended at the site by the FS as provided by statute, would commensurately reduce PacifiCorp's annual obligation at that site. These fees would be used to contribute toward meeting at these facilities the full service Meaningful Measures standard referred to in section 17.3 of the Settlement Agreement.
 - Subject to the TMP and relevant restrictions for public safety, PacifiCorp would allow the public to access the project for recreation (e.g., wildlife viewing, fishing, hunting).
 - Upon license issuance, PacifiCorp would provide capital improvements for existing recreation facilities and future expansion.
 - By the date of license issuance, or 2004, whichever comes earlier, PacifiCorp would provide funds for meeting the compliance requirements of the Umpqua National Forest Plan within the project boundaries.
 - Until license issuance, PacifiCorp would maintain Lemolo Reservoir at or near full pool elevation (i.e., approximate elevation of 4,148.5 feet amsl) throughout the peak recreation season of Memorial Day through Labor Day, except during energy emergencies.²⁵ PacifiCorp would also make reasonable efforts to allow boaters access to the lake by the opening of fishing season (i.e., the fourth Saturday in April) and limit total annual drawdown of the lake to 25 feet below full pool (i.e., to a maximum drawdown elevation of 4,123.5 feet amsl) from

²⁵ For example, during any regional energy Alert 2 applicable to the state of Oregon, PacifiCorp may draw down Lemolo Reservoir to approximately 4,142 feet amsl elevation between Memorial Day and Labor Day.

Labor Day to the next Memorial Day. Section 9.3 of the Settlement Agreement would allow PacifiCorp to draw Lemolo Lake down by up to 3.5 feet from full pool between Memorial Day and Labor Day.

- Upon license issuance, the annual drawdown of Lemolo Reservoir would be limited to 25 feet below full pool (i.e., to a maximum drawdown elevation of 4,123.5 feet amsl), unless greater drawdowns would meet ODFW and Umpqua National Forest Plan objectives.

Aesthetic Resources (section 16)

- By April 2003 (PacifiCorp 2002e), PacifiCorp would prepare a Visual Resource Management Plan (VRMP), containing guidelines for design, maintenance, and construction of project facilities to preserve or enhance the visual resources of the project area. Implementation of the VRMP would begin upon license issuance.
- Within 1 year of license issuance, or 2005, whichever is earlier, PacifiCorp would conduct photographic simulations of the Lemolo No. 2, Toketee, and Clearwater No. 2 penstocks and the Lemolo No. 2 and Toketee surge tanks showing alternative color treatments. The FS would select the color to be used at the next painting interval for the facility. Within 25 years of license issuance, PacifiCorp would evaluate the status of the existing paint on such facilities.
- Within 1 year of license issuance, or 2005, whichever is earlier, PacifiCorp would evaluate 11 sites on the transmission line right-of-way for existing plant species, mix, age, and size and their effectiveness in mitigating the visual impact of the transmission lines. PacifiCorp would consider modifications to such vegetation or other methods (e.g, using non-reflective material when conductors need to be replaced) that might reduce visual impact and would include an implementation schedule for these measures in the VRMP.
- Within 2 years of license issuance, or 2006, whichever is earlier, PacifiCorp would develop and implement a landscape plan for the Clearwater switching station and the Clearwater maintenance area.

Land Use

Roads (section 15)

- By April 2003, PacifiCorp would finalize the draft TMP. The TMP would describe the conditions under which certain PacifiCorp-maintained hydro and transmission roads would be open to public access. It would include a plan for monitoring roads for review of maintenance activities and for damage.
- PacifiCorp has assumed 100 percent maintenance and capital improvement responsibility for PacifiCorp-maintained hydro and transmission roads. Beginning

in 2005, PacifiCorp and the FS would cost-share maintenance and capital improvements on joint-use hydro maintenance roads.

- Within 4 years of license issuance, PacifiCorp would decommission 8.6 miles of hydro and transmission roads.

Bridges (section 15.5)

- PacifiCorp, in consultation with the FS, would inventory bridges, and the TMP would include a plan for inspecting them.
- PacifiCorp has assumed 100 percent maintenance responsibility for bridges on PacifiCorp-maintained hydro and transmission roads. Upon license issuance, PacifiCorp and the FS would cost-share bridge maintenance on roads classified as joint-use hydro maintenance; however, the owner of each bridge would bear the full cost of deferred maintenance on it. Within 1 year of license issuance, or 2005, whichever occurs earlier, PacifiCorp would perform critical, deferred, safety-related maintenance on its bridges, and within 10 years would perform non-critical, deferred maintenance on them.

Culverts (section 15.6)

- PacifiCorp, in consultation with FS, would inventory culverts on project lands.
- Culverts would be upgraded for fish passage by the fifth anniversary of the new license.
- Culverts would be upgraded to pass a 100-year flood by the eleventh anniversary of the new license.
- The cost of upgrading culverts would be allocated on the same basis as costs for road maintenance measures.

Mitigation Funding²⁶ (section 19)

- *Early Implementation Fund:* Beginning on January 31, 2002, and continuing each year until license issuance, PacifiCorp would deposit \$350,000 in an Early Implementation Fund to be used before the new licence becomes final for highly visible measures not otherwise funded during this period—for example, high-priority erosion sites, riparian restoration at Potter Creek, enhancement of up to two wetland areas, road decommissioning, tributary reconnections, and culvert replacements.

²⁶ All dollar amounts would be adjusted for inflation.

- ***Tributary Enhancement Program and Account:*** To offset project impacts to fish and wildlife that would not otherwise be mitigated by the Settlement Agreement, PacifiCorp would implement a Tributary Enhancement Program. The program would be funded by an Enhancement Account with an initial deposit of \$2 million made no later than January 31, 2004, and followed by annual deposits of \$430,000 for 7 years. Upon license issuance, these funds would be used to implement enhancement and mitigation projects, including those required by the ODFW MOU—for example, habitat enhancement on private lands in the upper Pass Creek and East Fork Pass Creek subbasins of the upper Canton Creek Basin.
- ***Mitigation fund:*** Prior to license issuance, or 2004, whichever is earlier, PacifiCorp would establish a mitigation fund to be administered by the FS. This fund would be used to mitigate or compensate for project-caused adverse impacts to natural resources—for example, wetlands; stillwater amphibian habitat; riparian, aquatic, and terrestrial species connectivity; vegetation management; soil loss; erosion—not otherwise mitigated under the Settlement Agreement. Upon license issuance, or 2004, whichever is earlier, PacifiCorp would deposit \$250,000 by January 31 each year. In addition, PacifiCorp would make a total payment of \$8 million in increments of \$1 million beginning on the first January 31 after license issuance, or January 31, 2004, whichever is earlier, and continuing on the second, seventh, tenth, thirteenth, sixteenth, nineteenth, and twenty-second anniversaries of the first payment. The FS would not be able to spend any of this money until after license issuance.
- ***Oversight costs:*** Upon license issuance, PacifiCorp would annually pay ODFW \$162,000 to monitor tasks associated with the Tributary Enhancement Program and oversee on-site mitigation measures.
- ***Annual reports:*** PacifiCorp would provide annual reports on the amounts deposited in and dispersed from these accounts.

Alternatives for Providing River Flow Reregulation (section 20)

- The parties to the Settlement Agreement agreed to finalize a feasibility report on two alternative measures that might better achieve their goals and objectives: (1) removing Soda Springs dam and installing a new reregulating dam upstream from the present location of this facility, and (2) installing an enlarged spill gate at Soda Springs dam.²⁷

²⁷ In their final report (PacifiCorp et al. 2001), the parties determined that the Settlement Agreement as a whole offers more certain environmental and power generation benefits throughout the North Umpqua River Basin than either alternative.

(continued...)

Resource Coordination Plan (section 21.1)

- Within 1 year after license issuance, or 2005, whichever is earlier, PacifiCorp would finalize the Resource Coordination Plan to incorporate PM&E measures required under the Settlement Agreement and FERC license.
- PacifiCorp would convene a meeting of a RCC consisting of representatives of the organizations that signed the Settlement Agreement to facilitate and coordinate the implementation of PM&E measures related to the project. The RCC would not be responsible for administration of either the Tributary Enhancement Program or the Mitigation Fund (section 19 of the Settlement Agreement), though the governmental agencies responsible for these programs may consult with the RCC regarding proposed mitigation activities. The RCC would: (a) facilitate coordination and consultation on plans developed by PacifiCorp for implementation of PM&E measures; (b) coordinate implementation of these measures and ongoing monitoring requirements by PacifiCorp; (c) establish appropriate procedures for conducting its activities; and (d) establish such subcommittees as it deems necessary to achieve the objectives in a, b, and c above and to determine, as appropriate, the size, membership, and procedures of such committees, including those of any of the committees identified specifically in the Settlement Agreement or in the PM&E measures.
- Beginning on June 13, 2002, PacifiCorp would prepare an annual report on the activities of the RCC and on implementation of the PM&E measures during the previous years.

Construction plans and schedules (sections 21.5–21.7)

- Construction requiring ground or habitat disturbance in rivers or riparian habitats would be done during noncritical periods for affected resources.
- Before beginning any ground- or habitat-disturbing construction activity, PacifiCorp would search for rare, endemic species and Survey and Manage Species within 400 feet of the planned activity.

²⁷(...continued)

Therefore, they recommended against further evaluation or technical analysis of those alternatives in this EIS.

2.2.3 Water Quality Certificate Conditions

On July 21, 2001, PacifiCorp applied to ODEQ for water quality certification as required under Section 401(a)(1) of the Federal Water Pollution Control Act (Clean Water Act). On June 28, 2002, ODEQ granted the Clean Water Act (CWA) § 401 Certificate for the North Umpqua Hydroelectric Project (ODEQ 2002), which adopted relevant measures from the Settlement Agreement and included additional conditions.²⁸ Table 2-2 summarizes the § 401 certificate conditions.

2.2.4 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission shall require the construction, maintenance, and operation by a licensee at its own expense of such fishways as may be prescribed by the Secretary of Commerce or Secretary of Interior as appropriate.

Table 2-2. Summary of Clean Water Act § 401 Water Quality Certificate Conditions (ODEQ 2002).

Water Quality Certificate Condition	Settlement Agreement conditions ^a
1. Temperature	
a. Implement a surface water temperature management plan with measures to reduce the project's contribution to exceedances of instream water quality criteria for temperature.	none
b. Implement a Stream Temperature Monitoring Plan (STMP) specifying instream temperature monitoring reasonably needed to determine (a) whether the temperature criteria continue to be exceeded in project affected waters, (b) the success of the temperature management plan in reducing the project's contribution to any continued exceedances of the criteria, and (c) any additional measures that may be needed to reduce the project's contribution to exceedances of the criteria.	none
c. Upon final Environmental Protection Agency (EPA) approval of Total Maximum Daily Load (TMDL) for temperature in project-affected waters, ODEQ may reevaluate PacifiCorp's temperature management plan and require revised measures after seeking to implement measures from other anthropogenic sources in the subbasin to reduce their contributions to exceedances of the temperature criteria.	none

²⁸ On March 13, 2003, ODEQ filed a letter with the Commission stating that it believed there was no basis for considering modification to conditions of the § 401 Water Quality Certificate's conditions as a result of the amendment to the Settlement Agreement.

Table 2-2. (continued).

Water Quality Certificate Condition	Settlement Agreement conditions ^a
d. At the end of the period determined necessary to implement the TMDL for temperature, ODEQ may reevaluate PacifiCorp's Temperature management plan to determine whether the TMDL and allocations for the project have been achieved and, if not, may require revised or additional measures.	none
e. ODEQ may modify the STMP if: (1) it proves inadequate to provide needed data or (2) modifications to the temperature management plan require modifications to the STMP.	none
f. Install a fish screen at the Fish Creek Diversion intake	4.3.2
g. Conduct scheduled maintenance.	6.6
2. Hydrogen Ion Concentration (pH)	
a. Reroute Lemolo No. 2 powerhouse discharge to Toketee Reservoir to address pH criteria exceedences in the Lemolo No. 2 full-flow reach.	5.4.
b. Conduct scheduled powerhouse maintenance and any ramping associated with project maintenance in accordance with the requirements of the Settlement Agreement	6.6
c. Design the expanded Lemolo No. 1 forebay to allow mechanical removal of macrophyte growth without compromising the forebay's liner integrity. If aquatic plant growth in the forebay causes a pH criteria exceedance, at ODEQ's request, develop and implement a plan and schedule to dredge the forebay or to take other measures to address the pH criteria exceedance.	11.5
d. Monitor pH: (1) on an hourly basis at the permanent monitoring station located below Soda Springs Powerhouse or at other approved location in the North Umpqua River below the project and report data to ODEQ each year; (2) annually the first and second year after the Lemolo No. 1 forebay expansion is completed, and every 5 years through the remaining term of the new FERC License; and (3) at the completion of annual maintenance at Lemolo No. 2, Fish Creek, and Clearwater No. 1 powerhouse tailraces for 30 hours, starting 6 hours before generator restart and continuing until 24 hours after restart.	none
3. Biological Criteria, and Protection of Beneficial Uses of Anadromous Fish Passage, Salmonid Spawning, Salmonid Rearing, and Resident Fish & Aquatic Life Under Other Appropriate Laws	
a. Provide in-stream flow as required by the Settlement Agreement.	5, 10.4
b. Develop and implement a coordinated gage installation and data reporting plan.	5.5
c. Implement fish passage measures.	4
d. Implement ramping restrictions and measures	6
e. Implement fluvial geomorphic restoration measures	7
f. Implement measures to restore, create, and enhance spawning habitat	8.1
g. Manage the drawdown and reservoir operating level (i.e., Lemolo Reservoir Rule Curve)	9.3, 9.4

Table 2-2. (continued).

Water Quality Certificate Condition	Settlement Agreement conditions ^a
h. Implement required aquatic connectivity measures, and breach or alter diversions for Helen, Spotted Owl, Karen, Thorn, Potter, Deer, White Mule, and Mill Creeks.	10.1, 10.2, 10.3, 10.4, 10.6, 15.6
i. Notify Oregon Emergency Response System of erosive events and coordinate remedial measures.	14.3.2 and 14.3.3
j. Fund, operate, and maintain a permanent water quality monitoring station below Soda Springs powerhouse.	none
4. Aesthetic Conditions, Turbidity, and Sediment	
a. Implement fluvial geomorphic process restoration measures	7
b. Implement project bypass ramping restrictions and maintenance measures	6.5, 6.6
c. Install and maintain gage stations.	5.5
d. Undertake project maintenance.	6.6.b.
e. Implement erosion and sediment control measures.	10.6, 12.1, 14
f. Implement transportation management measures.	15.1, 15.4, 15.6
g. When conducting ground-disturbing activities greater than 1 acre, comply with applicable provisions of the NPDES stormwater permitting program; use Best Management Practices (BMPs) to protect surface water from trace-metals and other toxic constituents, sediment, and turbidity.	none
h. Provide 60 days' written notice and obtain ODEQ approval for dredging or removal of sediments from project impoundments; use BMPs to protect surface water from trace-metals and other toxic constituents, sediment, and turbidity.	none
i. Monitor turbidity hourly below the project at a ODEQ-approved location.	none
j. Manage Lemolo Reservoir levels as required by the Settlement Agreement; evaluate erosion and sediment transport into Lemolo Reservoir through the Erosion Control Plan.	9.3, 14
5. Bacteria and Bacteria Pollution	
a. Verify the proper operation of on-site sewage systems	none
b. Maintain written records of the onsite system septic tank pumping and of visual observations of the operation and function of the leach field and other parts of the on-site system at the time of pumping.	none

Table 2-2. (continued).

Water Quality Certificate Condition	Settlement Agreement conditions ^a
6. Dissolved Oxygen (DO)	
a. Schedule powerhouse maintenance as required by the Settlement Agreement	6.6
b. During the first year after the Lemolo No. 2 powerhouse flow is rerouted, monitor DO at Lemolo No. 2 full-flow reach hourly for a minimum of 72 consecutive hours once between July 15 and August 15 and report monitoring data to ODEQ by December 31.	5.4
c. Monitor DO levels for a minimum of 72 consecutive hours in each bypassed reach once during the first July in which the minimum flows set forth in the Settlement Agreement are required; propose sampling locations for ODEQ approval; report data to ODEQ annually. If needed, undertake additional DO monitoring in bypassed reaches.	none
d. Monitor DO hourly at the monitoring station below Soda Springs powerhouse upon license issuance.	none
e. Report data to ODEQ by December 31 for the previous water year.	none
7. Habitat and Flow Modification; Deleterious Conditions; Taste and Odor	
a. Breach the diversion at Potter Creek and restore riparian habitat.	10.4, 10.5
b. Modify the diversion structure at Deer Creek, and complete erosion-site remediation to the extent required by the Settlement Agreement	10.4, 10.6, 14.4
c. Give priority to performing Lemolo No. 2 maintenance to maximize the potential for natural channel-forming events that will enhance fluvial geomorphology processes and promote the distribution of large wood and gravel in the Lemolo No. 1 and Lemolo No. 2 bypassed reaches.	6.6.b
8. Nuisance Algae	
a. Monitor chlorophyll-a in Lemolo Reservoir in accordance with a study plan approved by ODEQ.	none
b. If monitoring demonstrates an exceedance of the average chlorophyll-a action level, ODEQ may require PacifiCorp to undertake additional studies to describe the effects, determine the probable causes of the exceedance, and to propose a control strategy, if warranted.	none
9. Total Dissolved Gas (TDG)	
Implement a Total Dissolved Gas Management Plan that includes the following elements: (1) replace the Lemolo No. 1 powerhouse turbine and study the TDG saturation levels in the powerhouse tailrace, in the forebay inlet, and in the North Umpqua River approximately 0.25 mile downstream from the powerhouse; (2) if needed, modify the expanded Lemolo No. 1 forebay to dissipate dissolved gases entering the forebay and powerhouse and study the TDG saturation levels in the powerhouse tailrace, in the forebay inlet, in the penstock inlet,	

Table 2-2. (continued).

Water Quality Certificate Condition	Settlement Agreement conditions ^a
<p>and in the North Umpqua River approximately 0.25 mile downstream from the powerhouse and, if needed, submit a TDG management and compliance plan and implement it upon ODEQ approval; (3) ensure that the water conveyance system used to reroute flows from the Lemolo No. 2 tailrace to Toketee Lake (Settlement Agreement section 5.4) dissipates TDG and excludes fish from the tailrace and system and study TDG levels associated with the Lemolo No. 2 water conveyance system; (3) prior to operation of the new water conveyance system, assess gas bubble trauma in fish collected from the Lemolo No. 2 full-flow reach; (5) operate the Clearwater No. 2 powerhouse at a power generation level of at least 2 MW (when operating), and only with the air admission system closed at power generation levels of 10 MW or less; (6) study TDG saturation levels in the Clearwater No. 2 powerhouse tailrace; (7) monitor TDG saturation levels at the bottom and surface of Stump Lake at the diversion dam during the first annual maintenance event at the Clearwater No. 1 powerhouse; and (8) measure TDG above and below the Fish Creek diversion dam while in spill condition.</p>	none
10. Objectionable Discoloration; Scum and Oily Slick; Spill and Waste Management	
a. Implement project-specific Oil Spill Prevention, Control and Countermeasure (SPCC) Plan; Chemical Management System; and Waste Management Guidelines.	none
b. In the event of a spill or release or threatened spill or release to state waters, immediately implement the site's SPCC plan, modified SPCC plan, or other applicable contingency plan and notify the Oregon Emergency Response System.	none
c. Ensure compliance with ODEQ regulations and permit requirements for project maintenance, including bridge maintenance, that is PacifiCorp's responsibility under the Settlement Agreement, that could result in accumulations of solid waste or other residues; ensure that employees and contractors receive sufficient instruction and training to notify designated personnel to implement the applicable prevention and emergency response plans and to respond to situations that could result in unauthorized discharges to waters of the State.	15.5
d. Maintain records of instances where the site-specific SPCC plan, Chemical Management System, and/or Waste Management Guidelines (or equivalent) is modified or the emergency response provisions of the plans are invoked.	none
11. Total Dissolved Solids	
<p>Monitor specific conductance hourly at monitoring location below Soda Springs powerhouse; report the results of monitoring for specific conductance for each water year to ODEQ by December 31; and consult with ODEQ on the implementation of non-routine measures under the Settlement Agreement and the § 401 Certification that may threaten or cause significant short-term turbidity or increased erosion.</p>	none

Table 2-2. (continued).

Water Quality Certificate Condition	Settlement Agreement conditions ^a
12. Toxic Substances	
Follow manufacturer's label instructions when applying herbicides within the project; ensure the applicator has a current state Pesticide Applicator License; have a current Spill Prevention, Control, and Countermeasure Plan in effect at all times; and have a current and complete PCB procedure in effect at all times.	none
13. § 401 Certification Modification	
ODEQ may modify this Certification to add, delete, or alter Certification conditions as necessary and feasible to address: (a) adverse or potentially adverse project effects on water quality or designated beneficial uses that did not exist or were not reasonably apparent when this Certification was issued; (b) TMDLs (not specifically addressed elsewhere in the Certification conditions); (c) changes in water quality standards; (d) any failure of Certification conditions to protect water quality or designated beneficial uses as expected when the Certification was issued; or (e) any change in the project or its operations that was not contemplated by the Certification that might adversely affect water quality or designated beneficial uses.	none
14. Project Changes	
Obtain ODEQ review and approval before undertaking any change to the project that might significantly and adversely affect water quality, including changes to project structures, operations, and minimum flows.	none
15. Project Repair or Maintenance	
Obtain ODEQ review and approval before undertaking project repair or maintenance activities that might significantly affect water quality (other than repair or maintenance activities required by or considered in the Certification); ODEQ may, at PacifiCorp's request, approve specified repair and maintenance activities on a periodic or ongoing basis.	none
16. Project Inspection	
Allow ODEQ necessary access to inspect the project area and project records required by the Certification to monitor compliance with Certification conditions.	none
17. Project Specific Fees	
Pay a project-specific fee for ODEQ's costs of overseeing implementation of this Certification in the amount of \$10,000 (2002 dollars) annually, after issuance of this Certification beginning on July 1, 2003. The fee shall expire five (5) years after the first July 1 following the issuance of the new license, unless ODEQ terminates it earlier.	none

Table 2-2. (continued).

Water Quality Certificate Condition	Settlement Agreement conditions ^a
18. Monitoring	
Exercise reasonable care in the selection, installation, maintenance, and use of monitoring devices in undertaking monitoring required by this Certification. Providing such care is exercised, PacifiCorp would not be responsible for missing or inaccurate monitoring data, but ODEQ, may require PacifiCorp to undertake any additional reasonable monitoring that is needed to address the missing or inaccurate data.	none
19. Posting of § 401 Certification	
Post a copy of the § 401 certification conditions at the Toketee Control Center.	none

^a These sections of the Settlement Agreement are specifically called out in the § 401 Water Quality Certificate conditions.

By letters filed December 11, 2001, and December 26, 2001, the NMFS (as delegated by the Secretary of Commerce) and the FWS (as delegated by the Secretary of the Interior) filed revised preliminary Section 18 prescriptions, respectively.²⁹ The NMFS filing states its Section 18 prescriptions incorporate the “relevant fish passage requirements” contained in the Settlement Agreement. Section 4 of the Settlement Agreement lists fish passage requirements, which are summarized in section 2.2.2 of this EIS.

The FWS stated that nothing in its amended preliminary comments, recommendations, terms and conditions, and prescriptions is intended to materially alter the requirements and measures contained in the Settlement Agreement. The FWS’s Section 18 prescriptions include the following:

²⁹ NMFS and Interior filed their initial preliminary Section 18 fishway prescriptions on February 28 and March 1, 2001, respectively, in response to FERC’s November 20, 2000, Notice of Application Ready for Environmental Analysis and prior to the finalization of the Settlement Agreement. The revised preliminary fishway prescriptions were filed in response to FERC’s October 11, 2001, notice to revise and resubmit terms and conditions and prescriptions to resolve inconsistencies with the Settlement Agreement.

9. Develop and submit a post-construction evaluation plan for testing upstream passage facilities at Lemolo No. 2 in consultation with and for approval by the resource agencies.

Downstream fishways

1. Provide downstream passage at Soda Springs dam by installing fish screens that meet the performance standards set forth in the Settlement Agreement and include a trap for evaluating screen performance and to accommodate long-term monitoring of the downstream anadromous fish migrant populations.
2. Improve downstream fish passage over the spillway at Soda Springs dam through modifications in accordance with the Settlement Agreement.
3. Install a fish screen at the Fish Creek intake in accordance with the Settlement Agreement.

Both NMFS and the FWS reserve their authority under Section 18 of the FPA to prescribe such additional or modified fishways at those locations and at such times as they may subsequently determine are necessary to provide for effective upstream and downstream passage of anadromous fish and request that license articles reflect these prescriptions.

2.2.5 Incidental Take Statement Terms and Conditions and Essential Fish Habitat Conservation Recommendations

In compliance with Section 7 of the Endangered Species Act,³¹ the Commission has consulted with the FWS and NMFS on the impacts that the proposed relicensing would have on listed threatened and endangered species and designated critical habitat. In addition, the Commission consulted with the NMFS regarding essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996.³²

FWS Incidental Take Terms and Conditions

On December 23, 2002, the FWS filed a concurrence letter and its final Biological Opinion (BO) on the effects that the proposed relicensing might have on listed species and designated critical habitat (FWS 2002b). The FWS concurred with the Commission's

³¹ 16 U.S.C. §1531 *et seq.*

³² 16 U.S.C. §1801 *et seq.*

determination that implementation of the proposed action is not likely to adversely affect the rough popcorn flower, Kincaid's lupine, or Canada lynx. The FWS concluded in its BO that the Commission's issuance of a license is not likely to jeopardize the continued existence of the spotted owl, bald eagle, or Columbian white-tailed deer and is not likely to adversely modify designated spotted owl critical habitat, but would result in incidental take³³ of these three species. The FWS identified the following reasonable and prudent measures to minimize the level of take:

1. Prevent disturbances to northern spotted owl and bald eagle pairs and their progeny during the nesting season.
2. Protect the nest grove of active spotted owl pairs and active bald eagle nests.
3. Prevent impacts to deer.

To implement these reasonable and prudent measures, the FWS stated that "the Forest must comply with the following terms and conditions . . ."³⁴

1. The applicant shall manage disturbance-causing activities within 0.25 miles of unsurveyed suitable spotted owl nesting, roosting, and foraging (NRF) habitat by minimizing the number and extent of these activities between March 1 and July 15 during each calendar year the permit is in effect.
2. While operating within Deer fawning habitat, the applicant shall perform vegetation management and powerline maintenance activities outside the fawning period (May through July) whenever it is feasible. Activities which must be conducted in Deer habitat during the fawning period will be included in the monitoring report described below.
3. The Commission³⁵ shall monitor and file an annual report with the Service for all actions which are likely to adversely affect a listed species. This monitoring will ensure that the actual levels of incidental take that would result from the implementation of the proposed actions will not exceed the anticipated levels of

³³ Any take of a listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or the applicant.

³⁴ Although the FWS states that the Forest must comply with the terms and conditions, we assume the FWS intends for these terms and conditions to be directed at the Commission.

³⁵ Where FWS indicates that the Commission must perform specific actions (e.g., conduct monitoring, file reports), we interpret this to mean that PacifiCorp would be directed by the Commission to complete such actions as part of any license that would be issued.

incidental take, and facilitate the tracking of the habitat baseline. Progress on activities addressed in this Opinion will be reported on an annual basis, with a report submitted by January 31 for the preceding year, (i.e., the January 31, 2003 report will describe progress on the year 2002 activities) as well as activities previously consulted on but still being implemented. The monitoring report shall include all items listed in Appendix C.³⁶

³⁶ Staff believes that the FWS is referring to Appendix B of the BO (*Monitoring and Reporting Requirements for PacifiCorp Maintenance Activities*). The FWS specifies monitoring and reporting requirements for PacifiCorp maintenance activities as follows:

1. A report will be provided annually (by January 31) to the Umpqua National Forest Level 1 team which includes, but is not limited to, the following information: (a) Number of hazard trees ≥ 12 inches diameter breast high (dbh) (≥ 16 inches dbh when in lodgepole pine) felled and down trees bucked in the following three land categories: Designated critical habitat for the northern spotted owl; suitable northern spotted owl NRF habitat; and riparian reserve (break out lodgepole pine series activities and summarize separately); (b) When in suitable NRF habitat, subset of above totals which were felled/bucked during the bald eagle nesting season (1 January - 15 August). This information may be summarized by District, plant series, or by individual powerline.
2. The level one team will meet before the end of February each year to evaluate the information included in, and the format of the annual monitoring reports. The level one team will assess the value of the information provided in those reports for determining the impacts of incidental take to listed species. The level one team will also determine whether the level of anticipated incidental takings has been exceeded, and if, and how the Terms and Conditions need to be modified. Modifications are not expected to be necessary each and every year. The modifications agreed upon by the entire level one team (if any) may be incorporated into Opinion via reinitiation of consultation.

Reinitiation shall be required if more than 20 trees over 16" dbh are felled in a given year.

4. The Commission shall report all new bald eagle nests and roost sites discovered within the action area to the Service (Roseburg Field Office) and to the Applicant (Power Delivery Safety and Environmental) so the Applicant can conduct a risk assessment, and modify power poles in the immediate vicinity of the new nest or roost site, consistent with the standards and procedures³⁷ described above "Consultation History."

NMFS Incidental Take Terms and Conditions and EFH Recommendations

On December 17, 2002, the NMFS filed its BO on the effects of the proposed action on listed species. NMFS anticipates that the proposed action would cause more than a negligible amount of incidental take of Oregon Coast coho salmon, but that the extent of anticipated take would not be likely to jeopardize the continued existence of this species. Section 9.3 of the BO identifies the following reasonable and prudent measures:

1. Minimize the likelihood of incidental take associated with project operations by providing adequate instream flows, minimizing flow fluctuations, managing riparian vegetation, and controlling erosion and sediment.
2. Minimize the likelihood of incidental take from construction activities in or near watercourses by restricting instream work to recommended time periods, implementing pollution and erosion control measures, and avoiding or replacing lost riparian and instream functions.
3. Mitigate the effect of incidental take by providing fish passage to upstream habitat, and minimize incidental take associated with downstream fish passage at diversions by providing fish screens.
4. Mitigate the effect of incidental take by restoring fluvial geomorphic processes, enhancing spawning habitat, providing additional aquatic connectivity, providing access to upstream habitat, and funding tributary enhancement and other mitigation measures.
5. Monitor the effectiveness of the proposed protection, minimization, and enhancement measures in minimizing the effect of incidental take and report monitoring results to NMFS.

³⁷ The "standards and procedures" referred to here are contained in the publication entitled *Suggested Practices for Raptor Safety on Power Lines: The State of the Art in 1996* [Avian Power Line Interaction Committee (APLIC 1996)].

Section 9.4 of the NMFS BO specifies the terms and conditions to be included in any new license to implement these reasonable and prudent measures. Most of these terms and conditions require implementation of specific PM&E measures in the Settlement Agreement. The terms and conditions to implement each of the reasonable and prudent measures listed above are presented in table 2-3.

In regard to EFH, NMFS concluded that the proposed relicensing of the North Umpqua Project would adversely affect designated EFH for coho salmon and chinook salmon. NMFS states that it does not believe the conservation measures described in the Biological Assessment submitted by FERC are sufficient to address the adverse impacts to EFH. NMFS finds that the terms and conditions outlined in Section 9 of the BO are applicable to designated EFH for coho salmon and chinook salmon and recommends that they be adopted as EFH conservation measures.

2.2.6 Federal Land Management Conditions

Because the North Umpqua Project occupies lands within the Umpqua National Forest and the transmission lines cross BLM lands, the FS and BLM have the authority under Section 4(e) of the FPA to require conditions in any license issued that they may find necessary for the protection and utilization of the National Forest and public lands administered by BLM. In addition, Section 4(e) of the FPA prohibits the Commission from licensing a project that interferes or is not consistent with the purposes for which the national forests were created or acquired. Staff assumes that these Section 4(e) terms and conditions would be required for any of the alternatives considered in this EIS.

On March 7, 2003, the FS filed revised draft Section 4(e) terms and conditions it finds necessary for the protection and utilization of the Umpqua National Forest.³⁸ This filing incorporates modifications from Amendment No. 1 of the Settlement Agreement and states that all other draft 4(e) terms and conditions remain as written in the FS filing of June 24, 2002. Under Condition No. 3, the FS reserves its authority to add to, delete from, or modify these draft terms and conditions in the event that PacifiCorp, the FS, or other resource agencies withdraw from the Settlement Agreement. The FS also reserves its authority in Condition No. 4 to modify its Section 4(e) terms and conditions if (1) the term of the new license exceeds 35 years, (2) the FS is required to modify them upon

³⁸ The FS filed its initial preliminary Section 4(e) terms and conditions on February 27, 2001, and included a schedule for filing final terms and conditions within 90 days of publication of the Commission's final EIS for relicensing of the North Umpqua Project. On November 6, 2001, the FS filed 18 revised preliminary terms and conditions for the issuance of a new license for the North Umpqua Project to PacifiCorp.

Table 2-3. Terms and conditions of National Marine Fisheries Service's incidental take statement (NMFS 2002).

Terms and conditions	Settlement Agreement Sections
9.4.1 Instream Flows, Flow Fluctuations, Riparian Vegetation, Erosion and Sediment Control —Implement NMFS reasonable and prudent measure no. 1 with the following provisions:	
a. Implement the minimum instream flow measures.	5.1–5.9 and tables 1 and 2 of Appendix C
b. Implement the ramping measures.	6.1–6.9
c. Ensure that ramping criteria for the Wild and Scenic River reach are maintained during emergency shutdowns. In accordance with section 6.8 of the Settlement Agreement, this is to happen via necessary measures to achieve this requirement, including, but not limited to, installing a new bypass valve or improving the existing valve at Soda Springs powerhouse by the date the new license becomes final or 2004, whichever is earlier.	6.4 and 6.8
d. Develop and implement a vegetation management plan, including measures set forth in Section 9.4.2(n) – (q) of these terms and conditions.	12.1
e. Implement noxious-weed control measures.	12.2
f. Implement erosion- and sediment-control measures.	14.1–14.8
g. Perform road and bridge decommissioning.	15.1–15.5.1
9.4.2 Construction Activities In or Near Watercourses —Implement NMFS reasonable and prudent measure no. 2 with the following provisions:	
a. Complete all in-water work occurring on the downstream side of Soda Springs dam within the work period of July 1 and September 15.	NA ^a
b. Conduct no in-water work on the downstream side of Soda Springs dam outside this work period without prior written authorization from NMFS, in consultation with ODFW.	NA
c. Ensure that construction activities associated with habitat enhancement and erosion control measures meet or exceed best management practices and other performance standards contained in the ODEQ for the National Pollutant Discharge Elimination System ("NPDES") 1200-CA permit (General NPDES Stormwater Discharge Permit).	NA
d. Inspect all erosion control devices weekly, at a minimum, during construction to ensure that they are working adequately.	NA
e. Ensure that erosion control materials (e.g., silt fence, straw bales, aggregate) in excess of those installed are available on site for immediate use during emergency erosion control needs.	NA
f. Ensure that vehicles operated within 150 ft of the waterway are free of fluid leaks; conduct daily examination of vehicles for fluid leaks during periods operated within or above the waterway.	NA

Table 2.3. (continued).

Terms and conditions	Settlement Agreement Sections
g. During completion of habitat enhancement activities, allow no pollutants of any kind (sewage, waste spoils, petroleum products, etc.) to come in contact with the water body or wetlands nor their substrate below the mean high-high water elevation or 10-year flood elevation, whichever is greater.	NA
h. Evacuate any areas used for staging, access roads, or storage and remove all materials, equipment, and fuel if flooding of the area is expected to occur within 24 hours.	NA
i. Conduct vehicle maintenance, re-fueling of vehicles and storage of fuel at least 150 ft from the waterway.	NA
j. At the end of each work shift, ensure that no vehicles are stored within or over the waterway.	NA
k. Prior to operating within the waterway, clean all equipment of external oil, grease, dirt or caked mud; conduct any washing of equipment in a location that would not contribute untreated wastewater to any flowing stream or drainage area.	NA
l. Use temporary erosion and sediment controls on all exposed slopes during any hiatus in work exceeding 7 days.	NA
m. Place material removed during excavation only in locations where it cannot enter sensitive aquatic resources; store and reuse any topsoil removed on-site to the greatest extent possible.	NA
n. Minimize alteration or disturbance of the stream banks and existing riparian vegetation to the greatest extent possible.	NA
o. Apply no herbicide as part of this action; mechanical removal of undesired vegetation and root nodes is permitted.	NA
p. Identify and mark clearing limits; begin no construction activity or movement of equipment into existing vegetated areas until clearing limits are marked.	NA
q. Retain all existing vegetation within 150 ft of the edge of bank, downstream from Soda Springs dam to the greatest extent possible.	NA
9.4.3 Fish Passage — Implement NMFS reasonable and prudent measure no. 3 with the following provisions:	
a. Provide upstream fish passage at Soda Springs dam.	4.1.1
b. Provide fish screens at Soda Springs dam for downstream fish passage.	4.1.2
c. Implement changes to Soda Springs dam operations or facilities if performance standards listed in Appendix B, Part 1, Table 1 of the Settlement Agreement are not met during a post-construction evaluation period; such changes may include: (i) improved hydraulic balancing of screens or structural modifications; (ii) construction of additional screening facilities; (iii) seasonal shutdowns of turbines; or (iv) reductions in flow diversions.	4.1.2(e)
d. Install a fish screen at the Fish Creek intake which meets ODFW's March 2001 screen design criteria.	4.3.2(a) and Appendix B, Part 2

Table 2.3. (continued).

Terms and conditions	Settlement Agreement Sections
9.4.4 Fluvial Geomorphic Processes, Spawning Habitat, Aquatic Connectivity, Tributary Enhancement, and Other Mitigation Measures —Implement NMFS reasonable and prudent measure no. 4 with the following provisions:	
a. Implement gravel augmentation, woody debris and sediment passage measures.	7.1–7.4
b. Reconnect the Clearwater River to the Toketee bypass reach.	7.5
c. Perform spawning habitat enhancement measures.	8.1–8.3.5
d. Improve aquatic connectivity.	10.1–10.7
e. Perform culvert upgrades.	15.6
f. Fund tributary enhancement, long-term monitoring and predator control plans, a mitigation fund and an early implementation fund.	19.1–19.5.4
9.4.5 Monitoring —Implement NMFS reasonable and prudent measure no. 5 with the following provisions:	
a. Monitor the effectiveness of the proposed protection, minimization and enhancement measures in accordance with the scope and schedules of the Settlement Agreement, and provide results of such monitoring to NMFS as required in those sections.	4.1.1(b) and (d); 4.1.2(b); 4.3.1(c) and (d); 4.3.2(b); 6.2.1; 8.2.2; 8.3.3; 14.5; and 19.4.1
b. Provide NMFS with post-construction monitoring reports of erosion control measures required by terms and conditions set forth in Section 9.4.2, above, and include: (i) a narrative describing the nature of best management practices implemented to reduce erosion for habitat enhancement actions, and (ii) a narrative describing any failures experienced with erosion control measures and efforts made to correct them.	NA

^aNA = not specifically identified in the Settlement Agreement.

completion of the FS administrative appeals process, or (3) the Commission issues a new license that is materially inconsistent with provisions of the Settlement Agreement. The remainder of the FS Section 4(e) preliminary conditions are summarized as follows:

- Completely and fully comply with all provisions of the Settlement Agreement and Amendment No. 1 (Condition 1).
- Implement the PM&E measures in accordance with the schedules contained in the Settlement Agreement and Amendment No. 1 (Condition 2).
- Obtain a special-use permit for occupancy and use of National Forest System (NFS) lands added to the project area boundary in the new license (Condition 5).

- Conduct or fund an environmental analysis before initiating any ground- or habitat-disturbing activities on NFS lands and develop site-specific plans for FS review and approval for construction activities under the license that shall result in ground- or habitat-disturbance, whether within or outside of water bodies (Condition 6).
- Obtain written approval from the FS to make changes to the project or NFS lands to the extent required by law (Condition 7).
- Coordinate with the FS to avoid any potential conflicts of proposed activities not expressly provided for in the license prior to implementing the activity (Condition 8).
- Consult with and receive approval from the FS prior to conducting any activity related to excavation and removal of soil and rock materials from NFS lands; use and development of borrow and quarry pits shall be in accordance with the *Umpqua National Forest Rock Resource Management Plan*. (Condition 9).
- Perform high-level analyses of potential seismic and geologic hazards facing the project according to methodologies and procedures approved by the Oregon Department of Geology and Mineral Industries; consult with OWRD's Dam Safety Section in conjunction with FERC engineering and safety inspection activities, and comply with relevant dam safety statutes and rules when modifying dams or other hydraulic structures at the project. (Condition 10).
- File a FS-approved Spoils Disposal Plan with the Commission, if not completed as part of the Erosion Control and Transportation Management Plans (Condition 11).
- File a FS-approved Fire Suppression Plan with the Commission (Condition 12).
- Prepare a FS-approved Solid Waste and Waste Water Treatment Plan for facilities and operations on NFS lands in consultation with the FS, and file it with the Commission (Condition 13).
- Prepare a FS-approved Spill Prevention and Control, and Hazardous Materials Management Plan for facilities and operations on NFS lands in consultation with the FS, and file it with the Commission (Condition 14).
- Develop a Sensitive Species Plan in consultation with and approved by the FS, and file it with the Commission (Condition 15).
- Confer with the FS in the event that reinitiation of consultation is triggered under the Endangered Species Act (Condition 16).
- Prepare a Survey and Manage Species Plan in consultation with and approved by the FS and file it with the Commission (Condition 17).
- Submit all dredging proposals for review and approval by the FS (Condition 18).

By letter dated December 11, 2001, BLM submitted revised Section 4(e) draft terms and conditions for the North Umpqua Project.³⁹ Under Condition No. 2, BLM reserves its right to supplement or modify its terms and conditions if (1) the Commission does not accept and incorporate the Settlement Agreement, including its appendices and schedules, into license terms without modification; or (2) PacifiCorp does not immediately and completely implement the schedules in accordance with the Settlement Agreement. Under Condition No. 3, BLM reserves the authority to add to, delete from, or modify the revised draft terms and conditions if any party withdraws from the Settlement Agreement, and under Condition No. 4, BLM reserves the authority to modify its Section 4(e) terms and conditions if the Commission issues a new license for a term exceeding 35 years or that is materially inconsistent with the Settlement Agreement. The following summarizes the remainder of the BLM conditions:

- Comply completely and fully with the provisions of the Settlement Agreement, including all PM&E measures, all commitments identified in each and every plan referenced in the Settlement Agreement, including its appendices and schedules (Condition 1).
- Obtain a grant of rights-of-way from BLM for the occupancy and use of reserved BLM administered lands that are outside the project boundary as identified in the May 12, 1999, TMP maps, as needed (Condition 5).
- Comply with all NEPA requirements prior to initiating any ground- or habitat disturbing activities on BLM lands (Condition 6).
- Obtain BLM written approval prior to making changes in the location of any constructed project features or facilities, or in uses of project land, or any departure from requirements of any approved exhibits filed with the Commission (Condition 7).
- Coordinate with BLM to resolve any potential conflicts for proposed activities not expressly provided for in the license that affects another authorized activity (Condition 8).
- Include management procedures for BLM Sensitive Species in planning and conducting proposed actions on BLM lands consistent with BLM management direction (Condition 9).
- Include management procedures for BLM Survey and Manage Species in planning and conducting proposed actions on BLM lands consistent with BLM management direction (Condition 10).

³⁹ The Department of the Interior (joint filing for FWS and BLM) filed initial preliminary Section 4(e) terms and conditions on March 1, 2001, and included a schedule for filing modified terms and conditions by no later than 60 days after closure of the Commission's draft NEPA comment period.

2.3 MODIFICATIONS TO THE PROPOSED PROJECT

2.3.1 Staff Alternative

The Staff Alternative would include all of the provisions of the Settlement Agreement along with two additional recommendations.

Staff recommends that plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement would need to be submitted to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation. These plans include:

- the erosion control plan, including any plans or amendments to plans for implementing waterway drainage on any flume segment where it is not feasible to meet the 30-minute goal of draining the waterway (Settlement Agreement section 14.1);⁴⁰
- all plans for implementing, monitoring, and evaluating the Slide Creek Bypass Reach Habitat Enhancement Project (Settlement Agreement section 8.2), the Gravel Augmentation Program (Settlement Agreement section 7.2, as amended), and the North Umpqua Habitat Restoration/Creation Project (Settlement Agreement section 8.3, as amended);
- final plans for providing wildlife crossings and underpasses, which should include specific locations of the crossings and underpasses, monitoring methods, and criteria for deciding if additional crossings would be required (Settlement Agreement section 11.3);
- the study plan for reevaluating instream flows pertaining to the Clearwater No. 2 bypassed reach (Settlement Agreement section 5.2);
- the anadromous fish monitoring plan for the Slide Creek full-flow reach (Settlement Agreement section 6.2.1);
- postconstruction evaluation plans for upstream and downstream fish passage at Soda Springs, Lemolo No. 2, and Fish Creek dams (Settlement Agreement sections 4.1.1, 4.1.2, 4.3.1, 4.3.2); and

⁴⁰ In the draft EIS, staff recommended that PacifiCorp monitor shoreline erosion at project reservoirs with fluctuating water levels because such monitoring was not explicitly stated in the Settlement Agreement. In their comments on the draft EIS, the parties to the Settlement Agreement indicated that the scope and content of the erosion control plan and monitoring plan for erosion sites located within the project boundary would address shoreline erosion at the project's reservoirs (PacifiCorp 2002c).

- site-specific plans for enhancing, restoring or creating riparian habitats and wetlands (Settlement Agreement sections 10.5, 11.5, and 21.5).⁴¹

We recommend that PacifiCorp, in developing these plans, consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

Second, staff recommends that PacifiCorp resume operation of the existing gage at Boulder Creek (USGS gage #14316495), post real-time flow data on the internet for this gage and all the project gages described in the Settlement Agreement to provide recreational boaters with accurate flow information, and provide notice to the public of scheduled maintenance releases at the project developments.

2.3.2 Non-Governmental Group (NGO) Alternative

Two sets of recommendations were filed by the Conservation Groups. Umpqua Watersheds filed one submittal on behalf of itself and the Umpqua Valley Audubon Society, Steamboaters, the North Umpqua Foundation, and Oregon Natural Resources Council (Umpqua Watersheds 2001a). The second submittal was filed by American Rivers on behalf of itself, the Pacific Rivers Council, Oregon Trout, and WaterWatch of Oregon (American Rivers 2001). The Umpqua Watershed filing included as an attachment the February 27, 2001, filing from both groups. These filings are treated together in this EIS as the NGO Alternative and include the following recommendations:⁴²

License Terms

- The length of the license should be 30 years.
- The license should include a fish and wildlife reopener clause in case PM&E measures do not achieve performance criteria.

⁴¹ Although the Settlement Agreement does not specify that monitoring plans would be prepared for those activities associated with enhancing, restoring, or creating riparian habitats and wetlands, the FS has indicated that monitoring would be a component of the site plans developed for each of those actions (FS 2001d).

⁴² Details of specific measures can be found in various modules of the Existing Information Analysis (EIA) attached to the submittal of Umpqua Watersheds (2001).

Geology and Soils

Erosion and sediment control

- PacifiCorp would replace selected segments of the Lemolo No. 2, Clearwater No. 2, and Fish Creek canals with buried steel pipelines.

Fluvial Geomorphic Processes

- PacifiCorp would restore the natural large wood regime to the extent possible and monitor the effectiveness of the transport program. This requirement may be modified if Soda Springs dam is removed.

Water Quantity, Water Quality and Aquatic Resources

Water quality

- According to a schedule developed by ODEQ, PacifiCorp would make modifications and operational changes to reduce total dissolved gas levels at the Lemolo Nos. 1 and 2 and Clearwater Nos. 1 and 2 powerhouses and would monitor those changes to demonstrate compliance with total dissolved gas criteria.
- According to a schedule developed by ODEQ, PacifiCorp would develop and implement a plan to address progressive eutrophication in the North Umpqua Basin.
- PacifiCorp would implement a long-term monitoring program to ensure that water quality standards are being achieved and that adverse trends in water quality are being addressed. The program would include establishment of permanent water quality monitoring sites above, below, and within the project.

Instream flows for fish and other aquatic species

- On issuance of a license, PacifiCorp would provide the minimum instream flows in table 2-1. Measuring gages would be installed and maintained at all project developments to ensure these instream flow levels are being met.
- PacifiCorp would develop and implement a comprehensive monitoring and evaluation program to determine the sufficiency of the flows specified in table 2-1.

Ramping

- After license issuance, PacifiCorp would operate the entire project in a run-of-river manner, except during project maintenance. During maintenance, the project would be operated with the ramping rates shown in table 2-4.

Table 2-4. NGOs Proposed Ramping Rates.

Stream Reach	Upramping rate (ft/hr)	Downramping rate (ft/hr)	Time of year
Lemolo No. 1	0.1	0.1	mid-October - June 30
Lemolo No. 2	0.1	0.1	mid-October - June 30
Clearwater No. 1	0.1	0.1	mid-October - June 30
Clearwater No. 2	0.17	0.1	mid-October - June 30
Toketee	0.25	0.1	mid-October - June 30
Slide Creek	0.25	0.1	mid-October - June 30
Fish Creek	0.4	0.2	November 1 - June 30
Soda Springs	0.17	0.17	December 1 - March 31

Upstream and downstream fish passage

- Within 5 years of license issuance, a Technical Committee, comprised of PacifiCorp, appropriate federal and state agencies, and NGOs, would determine whether to provide upstream and downstream fish passage at Slide Creek dam. If fish passages are constructed, tailrace barriers would also be built at the Toketee and Fish Creek powerhouses. If fish passage is determined not to be warranted, PacifiCorp would contribute an additional \$5 million to the Habitat Restoration Fund.

Aquatic and riparian connectivity

- The existing study on decommissioning Soda Springs dam would be supplemented within 2 years after license issuance. Within 5 years after license issuance, PacifiCorp would remove Soda Springs dam and its associated facilities and construct a tailrace barrier at the Slide Creek powerhouse. Concurrent with removal of Soda Springs dam, PacifiCorp would study entrainment of Pacific lamprey and other anadromous fish and determine in consultation with a Technical Committee what, if any, additional measures are required to reduce entrainment.
- PacifiCorp would reconnect the following areas such that upstream and downstream movement of aquatic and riparian organisms is unimpaired and that flow, sediment, and large wood regimes are fully restored: Bear Creek to the Clearwater River, the

- Clearwater River to the North Umpqua River below Toketee dam, and Warm Springs Creek and its riparian reserve corridor with the North Umpqua River.
- PacifiCorp would functionally reconnect Mowich Creek and the riparian reserve corridor to the Clearwater River by modifying the powerhouse and canal at Clearwater No. 2.
- PacifiCorp would restore riparian reserve habitat and connectivity in small tributaries and headwater streams within the project area.
- PacifiCorp would implement measures to reduce entrainment at the Fish Creek intake. Within 2 years of license issuance, PacifiCorp would modify the Fish Creek facility to ensure that coarse sediment is delivered down Fish Creek rather than being trapped behind the current structure.
- Within 7 years of license issuance, PacifiCorp would restore 18 priority riparian reserves to provide full corridor connectivity and within 15 years of license issuance would place 12-foot-wide wildlife bridges over gunite canals in between the restored priority riparian reserves as needed to have crossings every 400 feet.
- Within 7 years of license issuance, PacifiCorp would reconnect stream channel and bank habitat for those roads or stream crossings identified as a connectivity problem.

Terrestrial Resources

Wildlife crossing and underpasses and wetlands

- Within 7 years of license issuance, PacifiCorp would restore habitat connectivity in the terrestrial habitat priority areas to allow continuous unencumbered wildlife movement and other ecological processes by either covering, burying, or elevating canals and flumes along the waterway system.
- PacifiCorp would rehabilitate four wetlands within 5 years of license issuance and create or rehabilitate an additional four wetlands within 10 years.

Mitigation

Habitat restoration and mitigation trust funds

- Within 1 year of license issuance, PacifiCorp would establish a trust fund in the amount of \$3 million for actual on-site mitigation projects (i.e., not used to cover administrative and organization costs) to address impacts (e.g., mortality of juvenile fish, loss of wetland habitat, entrainment of fish and other aquatic organisms) that would continue as long as the project is in place. These funds would be used for habitat enhancement and restoration throughout the license term.

Project decommissioning fund

- PacifiCorp would establish a fund with sufficient money to cover the cost of decommissioning or removing the dams when the project is no longer in the public interest and to restore the affected environment.

Oversight and management

- Within 1 year of license issuance, PacifiCorp would submit a monitoring plan to FERC and provide annual reports on how mitigation measures are working. If a given measure is not successful, alternatives would be developed and implemented.

2.4 OTHER ALTERNATIVES CONSIDERED

Other alternatives considered in this EIS, but eliminated from further detailed study, include federal government takeover of the project, (2) issuing a non-power license, and (3) project retirement.

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 federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed interest in operating the project.

2.4.2 Issuing A Non-Power License

Issuing a non-power license would not provide a long-term resolution of the issues considered in this EIS, and it would not meet the purpose of the action and the need for power as described in section 1. A non-power license is a temporary license that the Commission would terminate when it determines that another entity will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. In this case, no party has suggested its willingness or ability to do so. No party has sought a non-power license, and we have no basis for concluding that the project should no longer be used to produce power. Thus, a non-power license is not a realistic alternative to relicensing in this situation.

2.4.3 Project Retirement

Project retirement could be accomplished either with or without dam removal. Either alternative would involve denial of the license application and surrender or termination of the existing license with appropriate conditions. Although removal of Soda Springs dam is considered as part of the NGO Alternative, dam removal under a project retirement alternative would involve removal of all eight project dams and associated facilities.

Project retirement would result in the annual loss of 957,400 MWh of power generation valued at \$43.8 million.

No party is recommending removal of all the project dams. Adequate measures have been developed in the Settlement Agreement and are considered in this EIS to protect and enhance environmental resources. We conclude that the adverse effects associated with project retirement outweigh the potential benefits, and project retirement is not warranted. Therefore, we did not consider it reasonable to evaluate this alternative in greater detail in this EIS.

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**Federal Energy
Regulatory
Commission**

**Office of
Energy Projects**

March 2003

FERC/FEIS - 0147F

Final Environmental Impact Statement



**North Umpqua Hydroelectric
Project, Oregon
(FERC 1927)**

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

3. ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

3.1.1 General Environmental Setting

The North Umpqua River Basin is located in the western Cascades of southern Oregon in Douglas County (figure 3-1). The North Umpqua River flows west from its headwaters at about 6,000 feet amsl in the Mt. Thielsen Wilderness Area approximately 106 miles to its confluence with the South Umpqua River near Roseburg. Project diversions are located along the mainstem of the North Umpqua River and two of its major tributaries, the Clearwater River and Fish Creek. The Clearwater River flows approximately 11.5 miles from springs at an elevation of about 4,300 feet amsl to its confluence with the North Umpqua River at Toketee Lake (RM 75.4). Fish Creek flows north from its headwaters in the Rogue-Umpqua Divide Wilderness Area at an elevation of about 5,000 feet amsl for about 18 miles before entering the North Umpqua River at RM 71.8 below Toketee Falls.

Landforms in the North Umpqua River Basin reflect two distinctive geomorphic provinces: (1) the Western Cascade Province, a predominantly moderately dissected topography defined by irregular ridges and forested straight, steep slopes; and (2) the High Cascade Province, a flat, relatively undissected high plateau. Most of the project area below the Lemolo No. 2 Development occurs within the Western Cascade Province, while the Clearwater No. 1 and Lemolo No. 1 developments lie within the High Cascade Province. Elevations within the project vicinity range from 4,150 feet amsl at Lemolo Reservoir to 2,430 feet amsl at Toketee Lake to 1,807 feet amsl at Soda Springs Reservoir.

The climate of the study area is typical of a moist maritime regime with wet, mild winters and dry summers. Summer temperatures are mild, while winter temperatures are generally below freezing at elevations greater than 5,000 feet amsl. The mean annual temperature is 51.8 degrees Fahrenheit (°F) in Idleyld Park near the lower end of the project and 40.1°F at Diamond Lake near the upper reaches of the project. Average annual precipitation in the project area ranges from 50 inches at the lower elevations to 90 inches at higher elevations. Typically, 80 percent of the annual precipitation falls between October 1 and March 31. Because a large portion of the basin is higher than 5,000 feet amsl, snowmelt is a major source of runoff. Snowpacks of varying depths usually persist throughout the winter at project facilities higher than 3,000 feet amsl.

Figures

**Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-13,
2-15, 2-16, 2-18, 2-19, 2-21, 3-2, 3-6, 3-129, and 3-143**

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Stream gradients in the North Umpqua River Basin are moderate to steep and numerous waterfalls are present. From Lemolo Reservoir, the North Umpqua River drops approximately 1,800 feet in 17 river miles to Toketee Lake. Toketee Falls (RM 74.6) and Lemolo Falls (RM 90.6), 120 and 102 feet high, respectively, are the two highest falls on the North Umpqua River. At 272 feet, Watson Falls, near the confluence of Watson Creek and the Clearwater River, is the highest waterfall in the basin. Other well-known falls include White Horse and Warm Springs Falls, both located on tributary streams to the North Umpqua River.

Two federal agencies (BLM and the FS), the state, and private entities own or manage land in the North Umpqua River Basin (figure 2-1). Most of the basin upstream of Rock Creek is within the Umpqua National Forest. A total of 34 miles of the North Umpqua River downstream of Soda Springs powerhouse (RM 69.3) has been designated a National Wild and Scenic Recreation River and is managed jointly by the FS and BLM. The land downstream of the Wild and Scenic reach of the river is a checkerboard of BLM and private ownership.

Except for portions of the transmission lines, most of the North Umpqua Project lies within the boundaries of the Umpqua National Forest. About 80 percent of the project area, which is over 18,000 acres in extent, is forested, primarily in coniferous forest. Four major vegetation zones are represented, including western hemlock forest, mixed conifer forest, subalpine forest, and interior valley. Most of the project facilities are located in the western hemlock and mixed conifer forest zones. The forests in the project area support about 200 vertebrate species, including deer, elk, cougars, black bears, and raptors (e.g., eagles). Wetlands associated with project developments range in size from less than 1 acre to more than 22 acres and occur primarily around impoundments and under waterway flumes.

The Umpqua National Forest is located in the region covered by the Northwest Forest Plan (Forest Plan).⁴³ The Forest Plan establishes land allocations on federal lands to protect old-growth and late successional ecosystems and to promote ecosystem functions within and between these lands. All federal land in western Oregon and Washington has been allocated to one of six categories designed primarily for protection or to a seventh category called "matrix" (FS/BLM 1994a). Most of the project area is located in matrix lands that connect areas in designated Late Successional Reserves

⁴³ The Forest Plan denotes the 1994 amendments (FS/BLM 1994a, 1994b) to all existing BLM and FS land and resource management plans within the range of the northern spotted owl as they relate to management of habitat for late-successional and old-growth forest related species.

(LSRs), one of the categories of protected land. In LSRs, human activities are limited within entire watersheds or other relatively large blocks of land. The downstream section of the project area and parts of the transmission line corridors are in designated LSRs.

Another category of protected habitats established by the Forest Plan is Riparian Reserves.⁴⁴ Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply (FS/BLM 1994a). Under the ACS, Riparian Reserves have many purposes and are used to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity in the watershed (FS 2001d). They also serve as connectivity corridors between the LSRs. These areas provide buffers on the network of streams and water bodies on federal lands in the area, with the width of the reserves dependent on stream classification. Timber harvest and other human disturbances are limited in these reserves. The Riparian Reserve network in the North Umpqua area is spanned by project facilities that cross 97 headwater and 9 tributary streams. The total distance traversed is about 6 miles of headwater or tributary Riparian Reserve and about 7 miles of mainstream reserve in eight longitudinal areas of the North Umpqua, Clearwater, and Fish Creek Riparian Reserves. Also, an additional 3 miles of mainstream reserve are intersected by reservoirs.

3.1.2 Cumulatively Affected Resources

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

The spatial scope of our analysis for cumulatively affected resources is defined by the physical limits or boundaries of: (1) the proposed action's effect on the resources, and (2) contributing effects from other hydropower and non-hydropower activities within the

⁴⁴ Constructed impoundments (e.g., reservoirs, forebays) are one of the five categories of Riparian Reserves addressed in the Forest Plan's ACS. Therefore, Riparian Reserve management goals apply to project reservoirs and forebays.

Umpqua River Basin. Our analysis of cumulatively affected resources focuses on the upper North Umpqua River watershed as defined in the watershed analysis (Stillwater Sciences 1998a). As shown in figure 3-2, this area includes the Rock Creek and Canton Creek subbasins where off-site enhancements are proposed under the Settlement Agreement. The analysis includes all areas within the project boundary and addresses both project activities and non-project activities outside the project area which cause effects on the watershed.

We chose this geographic area because activities within the area, including project operations, FS land management practices, and off-site mitigation proposed in the Settlement Agreement, impact the waters that subsequently flow through a 34-mile-long reach of the North Umpqua River designated a National Wild and Scenic Recreation River below the Soda Springs powerhouse. The cumulative impacts of activities in the basin above the Soda Springs powerhouse could affect resources, both upstream and downstream of Soda Springs powerhouse.

We have identified the resources listed below as being potentially subject to cumulative effects resulting from the project and other activities within the basin (i.e., timber harvest, road construction and maintenance, development of new or expanded facilities such as campgrounds, trails, and resort areas).

- Geology and soils resources could be affected by erosion and landslides from project activities, continued logging, road construction and maintenance, and clearing associated with development of new and expanded facilities within the basin (e.g., campgrounds); excess sediment deposition, particularly by landslides and large-magnitude erosion episodes, adversely affects the maintenance of natural fluvial geomorphic processes.
- Water quality could be affected by changes in turbidity from erosion and landslides, changes in water temperature resulting from decreases in riparian canopy cover by logging and possible construction activities (e.g., new bridges associated with road construction), and changes to nutrient inputs and algal productivity from new or expanded recreational developments (e.g., campgrounds or resort development).
- Populations of fish and other aquatic biota extend throughout all or parts of the project. These resources could be affected by degradation of habitats, lack of connectivity between habitats, and barriers to movement.

Figures

Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-13, 2-15, 2-16, 2-18, 2-19, 2-21, 3-2, 3-6, 3-129, and 3-143

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- Terrestrial resources could be affected by fragmentation of wildlife habitat and disruption of terrestrial connectivity from logging operations, construction of new roads, and clearing for construction of new facilities; wildlife could be disturbed by new and expanded recreational areas and trails and increased presence of recreationists.
- Archeological and historic sites and traditional cultural properties (TCPs) of Native American tribes within the basin and with historical or traditional ties to cultural and historical developments in other parts of the basin could be affected by continued project operation, proposed modifications, and other activities such as the development and expansion of recreation areas and trails.

The temporal scope of our cumulative analysis includes past, present, and future actions and their effects on each resource that could be cumulatively affected. For purposes of our analysis, the temporal scope looks 30 to 50 years into the future, concentrating on the effect on the resources from reasonably foreseeable future actions.

The historical discussion, by necessity, is limited by the amount of information available for each resource. We have identified the present resource conditions using the license application (PacifiCorp 1995a), the watershed analysis (Stillwater Sciences, Inc. 1998a), the Settlement Agreement (PacifiCorp 2001a) and related filings, and other available sources of information.

3.2 GEOLOGY AND SOILS

3.2.1 Affected Environment

3.2.1.1 Geologic Setting

The landscape of the North Umpqua River Basin reflects a history of tectonic and volcanic activity over the last 40 million years, more recent periods of glaciation, and erosion and deposition under modern climate conditions. Volcanic rocks (basalt and andesite) underlie the entire area, formed from lava flows and pyroclastic eruptions. Streams carved valleys in the volcanic bedrock, and subsequent tectonic uplift caused intensive erosion that established the present-day steep topography. During the cold, wet Pleistocene glacial periods mountain glaciers covered the upper portions of the watershed, depositing glacial till and outwash. The eruption of Mt. Mazama about 7,700 years ago blanketed the upper portions of the study area with a thick layer of pyroclastic material (pumice and volcanic ash) and sent volcanic ash flows traveling down the valleys (Sherrod 1991, Bacon et al. 1997).

The North Umpqua Project overlaps two distinct physiographic provinces. The Western Cascades Province is formed primarily on older (early to middle Tertiary age) weathered and hydrothermally altered volcanic bedrock. It is characterized by dissected topography defined by irregular ridges and forested straight, steep slopes. The High Cascade Province includes some of the young volcanoes of the Cascade Mountains region, and is built mainly of relatively recent (late Tertiary and Quaternary age) volcanic deposits, mantled or interlayered with glacial deposits. In the project area it is represented by a relatively undissected high plateau characterized by gentle slopes. Most areas upstream of Toketee Lake are located in the High Cascades.

Glacial deposits, including unstratified glacial till as well as stratified deposits, occur in the High Cascades in the eastern portion of the basin, generally 4,000 feet amsl or higher. Glacial outwash deposits of gravel and sand form alluvial terraces along some lower-elevation streams. Pumice and ash from Mt. Mazama are found primarily in upland areas in the High Cascades east of Lemolo Reservoir, along the Clearwater River canyon, and around Toketee Lake (Sherrod 1991). Outwash and pyroclastic deposits have high permeability, promoting rapid infiltration of rainfall and snowmelt. The underlying High Cascade lava flows, which have high porosity and permeability due to interconnected fractures and voids, function as an aquifer that effectively stores this infiltrated water as groundwater and slowly releases it to streams as base flow. These geologic conditions are responsible for relatively sustained streamflows and cool water temperatures throughout the year in the High Cascades.

Upland areas in the Western Cascades typically have shallow clayey soils derived from the underlying weathered volcanic rock. These soils typically are moderately to highly susceptible to mass wasting (landsliding) and erosion. Landslide and earthflow deposits, which result from slope failures, are found primarily in the Western Cascades. Earthflows are deep-seated landslides initiated in weak, intensively weathered volcanic rocks. They consist primarily of fine-grained materials whose movement, when saturated, resembles that of a viscous fluid. This type of deposit is characterized by gently sloping hummocky ground. Once formed, earthflows may continue to move at a slow rate for many years, even over gentle slope gradients.

Glacial outwash deposits of gravel and sand form alluvial terraces in some stream valleys. Stream alluvium consisting of boulders, cobbles, gravel, and sand is present in floodplains and stream terraces. Lake alluvium has been mapped adjacent to Diamond Lake (Sherrod 1991).

3.2.1.2 Erosion and Landsliding

Landsliding and surface erosion are active geologic processes and the most significant geologic hazards in the project area, particularly in the Western Cascades. The high landslide susceptibility in the Western Cascades is attributable to steep slopes, heavy precipitation, and the characteristic weakness of soils derived from pyroclastic materials. Several types of landslide processes occur in the project area. Thin soils over steeply sloping bedrock are susceptible to landsliding when heavy rains or rapid snowmelt cause high pore pressures. Shallow landslides can initiate debris flows, in which a liquefied mass moves down a valley or stream channel, scouring soils and carrying large amounts of sediment and woody debris. Deep-seated slope failures can occur when zones of structural weakness are present in the underlying rock. Earthflows are relatively slow-moving landslides that are subject to continuing movement over very long time periods, usually at slow rates.

Rates of landsliding would be high under natural conditions in the Western Cascades portion of the project area, but disturbances from timber harvesting, roads, and project facilities have significantly increased landslide incidence and surface erosion by exposing bare soil to direct precipitation, changing the distribution of water flow on the land surface, undercutting slopes, and overloading hillslopes by placement of fill on slopes of low strength (Dunne and Leopold 1978, Stillwater Sciences, Inc. 1998a, Oregon Department of Forestry 2001). Landslide frequency in the Western Cascades portion of the project area is estimated to have increased by 5-fold or more since 1950, resulting in a 2- to 4-fold increase in sediment delivery to stream channels. Because slopes are gentler in the High Cascades and soils are thicker and more permeable, the incidence of landsliding and other mass wasting is lower than in the Western Cascades portion of the project watershed and has not increased as a result of disturbance. The pumice and volcanic ash soils in the High Cascades are, however, susceptible to erosion by moving water. In the High Cascades, streambank erosion, occurring primarily in low-order (headwater) streams, is the major natural source of sediment delivery to streams, with road- and project-related erosion contributing additional sediment to some reaches. Streambank erosion also is a major source of sediment in stream reaches that traverse earthflows. (Stillwater Sciences, Inc. 1998a).

There are large uncertainties in quantitative estimates of erosion and sediment delivery to streams (all estimates are reported with an uncertainty of plus or minus 50 percent), but several different methods of analysis support similar conclusions regarding the increased yields since the project was built, as well as the relative sediment contributions of the Western Cascades and the High Cascades. The majority of the project watershed above Soda Springs dam is in the High Cascades. Current sediment

yield from this area is estimated at 150 tons/km²/year, which is roughly twice the estimated pre-project sediment yield. Sediment yield in the North Umpqua River watershed below Soda Springs dam is estimated to be much higher at approximately 470 tons/km²/year, compared with an estimated pre-1950 yield of about 100 tons/km²/year. This portion of the watershed is almost entirely in the Western Cascades, and the increased sediment yield is attributed primarily to increased landsliding (Stillwater Sciences 2000c).

Potential for shallow landsliding in the project area was delineated on the basis of topographic parameters and soil physical properties, using a slope stability model called SHALSTAB (Montgomery and Dietrich 1994, Dietrich and Montgomery 1998). The five slope classifications ranged from "chronic" (slopes so steep that they might fail even under dry conditions) to "stable" (slopes so gentle that they will not fail even when saturated). Watershed subbasins in the High Cascades are predominantly classified as stable (74 to 94 percent of the surfaces are "stable" and no more than 4 percent have "high" or "chronic" instability), including the Clearwater, Diamond Lake, Lemolo, and Upper North Umpqua subbasins. Only 38 to 52 percent of slopes in subbasins in the Western Cascades portion of the watershed, including Steamboat, Canton, Rock, Shivigny, Horseshoe Bend, and Slide (including Boulder Creek), are classified as stable, and 9 to 11 percent of slopes have "high" or "chronic" instability. The Fish Creek subbasin includes both types of terrain and is intermediate in stability (about 75 percent of surfaces "stable" and 6 percent of slopes classified as having "high" or "chronic" instability) (Stillwater Sciences, Inc. 1998a, 2000c).

Land disturbance associated with project facilities results in elevated rates of soil erosion from areas including roads and poorly vegetated cutbanks and fill slopes associated with canals and roads. Erosion surveys of project facilities have identified more than 100 sites of chronic erosion or potential for erosion. Most sites rated as having high or medium erosion risk are adjacent to the Lemolo No. 2, Clearwater No. 2, and Fish Creek canals. Some of the identified erosion sites are associated with natural features such as earthflows or steep bedrock slopes, but the majority are related to project development, including oversteepened slopes (on both cuts and fills) associated with waterways and roads.

Landslides and hillslope erosion can cause structural damage to project waterways or can partially or totally block flumes or canals, causing them to fail or overflow. Uncontrolled releases of water from waterways due to these or other causes can bring about landsliding or severe erosion of unprotected slopes and deposition of significant quantities of sediment in the river system. The replacement of timber sections of some of the project flumes with concrete has reduced the number of failures significantly (for

example, the Clearwater No. 2 flume experienced 3 failures in 8 years after timber was replaced with concrete, in contrast to 24 failures in the previous 40 years).

Material delivered to watershed streams by landslide or spill events typically contains a much higher percentage of fine sediment than does eroded sediment material delivered by more gradual processes. Sediment deposition in watershed streams by a landslide or waterway failure can increase turbidity for several days at a time in the Wild and Scenic River portion of the North Umpqua River below the Soda Springs powerhouse; turbidity plumes reportedly continue to be visible in the river downstream beyond Roseburg (FS/BLM 2001a). Downstream drinking water supply systems that withdraw water from the river routinely treat the water to remove turbidity. However, the abrupt turbidity increases caused by waterway failures and project facilities maintenance releases often are unexpected because they are not associated with rainy weather, so the water plants must adjust their treatment processes after turbid water appears in their intakes, instead of preparing for the turbidity in advance (Groshong, 2001).

3.2.1.3 Seismicity and Volcanism

The region in which the project is located is one of low historical seismicity. However, seismic hazard in the project area is considered to be moderate because an earthquake in the Cascadia subduction zone could cause more damage than any historic earthquake in the region.

No active faults have been mapped or reported in the project area. The two largest earthquakes ever recorded in south-central Oregon occurred in the Klamath Falls area, about 60 miles southeast of the project, on September 20, 1993. A Richter Magnitude (ML) 5.9 earthquake centered about 12 miles northwest of Klamath Falls was followed by an ML 6.0 event 2 hours later. Hundreds of smaller seismic events were recorded as part of this sequence. No other earthquakes greater than magnitude 4 have been instrumentally recorded within 100 miles of the project since 1960 and no earthquakes greater than magnitude 6 are known from the historical record within 100 miles of the project (Ludwin et al. 1991). An earthquake experienced in the region in 1920 is estimated to have been centered near Crater Lake. It had an estimated magnitude of 4+ (Bacon et al. 1997).

The Cascadia subduction zone is an active fault zone off the coast of Oregon. There is geologic evidence that major earthquakes, with magnitude between 8 and 9, occur in this fault zone approximately every 350 to 500 years. The last such event happened about 300 years ago, before people in the area began to keep records. Seismic design criteria applicable to new construction in western Oregon are based on the ground

motions calculated for this type of earthquake. The project area is included in seismic hazard zone 3, where new construction is required to withstand a peak ground acceleration on bedrock equal to 30 percent of the acceleration of gravity (Structural Engineering Committee, 1997). This is considered to be moderate seismic risk.

Volcanic activity is a potential geologic hazard in the area. Several volcanic vents less than 100,000 years in age have been mapped in the upper watershed, but none was active within the last 10,000 years. Crater Lake, located approximately 20 miles to the south of the project area boundary, is the nearest potentially active volcanic center. The lake lies in a caldera basin formed by the violent eruption of Mt. Mazama about 7,700 years ago. The only subsequent eruptions in the area were small and were within the Crater Lake caldera. The most recent eruption occurred about 5,000 years ago (Bacon et al. 1997). USGS researchers estimated the annual probability of a new eruption somewhere in a 300-square-mile area centered on Crater Lake as approximately 1 in 10,000. The probability of an eruption in the upper portions of the North Umpqua watershed is considered to be relatively high, but less than in the area nearest Crater Lake. No part of the project area is in the estimated hazard zones for pyroclastic eruptions from an eruption within the Crater Lake caldera. The hazard zone for hypothetical lahars (mudflows) associated with such an eruption extends a short distance into the watershed upstream from Diamond Lake (Bacon et al. 1997).

Eruptions from more distant Cascade volcanic centers could deposit volcanic ash in the project area. The Three Sisters area, approximately 70 miles north of the project area, experienced volcanic activity as recently as 1,500 years ago. In May 2001, public awareness of the potential for new volcanic activity in the Three Sisters area was heightened by a USGS report that a slight ground uplift had been detected there, possibly indicating intrusion of magma deep below the surface (USGS 2001). The USGS has evaluated the potential for eruptions of this and other Cascade volcanoes to deposit volcanic ash at locations throughout Oregon and Washington. The analysis considered the combined likelihood of ash-producing eruptions at the major Cascade volcanic centers, the relationship of the thickness of past ash-fall deposits with distance from the source vents, and regional wind patterns. The project area is estimated to have an annual probability of about 1 in 5,000 of an ash-fall thickness of more than 1 centimeter (cm) and a probability less than 1 in 10,000 of a thickness of 10 cm of ash (Scott et al. 2001). Thus, a volcanic event significantly affecting project area streams or facilities is unlikely.

3.2.1.4 Fluvial Geomorphology and Sediment Transport

The North Umpqua River flows through a narrow canyon with steep bedrock steps and benches throughout most of the project area. Consistent with the incised topography,

almost all stream channels in the project area (more than 98 percent) are classified as confined, meaning the valley width is less than twice the width of the stream under bankfull conditions (Stillwater Sciences, Inc. 1998a). Unconfined reaches occur primarily in association with unconsolidated glacial and volcanic ash deposits in the High Cascades, as well as in the Western Cascades where a few streams flow across earthflow deposits.

Most streams in the North Umpqua watershed have a high capacity to transport sediments because of their steep gradients and abundant stream flow. Since most bypassed reaches still experience periodic peak flows, they retain the capacity to transport coarse (bedload) sediments, but finer sediments that would be flushed from a reach under natural flow conditions may remain in the stream channel between peak flow events. Natural sediment yields in most portions of the watershed are high, but sediment yields are greatly increased over natural conditions due to landsliding and erosion associated with roads, timber harvesting, hydroelectric project operations, and recreation. In some reaches, particularly lower-order tributary streams draining Western Cascades landscapes, deposition of sediment from land-management activities has exceeded the capacity of the stream to transport sediment. Culverts scattered throughout the area are locally important as sources of sediments, primarily because of a lack of maintenance or poor construction. A survey of 460 culverts in the affected area identified 172 in need of maintenance (PacifiCorp 1995a). Of the culverts inspected, 31 had damaged inlets or outlets and 21 were associated with active erosion processes that contribute sediment to the watershed.

The following discussion provides a description of specific reaches of the river.

North Umpqua River Upstream of Lemolo Reservoir

Upstream of Lemolo Reservoir, the North Umpqua River and its tributaries drain High Cascades terrain. Drainage density is low in much of the area upstream of Lemolo Reservoir, due to the prevalence of ashfall deposits, which have extremely high water infiltration rates. Well-developed floodplains exist along much of Lake Creek and the North Umpqua River above Lemolo Reservoir. The sand and gravel content of bed substrates is significantly higher than in downstream portions of the North Umpqua River Basin. Sediment transport in channels in this area is generally limited by stream capacity (rather than sediment supply-limited) because of low flood peaks and the presence of low-gradient, unconfined reaches.

Lemolo Reservoir acts as a trap for sediments transported by the North Umpqua River, except for those suspended sediments diverted to the Lemolo No. 1 waterway. Lemolo Reservoir was surveyed in 1992 and the bathymetric profiles were used to

estimate the volumes of sediments captured (PacifiCorp 1995a). The estimated sediment accumulation in Lemolo Reservoir was 1,441 acre-feet, which corresponds to an average annual sediment accumulation of 38 acre-feet and about 12 percent of the current reservoir volume. The accumulated sediment has reduced the original storage capacity of Lemolo Reservoir by 11.5 percent.

Some sediment accumulation in Lemolo Reservoir is attributable to the partial drawdown of Diamond Lake in 1954, when 25,000 acre-feet of water was released into Lake Creek over a 66-day period (Dimick 1954). The high flow rates during this period (an average of about 190 cfs over 66 days) would have caused significant channel and streambank erosion in Lake Creek and transported the eroded sediment into Lemolo Reservoir.

Another important source of sediment in Lemolo Reservoir is shoreline erosion. An erosion survey of the project area in 1992 and 1993 (PacifiCorp 1995a) identified 11 sites along the shoreline of Lemolo Reservoir that were contributing sediment to the reservoir. These sites were associated with pumice cliffs along the shoreline. The survey also identified six different locations along the shoreline where headlands had retreated from erosion by wave action. The most prominent point on the shoreline had retreated 50 feet from 1966 to 1992 based on aerial photographs of the reservoir. The estimated average annual contribution of sediment from headlands retreat during that period was 2.5 acre-feet, which is less than 10 percent of the average annual sediment accumulation in Lemolo Reservoir. Shoreline erosion rates probably were higher during the first years after the reservoir was filled, when fragile volcanic ash and pumice deposits were first exposed to wave action and water-level fluctuations.

North Umpqua River between Lemolo Reservoir and Toketee Lake

This reach of the river consists of two bypassed reaches and a short full-flow reach between the Lemolo No. 2 powerhouse and Toketee Lake. The watershed contributing to the Lemolo No. 1 bypassed reach is within the High Cascades, while the Lemolo No. 2 bypassed reach receives inflows from areas in both the High Cascades and Western Cascades. The river channel is confined through most of the length of the two bypassed reaches, except for a portion of Lemolo No. 2 bypassed reach near Deer Creek that crosses an earthflow deposit. Channel morphology in the Lemolo No. 1 bypassed reach is dominated by bedrock outcrops. In the Lemolo No. 2 bypassed reach, the median grain size is cobble, with substantial boulder and gravel substrate. The full-flow reach is unconfined with a median grain size in the gravel range. Under natural conditions, the North Umpqua River was sediment-supply limited, but both sediment supplies and streamflow in this reach have been significantly reduced as a result of the project.

However, flume failures occasionally result in delivery of significant volumes of coarse and fine sediment to both bypassed reaches. The Burma Road, which is the service road adjacent to the Lemolo No. 2 waterway, both intercepts sediment and acts as a source of sediment to the Lemolo No. 2 bypassed reach.

Toketee Lake acts as a trap for sediments transported in the reach of the North Umpqua River below Lemolo Reservoir, except for those suspended sediments transported to the Toketee Waterway. Toketee Lake also acts as a trap for sediments transported in the Clearwater River below the Clearwater No. 2 diversion dam. Additionally, sediments transported in the North Umpqua River below Lemolo Reservoir are trapped in the Lemolo Nos. 1 and 2 forebays. Toketee Lake was surveyed in 1992, and the bathymetric profiles were used to estimate the quantities of sediment captured (PacifiCorp 1995a). The estimated sediment accumulated in Toketee Lake was 414 acre-feet. Additionally, the sediment accumulated in the Lemolo No. 2 forebay was estimated to be 28 acre-feet. The sediment accumulation in Lemolo No. 1 forebay was not determined.

Clearwater River

Upstream of Stump Lake, the Clearwater River drainage consists of the upper Clearwater River, which occurs within the High Cascades, and Bear Creek, which is located on a mixture of High Cascades and Western Cascades terrains. Channel conditions in the upper Clearwater River are similar to those in the mainstem North Umpqua River above Lemolo Reservoir. Upper portions of Bear Creek are characterized by steep confined channels, while channels in the lower third of the watershed are generally unconfined. Stump Lake, which is formed by the Clearwater No. 1 diversion dam, inundated approximately 0.34 mile of low-gradient floodplain/wetlands habitat, transforming it to more lake-like habitat with associated marginal wetlands. The two bypassed reaches below Stump Lake are incised in bedrock canyons, with channels influenced by boulder and bedrock obstructions. Stump Lake captures sediment from stream bank, road, and, in Bear Creek, hillslope erosion. Stump Lake appears to have caused aggradation, increased bank erosion, and channel widening in the stream reaches located just upstream from the impoundment. According to PacifiCorp (1995a), Stump Lake intercepts all coarse sediment (bedload) and up to 34 percent of suspended sediment originating from upstream areas. Consequently, the Clearwater No. 1 bypassed reach receives substantially reduced supplies of coarse sediment. Reductions in coarse sediment supply have likely reduced the proportion of gravel in the bed compared to reference conditions, particularly in reaches just downstream of Stump Lake.

Delivery of coarse sediment to the Clearwater No. 2 bypassed reach has been reduced by the existence of Stump Lake and the Clearwater No. 2 diversion dam. Chronic erosion of unconsolidated ash deposits that are exposed in large road cuts along Highway 138 contributes substantial quantities of fine sediment to both the Clearwater Nos. 1 and 2 bypassed reaches, and the deposition of fine sediments is especially pervasive near Toketee Lake. Since most of this sediment is transported downstream during peak flow periods, the effects of such increased fine sediment deposition are transient.

Stump Lake, Clearwater No. 2 diversion dam, and Clearwater Nos. 1 and 2 forebays act as traps for sediments transported in the Clearwater River, except for those suspended sediments transported to Toketee Lake. Estimates of the sediments that have accumulated in the Clearwater forebays amount to 30 acre-feet and 21 acre-feet, respectively. No estimates of the accumulated sediments in Stump Lake and behind the Clearwater No. 2 diversion dam are available.

North Umpqua River from Toketee Lake to Soda Springs Dam

These reaches are confined in a steep-walled canyon cut into basalt. Substrates are dominated by bedrock, boulders, and cobbles. Toketee Falls, a 120-foot, two-tiered knickpoint formed in basalt bedrock, occurs in this reach. Sediment transport in the Toketee and Slide Creek bypassed reaches has been altered by the lower-magnitude, higher-frequency floods. Despite reductions in peak flows upstream from Soda Springs Reservoir, the North Umpqua River retains high sediment transport capacity, resulting in depletion of gravel supplies. In the reach below the Fish Creek confluence, sediment supply is partially replenished by Fish Creek sediment delivery. Gravel patches and bars appear to be more common in this reach than upstream of the Fish Creek confluence.

Soda Springs Reservoir inundated approximately 1.4 miles of the main stem of the river. Historically the inundated reach included several large alluvial depositional features that probably provided high-quality habitat for anadromous fish. Soda Springs Reservoir now acts as a trap for sediments being transported in the North Umpqua River, except for those suspended sediments transported through the Soda Springs waterway. Estimates of the sediments trapped in Soda Springs Reservoir amount to 367 to 527 acre-feet, 89 to 128 percent of current volume (Stillwater Sciences, Inc. 1998b; PacifiCorp 1995a). This estimate is based on a comparison of the original bathymetry of the reservoir to the bathymetry in 1992. Based on limited sampling, Stillwater Sciences, Inc. (2000c) estimated that 5 to 25 percent of this material consists of coarse sediments, with the remainder being fine sediment, including silt and sand. The average annual sediment accumulation for the operating period of Soda Springs Reservoir is 9.2 acre-feet/year.

Fish Creek

The Fish Creek drainage is divided between Western Cascades and High Cascades. Stream channels are largely confined. Immediately upstream of the Fish Creek diversion dam, sediment supplies are abundant, but sediment transport capacity tends to exceed supply. However, large accumulations of sediment delivered by mass wasting during 1996 and 1997 winter storms are currently located in this reach. This sediment caused aggradation and was expected to become a source of increased downstream sediment delivery in subsequent years (Stillwater Sciences, Inc. 1998b).

The Fish Creek diversion dam allows for some sediment passage, but it traps a relatively high proportion of the coarse sediment load during average annual peak flows. Large volumes of fine sediment are diverted into the Fish Creek waterway and forebay, and accumulated sediment is periodically excavated from behind the dam to ensure proper functioning of the intake.

Very large boulders and bedrock outcrops are abundant in the bypassed reach below the diversion dam. A major feature of this bypassed reach is a complex of cascades, rapids and falls beginning 3.2 miles upstream of the North Umpqua River confluence. This reach receives large supplies of sediment from Western Cascades landscapes.

North Umpqua River below Soda Springs Dam

In the bypassed reach between Soda Springs dam and the powerhouse, the North Umpqua River is generally confined within a steep-walled canyon cut into basalt bedrock. The channel gradient of 1 to 4 percent is relatively high for a stream with this large a drainage area, indicating that sediment and debris transport capacity are high. Under natural conditions, bed materials were likely dominated by boulders, bedrock and cobbles, with gravel deposition in some portions of the channel. Soda Springs dam has reduced bedload delivery to this reach by 95 to 100 percent. It also has reduced baseflows and the magnitude and frequency of high flows, although spills that occur when the waterway's diversion capacity is exceeded are probably large enough to transport remaining stream gravels downstream. The reduction in bedload and debris delivery downstream from the dam, combined with the stream's high transport capacity, probably has resulted in substantial depletion of stream gravel deposits, in turn reducing the availability and quality of habitat for anadromous fish. Large boulders visible in pre-dam aerial photographs are no longer present, suggesting that they were transported downstream by flooding in 1964. The Soda Springs access road and Highway 138 are constructed on former floodplain areas in some locations, increasing sediment inputs to the channel.

Gravels and gravel retainment structures have been added to this reach in recent years in an effort to increase spawning habitat.

Below Soda Springs powerhouse, the river channel is confined and is largely characterized by forced pool-riffle and plane-bed morphology. Large boulders and abundant bedrock outcrops create pools and provide channel complexity. Bedload delivery to the reach from Soda Springs powerhouse to Boulder Creek is reduced by 95 to 100 percent (an estimated annual reduction of 4,000 tons of gravel) compared with pre-project conditions. As in the bypassed reach, the decrease in bedload delivery probably has led to overall bed coarsening, reduced abundance of gravel deposits, and reduced availability and quality of fish habitat in this reach. Field observations of the channel in the reaches between Soda Springs dam and Boulder Creek found that gravel was absent or relatively scarce in locations where flow patterns would be expected to favor gravel deposition (PacifiCorp 2003a). Below Boulder Creek the effect of Soda Springs dam on bedload delivery diminishes as each major tributary delivers sediment to the North Umpqua River. Tributaries entering the North Umpqua River along this reach drain watersheds in the Western Cascades and yield large sediment supplies due to natural terrain instability and (except for Boulder Creek, which drains a wilderness area and is largely undisturbed) the effects of roads and timber harvesting. The net reduction in bedload is estimated to be 70 percent below Boulder Creek (1.4 miles below Soda Springs dam), decreasing to 15 percent above Steamboat Creek (16.3 miles below Soda Spring dam). Also, large volumes of sediment were contributed by two deep-seated landslides that occurred along the North Umpqua River between Boulder and Steamboat Creeks since construction of the hydroelectric project, probably as a result of road construction. Below Steamboat Creek the bedload supply is estimated to be approximately twice as high as under pre-project conditions, due to large contributions of sediment from downstream tributary watersheds where road construction, timber harvesting, and other activities have led to increased rates of landsliding and other erosion (Stillwater Sciences, Inc. 1998a, 2000c).

Field observations revealed no systematic downstream variation in sediment size or character in the North Umpqua River below Soda Springs powerhouse. In addition, comparison of pre-dam (1946) and post-dam (1992) aerial photographs revealed no detectable changes in the size of alluvial features (cobble bars) upstream of the Steamboat Creek confluence. However, bars immediately downstream of Steamboat Creek appear to have increased in size, likely due to the effects of a 1964 flood that delivered an estimated 700,000 tons of bedload from the Steamboat Creek watershed (Stillwater Sciences, Inc. 1998a).

Canton Creek

The watershed of Canton Creek, a major tributary of Steamboat Creek, is in the Western Cascades and is extensively disturbed by natural wildfires, timber harvesting, and roads. Landslide incidence and surface erosion rates have been high. Some tributary channels are so thoroughly filled with sediment that only subsurface flow occurs. Plugging of drainages at road crossings is also a problem. Stream habitat conditions in the mainstem are rated as "severely degraded" due in part to large quantities of fine sediment, but several major tributaries are considered to provide good quality habitat for anadromous fish (BLM 1995a).

Rock Creek

Rock Creek drains Western Cascades terrain and enters the North Umpqua River about 34 miles downstream from Soda Springs dam. In contrast with other project area streams, most of the mainstem of Rock Creek has an unconfined channel and a broad floodplain, characterized by side channels, backwaters, and floodplain depressions. Dominant substrates are gravel and cobble (Stillwater Sciences, Inc. 1998a). The watershed is extensively disturbed by timber harvesting and a high density of roads (5 miles of road per square mile). Many roadside ditches and gullies are believed to function as surface flow paths, with the effect of extending stream networks and increasing peak flows (BLM 1996).

3.2.2 Environmental Impacts and Recommendations

3.2.2.1 Erosion and Sediment Control

Landsliding and soil erosion are natural processes in the watershed, but rates of these processes are substantially higher than would exist under natural conditions (section 3.2.1.2). The resulting delivery of sediment to stream channels adversely affects fluvial geomorphic processes, degrades aquatic habitat, and increases downstream turbidity. Terrestrial habitat quality also is adversely affected by the loss of soil productivity in disturbed areas. Project facilities and operations contribute to accelerated erosion and landsliding in the watershed, due to disturbance of hillslopes, erosion of road surfaces and unstable road fills, inadequate road culverts, and overflows of open canals and flumes that initiate landslides or cause severe erosion. Reduction in the incidence and severity of landsliding, erosion, and sediment delivery is a management objective related to maintaining and restoring geomorphic processes, water quality, and ecological processes and habitat.

The parties to the Settlement Agreement have developed a strategy to limit erosion and sediment delivery by implementing remedial measures at a specified group of high- and medium-priority erosion sites, an emergency operation system to limit the duration and impacts of overflow events resulting from waterway failures, and continued monitoring and remediation of erosion throughout the duration of the proposed license. These measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS and Section 4(e) conditions from the FS and BLM. Provisions of the Settlement Agreement are discussed in more detail below.

The Conservation Groups recommend a different approach to reducing erosion impacts. They call for replacing extensive segments of three canals with buried steel pipelines. Some of the high- and medium-priority erosion sites identified in the Settlement Agreement would be eliminated as a direct result of pipeline construction and burial, and the replacement of open waterways with a closed pipeline would essentially eliminate waterway failures on the affected segments. The NGO Alternative is described further below.

No-Action Alternative

Under the No-Action Alternative, no new measures would be implemented to limit erosion and sediment delivery associated with the project. Rates of landsliding and surficial erosion in the watershed would continue to exceed natural rates of these processes. Road-related and hillslope erosion would continue at their current rates, and the incidence of erosion-related damage to project flumes and canals would be unchanged. Erosion from project roads and waterway overflows would continue to contribute fine and coarse sediment to area streams and project reservoirs.

Settlement Agreement

To support the objectives of maintaining and restoring geomorphic processes, water quality, and ecological processes and habitat, section 14 of the Settlement Agreement requires the development and implementation of measures to reduce erosion associated with project facilities. These measures are also required by the § 401 Water Quality Certificate. PacifiCorp would be required to document these measures in a final Erosion Control Plan. Specific measures that would be included are detailed below. Other measures included in the Settlement Agreement that would contribute to reducing or controlling erosion and sediment delivery in the project area are included in the Vegetation Management Plan (section 3.5.2.1) and Transportation Management Plan (section 3.10.2.2). Consistent with section 10.6 of the Settlement Agreement and the provisions of the § 401 Water Quality Certificate, some remediation of highly eroded sites

would be accomplished as part of the reconnection of Deer Creek and other tributary streams. Also, off-site mitigation measures included in the Settlement Agreement as a result of the ODFW MOU would contribute to reduced near-stream erosion and resulting deposition of sediments in portions of the Rock Creek and Canton Creek watersheds (sections 3.4.2.3 and 3.10.2.1). In addition, the mitigation fund created by section 19 of the Settlement Agreement could be used to fund implementation of additional erosion control measures that the parties to the Settlement Agreement consider necessary to mitigate or compensate for project-related erosion impacts.

The Erosion Control Plan would address several areas:

1. To limit the impacts of waterway failures, PacifiCorp would be required to develop an emergency operation system to provide for removing water from the affected segments of three project flumes (Fish Creek, Lemolo No. 2, and Clearwater No. 2) within 30 minutes after a flume failure, and to construct, operate, and maintain this system following approval by ODFW, ODEQ, and FS and on a schedule given in section 14.2 of the Settlement Agreement. If it is not possible to meet the 30-minute goal on a particular segment of any of these flumes, PacifiCorp would be required to conduct an engineering feasibility study, in consultation with ODFW, ODEQ, and FS, to isolate the system failure and identify alternatives, and identify and implement the most effective alternative.
2. In the event of a flume failure or other accidental spill or discharge from the waterway system, PacifiCorp would be required to provide immediate notification to the FS, notify the Oregon Emergency Response System within 24 hours, and consult with ODFW immediately after any such event that is observed or suspected of harming fish or wildlife or their habitat. PacifiCorp would be required to coordinate emergency response to waterway failures or other erosive events and to begin remediation planning and implementation within 24 hours, to be completed within 30 days after the waterway is brought back into operation. PacifiCorp would be required to consult with the agencies that are parties to the Settlement Agreement in developing site-specific plans for remediation of waterway failures.
3. PacifiCorp would be required to plan and implement remedial measures to reduce or prevent erosion at 31 high-priority and 27 medium-priority erosion sites identified in erosion surveys of the project area and listed in schedule 14.4 of the Settlement Agreement. Throughout the license period, PacifiCorp would be required to monitor existing erosion sites, identify new sites that may require remediation, redesignate site priorities as appropriate, and implement remediation measures to reduce or prevent erosion at sites identified as high priority. All designs and plans for mitigation or remediation of erosion sites would be required to be developed in consultation with ODFW, ODEQ, and FS, to be consistent with

criteria in the Umpqua National Forest Land and Resource Management Plan (1990), as amended, and to be approved by the agencies before being implemented.

In combination, these erosion control measures, together with the transportation management and vegetation management measures in the Settlement Agreement, should enhance aquatic habitats and fluvial geomorphic processes in project area streams and contribute to improved water quality in the project area and downstream. There would be a reduced frequency of erosion events that cause damage to project waterways or deposit sediment in streams. There also would be less erosion and sediment deposition when a flume failure does occur. As a result, there would be fewer instances of sediment blocking aquatic connectivity in tributary streams and bypassed reaches and less deposition of fine sediment that degrades aquatic habitat quality and impedes natural fluvial geomorphic processes. Decreased erosion also could benefit riparian habitats by reducing unnatural disturbances that impede the development of functional riparian systems (see section 3.4.2.4). Project-area stream reaches experiencing the most benefits would be the Lemolo No. 2 bypassed reach and its tributaries, the Clearwater No. 2 bypassed reach, and Fish Creek. Water quality would be enhanced by reduction in the frequency and duration of episodes of high turbidity in tributary streams, bypassed reaches, project reservoirs, and the North Umpqua River downstream from the project area. There also would be fewer disruptions of project operations and some reduction in the rate of sediment accumulation in project reservoirs and forebays.

Outside the boundaries of the project area, the purchase and enforcement of conservation easements in riparian areas on private land in the Rock Creek watershed and the upper Canton Creek and East Fork Pass Creek subbasins of the Canton Creek watershed could contribute to reduced rates of near-stream erosion and resulting deposition of eroded materials in streams in these watersheds by restricting future disturbances near streams.⁴⁵ This would enhance ecosystem functions, water quality, and fluvial geomorphic processes.

Minor increases in erosion and sediment delivery may, however, result from other provisions of the Settlement Agreement. In the short term some project area streams

⁴⁵As explained in section VI of the ODFW MOU(Appendix E, PacifiCorp 2001a), "Enhancement measures proposed for the Rock Creek Basin in this MOU represent only a portion of the restoration efforts planned for this basin and are intended to serve as a foundation for acquiring matching funds for habitat restoration on private and public lands."

would experience temporary localized increases in soil erosion due to disturbances from construction done to enhance terrestrial habitat connectivity, including excavation of wildlife underpasses below project penstocks and replacement of some segments of project flumes and canals with buried pipelines. Increases in the magnitude of daily drawdowns in Toketee Lake, Fish Creek forebay, and Soda Springs Reservoir, would increase the rates of shoreline erosion and resulting sediment accumulation in these reservoirs, and could result in increased turbidity downstream. Larger daily water-level fluctuations also might reactivate old landslides or earthflows present near the water surface. There is a potential to destabilize the toe of a deep-seated landslide deposit on the north shore of Soda Springs Reservoir downstream from Medicine Creek (Stillwater Sciences, Inc. 1999) and cause renewed movement, although past fluctuations apparently have not affected the stability of this deposit.

Under section 14.5 of the Settlement Agreement, PacifiCorp would be required to implement a monitoring program to evaluate currently ranked erosion sites and to identify new erosion sites. New sites would be ranked and site-specific remediation plans would be prepared as appropriate to the rank assigned. Under section 9.4 of the Settlement Agreement, PacifiCorp would determine the feasibility of specific measures for revegetation and erosion control of reservoir banks and other areas subject to reservoir fluctuations. The § 401 Water Quality Certificate specifically requires evaluation of erosion and sediment transport into Lemolo Reservoir.

The erosion control provisions in the Settlement Alternative are not designed to affect the incidence of erosion, landsliding, and associated sediment delivery in the watershed not caused by project activities. The high incidence of shallow landsliding in Western Cascades watersheds would not be reduced, except where landsliding directly affects project waterways and in those portions of the Rock Creek and Canton Creek watersheds addressed by off-site mitigation measures. However, the mitigation fund created by section 19 of the Settlement Agreement could be used to fund additional erosion control measures.

Other provisions of section 14 of the Settlement Agreement would require PacifiCorp to: (1) provide a performance bond not to exceed \$1 million to ensure proper and timely remediation if the FS, ODEQ, and ODFW determine site-specific performance criteria are not being met (section 14.6); (2) perform high-level analyses of potential seismic and geologic hazards in conjunction with regularly scheduled FERC Part 12 inspections (section 14.7); and (3) continue to consult with ORWD's Dam Safety Section in conjunction with FERC's engineering and safety inspection activities to ensure compliance with relevant dam safety requirements (section 14.8). Also, the mitigation fund created by section 19 of the Settlement Agreement could be used to fund

implementation of additional erosion control measures that the parties to the Settlement Agreement consider necessary to mitigate or compensate for project-related erosion impacts.

NGO Alternative

The Conservation Groups' principal recommendation for erosion control is that extensive segments of the Lemolo No. 2, Clearwater No. 2, and Fish Creek canals should be replaced with buried steel pipelines. Most of the highest priority erosion sites identified in erosion surveys are associated with these waterways. The Conservation Groups also recommended implementing all measures required by the § 401 Certificate, which includes remediation of the remaining high- and medium-priority erosion sites and monitoring for new soil erosion problems.

Pipeline installation would cause increases in soil erosion in the short term, but over the long term this measure would essentially eliminate waterway failures and resulting erosion along these waterways. Installation of a buried pipeline would have the effect of eliminating several of the high- and medium-priority erosion sites listed in the Settlement Agreement, but it would not remediate all of the erosion sites identified in the Settlement Agreement, particularly those associated with service roads.

Other aspects of the NGO Alternative would have implications for erosion and sediment delivery. Removal of Soda Springs dam would expose land surfaces that are now underwater. Initially, these newly exposed surfaces would be susceptible to accelerated surficial soil erosion due to lack of vegetative cover. Sediments trapped behind the dam that were not removed before dam removal or flushed downstream during the removal process would be particularly susceptible to erosion. Slumps could occur in saturated sediments exposed by the draining of the reservoir, and some newly exposed slopes might also be susceptible to shallow landsliding. Complete exposure of the toe of a deep-seated landslide deposit on the north shore of the reservoir downstream from Medicine Creek (Stillwater Sciences, Inc. 1999) might destabilize the slide and result in renewed movement, although reservoir water-level fluctuations apparently have not affected the stability of this deposit. To help minimize soil erosion, a plan for promoting revegetation of newly exposed surfaces would need to be developed before dam removal so that revegetation could begin immediately after dam removal. Some erosion could be avoided by timing the dam removal to allow establishment of new vegetation before the start of winter rains.

Because there would be little or no daily fluctuation in water levels in the remaining reservoirs, rates of shoreline erosion and resulting sediment accumulation in

project reservoirs would be lower than under the No-Action Alternative and the Settlement Agreement.

Under the NGO Alternative, long-term erosion impacts in the project area would be less than those under the Settlement Agreement. Also, there would be fewer project-related turbidity episodes downstream. In other respects long-term impacts would be similar to those under the Settlement Agreement, except erosion control benefits in Canton and Rock Creeks would not occur because off-site mitigation would not be undertaken.

Staff Alternative

We find that the Settlement Agreement would result in marked improvements in the control of erosion processes and resulting sediment delivery. We concur with the provisions of section 14 of the Settlement Agreement, with the following modification intended to provide greater assurance of its effectiveness in achieving its objectives: the Erosion Control Plan should be filed with the Commission for review and approval prior to implementation, including any plans or amendments to plans for implementing waterway drainage on any flume segment where it is not feasible to meet the 30-minute goal of draining the waterway.

Impacts from the Staff Alternative would be the same as those described for the Settlement Agreement.

3.2.2.2 Restoration of Fluvial Geomorphic Processes

Fluvial geomorphic processes influence stream channel morphology and the types and quality of aquatic and riparian habitats. The maintenance and/or restoration of geomorphic processes characteristic of the North Umpqua River watershed is a management objective intended to maintain habitat for native aquatic species and promote the long-term ecological health of the watershed. Streambed gravel deposits are a particular focus because of their role in providing habitat for spawning and incubation of anadromous fish.

The parties to the Settlement Agreement have identified a suite of measures to help restore fluvial geomorphic processes and associated streambed conditions that are significant to ecological functions. Included are measures to allow passage of large woody debris (LWD) at several project dams, to augment streambed gravels at other locations, and to create or restore streambed habitat in the Slide Creek bypassed reach and reaches below Soda Springs dam. Several other elements of the Settlement Agreement,

including reconnection of specified tributaries and increases in minimum streamflows, would contribute to restoration of fluvial geomorphic processes and streambed gravels suitable for fish habitat. These measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS and Section 4(e) conditions from the FS and BLM, and are required by the § 401 Water Quality Certificate. The provisions of the Settlement Agreement are described in more detail below.

The Conservation Groups' recommendations related to fluvial geomorphic processes include implementing the measures required by the § 401 certificate, plus more extensive measures to allow LWD passage, reconnection of more tributaries and specification of higher minimum instream flows than called for in the Settlement Agreement. The Conservation Groups do not recommend interventions to create or restore streambed geomorphic features in reaches where gravel supplies are depleted due to upstream dams. Instead, they call for removal of Soda Springs dam, which would remove this dam as a barrier to movement of sediment and LWD. The NGO Alternative is described further below.

No-Action Alternative

Under the No-Action Alternative, no new measures would be implemented to limit sediment input to streams and waterways, promote the passage of gravel and sediment past the dams and other barriers that currently trap sediments, augment gravel supplies in stream reaches where volumes of coarse sediment are depleted, or enhance stream channel morphology. Sediments would continue to accumulate in project reservoirs and forebays. Depletion of gravel supplies in the North Umpqua River below Soda Springs dam would continue, particularly in the 1.4-mile reach between the dam and the confluence with Boulder Creek. Existing conditions of gravel depletion would persist in the Clearwater No. 1 bypassed reach and bypassed reaches of the North Umpqua River between Toketee and Soda Springs dams.

Settlement Agreement

Section 7 of the Settlement Agreement includes provisions specifically intended to help restore fluvial geomorphic processes and streambed conditions that are significant to ecological functions. Other measures identified in the Settlement Agreement, including reconnections of tributaries, increases in minimum streamflows, and fish habitat enhancement projects, also would contribute to restoration of natural fluvial geomorphic processes and streambed conditions. These measures are also required by the § 401 Water Quality Certificate.

Under the Settlement Agreement PacifiCorp would continue on a temporary basis its current practices for allowing passage of LWD at Slide Creek dam. For the long term, PacifiCorp would implement structural modifications and operations changes at Slide Creek and Clearwater No. 1 dams to allow passage of sediment and woody debris at high flows. In the Slide Creek Bypass Habitat Enhancement Project required by section 8 of the Settlement Agreement, PacifiCorp also would endeavor to create up to 6,000 square feet of new spawning habitat in the Slide Creek bypassed reach of the North Umpqua River (between Toketee and Soda Springs dams) by placing or repositioning boulders in the streambed to trap bedload. Subsequently, PacifiCorp would monitor and evaluate the effectiveness of these measures in establishing appropriate conditions for fish spawning, and make adjustments as indicated. Together these measures (i.e., the modifications to the dams and the Slide Creek Bypass Habitat Enhancement Project) would lead to increased streambed gravel deposition and retention and improved fish habitats in the Slide Creek bypassed reach and in the Clearwater No. 1 bypassed reach (see sections 3.4.2.4 and 3.4.2.5).

Section 7 of the Settlement Agreement, as amended (PacifiCorp 2002f, 2003a), would require PacifiCorp to continue its current augmentation of gravels in the bypassed reach of the North Umpqua River below Soda Springs dam through the year 2004, and to continue to allow passage of LWD at the dam through the term of the new license. Amended section 7.2 of the Settlement Agreement would also require PacifiCorp to develop plans for implementation and monitoring of a longer-term gravel augmentation program in the bypassed and full-flow reaches below Soda Springs dam, and to begin implementing that new program in the fall of 2003 with the one-time placement of about 4,000 tons of gravel. Amended section 8.3 of the Settlement Agreement would further require PacifiCorp to develop and implement a plan to restore or create salmonid spawning habitat in these reaches. The Gravel Augmentation Program required by amended section 7.2 of the Settlement Agreement would be coordinated with the North Umpqua River Habitat Restoration/Creation Project required by amended section 8.3, and the RCC created under the Settlement Agreement would have a role in technical oversight of design, implementation, and evaluation of both programs.

The North Umpqua River Habitat Restoration/Creation Project would have the objective of restoring or creating habitat conditions in river reaches below Soda Springs dam that would be comparable to habitats lost as a result of the hydroelectric project. Before the dam was built, the Soda Springs bypassed reach included an unconfined segment, with multiple side channels that would have provided high quality anadromous fish habitat (FS 2001d). Similar alluvial habitat probably was also present in portions of the stream channel inundated by Soda Springs Reservoir. Gravel augmentation efforts under amended section 7.2 would support the habitat restoration project by increasing the

availability of gravel to sustain spawning habitat. Channel conditions would be monitored before and after the one-time gravel addition to identify locations where gravel accumulates. Additional gravel augmentation would be done periodically through the term of the license, targeted at these gravel deposition zones (PacifiCorp 2003a). Implementation of the gravel augmentation and habitat restoration measures would be monitored to evaluate their effectiveness. A technical committee of the RCC would evaluate the quantity and quality of spawning habitat, including gravel substrate size, amount of fine sediment, and other factors. The benefits of these measures to aquatic resources are discussed in section 3.4.2.5.

The measures under the Settlement Agreement to augment gravel and woody debris would increase channel geomorphic complexity and the quantity of substrate gravel in the bypassed and full-flow reaches below Soda Springs dam. As a result of requirements for planning, coordination, and effectiveness monitoring, the measures under the Settlement Agreement would have a higher probability of long-term success in restoring fluvial geomorphic conditions and enhancing fish habitat than the current gravel augmentation program. The gravel augmentation program would not replace the entire amount of gravel that is intercepted by the dam, but targeted placement of gravels should improve gravel retention and thus help assure the program's effectiveness in achieving these objectives. Potential secondary impacts from implementation of gravel augmentation and habitat restoration measures include temporary increases in downstream turbidity due to the acquisition and placement of gravel, reduced gravel accumulations at and downstream from the collection site, and additional land disturbance if new roads are needed for access to the river to collect or place gravel. The Settlement Agreement does not specify how or where gravels would be obtained. If gravels for use in augmentation efforts are collected from Soda Springs Reservoir by dredging, the excess sediment accumulation there would be slightly reduced. If gravels are collected from a stream channel using a sediment trap, streambed gravels would be depleted in reaches downstream from the collection point.

Increases in minimum instream flows under section 5 of the Settlement Agreement would generally increase the capacity of affected reaches to transport some size classes of fine sediment but would not substantially affect the transport of coarse bedload, which is mobilized only during high flows. As a result, some of the fine sediments deposited in stream channels by erosion events would be cleared from the stream channels more quickly, resulting in an improvement in streambed habitat quality.

In the Lemolo Nos. 1 and 2 bypassed reaches, reconnections of tributaries required by section 10 of the Settlement Agreement would contribute to restoration of fluvial geomorphic processes by increasing base flow, peak flows, and sediment supply. Giving

priority to performing Lemolo No. 2 maintenance during normal high-flow periods, as required by section 6.6b of the Settlement Agreement and the § 401 Water Quality Certificate, would further contribute to enhancing fluvial geomorphic processes. Increased sediment transport capacity in these reaches would reduce the residence time of fine sediments delivered to the reaches by episodes of erosion, thus reducing the adverse impacts of such episodes. The dominant substrate characteristics in these reaches probably would not change. These reaches were sediment-supply limited under natural conditions, so restoration of a more natural flow and sediment regime should not increase the deposition or retention of material less coarse than is now present. Also, the dominant cobble size observed in the streambed of the Lemolo No. 2 bypassed reach is essentially the same size that sediment transport equations predict should be present under natural bankfull streamflow conditions (Stillwater Sciences, Inc. 1998a). Increased sediment supplies due to reconnection of tributaries would increase the rates of sediment accumulation in the Lemolo Nos. 1 and 2 forebays.

Reconnection of the Clearwater River to allow high flows to bypass Toketee dam (as required by section 10 of the Settlement Agreement) would increase the quantity of substrate gravel in the Toketee bypassed reach of the North Umpqua River while somewhat reducing deposition in Toketee Lake. Because of the high sediment transport capacity in this bypassed reach, it would still have limited gravel deposits.

Off-site mitigation measures included in the Settlement Agreement as a result of the MOU between ODFW and PacifiCorp require addition of LWD in East Fork Rock Creek, upper Canton Creek, and East Fork Pass Creek in the Canton Creek watershed. Addition of LWD in these streams would enhance fluvial geomorphic processes by increasing channel complexity and stability and by forming focal points for the accumulation of gravels suitable for anadromous fish habitat. Over time, these measures would be expected to increase the availability of streambed gravels and thus contribute to enhanced habitat quality in the affected reaches.

NGO Alternative

Elements in the NGO Alternative that would affect the maintenance and restoration of fluvial geomorphic processes and streambed conditions include removal of Soda Springs dam, reconnections of tributaries, increases in minimum streamflows, and development of a LWD management plan intended to restore the natural large wood regime to the extent possible. The alternative does not include specific measures for geomorphic enhancements in the Slide Creek area.

Removal of Soda Springs dam would have the long-term effect of restoring a relatively natural sediment and debris transport regime to the mainstem North Umpqua River below the dam site. At some undetermined time in the future, near-natural streambed gravel supplies would be restored to the reaches below the dam because of restoration of some or all sediment delivery from Slide Creek, Fish Creek, Medicine Creek, and other smaller tributaries. Also, fluvial geomorphic conditions would return in the 1.4-mile reach that is now inundated by Soda Springs Reservoir.

There is considerable uncertainty about the potential effects of dam removal on fluvial processes and geomorphology in the near term (Stillwater Sciences, Inc. 1998b, Pizzuto 2002). Removal of the dam would rapidly release much of the coarse and fine sediment accumulation in Soda Springs Reservoir into the North Umpqua River. Most of the coarse sediment released would initially be deposited downstream in the North Umpqua River, within the Wild and Scenic River section. The initial flush of water would have very high levels of suspended sediment, which would result in high turbidity downstream in both the North Umpqua and mainstem Umpqua Rivers. Much of the silt-sized component of the fine sediment would be transported as suspended load beyond the river confluence with the South Umpqua River, but substantial quantities of sand would settle out in the North Umpqua River and could adversely affect existing anadromous fish habitat (section 3.4.2.3). The sediment release probably would increase the supply of gravels in the reaches downstream from the dam location where gravel deposits are depleted, but it could also increase coarse sediment loads in the river below Steamboat Creek, where logging and other activities unrelated to the North Umpqua Project have increased sediment loads considerably.

It is particularly difficult to predict the potential effects of dam removal on the quantity, character and location of sediment accumulation downstream from the dam, as well as how long sediment accumulations resulting from dam removal would remain in the channel (Stillwater Sciences, Inc. 1998b, 1999). Detailed hydraulic modeling would be needed to improve predictions of sediment transport and deposition. To support modeling it would be necessary to conduct extensive sampling of reservoir sediments to develop more reliable estimates of the quantity, grain-size characteristics, and areal distribution of sediment in the reservoir.

The method of dam removal would influence the impacts of sediment release. For example, the amount of sediment released to the channel in a single pulse could be reduced somewhat by removing the dam in stages, or by lowering the water level in the reservoir and dredging some of the accumulated sediment before removing the dam. However, removal methods that include drawdown of the reservoir before dam removal would also result in less downstream transport, potentially resulting in larger deposits of

sand in the river bed. If the dam were removed in a one-time event without first lowering the water level in the reservoir, there would be less potential for sand deposition in the Wild and Scenic River section than with phased removal, but the removal would cause larger short-term impacts on downstream water quality and could cause scouring of streambed gravels from reaches close to the dam location.

Upstream from the dam, sediment that was not flushed downstream would remain to form a new land surface. The newly exposed surface would be susceptible to erosion and landsliding (section 3.2.2.1), and the river and its tributaries would rapidly cut new channels in the sediment. Over a period of years to decades the streams would evolve a new equilibrium channel configuration (see Pizzuto 2002 for a review of the current state of knowledge on stream channel evolution following removal of dams) and terrestrial vegetation would stabilize the upland surface (see section 3.5.2.1). Due to the abundance of sediment in the formerly inundated area, it is likely that the new stream channels would include some alluvial depositional features. The location, character, and configuration of these features cannot be reliably predicted, but the stream channels in the former reservoir area probably would include some good-quality habitat for anadromous fish and aquatic invertebrates (see sections 3.4.2.4 and 3.4.2.5).

Under the NGO Alternative minimum instream flows generally would be substantially higher than under the Settlement Agreement and the No-Action Alternative. As under the Settlement Agreement, the bypassed reaches generally would have greater capacity to transport fine sediments, but the increased flows would not substantially affect the transport of coarse bedload, which is mobilized only during high flows. Fine sediments deposited in stream channels by erosion events would be cleared from the stream channels more quickly. Measures to restore the natural large wood regime to the extent possible would support the maintenance and enhancement of natural fluvial geomorphic processes throughout the project area.

The NGO Alternative would include the same recommendations for reconnections of tributaries as the Settlement Agreement. In addition, Bear Creek would be reconnected with the Clearwater River, bypassing Stump Lake, and Warm Springs Creek would be reconnected with the North Umpqua River below the Lemolo No. 2 diversion dam. These measures would increase both sediment supplies and non-peak flows in the Clearwater No. 1 and Lemolo No. 2 bypassed reaches, respectively. Streambed gravel supplies should increase in both reaches as a result. Reconnection of Bear Creek would help restore gravels to the Clearwater No. 1 bypassed reach, where the substrate is now coarser than would be expected under natural conditions. Also, there would be some reduction in sediment accumulation in Stump Lake, but sediments from Bear Creek would eventually be deposited behind the Clearwater No. 2 diversion dam or in the

Clearwater No. 2 forebay. Sediment effects in the Lemolo No. 2 bypassed reach would be qualitatively similar to the effects under the Settlement Agreement.

Staff Alternative

Both the Settlement Agreement and the NGO Alternative would result in streambed sediment characteristics more favorable for fish habitat than the No-Action Alternative. The NGO Alternative might result in somewhat greater enhancement of habitat than the Settlement Agreement, but its uncertainties and costs are considerably greater.

Therefore, the staff concurs with the provisions of the Settlement Agreement that are relevant to fluvial geomorphic processes. To help assure the effectiveness of the planned measures, we recommend that all plans for implementation, monitoring, and evaluation of the Slide Creek Bypass Reach Habitat Enhancement Project, the Gravel Augmentation Program, and the North Umpqua River Habitat Restoration/Creation Project be filed with the Commission for review and approval prior to their implementation.

Impacts to fluvial geomorphic processes from the Staff Alternative would be the same as under the Settlement Agreement. Fluvial geomorphic processes in the watershed would be maintained and enhanced by increases in base flows, reconnection of some tributaries, implementation of gravel augmentation and habitat enhancement/creation projects below Soda Springs dam and in the Slide Creek bypassed reach, and addition of LWD in streams in the Rock and Canton Creek watersheds.

3.3 WATER QUANTITY AND QUALITY

3.3.1 Affected Environment

3.3.1.1 Water Quantity

The water resources affected by the North Umpqua Project include the upper reaches of the North Umpqua River and its tributaries, the Clearwater River and Fish Creek. The discharge of water resources within the area affected by the project has been significantly altered by project operations, which divert large portions of the river

discharge to a network of waterways.⁴⁶ The discharge of the river system has also been affected by the construction of roads, timber harvesting, landslides and erosion, and recreational development. Each reach of the watershed affected by the project is discussed separately below.

Diamond Lake and Lake Creek

Diamond Lake is a natural lake supplied by runoff from the adjacent Cascade Mountains, and is the headwaters of Lake Creek, which is a tributary of the North Umpqua River. Diamond Lake is approximately 3,200 acres and has a storage capacity of about 77,000 acre-feet. The discharge of Diamond Lake to Lake Creek has been measured at USGS gaging station #14312500.

The drainage area above this gaging station is 55 square miles. The periods of record are 1923 to 1925 (incomplete records), 1927, 1934 to 1953, and 1972 to 1984. The daily average flow duration curve for Lake Creek is shown in figure 3-3 using the data from 1934 to 1953 and 1972 to 1984 (Stillwater Sciences, Inc. et al. 2000a). The annual mean flow of Lake Creek is approximately 57 cfs (Moffatt et al. 1990), with the discharge typically ranging from 30 to 80 cfs. The discharge of Lake Creek is relatively uniform throughout the year with occasional peak discharges in late fall from rain on snow events and late spring from snowmelt. An analysis of the gaging data by Stillwater Sciences (2000a) resulted in estimates of the 1.5-year flood of 110 cfs, the 2.5-year flood of 140 cfs and the 10-year flood of 210 cfs using a log-Pearson type III fit to the discharge data. Lake Creek channel morphology is described as pool-riffle with a sand and gravel substrate. The geomorphic terrain is primarily Surficial Deposits and High Cascades to a lesser extent. Lake Creek discharges to Lemolo Reservoir approximately 10 miles downstream from Diamond Lake.

⁴⁶ For purposes of this EIS, we use the term “waterway” to include man-made flumes, penstocks, and canals.

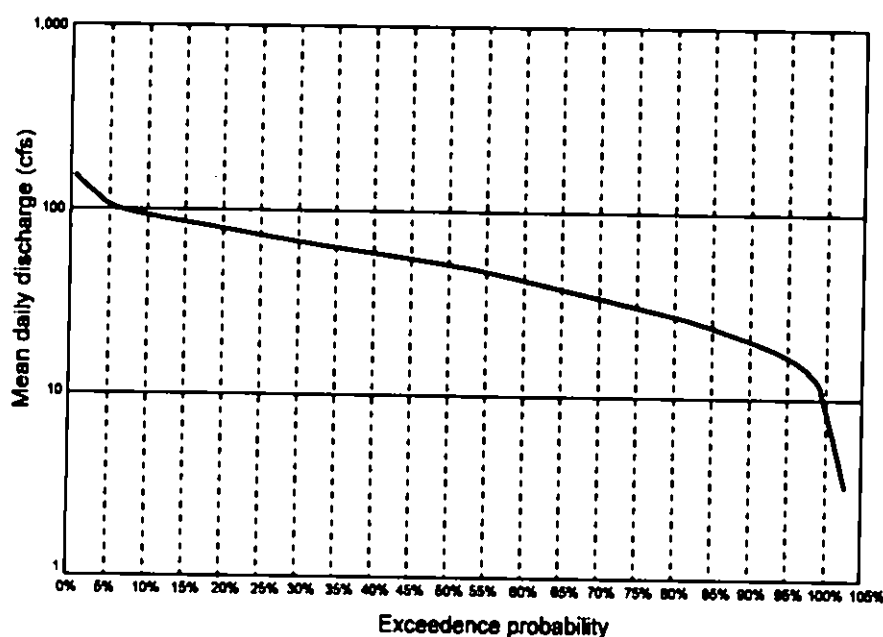


Figure 3-3. Lake Creek, 1934–1953 and 1972–1984, flow duration curve.
Source: Stillwater Sciences, Inc. 2000a.

Lemolo Reservoir and North Umpqua River

Lemolo Reservoir is an existing impoundment of the North Umpqua River located 1 mile downstream of the confluence with Lake Creek at North Umpqua RM 93.0. Pool Creek and Spring River also discharge to Lemolo Reservoir. The surface area at full pool is approximately 420 acres, and Lemolo Reservoir originally had a storage capacity of 12,520 acre-feet. Sediment trapping by Lemolo No. 1 dam has reduced this capacity to approximately 11,100 acre-feet. The lake is subject to winter drawdown, which reduces the surface area to about 200 acres and the storage to about 2,000 acre-feet. The impoundment is formed by Lemolo No. 1 dam, an 885-foot-long, 120-foot-high, rockfill dam with concrete facing. The spillway is rated at 16,300 cfs, but has been used only once in the flood of 1964 (PacifiCorp 1995a).

The discharge of the North Umpqua River is largely diverted to the Lemolo No. 1 waterway at Lemolo No. 1 dam as part of the North Umpqua Project. The capacity of the Lemolo No. 1 waterway is 561 cfs. The discharge of the North Umpqua River 0.4 miles below Lemolo No. 1 dam is measured at USGS gaging station #14313500 (RM 92.6). The drainage area above this gaging station is 170 square miles. The period of record is

continuous from October 1927 to present with a brief interruption from December 1945 to March 1946. The daily average flow duration curve for this gaging station is shown in figure 3-4 for the period of record from 1928 to 1996 (Stillwater Sciences, Inc., et al. 2000a). This figure shows the flow duration curve before and after the hydroelectric project began operating. The minimum discharge in the North Umpqua River is required to exceed 25 cfs or the inflow, whichever is less, as one of the current licensing conditions. The discharge is typically 30 to 40 cfs, except for occasions when dam and canal maintenance are performed. During maintenance activities, the discharge can be as high as 1,000 cfs and remain high for a period of 1 to 3 weeks.

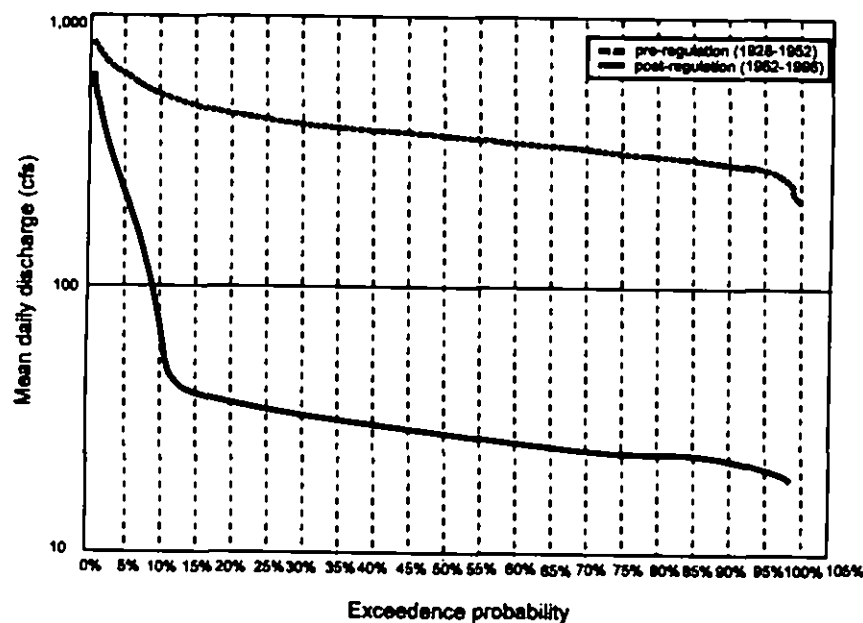


Figure 3-4. North Umpqua River Below Lemolo Reservoir, 1928–1952 (pre-dam), and 1962–1996 (post-dam) flow duration curve. *Source:* Stillwater Sciences, Inc. 2000a.

The daily average discharge in the North Umpqua River downstream of Lemolo No. 1 dam is significantly affected by the project's water diversions. Figure 3-5 shows the daily average hydrograph for the water year 1936, which is representative for the river prior to hydroelectric operations. Typically, the unregulated discharge ranges from 300 to 600 cfs during the water year with a maximum discharge occurring in the late spring from snowmelt. A rain on snow event in late fall can cause an increase in the discharge, but

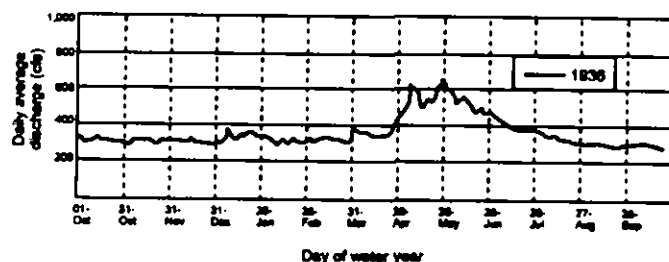


Figure 3-5. North Umpqua River below Lemolo No. 1 dam (Station 14-3135) daily average annual hydrograph for water year 1936. Source: Stillwater Sciences, Inc. 2000a.

these types of events are not to be expected every year. Figure 3-6 shows the daily average hydrograph for the water year 1987, which is representative for the river during hydroelectric operations. The discharge during operations is much more irregular and does not have the seasonal increase associated with snowmelt. The hydrograph shows the discharge in the river and the combined discharge of the diverted water and the water in the river. Consequently, the period of canal maintenance in the spring resulted in an increase in the discharge in the river bed, which lasted for several weeks. Otherwise, the discharge in the river remained at very low levels. The daily fluctuations in the hydrograph are the result of reservoir operations of Lemolo Reservoir that attenuate the seasonal fluctuations of the unregulated river.

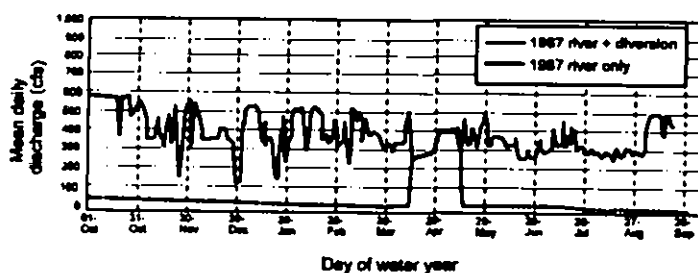


Figure 3-6. North Umpqua River below Lemolo Reservoir (station 14-3135) daily average hydrograph for water year 1987. Source: Stillwater Sciences, Inc. 2000a.

Table 3-1 shows the effect of Lemolo No. 1 dam on the flooding discharge of the North Umpqua River for various recurrence intervals using a log-Pearson type III fit to the data. The longer the recurrence interval, the larger the discharges become with the presence of the dam as compared to the discharges without the dam. These increases are

Table 3-1. Flooding discharge of the North Umpqua River below Lemolo No. 1 dam in cubic feet per second.

	Recurrence interval (years)			
	1.5	2.5	10	50
With Lemolo No. 1 dam	409	600	1,048	1,724
Without Lemolo No. 1 dam	633	800	1,078	1,343

attributed to shifts in climate (Stillwater Sciences, Inc. 2000a) and timber harvesting (PacifiCorp 1995a). Clearly Lemolo No. 1 dam attenuates high frequency flood events, but the limited storage capacity of Lemolo Reservoir does not affect infrequent flooding events.

Prior to the presence of the Lemolo No. 1 dam, changes in the discharge of the river occurred in response to floods that were not rapid and included only modest changes in the rate of change in river stage at the gaging station. Since the construction of Lemolo No. 1 dam, changes in the discharge in the North Umpqua River below the dam occur in response to floods, maintenance activities, or other events. The changes in discharge are much more rapid and also are associated with rapid changes in river stage. While the data available for describing the effect of the dam on the dynamics of the river discharges and stage are limited, they do indicate that prior to the dam the largest recorded rate of change in river stage was 0.15 feet/hour. Following the construction of the dam, the largest recorded rate of change in river stage was over 1.5 feet/hour (Stillwater Sciences, Inc. 2000a). Consequently, dam operations have increased the dynamic characteristics of the river.

The morphology of the North Umpqua River below Lemolo No. 1 dam is a step pool with forced pool riffle. Cobbles, boulders, and bedrock are typically present in the river substrate. The geomorphic terrain is described as Surficial Deposits and High Cascades, with some Western Cascades (see section 3.2.1.1).

Downstream of Lemolo No.1 dam and upstream of the USGS gaging station, White Mule Creek discharges to the North Umpqua River at RM 92.7. Previously, the discharge of White Mule Creek was diverted to the Lemolo No. 1 waterway, except during large runoff events. White Mule Creek was reconnected to the North Umpqua River in 2000 (PacifiCorp 2002c). There are no gaging data for White Mule Creek. The estimated base flow in White Mule Creek upstream of the former diversion during the summer is 0 to 0.7 cfs (Stillwater Sciences, Inc. 2000a).

The Lemolo No. 1 waterway discharges diverted water to the Lemolo No. 1 penstock at the Lemolo No. 1 forebay. A spillway at the intake to the penstock prevents overfilling. The spillway discharges from the forebay to the North Umpqua River approximately 2 miles upstream of the Lemolo No. 1 powerhouse. There are no data characterizing the discharge from the Lemolo No. 1 forebay to the North Umpqua River.

The Lemolo No. 1 penstock connects to the Lemolo No. 1 powerhouse. All of the water discharged from the powerhouse is returned to the North Umpqua River at RM 88.5. The discharge data from the Lemolo No. 1 powerhouse to the North Umpqua River was used to construct the “river + diversion” hydrograph presented in figure 3-6 (Stillwater Sciences, Inc. 2000a).

Lemolo No. 2 Diversion Dam and North Umpqua River

The Lemolo No. 2 diversion dam on the North Umpqua River is located 190 feet downstream of the discharge from the Lemolo No. 1 powerhouse to the North Umpqua River (North Umpqua RM 88.5). The diversion includes the discharge from Warm Spring Creek, which is ungaged. The diversion dam forms a 1.4-acre pond with no active storage that diverts water to the Lemolo No. 2 waterway. The diversion dam is a 350-foot-long, 25-foot-high, concrete gravity dam. The spillway of the Lemolo No. 2 diversion dam is not rated.

The discharge of the North Umpqua River is largely diverted to the Lemolo No. 2 waterway at the Lemolo No. 2 diversion dam. The intake structure for the Lemolo No. 2 waterway includes a spillway, to prevent overflowing of the waterway, that discharges to the North Umpqua River. The capacity of the Lemolo No. 2 waterway is 637 cfs (PacifiCorp 1995a). The minimum discharge in the North Umpqua River downstream of the Lemolo No. 2 diversion dam is required to exceed 25 cfs or inflow, whichever is less, as one of the current licensing conditions. The discharge from the Lemolo No. 2 diversion dam is monitored with a staff gage. There are no data characterizing the discharge from Lemolo No. 2 diversion dam or the spillways.

Several small creeks discharge to the North Umpqua River downstream of the Lemolo No. 2 diversion dam. Table 3-2 identifies these creeks and their location on the North Umpqua River. The table identifies those creeks which were formerly diverted to the Lemolo No. 2 waterway prior to their discharge to the North Umpqua River. These creeks have recently been reconnected to the North Umpqua River, and their infrastructure would be removed under Section 10.4 of the Settlement Agreement. Karen Creek, Spotted Owl Creek and Thorn Creek, which are tributaries of Deer Creek, were diverted to the Lemolo No. 2 waterway before their confluence with Deer Creek. The table also provides estimates of the summer base flow in the formerly diverted creeks above and below the diversion. These estimates were derived from gaging data prior to the hydroelectric project that provided an estimate of the average annual runoff per square mile of the drainage area of 1.25 cfs/mile² (Stillwater Sciences, Inc. 2000a). As noted in the table, most of the tributaries of this reach drain the area north of the North Umpqua River. This is attributed to the Western Cascades terrain that is prevalent in the mountains north of the river, and the increased snowmelt runoff from south facing slopes. Most of these tributaries are ephemeral, discharging snowmelt runoff to the North Umpqua River.

Prior to the presence of the Lemolo No. 2 diversion dam, changes in the discharge of the river occurred in response to floods that were not rapid and included modest rates of change in the river stage. USGS gaging station #14314000 was operated 2 miles upstream from the confluence of the Clearwater River from 1949 to 1954 (RM 77.3). The drainage area above this station is 258 square miles. The daily average flow duration curve for the period of record is shown in figure 3-7.

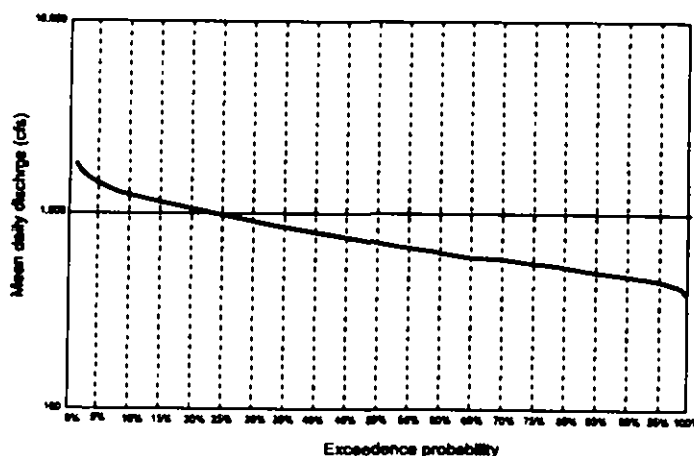


Figure 3-7. Daily average flow duration curve for the period of record for USGS gaging station #14314000 on the North Umpqua River, 2 miles upstream of its confluence with the Clearwater River. Source: Stillwater Sciences, Inc. 2000a.

Table 3-2. Tributaries to the North Umpqua River downstream of Lemolo No. 2 dam.

Tributary	North or south tributary	Location (RM)	Formerly Diverted ^a ?	Estimated summer baseflow ^b (cfs)	Estimated undiverted baseflow (cfs)
Nancy Creek	North	87.9	No		
Beverly Creek	North	87.6	No		
Helen Creek	North	87.4	Yes	0.4	0.0
Norma Creek	North	86.9	No		
Dorothy Creek	North	86.4	No		
Sally Creek	North	86.1	No		
Potter Creek	North	85.7	Yes	0.8–2.4	1.1 ^c
Laura Creek	North	85.3	No		
Nurse Creek	North	84.8	No		
Barkenberger Creek	North	84.3	No		
Patricia Creek	North	83.7	No		
Alvin Creek	North	83.2	No		
Charlie Creek	North	82.1	No		
Unnamed Creek	North	82.0	No		
Loafer Creek	South	80.2	No	25–60	25–60
Unnamed Creek	South	79.8	No		
Unnamed Creek	South	79.6	No		
Deer Creek	North	79.1	Yes	3–12	1 (required)
Unnamed Creek	South	78.0	No		
Mill Creek	North	77.8	Yes	1.75	0.6–0.8
Karen Creek	North	Deer Creek tributary	Yes	1.1	0.0
Spotted Owl Creek	North	Deer Creek tributary	Yes	1.4	0.0
Thorn Creek	North	Deer Creek tributary	Yes		

^a Tributaries that have recently been reconnected to the North Umpqua River (PacifiCorp 2002c).

^b Estimate based on average annual runoff of 1.25 cfs/mi² (Stillwater Sciences, Inc. 2000a).

^c Immediately below the Potter Creek diversion, the creek bed is dry during the summer; upstream of the confluence with the North Umpqua, a spring reestablishes flow in the creek.

The daily average discharge in the North Umpqua River at gaging station #14314000, which is located downstream of Lemolo No. 2 dam, is similar in character to the discharge at gaging station #14313500, which is located downstream of Lemolo No. 1 dam. Figure 3-8 shows the daily average hydrograph for 1950 for gaging station #14314000. Stillwater Sciences, Inc. (2000) compiled the data for gaging station #14314000 and #14313500 and developed the average annual daily hydrograph for the

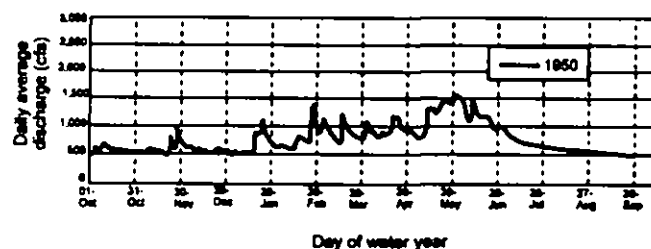


Figure 3-8. Daily average annual hydrograph for 1950 for the North Umpqua above the confluence with the Clearwater River. Source: Stillwater Sciences, Inc. 2000a.

period of record. The arithmetic difference between the data was calculated as the accretion between the two gaging stations. The results are shown in figure 3-9. As noted in table 3-2, the Loafer Creek tributary provides approximately 10 percent of the accretion from Lemolo No. 1 dam to the North Umpqua River upstream of the confluence with the Clearwater River.

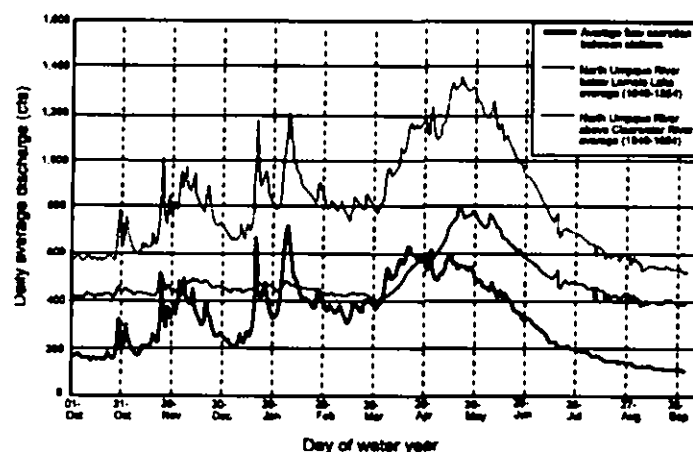


Figure 3-9. Daily average annual hydrograph and average annual hydrograph of flow accretion between Lemolo Reservoir and above Clearwater River gaging station. Source: Stillwater Sciences, Inc. 2000a.

The channel morphology of the North Umpqua River below Lemolo No. 2 diversion dam is more varied than the reach below the Lemolo No. 1 diversion dam. It is described as plane-bed and forced pool-riffle, with abundant unconfined reaches. The dominant substrate is cobble and gravel. The geomorphic terrain is associated largely with the Western Cascades, and a lesser presence of High Cascades and Surficial Deposits terrains.

The Lemolo No. 2 waterway discharges diverted water to the Lemolo No. 2 penstock at the Lemolo No. 2 forebay. The forebay has a total storage capacity of 230 acre-feet and an active storage capacity of 159 acre-feet. A spillway from the waterway discharges to the North Umpqua River at RM 78.6 to prevent overfilling of the canal. A spillway is also associated with the forebay that discharges to the Stink Hole pond, which is a large wetland, at the east end of Toketee Lake. There are no data describing the discharge of these spillways.

The Lemolo No. 2 penstock connects to the Lemolo No. 2 powerhouse, which is located at RM 77.3. All of the water discharged from the powerhouse is returned to the North Umpqua River. The length of the reach between the powerhouse and Toketee Lake is approximately 0.9 miles. The discharge of this reach of the river is variable and is directly related to the generation of power at the Lemolo No. 2 powerhouse. Typical variations in discharge during a day are 400 cfs (PacifiCorp 1995a).

Stump Lake and Clearwater River

Stump Lake is an existing impoundment of the Clearwater River located at the confluence of Bear Creek with the Clearwater River at Clearwater RM 8.1. The surface area at full pool is approximately 12 acres with a storage capacity of 30 acre-feet. The impoundment is formed by the Clearwater No. 1 diversion dam, a 1,426-foot-long, 17-foot-high earthfill dam. The concrete spillway is an ungated buttress with flashboards and is not rated.

The discharge of the Clearwater River is largely diverted to the Clearwater No. 1 waterway. The capacity of the waterway is 228 cfs. The discharge of the Clearwater River 0.4 miles downstream of Clearwater No. 1 diversion dam is measured at USGS gaging station #14314500 (RM 7.8). The drainage area above this gaging station is 41.6 square miles. The period of record is continuous from 1946 to present. The daily average flow duration curve for this gaging station is shown in figure 3-10 for the period of record. The figure shows the flow duration curve prior to the construction of the diversion dam and after the construction of the diversion dam. The minimum discharge

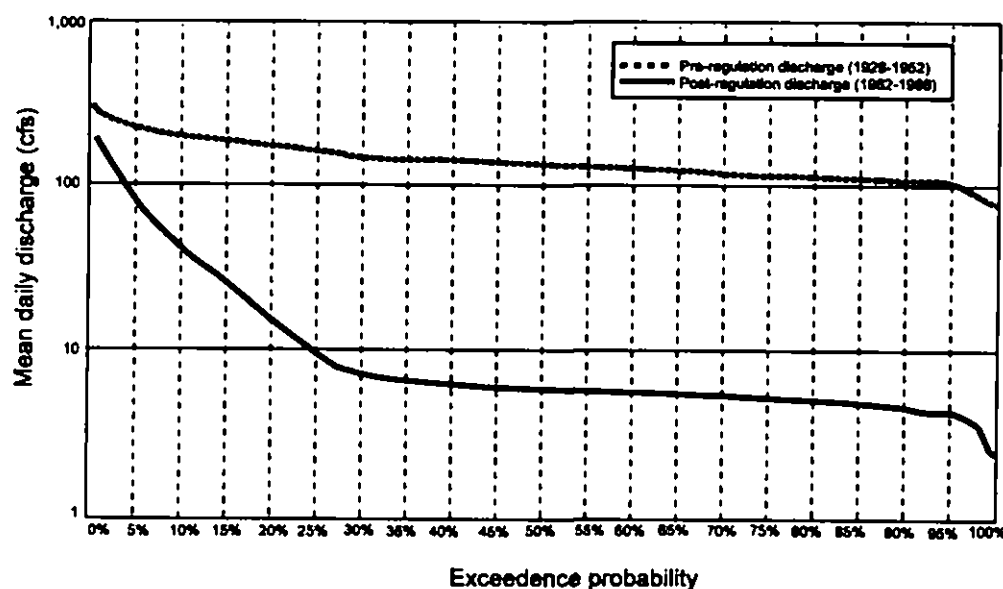


Figure 3-10. Clearwater River above Trap Creek, 1928–1952 (pre-dam) and 1962–1996 (post-dam) flow duration curves, downstream of Stump Lake and the Clearwater No. 1 diversion.

Source: Stillwater Sciences, Inc. 2000a.

in the Clearwater River is required to exceed 5 cfs or the inflow, whichever is less, as one of the current licensing conditions. During maintenance activities, the discharge can be as high as 200 cfs for a period of 1 to 3 weeks.

The daily average discharge in the Clearwater River downstream of the Clearwater No. 1 diversion dam is significantly affected by the diversion of water for the project. Figure 3-11 shows the daily average hydrograph for the water year 1935, which is representative of the river prior to the project. Typically, the unregulated discharge is about 140 cfs with a maximum daily discharge of over 200 cfs during the late spring from snowmelt. A rain-on-snow event in the late fall can cause an increase in the discharge, but these events do not occur every year. Figure 3-12 shows the daily average hydrograph for the water year 1988, which is representative for the river during hydroelectric

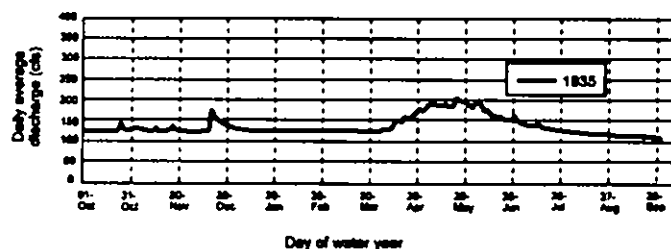


Figure 3-11. Daily average annual hydrograph for Clearwater River above Trap Creek for 1935. Source: Stillwater Sciences, Inc. 2000a.

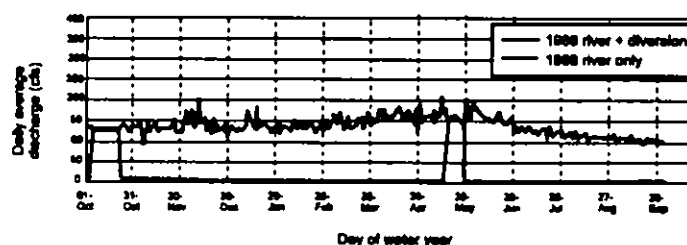


Figure 3-12. Daily average annual hydrograph for Clearwater River above Trap Creek, below Stump Lake and the Clearwater No. 1 diversion. Source: Stillwater Sciences, Inc. 2000a.

operations. The discharge during operations is much lower and is essentially constant throughout the year except for maintenance activities. The seasonal increase associated with snowmelt no longer occurs as a result of water diversion.

An analysis of the gaging data by Stillwater Sciences, Inc. (2000a) provided estimates of the flood frequency curve for the Clearwater River downstream of the Clearwater No. 1 diversion dam. Table 3-3 shows the effect of the Clearwater No. 1 dam on the flooding discharge of the Clearwater River for various recurrence intervals using a log-Pearson type III fit to the data. As with the Lemolo No. 1 dam, the estimates for the floods with longer recurrence intervals showed larger discharges with the presence of the dam, which illustrates the limited storage capacity of Stump Lake.

Table 3-3. Flooding discharge of the Clearwater River below Clearwater No. 1 dam in cubic feet per second.

	Recurrence interval (years)		
	1.5	2.5	10
With Clearwater No. 1 dam	127	260	456
Without Clearwater No. 1 dam	254	300	415

Prior to the presence of the Clearwater No. 1 diversion dam, changes in the discharge of the river occurred in response to floods that were not rapid and included rates of change in the river stage that rarely exceeded 0.2 feet/hr. Since the construction of the dam, significant changes in the discharge in the Clearwater River occur below the dam in response to maintenance activities. These changes in discharge associated with rapid changes in the river stage of approximately 1.0 feet/hour. Dam operations have increased the dynamic nature of the river.

The morphology of the Clearwater River below Clearwater No. 1 diversion dam is described as a step pool and forced pool riffle. The substrate is composed of boulders and cobbles with bedrock outcrops. The geomorphic terrain is typical of the High Cascades with Surficial Deposits. Some terrain is associated with the Western Cascades to the north of the Clearwater River.

Below the Clearwater No. 1 diversion dam, Trap Creek discharges to the Clearwater River just below the USGS gaging station. There are no gaging data that characterize the contributions of Trap Creek to the discharge of the Clearwater River. The Trap Creek discharge is unregulated.

The Clearwater No. 1 waterway discharges diverted water to the Clearwater No. 1 penstock at the Clearwater No. 1 forebay. The spillway at the Clearwater No. 1 forebay discharges to Mowich Creek which discharges to the Clearwater River below the Clearwater No. 1 powerhouse. There are no data describing the discharge from the Clearwater No. 1 forebay to Mowich Creek.

The Clearwater No. 1 penstock connects to the Clearwater No. 1 powerhouse. All of the water discharged from the powerhouse is returned to the Clearwater River at Clearwater RM 4.9. The discharge from the Clearwater No. 1 powerhouse was used to

construct the “river + diversion” hydrograph shown in figure 3-12 (Stillwater Sciences, Inc. 2000).

Clearwater No. 2 Diversion Dam and Clearwater River

The Clearwater No. 2 diversion dam is located 140 feet downstream of the Clearwater No. 1 powerhouse, at the confluence of the Clearwater River and Mowich Creek (Clearwater RM 4.9). The diversion dam impounds the discharge of Mowich Creek, which is ungaged. The diversion dam forms a 1.2-acre impoundment with no active storage capacity that is diverted to the Clearwater No. 2 waterway. The diversion dam is a concrete buttress design which has a length of 157 feet and a height of 18 feet. The spillway is also a concrete buttress design and is not rated.

The discharge of the Clearwater River is largely diverted to the Clearwater No. 2 waterway at the Clearwater No. 2 diversion dam. The intake structure for the Clearwater No. 2 waterway includes a spillway, to prevent overflowing of the waterway, that discharges to the Clearwater River. The capacity of the Clearwater No. 2 waterway is 341 cfs. The minimum discharge of the Clearwater River downstream of the Clearwater No. 2 diversion dam is required to exceed 5 cfs or inflow, whichever is less, as one of the current licensing conditions. The discharge from the Clearwater No. 2 diversion dam is monitored with a staff gage. There are no data characterizing the discharge from the Clearwater diversion dam or spillways.

Several small creeks discharge to the Clearwater River downstream of the Clearwater No. 2 diversion dam. Table 3-4 identifies these creeks and their location on the Clearwater River. None of these creeks is diverted to the Clearwater No. 2 waterway. There are no data or estimates of the discharge of these creeks to the Clearwater River. The increase in flow of the Clearwater River between the Clearwater No. 2 diversion dam and the discharge of the Clearwater River to Toketee Lake at the confluence of the Clearwater River with the North Umpqua River has been attributed primarily to groundwater sources.

Prior to the presence of the diversion dams on the Clearwater River, rapid changes in discharge in the lower reaches of the Clearwater River occurred in response to frequent flooding events. However, these variations in discharge were associated with modest changes in river stage. These characteristics of the lower Clearwater River are in contrast

Table 3-4. Tributaries to the Clearwater River downstream of Clearwater No. 2 dam.

Tributary	North or south tributary	Location (RM)	Diverted?
Maple Creek	South	3.6	No
Chinquapin Creek	South	3.2	No
No Tunnel Creek	North	2.4	No
Watson Creek	South	1.8	No
Watson Creek	South	1.2	No

to the upper reaches of the Clearwater River, where increases in discharge are associated with noticeable changes in river stage. USGS gaging station #14315000 was operated from 1948–1954. The drainage above this station is 76.6 square miles. The gaging station was located at Clearwater RM 0.25. The daily average flow duration curve for the period of record is shown in figure 3-13.

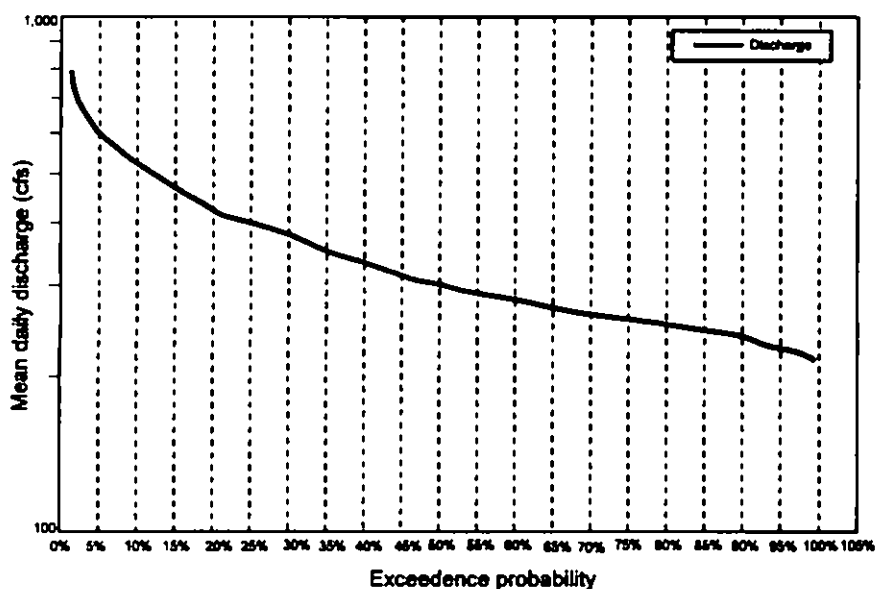


Figure 3-13. Flow duration curve for the Clearwater River at its confluence with the North Umpqua River. Source: Stillwater Sciences, Inc. 2000a.

The daily average discharge in the Clearwater River at gaging station #14315000 is more dynamic than the discharge at gaging station #14314500 located downstream of the Clearwater River No. 1 diversion dam. Figure 3-14 shows the daily average hydrograph for 1952, which is representative of the period of record. The comparison of the annual hydrographs for the Clearwater River between gaging stations #143145000 and #14314500 was performed by Stillwater Sciences, Inc. (2000). This comparison showed that for the period of record before the presence of the Clearwater River No. 2 Development, the accretion between the two gaging stations was 60 to 80 cfs during the summer. Since no tributary discharges are diverted by the project, the discharge of the Clearwater River at Toketee Lake under current project operations should be about 85 cfs.

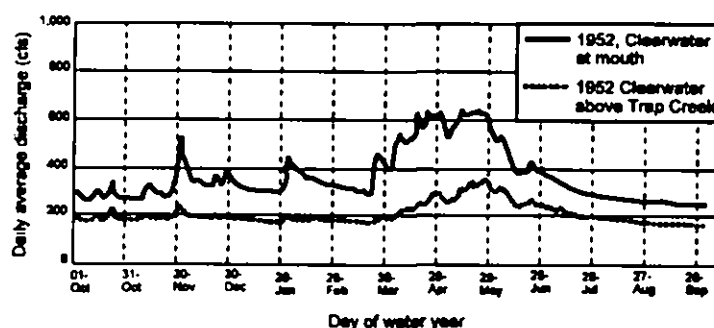


Figure 3-14. Daily average annual hydrograph for the Clearwater River. *Source: Stillwater Sciences, Inc. 2000a.*

The morphology of the Clearwater River below Clearwater No. 2 diversion dam is described as forced pool-riffle and plane bed. The dominant substrate materials are boulders and cobbles with gravel bars. The geomorphic terrain is associated largely with the High Cascades and Western Cascades, but there are also areas associated with Surficial Deposits.

The Clearwater No. 2 waterway discharges to the Clearwater No. 2 forebay, which in turn discharges to the Clearwater No. 2 penstock. A spillway from the forebay discharges to the Clearwater River prior to the discharge of the Clearwater River to Toketee Lake. There are no data describing the discharge from the spillway.

The Clearwater No. 2 penstock connects to the Clearwater No. 2 powerhouse located on Toketee Lake upstream of the confluence of the Clearwater River with the North Umpqua River. All of the diverted water is returned to the North Umpqua River at Toketee Lake.

Toketee Lake and North Umpqua River

Toketee Lake is formed by Toketee dam, which is an impoundment on the North Umpqua River at its confluence with the Clearwater River. The dam is located at North Umpqua RM 75.4 and is a 1,381-foot-long, 53-foot-high earthfill structure. The spillway is rated at 28,000 cfs. Toketee Lake is a 96.9-acre lake with a total storage of 1,051 acre-feet. The active storage of Toketee Lake is 491.4 acre-feet.

The discharge of the North Umpqua River is largely diverted to the Toketee waterway at Toketee dam. The capacity of the Toketee waterway is 1,425 cfs. The discharge of the North Umpqua River downstream of Toketee dam was measured at USGS gaging station #14315500 from 1926 to 1954. The drainage area above this station is 339 square miles. The daily average flow duration curve for this gaging station is shown in figure 3-15 for the period of record. The flow duration curve for the North Umpqua River before and after the construction of the dam is presented. The flow duration curve for the period of 1950 to 1954 is the result of a reconstructed hydrograph developed by taking the total inflows to Toketee Lake and subtracting the maximum diversion to the Toketee waterway. The minimum discharge in the North Umpqua River downstream of Toketee dam is required to exceed 25 cfs or the inflow, whichever is less, as one of the current licensing conditions. The discharge is monitored with a staff gage.

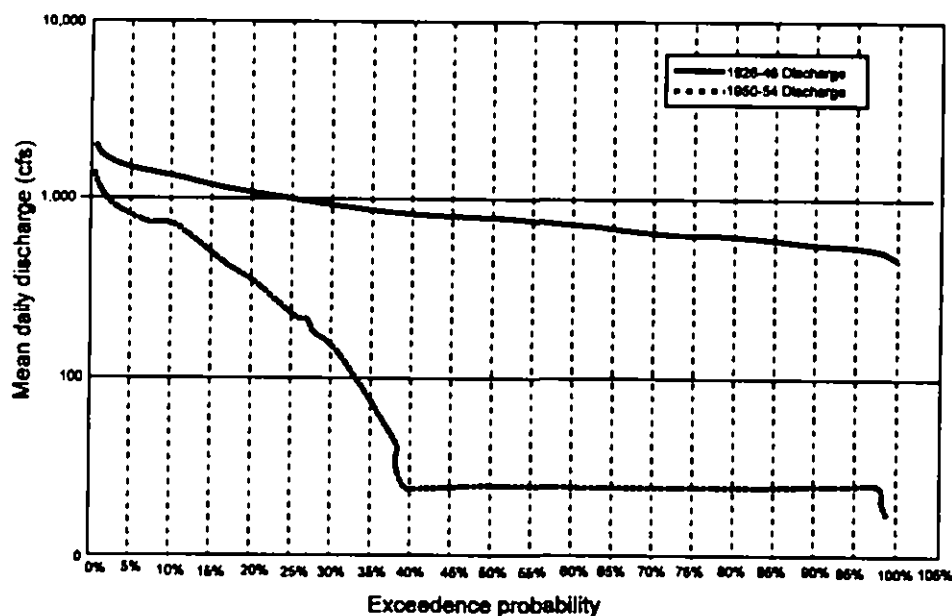


Figure 3-15. North Umpqua River at Toketee Falls, pre-dam (1926-1948) and post-dam (1950-54) flow duration curves. Source: Stillwater Sciences, Inc. 2000a.

The daily average discharge in the North Umpqua River downstream of Toketee dam is significantly affected by the project's water diversions. Figure 3-16 shows the daily average hydrograph for 1936, which is representative for the river prior to hydroelectric operations. Typically, the unregulated discharge ranges from 600 to 1,200 cfs with maximum discharges occurring during the spring snowmelt. Figure 3-17 shows a reconstructed hydrograph of the North Umpqua River for 1952 after the beginning of hydroelectric operations. This hydrograph does not take into account the active storage of Toketee Lake, assumes full diversion of water into the Toketee waterway at all times, and does not consider releases associated with waterway or dam maintenance. However, it does account for the 25 cfs instream flow requirement. While this figure is not a measured hydrograph, it does illustrate the typical differences in the river discharge to be associated with hydroelectric operations.

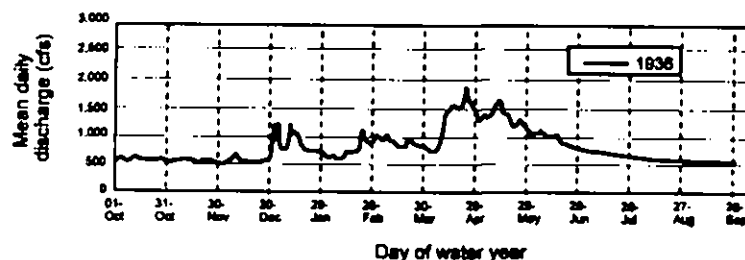


Figure 3-16. Daily average annual hydrograph of the North Umpqua River at Toketee Falls. *Source: Stillwater Sciences, Inc. 2000a.*

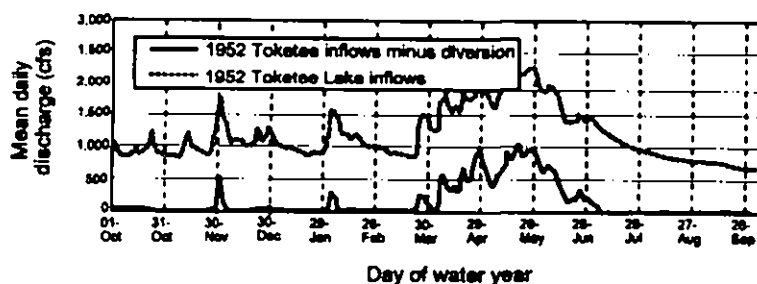


Figure 3-17. Reconstructed annual hydrograph of the North Umpqua River for Toketee bypassed reach. *Source: Stillwater Sciences, Inc. 2000a.*

An analysis of the gaging data from 1926 to 1949 by Stillwater Sciences, Inc. (2000a) provided estimates of the flood frequency curve for the North Umpqua River. Prior to the construction of the dam, the 1.5-year flood was estimated to be 2,210 cfs using a log-Pearson type III fit to the data. The 2.5-year flood event was 2,900 cfs, and the 10-year flood was 4,200 cfs, which were both determined using a log-Pearson type III fit to the data.

Prior to Toketee dam, floods caused significant changes in the discharge of the river with small changes in the rate of change of the river stage. Since the construction of the dam, much more rapid rates of change in river stage occur in response to maintenance events that can result in increased discharges for several weeks, with rapid increases and reductions in stage.

The channel morphology of the North Umpqua River below Toketee dam is a forced pool-riffle and plane-bed with some step pools. The dominant substrate materials are boulders, cobbles, and bedrock. The geomorphic terrain is typical of the Western Cascades and High Cascades. Below Toketee dam, the North Umpqua River enters into a 300-foot-deep canyon. In this reach of the river, no tributaries discharge to the North Umpqua River. Also this reach of the river includes Toketee Falls (North Umpqua RM 74.6), which is a natural barrier to fish migration. Toketee Falls is 120 feet high, with the upper portion falling 40 feet, and the lower portion plunging an additional 80 feet.

The Toketee waterway discharges diverted water to the Toketee penstock and then to the Toketee powerhouse at North Umpqua RM 73.4, 2 miles below the dam, where all of the diverted water is returned to the North Umpqua River.

Fish Creek Diversion Dam and Fish Creek

The Fish Creek diversion dam is located at Fish Creek RM 6.6, upstream of the confluence of Fish Creek with the North Umpqua River. The diversion dam forms a 3-acre pond with no active storage that diverts water to the Fish Creek waterway. The diversion dam is a 133-foot-long, 6-foot-high concrete gravity dam. The spillway of the Fish Creek diversion dam is not rated.

The discharge of Fish Creek is largely diverted into the Fish Creek waterway at the Fish Creek diversion dam. The capacity of the Fish Creek waterway is 177 cfs. The discharge of Fish Creek is measured at USGS gaging station #14316000, which is located at Fish Creek RM 4.7, approximately 1.9 miles downstream of the Fish Creek diversion dam. The drainage area above this gaging station is 68.8 square miles. The period of

record for this gaging station is 1948 to present. The daily average flow duration curve for this gaging station is shown in figure 3-18. The figure shows the flow duration curve before and after the operation of the hydroelectric project. The existing license requires a minimum discharge below the Fish Creek diversion dam of 20 cfs between April and August and 10 cfs from September to March or inflow, whichever is less. The discharge from the Fish Creek diversion dam is measured with a staff gage. PacifiCorp typically releases 30 cfs downstream of the Fish Creek diversion dam, but the discharge is heavily influenced by storms that can occur at any time of the year.

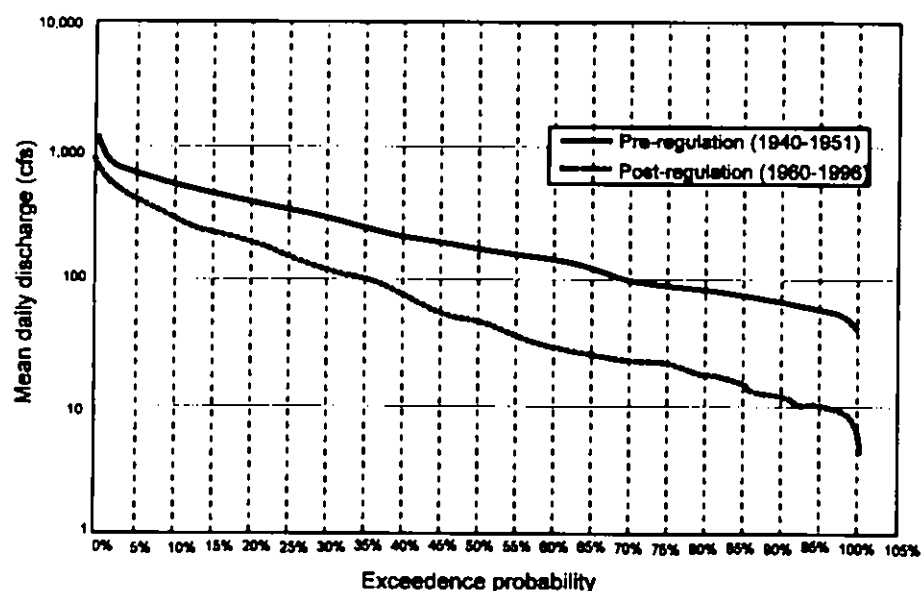


Figure 3-18. Fish Creek flow duration curve. Source: Stillwater Sciences, Inc. 2000a.

The daily average discharge in Fish Creek is not as significantly affected by the project as other river reaches within the project area because the maximum diversion capacity is low relative to unregulated flows. Figure 3-19 shows the daily average hydrograph for water year 1969, which is representative for the creek. The figure shows the creek and creek plus diversion hydrograph. The creek plus diversion hydrograph was constructed by adding the creek discharge at the gaging station to the diverted water to generate the combined hydrograph. The limited storage at the diversion dam and the limited capacity of the diversion results in the total discharge closely following the creek discharge. The daily discharge is influenced by rainfall, snow, rain on snow, and snowmelt events.

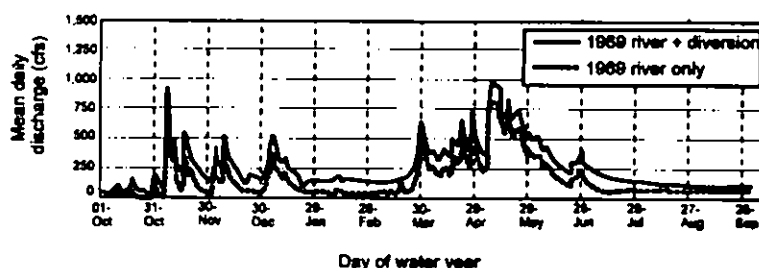


Figure 3-19. Daily average annual hydrograph for Fish Creek at Big Camas Ranger Station. Source: Stillwater Sciences, Inc. 2000a.

An analysis of the gaging data by Stillwater Sciences, Inc. (2000a) provided estimates of the flood frequency for Fish Creek. Table 3-5 shows the effect of the Fish Creek diversion dam on the flooding discharge of Fish Creek for various recurrence intervals using a log-Pearson type III fit to the data. These results indicate that the presence of the dam does not significantly affect the flooding discharges of Fish Creek and underscore the smaller impact this portion of the hydroelectric project has had on the discharge of the creek when compared to the dams on the North Umpqua and Clearwater Rivers.

Table 3-5. Flooding discharge of Fish Creek below Fish Creek diversion dam in cubic feet per second.

	Recurrence interval (years)		
	1.5	2.5	10
With Fish Creek dam	1,400	2,400	5,700
Without Fish Creek dam	1,600	2,700	5,900

Prior to the presence of the Fish Creek diversion dam, changes in the discharge of the creek occurred in response to storms. The discharge in the creek could be expected to change by a factor of 10 in response to storms. The rate of change of the stage during storm events could be as rapid as 1 foot/hour. Maintenance of the dam and the waterway also affect the discharge, but typically by a factor of 2 to 3. The rate of change of the stage is pronounced and typically exceeds 0.5 feet/hour.

The morphology of Fish Creek is forced pool-riffle and step pool. The dominant substrate in the creek bed is boulder, cobble, and gravel. The geomorphic terrain is Western Cascades and High Cascades.

Downstream of Fish Creek diversion dam, Shipper Creek and an unnamed tributary of Fish Creek discharge to the creek before the gaging station. There are no records of the discharge from these tributaries. Downstream of the gaging station, Camus Creek and Pie Creek discharge to Fish Creek before the confluence of Fish Creek with the North Umpqua River. There are no data describing the discharge of these tributaries to Fish Creek.

The Fish Creek waterway discharges diverted water to the Fish Creek penstock at the Fish Creek forebay. This forebay is a 9.3-acre impoundment with a total storage of 110 acre-feet and an active storage of 83 acre-feet. A spillway exists along the Fish Creek waterway that allows excess diverted water to be returned to Fish Creek. Another spillway is present at the Fish Creek forebay that routes excess diverted water in the forebay directly to the North Umpqua River upstream of its confluence with Fish Creek. There are no data quantifying discharges to either Fish Creek or the North Umpqua River from these spillways.

The Fish Creek penstock connects to the Fish Creek powerhouse. All of the water discharged from the Fish Creek powerhouse is returned to the North Umpqua River at North Umpqua RM 73.2, just downstream of the Toketee powerhouse. Fish Creek discharges to the North Umpqua River 1.4 miles downstream of the Fish Creek powerhouse at North Umpqua RM 71.8. Consequently, the river plus diversion daily average hydrograph shown in figure 3-17 is not a measured hydrograph, but a conceptual hydrograph of the approximate discharge of the creek if all of the Fish Creek discharge were combined.

Slide Creek Diversion Dam and North Umpqua River

The Slide Creek diversion dam is located 900 feet downstream from the Toketee powerhouse and 350 feet downstream of the Fish Creek powerhouse at North Umpqua RM 73.2. The diversion dam forms a 2.0-acre pond with a total storage of 43.0 acre-feet and no active storage. The water in the impoundment is diverted to the Slide Creek waterway, which has a capacity of 1,500 cfs. The diversion dam is a 183-foot-long, 30-foot-high concrete gravity dam. The spillway of the Slide Creek diversion dam is not rated.

The discharge of the North Umpqua River is largely diverted to the Slide Creek waterway through the intake structure at the dam, which also has a spillway 190 feet downstream from the intake structure itself. The existing license requires a minimum instream flow of 25 cfs or inflow, whichever is less, downstream of the Slide Creek diversion dam. The discharge of the North Umpqua River downstream of the Slide Creek diversion dam is monitored with a staff gage. There are no gaging data downstream of the Slide Creek diversion dam.

The North Umpqua River below Slide Creek diversion dam is confined in a 500-foot-deep canyon. The only tributary discharging to the North Umpqua River in this reach of the river is Fish Creek. The morphology of the North Umpqua River below the Slide Creek dam is described as forced pool-riffle and plane-bed with some step pool. The dominant substrates are boulders, cobbles and bedrock. The geomorphic terrain is described as Western Cascades and High Cascades.

The Slide Creek waterway discharges diverted water to the Slide Creek penstock at the Slide Creek forebay. The Slide Creek forebay has no storage capacity but includes a spillway that discharges directly to the North Umpqua River. There are no data that characterize the discharge of the spillway.

The penstock is connected to the Slide Creek powerhouse located at North Umpqua RM 71.2, which is the confluence of Slide Creek with the North Umpqua River. All of the diverted water is returned to the North Umpqua River. The Slide Creek powerhouse is located at the top of Soda Springs Reservoir, which is an impoundment of the North Umpqua River (see below). In addition to Slide Creek, Medicine Creek discharges to Soda Springs Reservoir from the north side of the river. An unnamed creek discharges to Soda Springs Reservoir from the south side of the river. Gaging data are not available for these tributaries.

Soda Springs Dam and North Umpqua River

Soda Springs dam on the North Umpqua River is located 1.3 miles downstream of the confluence of Slide Creek with the North Umpqua River (North Umpqua RM 69.8). Soda Springs dam forms Soda Springs Reservoir, which is a 31.5-acre impoundment with a total storage of 411.6 acre-feet and an active storage of 307.1 acre-feet. The dam is a 309-foot-long, 77-foot-high concrete arch dam. The spillway for the dam is rated at 20,000 cfs.

The discharge of the North Umpqua River is largely diverted at Soda Springs dam to the Soda Springs waterway. The intake for the waterway is part of the dam. The existing license requires that the minimum instream flow of the North Umpqua River downstream of Soda Springs dam exceeds 25 cfs or inflow, whichever is less. The discharge from Soda Springs dam can be reduced to 17 cfs when ODFW diverts 8 cfs of water for use in its salmon holding ponds. The discharge from Soda Springs dam is monitored with a staff gage. There are no gaging data for the bypassed reach below Soda Springs dam. Gaging data for the reach of the North Umpqua River from the Soda Springs dam to the Soda Springs powerhouse are not available. One unnamed tributary discharges to the North Umpqua River from the north in this reach of the river.

Soda Springs Reservoir has accumulated over 250,000 cubic yards of sediment, which has significantly reduced the total and active storage capacity of the reservoir by over 150 acre-feet.

The morphology of the reach of the river between Soda Springs dam and powerhouse is plane-bed and forced pool riffle. The dominant substrates are boulders and cobbles. The geomorphic terrain is Western Cascades and High Cascades.

The Soda Springs waterway discharges to the Soda Springs penstock, which connects to the Soda Springs powerhouse. The Soda Springs powerhouse discharges all of the diverted water to the North Umpqua River at North Umpqua RM 69.3.

North Umpqua River Downstream of Soda Springs

All project releases return to the mainstem of the river at the Soda Springs powerhouse. At North Umpqua RM 67.9, Boulder Creek discharges to the North Umpqua River. The Boulder Creek watershed is 39.4 square miles in area and is a wilderness area. The watershed is very flashy with significant variations in discharge. The mean daily discharge is 40 cfs, but the range is from 2 to 600 cfs. Figure 3-20 shows the daily average flow duration curve for the Boulder Creek gaging station. At North Umpqua RM 67.2, Eagle Creek discharges to the North Umpqua River. The discharge of the North Umpqua River is measured at the Copeland Creek gaging station (USGS gaging station #14316500), which is located adjacent to the confluence of Eagle Creek with the North Umpqua River. The period of record is from 1949 to present. The drainage area is 475 square miles. At this station, the average discharge is 1,460 cfs with considerable fluctuation in the discharge caused by hydroelectric power generation.

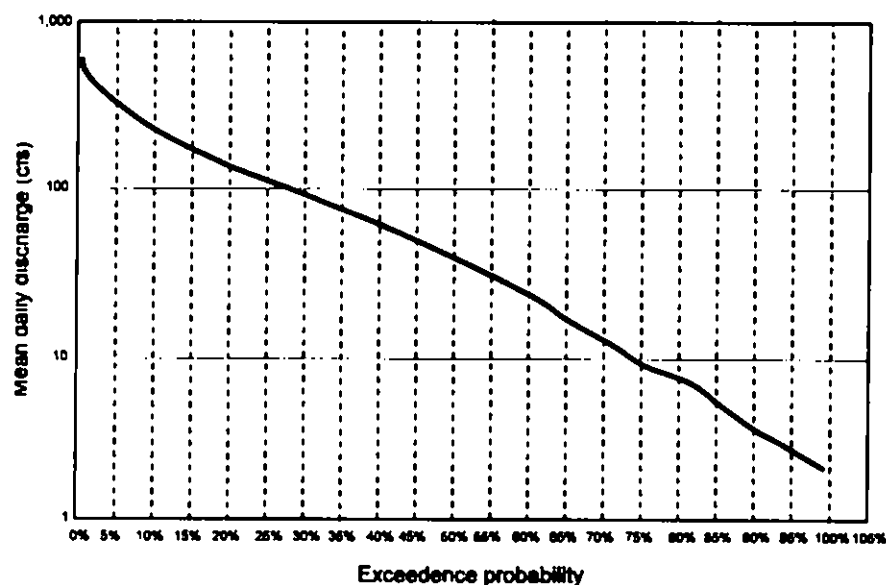


Figure 3-20. Boulder Creek, 1987-1994 flow duration curve. *Source:* Stillwater Sciences, Inc. 2000a.

The USGS operates gaging station #14318500 on the North Umpqua River near Glide at North Umpqua RM 27.2. The period of record for this gaging station is 1916 to 1918 and 1928 to 1938. At this location, the drainage area is 1,210 square miles. The average daily discharge is 2,000 cfs with a range of 500 to 20,000 cfs. No gaging data were recorded after the construction of the project, and the hydrograph is influenced by diversions of water for agriculture. Between the gaging station located at the confluence of Eagle Creek and the gaging station near Glide, 73 tributaries discharge to the North Umpqua River. Major tributaries include Little River (North Umpqua RM 29.1), Rock Creek (North Umpqua RM 35.7), and Steamboat Creek (North Umpqua RM 53).

The USGS operates gaging station #14319500 on the North Umpqua River at Winchester at North Umpqua RM 1.8. The period of record is from 1909 to 1913, 1924 to 1929, and 1955 to present. At this gaging station, the drainage area is 1,344 square miles and the average discharge of the river is 3,700 cfs. The daily average flow duration curve for the period of record is shown in figure 3-21. This figure shows any effects from the project on the flow duration curve are small, which is to be expected at a location as far downstream from the project as Winchester.

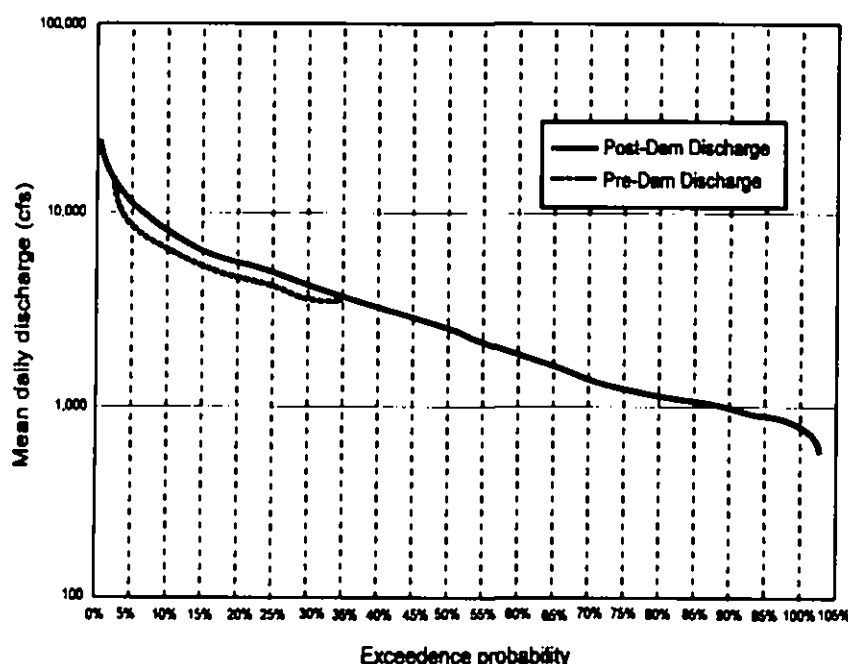


Figure 3-21. North Umpqua River at Winchester, 1909–1913 and 1924–1929 (pre-dam), and 1957–1996 (post-dam) flow duration curve.
Source: Stillwater Sciences, Inc. 2000a.

3.3.1.2 Water Quality

Generally, water quality is considered to be one of the outstanding features of the North Umpqua River (FS 2001a). However, water quality in the North Umpqua River Basin has been degraded by a variety of activities, including timber harvesting, erosion, nutrient enrichment, and operation of the North Umpqua Project. Water quality requirements for the North Umpqua River Basin are set by the State of Oregon (OAR 340, Chapter 41).

The North Umpqua Cooperative Watershed Analysis (Stillwater Sciences, Inc. 1998a) focused on four major water quality issues: temperature, turbidity, eutrophication (nutrient enrichment), and TDG. Table 3-6 displays the Oregon Administrative Rules for these water quality parameters in the North Umpqua River Basin, as well as ranges of values measured during the studies conducted for the license application (June 1992 to October 1994) and other supplemental studies conducted from 1995 to 2001 and presented in ODEQ (2002b).

Table 3-6. Water quality standards and measured values for the North Umpqua River Basin.^a

Water quality parameter	Oregon standard	Measured values in project area during 1992–1994 ^b
Temperature	Unless allowed under an ODEQ surface water temperature management plan, no increase over 0.14 °C where (1) temperature exceeds 12.8 °C and the water supports native salmonid spawning, egg incubation, or fry emergence; or (2) temperature exceeds 17.8 °C and salmonid rearing is a designated beneficial use. Temperature criteria are applied as the moving 7-day average of daily maximum temperatures.	Temperatures ranged from 0 to 27 °C, depending on season, year, and location. Increases exceed 0.14 °C in most project-affected reaches
Turbidity	Shall not increase more than 10 percent over background levels, except under certain circumstances as a result of limited-duration activities necessary to address an emergency or to accommodate essential dredging, construction, or other limited activities. Natural turbidity levels are not subject to the criterion.	Criterion was exceeded during annual maintenance of project facilities, landslides, and large storm events
Dissolved oxygen	Cold water: 8.0 mg/L Salmonid spawning: 6.0 mg/L for intergravel dissolved oxygen and 9.0 mg/L for water column dissolved oxygen.	Depending on site and time, values ranged from 5.9 to 16.2 mg/L
pH	Shall not fall outside the range of 6.5–8.5. The criterion does not apply to impoundments if all practicable measures have been taken to bring the pH into compliance.	551 of 554 measured values were between 6.5 and 8.5
Nuisance phytoplankton growth	Average chlorophyll-a concentration shall not exceed 0.015 mg/L for 3 consecutive months (this is an action level, not a standard).	Single sample values ranged from 0.001 to 0.033 mg/L in the stream reaches, but did not exceed the action level in project impoundments
Total dissolved gas (TDG)	Shall not exceed 105 percent in water less than 2 feet deep, or 110 percent in waters more than 2 feet deep	Values ranged from 94 to 122 percent of saturation

^a Sources: Stillwater Sciences, Inc. 1998a; ODEQ 2002b.^b Supplemental data collected after October 1994, as presented in ODEQ 2002b, were also reviewed and included, as appropriate, in the table.

Water Temperatures

Information about water temperatures in the North Umpqua River has been developed by monitoring temperatures at selected stations and by using models to predict water temperatures under alternative operating conditions. In general, water temperatures in the North Umpqua River increase in a downstream direction, owing to increasing air temperatures, cumulative warming by solar radiation, and decreasing inflow of cold groundwater in the lower elevations of the watershed. This downstream warming trend is influenced by hydroelectric operations, riparian conditions, geomorphic characteristics, and other factors.

There is considerable variation in water temperatures within the project area, depending on season, elevation, water flow, and location (i.e., within impoundments, bypassed reaches, or full-flow reaches). Summer water temperatures within the basin ranged from 4 to 25 °C during 1992, 4 to 23 °C during 1993, and 4 to 27 °C during 1994. Some of the warmest summer water temperatures were recorded in tributaries to the North Umpqua River downstream of the Soda Springs powerhouse. Fall temperatures measured during 1992 and 1993 ranged from 0 to 15 °C. Winter water temperatures in 1993 and 1994 ranged from 0 to 9 °C.

The summertime warming of Soda Springs Reservoir between the inlet and outlet is less than might be expected in this reach of the river without the reservoir (based on a comparison with the modeled temperature increase per kilometer below the powerhouse). Farther downstream, high summer water temperatures result primarily from solar warming of the river and, to a minor extent, from the inflow of the warmer tributaries.

Water temperatures are altered not only by the hydropower project but also by forest management and other land uses. For example, some of the highest summer water temperatures in the 1992 to 1994 period occurred in Lake Creek, which originates as outflow from Diamond Lake above the project. Similarly, high water temperatures were recorded in tributaries of the North Umpqua River below the project (Boulder, Copeland, Calf, Panther, Steamboat, and Canton creeks). Owing to the contribution of warm water from tributaries below Soda Spring powerhouse, the daily maximum stream temperatures in the Wild and Scenic River reach were higher in 1996 than both the standard for the State of Oregon and the optimal temperature ranges for many anadromous fishes (Anderson and Carpenter 1998). Stream temperatures exceeded temperature criteria at times in Fish Creek above and below the diversion from May through October.

Turbidity

Turbidity during the June 1992 through September 1994 sampling periods ranged from 0.1 to 46.5 nephelometric turbidity units (NTU). Most measurements greater than 2 NTU occurred during rain-on-snow flood events in January and March 1993. The highest turbidity was measured in Potter Creek after a landslide. Generally, turbidity at most sampling sites was low (averaging 1 NTU), even during moderate floods.

Nutrients and Eutrophication

Total Kjeldahl nitrogen (TKN) concentrations, which reflect organic nitrogen and ammonia, were below detection limits of 0.10 mg/L in 82 percent of 380 samples collected from 1992 to 1994. TKN concentrations in the remaining samples ranged from 0.10 to 0.40 mg/L. Similarly, concentrations of inorganic nitrogen (nitrate and nitrite) were below the detection limit of 0.01 mg/L in 241 of 285 water samples.

Nitrogen is considered to be the limiting nutrient for plant growth in the North Umpqua River. Although it is nitrogen-limited, the North Umpqua River is undergoing eutrophication due to: (1) increased nitrogen loading from recreational use and timber harvest; (2) decomposition of organic matter trapped in reservoirs and the release of nutrients downstream; and (3) discharge of nutrient-rich, hypolimnetic water from the reservoirs (e.g., Lemolo and Toketee Lakes). Potential nitrogen sources include aerial fertilization of Umpqua National Forest lands prior to 1994; sediments in Diamond Lake, which is located in the upper watershed and has become eutrophic, and sediments in Lemolo and Toketee Lakes; and septic tank leach fields at Toketee Lake and pit toilets at Lemolo and Stump Lakes.

Total phosphorous concentrations ranged from less than 0.01 to 0.35 mg/L. Both total phosphorus and ortho-phosphorus (the form most readily available to plants) showed higher values during low-flow periods. Phosphorous concentrations were lower in Fish Creek than in either the Clearwater or North Umpqua Rivers.

Chlorophyll-a concentrations in Lemolo Reservoir averaged 0.014 mg/L during August, September, and October, 1993. This value is slightly below the action level for identification of potentially nuisance phytoplankton growth (table 3-6). Measured chlorophyll-a concentrations in all other project impoundments and stream sites were well below the action level.

Dissolved Gases

The levels of DO in the project area are generally good. DO concentrations in project-affected streams and powerhouse tailraces ranged from 5.9 to 16.2 mg/L during monitoring from 1992 through 1994. All 31 sampling sites had median saturation values for DO above 90 percent, and 27 sites had median saturation values above 95 percent. Samples of intergravel DO concentrations, collected from trout and salmon redds, all showed values well above the state's standard of 6 mg/L, as well as the minimum 8.0 mg/L action level.

TDG concentrations occasionally exceeded the state standards of 105 and 110 percent of saturation (table 3-6). Although measured values of TDG generally ranged between 98 and 105 percent, values as high as 121 percent of saturation were observed below Whitehorse Falls on the Clearwater River (caused naturally by the waterfall) and the project powerhouse tailraces. Overall, 19 of 329 TDG measurements at stream sites exceeded the state standard of 105 percent. At powerhouse, impoundment, and forebay sites, the state standard of 110 percent was exceeded in 22 of 123 measurements.

Other Water Quality Parameters

PacifiCorp and the USGS collected water samples from a small number of sites in the project area to measure other water quality parameters, including metals, herbicides, pesticides, and polychlorinated biphenyls (PCBs). Concentrations of copper exceeded state chronic and/or acute standards in samples collected from the Soda Springs bypassed reach in 1993. The concentration of lead exceeded the state's chronic standard for the protection of aquatic life in a sample collected from the Fish Creek bypassed reach in 1993. All the other metals analyzed in samples from these and other sites in 1993 and 1994 were below the limits of detection. No detectable concentrations of herbicides, pesticides, or PCBs were recorded in the USGS samples. Out of 395 measurements of pH, all but 3 were within the range of 6.5 to 8.5 (the Oregon standard).

3.3.2 Environmental Impacts and Recommendations

3.3.2.1 Water Quantity

Operation of the North Umpqua Project has significantly altered the flow regime of the project bypassed reaches resulting in reduced habitat for anadromous and resident fish, changes in water quality, and natural regimes of sediment deposition.

No-Action Alternative

Under the No-Action Alternative, instream flow releases would continue at the same levels as required under the current license. The minimum flows in the North Umpqua River would remain at 25 cfs from Lemolo No. 1 dam to the Soda Springs dam; the minimum flow in the Clearwater River would remain at 5 cfs from the Clearwater No. 1 diversion dam to Toketee Lake; and the minimum flow in Fish Creek below the Fish Creek diversion dam would remain at 20 cfs from April 1 to Labor Day and 10 cfs from Labor Day to April 1.

The flow duration curves and daily hydrographs described in section 3.3.1.1 would be representative of project operation effects under the No-Action Alternative. Significant changes in discharge associated with maintenance activities would be expected and would persist for several weeks. Ramping rates would remain rapid when diversions of water would either stop or begin. The discharge in the full flow reaches of the North Umpqua River above Soda Springs dam would have large fluctuations each day during periods of on-peak power generation. Flooding characteristics, as discussed in section 3.3.1.1 for each reach of river affected by the project, would be expected to remain unchanged under the No-Action Alternative. Under the No-Action Alternative, sediment would continue to build up in the existing impoundments and would limit the storage capacity of the reservoirs.

Settlement Agreement

Under section 5.1 of the Settlement Agreement, PacifiCorp would implement the increased minimum instream flow regimes shown in table 2-1 in two stages. By the end of the first year after license renewal or by 2005, whichever comes earlier, and prior to implementation of measures to promote passage of anadromous fish (see section 3.4.2.3 for discussion of these measures), the "pre-anadromous fish passage flows" shown in table 2-1 would be implemented. By the end of the seventh year after license renewal, when anadromous fish passage measures discussed in section 3.4.2.3 have been implemented, the "post-anadromous fish passage flows" shown in table 2-1 would be established. These latter flows are significantly higher for the Slide Creek and Fish Creek bypassed reaches.

Under section 5.4 of the Settlement Agreement, PacifiCorp would reroute the discharge from Lemolo No. 2 powerhouse to Toketee Lake, thereby making the Lemolo No. 2 full-flow reach an extension of the Lemolo No. 2 bypassed reach.

Under section 5.5 of the Settlement Agreement, PacifiCorp would install and maintain gaging stations at the head of the bypassed reaches or elsewhere as required by OWRD to monitor compliance with the instream flow regime.

Implementation of minimum instream flows specified in the Settlement Agreement would result in significantly increased flows for all bypassed reaches in comparison to existing conditions. These increased minimum instream flows would provide benefits for anadromous and resident fish, amphibians, macroinvertebrates, water quality, and transport of gravel, sediment, and LWD. The impacts and benefits of these flows are discussed in sections 3.2.2.1, 3.3.2.2, and 3.4.2.1 of this EIS.

NGO Alternative

Under the NGO Alternative, instream flows would be increased above the flows specified in the Settlement Agreement as shown in table 2-1, Soda Springs dam would be removed, and ramping rates would be restricted as shown in table 2-4. The discharge of the full flow reaches of the North Umpqua River and its tributaries under this alternative would closely approximate the pre-project discharges. The discharges in the bypassed reaches associated with diversions for power generation would either be maintained at the minimum flows specified by the NGO Alternative or would be at the natural (i.e., unregulated) discharge when the natural (i.e., unregulated) discharge is less than the minimum discharge. The only regulation of the river would be provided by Lemolo Reservoir subject to the drawdown constraints that might be imposed on the project.

The Conservation Groups have recommended that Soda Springs dam be removed. The removal of the dam would require disposition of the large quantities of sediment currently trapped in Soda Springs Reservoir. Specific recommendations for the disposition of sediment were not included in the NGO Alternative. Raytheon (1999) considered several alternatives for the removal of Soda Springs dam for PacifiCorp. This study included the disposition of the trapped sediment and addressed the impacts from dam removal. The uncontrolled release of the sediment from Soda Springs Reservoir would result in significant adverse impacts to the water quality and habitat associated with the North Umpqua River throughout the Wild and Scenic River reach (see sections 3.2.2.1, 3.4.2.4, and 3.4.2.5). Without some form of mitigation or planned disposition, these impacts could reasonably be expected to extend beyond the Winchester dam at Winchester, Oregon.

Staff Alternative

Staff has reviewed the instream flows recommended in the Settlement Agreement and considers the impacts and benefits of these flows on transport of gravel, sediments, and LWD; water quality; and aquatic resources in sections 3.2.2.2, 3.3.2.2, and 3.4.2, respectively.

3.3.2.2 Water Quality

The North Umpqua Project affects a variety of surface water quality parameters, including temperature, algal primary productivity, nutrient (phosphorous and nitrogen compounds) cycling, DO, pH, turbidity, total dissolved solids, and TDG (ODEQ 2001). These effects are complex, interrelated, and not completely understood.

The North Umpqua Project must comply with applicable water quality standards through state certification of water quality compliance under § 401 of the CWA. These standards consist of three components: (1) uses designated in OAR 340-041-0282 (e.g., support of fish, aquatic habitats, or drinking water); (2) numeric and narrative criteria to support the designated beneficial uses; and (3) degradation of water quality is allowed if the criteria for degradation are met following an antidegradation review. Water quality standards for the North Umpqua River Basin, listed in OAR 340-41-282 and OAR 34-41-285, are designed to protect beneficial uses including fish and aquatic life, domestic use, wildlife, power generation, and recreation.

The ODEQ has determined that water quality criteria are not being met in specific reaches of the project for temperature, pH, TDG, habitat modification, biological criteria, and flow modification (ODEQ 2001). Exceedances of numerical criteria (temperature, pH, TDG, flow modification) require the development of TMDL, while exceedances of narrative criteria would be addressed in a Water Quality Management Plan (WQMP) for the North Umpqua River Basin.

The following water quality criteria within the North Umpqua River Basin were not being met (ODEQ 2001 and PacifiCorp 2002d):

Criterion	Project reach within which criterion is not met
Temperature	Deer Creek mouth to diversion Fish Creek mouth to diversion North Umpqua River from Soda Springs powerhouse to Slide Creek dam North Umpqua River from Toketee Lake to Barkenberger Creek
Total dissolved gas	Clearwater River immediately below Clearwater No. 2 powerhouse North Umpqua River from Lemolo No. 2 powerhouse 1 mile downstream North Umpqua River immediately below Lemolo No. 1 powerhouse
pH	Toketee Lake to Lemolo No. 2 powerhouse
Habitat modification	Potter Creek mouth to diversion North Umpqua River from Toketee Lake to Lemolo Reservoir
Biological criteria	Potter Creek mouth to diversion
Flow modification	Deer Creek mouth to diversion

Source: ODEQ 2001 and PacifiCorp 2002d.

Flow reductions in the bypassed reaches modify stream temperatures. In some cases, stream temperatures are increased because of flow diversions (Fish Creek during the summer months), whereas in other cases temperatures are decreased (Toketee bypassed reach during the summer months). These temperature changes can in turn alter the concentration of oxygen and other dissolved gases; gases become less soluble in water with increasing temperature, so that warm water may become oxygen deficient. The growth rates of fish, aquatic macroinvertebrates, and nuisance algae are influenced by temperature; within limits, increasing temperatures will increase the growth rates of these organisms.

High turbidity in the North Umpqua River can be caused by both natural events (e.g., storm events and high runoff; landslides unrelated to project operations), project-related effects (e.g., facility maintenance releases and unplanned emergency shutdowns; inadvertent canal overflows and failures; sloughing and downstream transport of periphyton; and phytoplankton blooms in reservoirs), or other human activities (e.g., increased surface erosion and mass wasting due to logging and road construction).

During normal operations, the project does not cause turbidity that is significantly above natural levels. High levels of turbidity can clog the gills of fish and other aquatic organisms and hinder feeding activities. If the suspended sediments settle out, they can smother important habitats for fish spawning and growth of aquatic macroinvertebrates.

The increased growth of algae (eutrophication) resulting from nutrient enrichment is considered one of the most serious water quality problems in the study area (Stillwater Sciences, Inc. 1998a). The soils in the basin are relatively rich in phosphorus, so the growth of algae is most likely influenced by the supply of available nitrogen. Although the North Umpqua River is nitrogen-limited (Anderson and Carpenter 1998), it is nonetheless undergoing progressive eutrophication. Observed eutrophication is a result of: (1) increased nitrogen loading from recreational use and timber harvest; (2) trapping of organic matter in reservoirs and subsequent decomposition and release of nutrients downstream; and (3) discharge of nutrient-rich hypolimnetic water from the reservoirs and its subsequent routing to project waterways rather than shaded stream channels. Localized exceedances of state criteria for pH and DO are related to this eutrophication. In addition to increasing pH and reducing DO, eutrophication increases background turbidity at lower flows and may disrupt aquatic food webs in a way that is detrimental to fish species that feed on aquatic macroinvertebrates.

Reservoirs and forebays can aggravate eutrophication by trapping organic matter which is subsequently mineralized in the reservoirs and released downstream as plant nutrients. Eutrophication increases turbidity, disrupts aquatic food webs, and can cause wider-than-normal daily variations in DO and pH. The project is not a significant source or sink for nutrients; limited algae and pH problems in Lemolo Reservoir are primarily due to nutrients from Diamond Lake, which is upstream from the project.

Whereas high concentrations of DO are desirable, excessive levels of other gases, especially nitrogen, can also be a problem. Water can become supersaturated with air at natural springs (e.g., Crystal Springs) and waterfalls (e.g., Whitehorse Falls). In addition, project operations may lead to dissolved gas supersaturation problems. Several of the project powerhouses (Lemolo Nos. 1 and 2, Clearwater Nos. 1 and 2) may discharge water that is supersaturated with TDG.

The concentrations of gases in the water diverted into the project pipelines are usually at equilibrium with the atmosphere—that is, the water is saturated with nitrogen, oxygen, etc. However, if air is also entrained into the intake structure (e.g., by surface vortices) additional amounts of atmospheric gases could become dissolved in the diverted water under high pressures within the penstock. When released into the tailrace at normal atmospheric pressures, the water is then supersaturated with the gases. As a result of

equilibrating with the supersaturated discharge, the tissues of aquatic organisms residing below the tailrace could become supersaturated as well. DO is readily metabolized and therefore would not cause problems, even at concentrations greater than 100 percent. However, fish residing in waters supersaturated with nitrogen could suffer from gas bubble disease, a condition that occurs when nitrogen gas comes out of solution in the tissues and forms bubbles, most obviously in the fins and eyeballs (Wolke et al. 1975). Fish mortalities from gas bubble disease generally occur at gas supersaturation levels above 110 to 115 percent (EPA 1986). The Department of Energy (1995) reviewed the direct and sublethal effects of gas supersaturation on fish. Adverse effects of gas supersaturation on aquatic organisms can be avoided by either preventing the entrainment of air at the intake or using turbine and tailrace designs that promote turbulence and mixing and cause supersaturated nitrogen to become rapidly re-equilibrated to saturated conditions. While several project powerhouses discharge water supersaturated with TDG, there is no evidence that fish are affected by gas bubble disease in project waters.

The parties to the Settlement Agreement have developed a number of measures to minimize the impacts of project operations on water quality, including: increased instream flow releases to moderate effects on water temperatures, control of soil erosion, and operational changes to minimize dissolved gas supersaturation. These water quality measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS (section 5.3), the Section 4(e) conditions from the FS and BLM (section 2.2.6), and the § 401 Water Quality Certificate conditions (section 2.2.3).

The Conservation Groups recommend greater instream flow releases to moderate water temperature effects, modification of structures and operations to reduce dissolved gas levels, implementation of plans to address eutrophication, § 401 Water Quality Certificate conditions, water quality monitoring, and replacement of selected canal segments with buried steel pipelines. These recommendations are described further below under the NGO Alternative.

No-Action Alternative

Under the No-Action Alternative, the current water quality conditions in project-affected reaches of the North Umpqua River, Clearwater River, and Fish Creek would continue. For example, project-induced increases in water temperature variations upstream from Soda Springs Reservoir and temporary pulses of turbidity caused by scheduled maintenance activities would still occur.

Flow reductions in the project bypassed reaches would alter water temperatures. Outflow from Lemolo Reservoir during summer months is warmer than inflow from the

North Umpqua River, which accounts for most of the inflow to the lake. Under current diversion rates, the water in bypassed reaches warms faster in a downstream direction, and the daily and annual variation in water temperatures is increased. Reduced instream flows also increase the relative influence of tributary and groundwater inflows (which generally cool the bypassed reaches) on mainstem water temperatures. Although the project has important effects on water temperatures in the bypassed reaches, the cumulative effects below Soda Springs powerhouse are small. Downstream of Soda Springs powerhouse, the hydroelectric project causes localized reductions in daily and seasonal water temperature fluctuation, and may result in a slight summer temperature increase.

Episodes of high turbidity in the North Umpqua River are caused by: (1) storm events and high runoff; (2) facility maintenance releases and unplanned emergency shutdowns; (3) inadvertent canal overflows and failures; and (4) landslides unrelated to project operations (Stillwater Sciences, Inc. 1998a). Increased surface erosion and mass wasting due to logging and road construction can contribute to increased turbidity. The North Umpqua Project causes pulses of turbidity within the range found under natural conditions but outside of the seasons when these pulses would naturally occur. Turbidity is temporarily increased during facility maintenance releases and other high flow events. Episodic high turbidity events during summer months could also affect angler success and the aesthetic qualities of the Wild and Scenic River Reach below the Soda Springs Development.

Increased nitrogen loading from recreational activities and timber harvest in the basin that has led to eutrophication and adverse effects on pH and DO would continue to occur. State water quality criteria for temperature, turbidity, TDG, and pH would continue to be occasionally exceeded in project-affected reaches.

Settlement Agreement

The water-quality related management goals of the parties to the Settlement Agreement include managing the North Umpqua Project in a manner that maintains and/or improves water quality in the watershed, meets water quality standards and antidegradation requirements, and protects beneficial uses. Consistent with the goals of the ACS of the Forest Plan, the Settlement Agreement seeks to maintain and restore water quality in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefitting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.

Under section 1.1.6 of the Settlement Agreement, PacifiCorp agrees to cooperate with ODEQ and to use every reasonable effort to assist in the development of § 401 Certificate conditions that comply with state and federal law. The § 401 Certificate was issued on June 28, 2002 (sections 2.2.3 and 5.5.1). In addition, PacifiCorp agreed to assist ODEQ in the development and submittal of the TMDLs required by the CWA for project-affected waters. The § 401 Certificate and TMDL activities focus on those water quality parameters which ODEQ has determined are not being met in specific reaches of the project: water temperatures, pH, TDG, habitat modification, and biological criteria (ODEQ 2001). Exceedances of numerical criteria (temperature, pH, DO and TDG, flow modification) require the development of TMDLs, while exceedances of narrative criteria would be addressed in a WQMP for the North Umpqua River Basin.

Instream flow releases would be increased under the terms of the Settlement Agreement (section 3.4.2.1). Two water temperature models were used to predict the effects of these changes, as well as other measures that might affect water temperatures (Stillwater Sciences, Inc. 1998a). Although increased streamflows generally would reduce the magnitude of water temperature modifications in the bypassed reaches, local conditions could alter this pattern. For example, small instream flow releases in the Lemolo No. 1 bypassed reach would be expected to allow water temperatures to warm faster in the summer. However, the models predict that water temperatures in the Lemolo No. 1 bypassed reach during mid-July would change relatively little; in the lower portion of the Lemolo No. 1 reach the colder waters from springs and tributaries dominate the warmer instream flow releases. In the Soda Springs bypassed reach, increased flows would slightly increase water temperatures in the summer by diluting the effect of coldwater springs that make up a relatively large proportion of the flow under the No-Action Alternative. As a general rule, however, the models predict that increasing instream flows under the Settlement Agreement would reduce water temperatures in reaches that are or would be accessible to anadromous fish (Stillwater Sciences, Inc. 1998a, vol. 2, tables 4-11, 4-12, and 4-15), and therefore would improve conditions for these species. The § 401 Water Quality Certificate requires PacifiCorp to implement (1) a surface water temperature management plan with measures to reduce the project's contributions to exceedances of the water quality criteria for temperature and (2) a STMP, as outlined in Exhibit B of the § 401 Certificate, to determine compliance with the temperature criteria, the success of the temperature management plan, and any additional measures that are needed to reduce the project's contribution to exceedances of the criteria. The temperature management plan may be reevaluated by ODEQ after EPA approval of the TMDL for temperature and/or after implementation of the TMDL to determine if revised or additional measures, which meet the limitations specified in Exhibit B of the § 401 Certificate, are necessary to achieve compliance with the water

quality criteria for temperature. The § 401 Certificate also addresses conditions for ODEQ modifications to the STMP and the performance of scheduled maintenance.

The Settlement Agreement does not include dredging beyond that currently done for maintenance purposes. Therefore, the evaluation in this EIS is based on the assumption that the amount of dredging would not increase under the Settlement Agreement. The impacts of dredging on vegetation are discussed as part of the assessment of dam removal under the NGO Alternative in section 3.5.2.1 of the EIS. Further, under FS Section 4(e) Condition No. 18 (FS, June 24, 2002), reservoir and forebay dredging on National Forest System lands is restricted to actions that are consistent with the Umpqua National Forest Land and Resource Management Plan, as amended, within and below the project. All dredging proposals are subject to review and authorization by the FS, as described in Condition No. 6, and subject to coordination with and approval by the Oregon Division of State Lands, ODEQ, and ODFW. The § 401 Water Quality Certificate requires 60 day's written notice and ODEQ approval for dredging or removal of sediments from project impoundments, and the use of BMPs to protect surface water from toxic constituents, sediment, and turbidity.

In order to reduce the impacts of turbidity, the Settlement Agreement includes measures to limit the adverse impacts of waterway failure and recommends remediation of existing erosion sites. Unless properly controlled, water quality could be degraded by turbidity arising from soil disturbance and erosion. The § 401 Water Quality Certificate requires hourly monitoring of turbidity below the project at a ODEQ-approved site. Measures to minimize the effects of soil disturbance and other construction activities on water quality would be incorporated into an Erosion Control Plan (ECP) (see section 3.2.2.1). Erosion control measures used prior to, during, and after construction, could include road regrading, culvert improvements and replacements, canal dewatering systems, retaining walls, rock fences, and revegetation. Under the provisions of Settlement Agreement section 14, PacifiCorp would implement a waterway shutoff and drainage system that promptly redirects water from erodible areas. The goal of this mitigation measure is to drain the affected waterway segment within 30 minutes in the event of a flume failure on any section of the Fish Creek, Lemolo No. 2, and Clearwater No. 2 waterways. If an erosive event occurs or there is an accidental spill or discharge from the waterway system, the § 401 Water Quality Certificate requires PacifiCorp to promptly notify the FS and the Oregon Emergency Response System, and coordinate subsequent remedial measures. In addition to requiring implementation of the erosion and sediment control measures stipulated in sections 10.6, 12.1, and 14 of the Settlement Agreement, the § 401 Water Quality Certificate requires both the use of BMPs to protect surface waters and compliance with applicable provisions of the NPDES stormwater

permitting program whenever ground-disturbing activities exceeding 1 acre are conducted.

With the support of the FS and BLM, PacifiCorp began trial implementation of an Erosion Control Program in 1995, targeting erosive sites with high-priority ratings. This effort included a 2-year pilot program that tested various revegetation seeding methods. Erosion reduction prescriptions were applied at 22 sites between 1995 and 1997, before the trial implementation was temporarily stopped. Under the terms of the Settlement Agreement section 14, PacifiCorp would develop site plans for 31 actions at existing, high-priority erosion sites and 27 actions at medium-priority erosion sites. These remedial measures would be site-specific, but may include removing sidecasted soil, installing drainage pipes at stream crossings, and installing large-diameter culverts beneath access road embankments. The Settlement Agreement contains a schedule for completion of all these erosion control actions (schedule 14.4). High-priority erosion sites on Fish Creek would be completed first (by the second anniversary of the new license or 2006, whichever is earlier); all other high-priority erosion sites would be remediated between the second and sixth anniversary of the new license. The first 10 of the medium-priority erosion sites are scheduled to be remediated between 7 and 11 years after the new license becomes final.

The Settlement Agreement does not include a plan to address eutrophication in the basin, but many of the mitigation measures recommended in the Settlement Agreement should reduce the risk of excessive growth of algae and periphyton. Compared to the No-Action Alternative, the implementation of increased instream flow releases in the Settlement Agreement are expected to moderate the effects of project operations on water temperatures; water in some of the bypassed reaches would not warm as readily under increased flows, which should reduce the growth of nuisance algae. Reducing the amount of soil that enters the streams by remediating high- and medium-priority erosion sites would reduce the amount of nutrients that are introduced to the water from soil, and thus help control eutrophication. Revegetation of riparian areas and increased wetlands would help sequester nutrients that are presently available for algal growth. Nuisance algae are addressed in the § 401 Water Quality Certificate, which requires the development and approval of a plan for monitoring chlorophyll-a in Lemolo Reservoir. If the concentration of chlorophyll-a exceeds the water quality criterion, ODEQ may require additional studies to identify the causes and describe the effects on water quality and beneficial uses and to develop a control strategy.

The § 401 Water Quality Certificate requires the monitoring of pH at a permanent water quality monitoring station downstream of the Soda Springs powerhouse; in the Lemolo No. 1 forebay after expansion of the forebay is completed; and in the tailraces

below the Lemolo No. 2, Fish Creek, and Clearwater No. 1 powerhouses. The Lemolo No. 1 forebay expansion would include a provision for mechanical removal of macrophyte growth. However, if aquatic plant growth causes an exceedance of the pH criteria, PacifiCorp would, at ODEQ's request, develop and submit a plan for ODEQ approval that includes a schedule for dredging the forebay or other measures that would reduce the exceedance of the pH criteria. To address exceedances of the pH criteria in the Lemolo No. 2 full-flow reach, PacifiCorp would reroute the Lemolo No. 2 powerhouse discharge to Toketee Reservoir, as stipulated in section 5.4 of the Settlement Agreement. The § 401 Water Quality Certificate also requires hourly monitoring of specific conductance below Soda Springs powerhouse and annual reporting of the results.

PacifiCorp proposes to reduce the risk of TDG supersaturation by inspection of the air admissions systems and operational changes at the Lemolo Nos. 1 and 2, and Clearwater No. 2 powerhouses (PacifiCorp 2000b; Addendum to 1995 Application for New License). These measures are relatively easy to achieve, and would eliminate the exceedances of TDG standards that have occurred below project powerhouses—that is, if these measures are effective, TDG would not exceed 100 percent saturation.

The § 401 Water Quality Certificate requires PacifiCorp to implement a Total Dissolved Gas Management Plan that includes the following elements: (1) replace the turbine in the Lemolo No. 1 powerhouse and study the TDG levels above and below the powerhouse; (2) if needed, modify the expanded Lemolo No. 1 forebay to dissipate gases entering the forebay and powerhouse and study the TDG saturation levels above and below the powerhouse and, if needed, develop a TDG management plan; (3) ensure that the water conveyance system used to reroute flows from the Lemolo No. 2 tailrace to Toketee Lake (Settlement Agreement section 5.4) dissipates TDG and excludes fish from the tailrace and system, and study TDG levels associated with the Lemolo No. 2 water conveyance system; (4) prior to operation of the new water conveyance system, assess gas bubble trauma in fish collected from the Lemolo No. 2 full-flow reach; (5) operate the Clearwater No. 2 powerhouse at a power generation level of at least 2 MW (when operating), and only with the air admission system closed at power generation levels of 10 MW or less; (6) study TDG saturation levels in the Clearwater No. 2 powerhouse tailrace; (7) monitor TDG saturation levels at the bottom and surface of Stump Lake at the diversion dam during the first annual maintenance event at the Clearwater No. 1 powerhouse; and (8) measure TDG above and below the Fish Creek diversion dam while in spill condition.

The § 401 Water Quality Certificate requires PacifiCorp to monitor DO at several locations, including (1) the Lemolo No. 2 full-flow reach during the first year following rerouting of the powerhouse flow, (2) each bypassed reach during the first July in which

minimum flows specified in the Settlement Agreement are required, and (3) the permanent water quality monitoring station below the Soda Springs powerhouse. PacifiCorp would propose monitoring locations for ODEQ approval and would report the results to ODEQ annually.

In addition to monitoring temperature, pH, turbidity, DO, chlorophyll-a, and specific conductance (total dissolved solids) and operating and maintaining a permanent water quality monitoring station below Soda Springs powerhouse with annual reporting of results to ODEQ, the § 401 Water Quality Certificate adopts many of the provisions of the Settlement Agreement related to aquatic resource protection and restoration. These provisions include installation of a fish screen at the intake of the Fish Creek diversion; implementation of fish passage measures; maintenance of instream flow; implementation of ramping restrictions and management of the drawdown and reservoir operating level (i.e., Lemolo Reservoir Rule Curve); and implementation of aquatic connectivity measures, including the breaching or altering of diversions for Helen, Spotted Owl, Karen, Thorn, Potter, Deer, White Mule, and Mill Creeks. The § 401 Certificate also stipulates that PacifiCorp develop and implement a coordinated gage installation and data reporting plan, schedule and conduct powerhouse maintenance, implement transportation management measures, verify the proper operation of on-site sewage systems, and maintain written records of the on-site septic tank pumping operation and of visual observations of the operation of the system components during pumping. Finally, ODEQ review and approval is required for any project changes, including any project repair or maintenance activities not addressed in the § 401 Certificate, that might significantly and adversely affect water quality.

NGO Alternative

The Conservation Groups recommend the following measures to improve water quality in the North Umpqua River Basin: (1) implement their recommended instream flow regime (see section 3.4.2.1); (2) modify structures and operations to reduce TDG levels at the Lemolo Nos. 1 and 2 and Clearwater Nos. 1 and 2 powerhouses; (3) develop and implement a plan to address eutrophication in the basin; (4) implement all measures required by the § 401 Certificate; (5) develop and implement a long-term, comprehensive water quality monitoring program; and (6) replace selected segments of the Lemolo No. 2, Clearwater No. 2, and Fish Creek canals with buried steel pipeline.⁴⁷

⁴⁷ Alternative 3 (Partial Pipe Burial) as described in PacifiCorp's August 14, 1998, response to FERC Additional Information Request, would replace selected segments of Lemolo No. 2, Clearwater No. 2, and Fish Creek canals with buried steel pipelines.

Project-induced mass wasting along the Fish Creek, Clearwater No. 2, and Lemolo No. 2 waterways has degraded water quality owing to erosion and sedimentation. The Conservation Groups maintain that reconstructing these waterways using buried pipe would greatly reduce waterway failures. Because of the widely distributed sources of nutrient loading in the watershed, as well as the complicated influence of the North Umpqua Project on transforming and transporting nutrients, the NGOs recommend development and implementation of a comprehensive plan to address eutrophication. This plan would be useful for identifying all the sources of nutrients and limiting their concentrations in the river.

The Conservation Groups recommend larger instream flow releases than recommended in the Settlement Agreement. The greater instream flow releases would cause lesser water temperature variations than either the No-Action Alternative or the Settlement Agreement.

Some of the recommendations of the parties to the Settlement Agreement and the Conservation Groups are similar. Both alternatives call for modifying structures and operations of the Lemolo Nos. 1 and 2 and Clearwater No.2 powerhouses to reduce TDG concentrations. Both would require the implementation of all measures required by the § 401 Certificate as well as monitoring to assess the effectiveness of the measures.

There are differences between the NGO Alternative and the Settlement Agreement with regard to remediating mass-wasting and soil erosion problems in the project area. Rather than replacing selected segments of the Lemolo No. 2, Clearwater No. 2 and Fish Creek canals with buried steel pipelines (NGO recommendation), the Settlement Agreement would implement a waterway shutoff and drainage system in these areas to reduce erosion in the event of a waterway failure. In addition, the Settlement Agreement calls for erosion control actions at 31 high-priority sites and 27 medium priority sites; these remedial activities are not specifically recommended in the NGO Alternative.

Both the Settlement Agreement and the NGO Alternative would result in improved water quality compared to the No-Action Alternative. The NGO Alternative might result in somewhat greater improvement in water quality than the Settlement Agreement, owing to increased instream flow releases and reduced likelihood of mass wasting from waterway failures at the Lemolo No. 2, Clearwater No. 2 and Fish Creek canals. The site-specific prescriptions for remediation of existing high- and medium-priority erosion sites would be considerably more cost effective than PacifiCorp's Alternative 3, and a shutoff and drainage system would reduce erosion in the event of a failure. This determination is reflected in the FS 4(e) conditions. Further, the NGO Alternative would not include the

water quality benefits of off-site measures or of remediating 58 existing erosion sites in the basin.

Staff Alternative

The Staff Alternative includes adopting all of the elements in the Settlement Agreement, and, therefore, the benefits of the Staff Alternative would be the same as those under the Settlement Agreement, including all measures required by the § 401 Water Quality Certificate. Mitigative measures associated with the Settlement Agreement would moderate the effects of the North Umpqua Project operation on water temperatures, reduce the occurrence of dissolved gas supersaturation, and reduce soil erosion and turbidity.

3.4 AQUATIC RESOURCES

3.4.1 Affected Environment

The North Umpqua River Basin supports populations of anadromous fish, resident fish, and other aquatic biota (e.g., benthic invertebrates). Depending on the particular reach of river, the fish populations are either native or have been introduced to support a recreational fishery (table 3-7). Unless otherwise cited, information on the aquatic biota of the North Umpqua River Basin summarized in this section is drawn from the Cooperative Watershed Analysis (Stillwater Sciences, Inc. 1998a).

Anadromous Fish

Five native anadromous fish species commonly occur in the North Umpqua River Basin. These are chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead (*O. mykiss*), sea-run coastal cutthroat trout (*O. clarki clarki*), and Pacific lamprey (*Lampetra tridentata*). The summer and winter steelhead and spring chinook salmon runs are relatively large and stable; although the numbers of adults returning to the river vary from year to year, there have been no strong declines since 1946. On the other hand, populations of sea-run coastal cutthroat trout, coho salmon, and Pacific lamprey are in decline. The relative success of steelhead and chinook salmon probably relates to their ability to utilize higher-quality mainstem rearing habitats. The other species rely more on tributaries for spawning and the rearing of juveniles; many of these tributaries are degraded by land use impacts.

Table 3-7. Major river segments affected by the North Umpqua Project.

River segment	Issues/ major obstacles to enhancement	Existing fish resources	Desired future aquatic resources
Mainstem of North Umpqua River between Soda Springs powerhouse and Rock Creek	Recreational river protected under the national Wild & Scenic Rivers Act; mix of whitewater boating in upper reach and steelhead fishery in the lower reach; "full-flow" reach with project induced flow fluctuations. Water temperatures above optimum for salmonid spawning and rearing.	summer/winter steelhead; spring/fall chinook; coho; sea-run/resident cutthroat; Pacific lamprey; rainbow and brown trout; shiners; dace; sculpins	Enhance anadromous fish production
North Umpqua River between Soda Springs dam and Soda Springs powerhouse (Soda Springs bypassed reach)	Bypassed reach; water temperature is above optimum for salmonids; project-induced flow fluctuations; restriction of sediment transport.	anadromous fish brown trout rainbow trout resident cutthroat trout	Enhance anadromous fish production
Soda Springs Reservoir	Small (660 acre feet) reregulating reservoir for peaking releases at Slide Creek powerhouse and diversion point; barrier to fish and other aquatic organisms; restriction of sediment and wood transport.	brown trout (40 percent) rainbow trout (60 percent)	Restore access by anadromous fish to 6.6 miles of habitat in the mainstem North Umpqua River and Fish Creek; Enhance and restore habitat connectivity
North Umpqua River from Soda Springs Reservoir to Fish Creek confluence	Bypassed reach; not accessible to anadromous fish; restriction of sediment transport.	brown trout rainbow trout	Restore access by anadromous fish; Enhance/create spawning habitat
North Umpqua River from Fish Creek upstream to Slide Creek diversion	Bypassed reach, 1.4 miles long; not accessible to anadromous fish; restriction of sediment transport; included on 303(d) list for temperature.	brown trout (50 percent) rainbow trout (50 percent)	Restore access by anadromous fish, especially spring chinook salmon and steelhead; no fish passage proposed at Slide Creek dam

Table 3-7. Continued.

River segment	Issues/ major obstacles to enhancement	Existing aquatic resources	Desired future aquatic resources
North Umpqua River from Slide Creek diversion to Toketee Lake	Bypassed reach that includes Toketee Falls, a major natural barrier to upstream fish migration; not accessible to anadromous fish; restriction of sediment transport.	brown trout (41 percent) rainbow trout (45–50 percent) brook trout (9–14 percent)	Improve habitat connectivity; reduce predation of anadromous fish by trout displaced from Toketee Lake
Toketee Lake	Relatively small (1,400 acre feet), shallow reregulating reservoir for peaking releases from Lemolo No. 2 and Clearwater No. 2 powerhouses and diversion point.	brown trout (90 percent); rainbow trout (5 percent); tui chub (5 percent); bluegills; brown bullheads	maintain/restore habitat sufficient to support productive trout fisheries; reduce predation of downstream anadromous fish by trout displaced from Toketee Lake
North Umpqua River from Toketee Lake headwaters to Lemolo No. 2 powerhouse	Short “full-flow” reach with fluctuating flows dominated by peaking releases from Lemolo No. 2 powerhouse; included on 303(d) list for habitat modification, temperature, pH, and TDG (upper mile only).	brown trout rainbow trout	Protect biodiversity; Create and/or enhance trout habitat
North Umpqua River from Lemolo No. 2 powerhouse to Lemolo No. 2 diversion	Bypassed reach, with major sediment inputs from erosion related to the Lemolo No. 2 flume; included on 303(d) list for habitat modification and temperature (part of reach only)	brown trout rainbow trout	Enhance and restore habitat connectivity; reduce fine sediment
North Umpqua River from Lemolo No. 2 diversion up to Lemolo Reservoir	Bypassed reach, with reduced sediment supply and periodic sediment inputs from erosion related to the Lemolo No. 1 flume; included on 303(d) list for habitat modification and TDG (part of reach below Lemolo No. 1 powerhouse only).	brown trout (55 percent) rainbow trout (45 percent)	Enhance and restore habitat connectivity; facilitate upstream passage of resident trout; reduce fine sediment

Table 3-7. Continued.

River segment	Issues/ major obstacles to enhancement	Existing aquatic resources	Desired future aquatic resources
Lemolo Reservoir	Large storage reservoir (12,300 acre feet) and diversion point; surface water temperature is above optimum for salmonids; included on 303(d) list for nuisance algae and pH.	brown trout (46 percent); rainbow trout; brook trout; tui chub (52 percent); kokanee	maintain/restore habitat sufficient to support productive trout fisheries (catch rate of 0.5 trout per angler-hour)
Fish Creek between North Umpqua River and Fish Creek diversion	Bypassed reach; fishery of endemic rainbow trout; possible natural barrier at R.M. 3.2 (disputed); extensive fish passage facility at Fish Creek diversion; not accessible to anadromous fish; included on 303(d) list for temperature, restriction of sediment transport.	rainbow trout	Facilitate upstream and downstream passage of resident trout; improve aquatic habitat connectivity; restore access and habitat for anadromous fish in the reach below the natural obstacle (and farther if Pacific lamprey or other anadromous fish can volitionally ascend the obstacle)
Clearwater River from Toketee Lake upstream to Clearwater No. 2 diversion	Bypassed reach; fishery dominated by brook trout; significant accretion in bottom few kilometers just above Toketee Lake; included on 303(d) list for TDG.	brook trout and rainbow trout dominate; small numbers of brown trout	Enhance rainbow trout (may be native population)
Clearwater River from Clearwater No. 2 diversion to Clearwater No. 1 diversion	Bypassed reach; included on 303(d) list for TDG.	brook trout rainbow trout	Enhance rainbow trout (may be native population)
Stump Lake (impoundment of Clearwater No. 1 dam)	Small forebay/wetland that serves as diversion point to the Clearwater No. 1 powerhouse	brook trout (78 percent) rainbow trout (22 percent)	Enhance rainbow trout (may be native population); maintain/restore habitat sufficient to support productive trout fisheries; enhance aquatic connectivity
Headwaters of Clearwater River, above Stump Lake		rainbow trout brook trout	Rainbow trout may be native population; enhance by reducing non-native brook trout population.

Table 3-7. Continued.

River segment	Issues/ major obstacles to enhancement	Existing aquatic resources	Desired future aquatic resources
Lake Creek	Inflow to Lemolo Reservoir dominated by surface release from Diamond Lake; essentially unregulated, but with water quality problems (nutrients, etc.).	tui chub rainbow trout brown trout	unknown

^a The 303(d) list is a requirement of the Clean Water Act, mandating that States, Territories and authorized Tribes submit to EPA a list of waterbodies for which existing pollution controls are not stringent enough to attain and maintain State, Territorial, and authorized Tribal water quality standards. In this case, Oregon is required to identify those waters within its boundaries that are water quality limited and indicate those parameters that do not meet the water quality standards. The deadline for submitting the 303(d) list is April 1 of even-numbered years, except 2000, when the deadline was suspended because the new TMDL rule was not promulgated sufficiently in advance of the deadline.

The 120-foot-high Toketee Falls (figure 3-22) was the downstream-most natural barrier to anadromous fish migration in the North Umpqua River. However, Soda Springs and Slide Creek dams, 4.8 and 1.4 miles downstream of Toketee Falls respectively, are barriers to upstream movement. Downstream from Toketee Falls, Fish Creek is an important tributary that was historically used by anadromous fish. Upstream passage in Fish Creek is presently impeded by a 0.25-mile-long



Figure 3-22. Toketee Falls.

complex of cascades, chutes, and water falls up to 16 feet high. Some anadromous fish (e.g., steelhead and lamprey) may be able to pass this obstacle under high flow conditions. However, access to Fish Creek is presently prevented by the Soda Springs dam. The dam lacks a fish ladder, and thus blocks access of anadromous fish to at least 6.6 miles of habitat (3.4 miles in the North Umpqua River and 3.2 miles in Fish Creek). Slide Creek dam prevents anadromous fish from reaching an additional 1.4 miles of habitat in the North Umpqua River.

Several fish species on the Regional Forester's Sensitive Animal Species list are documented (5 species) or suspected (1 species) to occur on the Umpqua National Forest and are potentially affected by the project (see Appendix A) (FS 2001d). Of these the FS indicates that chinook and coho salmon and steelhead have been documented as occurring in the project area.

Resident Fish

Resident fish inhabit both the project impoundments (reservoirs and forebays) and the stream reaches between the project structures. Rainbow trout (*O. mykiss*) and coastal cutthroat trout are native fishes, and are likely resident forms of the anadromous steelhead and sea-run coastal cutthroat trout, respectively. Currently, resident cutthroat trout occur only downstream of Soda Springs dam. On the other hand, rainbow trout are found in many reaches and reservoirs in the North Umpqua River Basin, often as a result of stocking. Introductions of hatchery rainbow trout from outside of the basin began as early as 1910, and native rainbow trout may have interbred with hatchery rainbow trout until stocking was curtailed in the mid-1970s (although hatchery rainbow trout have been stocked recently in Diamond Lake, Clearwater No. 2 forebay, and Lemolo Reservoir).

Both brown trout (*Salmo trutta*) and brook trout (*Salvelinus fontinalis*) were introduced to the North Umpqua River Basin and support popular recreational fisheries in the project reservoirs and forebays. There is a small population of kokanee (landlocked sockeye salmon, *O. nerka*) in Lemolo Reservoir. Large numbers of tui chub (*Gila bicolor*) are found in Diamond Lake and Lemolo Reservoir, and smaller numbers in Toketee Lake and other downstream reservoirs. Bluegill (*Lepomis macrochirus*) and brown bullhead (*Ameiurus nebulosus*) have been collected in project reservoirs.

Other Aquatic Biota

Benthic macroinvertebrates were sampled in a variety of habitats in both the mainstem of the North Umpqua River and in selected tributaries. Habitats sampled included riffles, stream margins/shorelines, and collections of coarse particulate organic matter (CPOM), such as leaf packs and detritus. In addition, benthic macroinvertebrates were collected from selected reservoirs and forebays. In addition to identifying and enumerating the invertebrates in these samples, a rapid bioassessment protocol [the Aquatic Biology Associates (ABA) Bioassessment; Wisseman 1996] was used to detect impacts by comparing the benthic invertebrate communities at the stream sites affected by the project to the benthic invertebrate communities in nearby, unaffected streams.

Some of the sites exhibited moderate to high taxonomic richness (i.e., a wide variety of species) and the full range of functional feeding groups (e.g., scrapers, shredders, collectors, predators). The ABA Bioassessment protocol yields a single number that summarizes a wide variety of measures of the benthic macroinvertebrate community, including number of species, numbers of individuals, and the types of species (e.g., species indicative of clean water or tolerant of polluted water). The larger the score (expressed as a percent of the maximum value that would be expected for unimpacted streams in this area), the healthier the macroinvertebrate population. A sample with a high score (80 to 100) indicates a very healthy benthic invertebrate population, whereas a low score (less than 40) is indicative of habitat or water quality degradation. There was a general downward trend in ABA scores from the upstream end of the project down to the boundary of the Umpqua National Forest, 25 miles downstream from the Soda Springs powerhouse. Most aquatic macroinvertebrate communities in the bypassed reaches rated moderate (60 to 79 percent of the maximum value for the combined measures), whereas communities in the downstream reaches rated low to moderate. Four of 14 sites had "poor" or "very poor" taxonomic richness. Stream reaches subjected to fluctuating flows from peaking power generation tended to have lower ABA scores. Samples from four tributaries indicated that the benthic communities were unimpaired or only slightly impaired.

Macroinvertebrate populations were sampled in five reservoirs and forebays: Lemolo No. 2, Clearwater No. 1, and Clearwater No. 2 forebays, Toketee Lake, and Soda Springs Reservoir. Abundance ranged from 20 to 40,184 individuals/square meter. Samples were dominated by chironomids (midge larvae) and non-insect taxa that are typical of lakes and reservoirs with higher water temperatures, low DO, fine sediments, and organic enrichment.

3.4.2 Environmental Consequences and Recommendations

3.4.2.1 Instream Flows for Fish and Other Aquatic Species

Adequate quantities and timing of instream flow releases are needed to provide habitat for fish and aquatic invertebrates in the bypassed reaches. Diversion of streamflows into the North Umpqua Project waterways creates approximately 35 miles of bypassed reaches (FS 2000d). Eight North Umpqua Project diversions reduce baseflows in the bypassed reaches by 50 to 95 percent, including 20.3 miles of the North Umpqua River, 8.1 miles of the Clearwater River, and 6.6 miles of Fish Creek. In addition, at least 77 small, perennial and intermittent tributary streams and seeps are intercepted and /or diverted into the project's waterways, but only one has a mandated minimum flow release. Flows have been completely eliminated from some diverted tributaries, especially those on the north side of the Lemolo No. 2 bypassed reach (Stillwater Sciences, Inc. 1998a). Proposed efforts to restore these habitats are discussed in section 3.4.2.7.

The parties to the Settlement Agreement have developed a number of measures to improve instream flows for aquatic habitats, including: increased instream flow releases in all bypassed reaches; rerouting the discharge from Lemolo No. 2 powerhouse to Toketee Lake; providing flows for the operation of fish passage facilities and ODFW fish holding ponds; and supplementing instream flows in the Toketee bypassed reach with flows from the new Clearwater River reconnection. These instream flow enhancements are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS (section 5.3) and Section 4(e) conditions from the FS (section 2.2.6).

The Conservation Groups recommend larger instream flow releases than provided by the Settlement Agreement, including natural streamflows (no diversions) in the Soda Springs and Fish Creek bypassed reaches at all or parts of the year. The NGO Alternative emphasizes the value of comprehensive monitoring and evaluation programs, with clearly defined ecological criteria, in order to determine the benefits of instream flow releases. The NGO Alternative is described further below.

No-Action Alternative

Under the No-Action Alternative instream flow releases would remain unchanged from current conditions resulting in limited habitat for some species life stages (table 3-8). For example, in the portion of the basin above Soda Springs dam, existing flow releases in the bypassed reaches provide 38 to 100 percent of the peak weighted useable area (WUA) for adult rainbow trout, depending on stream reach. Releases in lower portions of the North Umpqua River provide 83 to 97 percent of peak adult rainbow trout WUA. On the other hand, the 5-cfs instream flow release in the Clearwater River bypassed reach yields as little as 38 percent of peak rainbow trout WUA. The 25-cfs flow release into the Soda Springs bypassed reach (the only project reach accessible to anadromous fish) provide 31 to 32 percent of peak spring chinook salmon WUA and 49 to 80 percent of peak coastal cutthroat trout WUA (Stillwater Sciences, Inc. 1998a, 2000b).

Compared to the other alternatives, continuation of existing instream flow releases would not provide sufficient habitat for resident rainbow trout and, where present, anadromous salmon, steelhead, and cutthroat trout. Those stream reaches that are expected to become accessible to anadromous fish following construction of fish passage facilities (i.e., the Slide Creek bypassed reach and Fish Creek) have very limited amounts of habitat. For example, the lower Slide Creek bypassed reach would provide 80 percent or less of the peak juvenile rearing WUA for spring chinook salmon and 60 percent or less of the peak WUA for steelhead. Even smaller percentages of peak spawning and adult holding habitat for these species would occur under the No-Action Alternative (Stillwater Sciences, Inc. 2000b). Similarly, steelhead spawning and adult holding habitat in Fish Creek would be less than 5 percent of peak values.

Settlement Agreement

The goal in developing the instream flow regime specified in the Settlement Agreement was to maintain and/or restore instream flows that sustain well-connected and functional riparian and aquatic habitats to which the native aquatic and riparian community are adapted. The flow regime under the Settlement Agreement was based on the need to establish: (1) a range of flows to provide habitat for anadromous and resident fish, amphibian populations, aquatic invertebrate production, and other aquatic attributes; (2) winter and summer flows to reflect seasonal shifts in habitat use; (3) priorities for native species over nonnative species; (4) seasonal flow patterns to meet the ACS

Table 3-8. Fish habitat provided by minimum instream flow releases under different alternatives. Habitat [expressed as percent of peak Weighted Useable Area (WUA)] is based on stream flows shown in table 2-1.

River Segment	No-Action Alternative^{1,2}	Settlement Agreement^{1,2}	NGO Alternative³
North Umpqua River, between Soda Springs dam and Soda Springs powerhouse (Soda Springs bypassed reach)	Existing release of 25 cfs provides 31 to 32 percent of peak WUA for spring chinook salmon and 49 to 80 percent of peak WUA for coastal cutthroat trout	Releases of 95 cfs beginning September 1, 2003. Beginning on September 1, 2005, a 275 cfs year-round release provides 87 to 95 percent of peak WUA for spring chinook salmon and 53 to 100 percent of peak WUA for coastal cutthroat trout	800 cfs (average unregulated base flow) provides 84 to 100 percent of peak WUA for spring chinook salmon and 48 to 100 percent of peak WUA for coastal cutthroat trout
North Umpqua River, from Soda Springs Reservoir to Fish Creek confluence (lower Slide Creek bypassed subreach)	Existing release of 25 cfs provides 83 to 97 percent of peak WUA for adult rainbow trout. No access by anadromous fish.	Pre-passage fish flows of 50 and 80 cfs provide 99 to 100 percent of peak WUA for adult rainbow trout. Post-passage fish flows of 240 cfs provide 70 to 100 percent of peak WUA for spring chinook salmon, steelhead, coastal cutthroat trout, and coho salmon	400 cfs year-round provides over 90 percent of peak adult WUA for spring chinook salmon and steelhead and over 80 percent of peak WUA for coastal cutthroat trout
North Umpqua River, from Fish Creek upstream to Slide Creek diversion (upper Slide Creek bypassed subreach)	Existing release of 25 cfs provides 83 to 97 percent of peak WUA for adult rainbow trout. No access by anadromous fish.	Pre-passage fish flows of 50 and 80 cfs provide 99 to 100 percent of peak WUA for adult rainbow trout. Post-passage fish flows of 240 cfs provide around 40 to 100 percent of peak WUA for spring chinook salmon, steelhead, coastal cutthroat trout, and coho salmon	400 cfs year-round provides over 90 percent of peak adult WUA for spring chinook salmon and steelhead
North Umpqua River, from Slide Creek diversion to Toketee Lake (Toketee bypassed reach)	Existing release of 25 cfs provides 78 to 89 percent of peak WUA for adult rainbow trout	Releases ranging from 60 to 80 cfs provide 99 to 100 percent of peak WUA for adult rainbow trout	Releases of 150 and 200 cfs provide about 90 percent of peak WUA for adult spring chinook salmon and steelhead up to Toketee Falls
North Umpqua River, from Lemolo No. 2 powerhouse to Lemolo No. 2 diversion (Lemolo No. 2 bypassed reach)	Existing release of 25 cfs provides 86 to 100 percent of peak WUA for adult rainbow trout	Releases ranging from 50 to 80 cfs provide 81 to 99 percent of peak WUA for adult rainbow trout	Releases of 120 and 170 cfs provide 90 percent of peak WUA for adult rainbow trout

Table 3-8. Continued.

River Segment	No-Action Alternative^{1,2}	Settlement Agreement^{1,2}	NGO Alternative³
North Umpqua River, from Lemolo No. 2 diversion up to Lemolo Reservoir (Lemolo No. 1 bypassed reach)	Existing release of 25 cfs provides 70 to 82 percent of peak WUA for adult rainbow trout	Releases ranging from 50 to 80 cfs provide 98 percent of peak WUA for adult rainbow trout	Releases of 130 and 150 cfs provide 90 percent of peak WUA for adult rainbow trout
Fish Creek between North Umpqua River and Fish Creek diversion	Existing release of 10 to 20 cfs provides 72 to 75 percent of peak WUA for adult rainbow trout. No access by anadromous fish.	Pre-passage fish flows of 50 and 80 cfs provide 100 percent of peak WUA for adult rainbow trout. Post-passage fish flows of 130 cfs provide 50 to 98 percent of peak WUA for steelhead and coastal cutthroat trout	Releases of 80 cfs, 160 cfs, and undiverted flows provide 90 percent of WUA for adult rainbow trout and steelhead
Clearwater River from Toketee Lake upstream to Clearwater No. 2 diversion (Clearwater No. 2 bypassed reach)	Existing release of 5 cfs provides 53 to 100 percent of peak WUA for adult rainbow trout	Releases ranging from 40 to 60 cfs provide 95 percent or more of peak WUA for adult rainbow trout	Releases of 128 cfs provide 90 percent of peak WUA for adult rainbow trout in the upper portion of the reach
Clearwater River from Clearwater No. 2 diversion to Clearwater No. 1 diversion (Clearwater No. 1 bypassed reach)	Existing release of 5 cfs provides 38 to 49 percent of peak WUA for adult rainbow trout	Releases ranging from 40 to 60 cfs provide more than 90 percent of peak WUA for adult rainbow trout	Releases of 120 cfs provide 90 percent of peak WUA for adult rainbow

¹ Stillwater Sciences, Inc. 1998a. *North Umpqua Cooperative Watershed Analysis. Synthesis Report*. Prepared for PacifiCorp, Portland, OR.

² Stillwater Sciences, Inc. 2000b. *North Umpqua Cooperative Watershed Analysis. Technical Appendix 7-3 to the Synthesis Report*. Prepared for PacifiCorp, Portland, OR.

³ Umpqua Watersheds. 2000c. *North Umpqua Hydroelectric Project Relicensing: EIA Module 8 - Instream Flows*. File Code: 2770. April 28, attachment to filing of Umpqua Watersheds, April 16, 2001.

objective that includes "the timing, magnitude, duration, and spatial distribution of peak, high and low flows;" (5) flows that address the ODFW Trout Management Plan (1988);⁴⁸ and (6) a flow regime that considers the impacts to project economics and power generation.

⁴⁸ ODFW seeks to actively pursue and promote habitat protection and enhancement. Habitat must be protected or enhanced, using a subbasin-wide approach, to maximize the productivity of the stock, conserve stock fitness and life history characteristics, and to maintain healthy populations with multiple age classes. Unique native populations may require additional recognition for protection.

In order to achieve the above objectives, the Settlement Agreement provides for the following measures:

- the staged increase in instream flows in the project's bypassed reaches; first in the Soda Springs bypassed reach, followed by all other project reaches, and later by further increases in bypassed reaches that are opened up to anadromous fish following completion of fish passage facilities at Soda Springs dam;
- reevaluating minimum instream flows in the Clearwater No. 2 bypassed reach using the Spatial Niche Analysis (SNA) methodology (described below);
- installing and maintaining new streamflow gaging stations;
- continuing to provide water for use in the ODFW salmon holding ponds adjacent to the Soda Springs bypassed reach; and
- removing diversions on and reconnecting tributary streams.

Because changes in fish habitat are not linearly related to changes in stream flows, three approaches were used in the development of the Settlement Agreement to predict the ecological effects of increased flow releases under different alternatives: trout growth modeling, a literature-based assessment, and the Instream Flow Incremental Methodology (IFIM). The effects of different instream flows on trout growth were estimated using a bioenergetics model that focused on flow-related changes in water temperature and production of aquatic invertebrates (Stillwater Sciences, Inc. 1998a). Scientific literature and data from relicensing studies were reviewed to evaluate potential ecological effects of changes in baseflow, high flows, and ramping rates, and to provide guidance about the times of the year that altered flows may have the greatest biological effects (Stillwater Sciences, Inc. 1998a).

The IFIM was used to estimate the amount of salmonid habitat in most of the project-affected reaches under different instream flow release alternatives (Stillwater Sciences, Inc. 1998a). The IFIM efforts focused on assessing resident trout and aquatic macroinvertebrate habitat in bypassed reaches upstream of Soda Springs dam, and anadromous fish habitat in the Soda Springs bypassed reach. The different habitats (e.g., for spawning, juvenile rearing, and adults) respond differently to flows; emphasis was placed on summer habitat for adult fish as the key to ensuring the abundance of relatively long-lived resident trout (Umpqua Watersheds 2000c).

In addition to the three approaches that were applied to all the project-affected reaches, the FS conducted an SNA for areas upstream of that portion of the river accessible to anadromous fish (above the Slide Creek diversion dam). Under the ACS, the FS must provide for stream flows that meet the needs of all native aquatic species. The existing PHABSIM analysis for the North Umpqua Project only addressed the

instream flow needs of salmonids. Although the FS believes that the prescribed flows in the anadromous reaches meet ACS objectives, they recognized a need to use the SNA to develop flow recommendations that would address the needs of multiple species inhabiting nonanadromous reaches, as required by the ACS.

The river reaches where the SNA was applied are inhabited by resident trout, as well as a wide variety of other fish, amphibians, and aquatic invertebrates. Because habitat suitability curves have not been defined for most aquatic species, conventional IFIM analyses cannot be conducted to ensure that adequate flows are released to protect these organisms. The FS employed an SNA, which models the response to flow of different niches (i.e., habitat types such as pools, glides, riffles, and stream margins), as described by depth and velocity bounds. For example, a "margin niche" is defined as areas of the stream that have depths between 0–0.5 feet and velocities between 0–0.5 feet/second (FS 2001d). On the other end of the scale, the "pool niche" is defined as stream areas that have depths greater than 3.5 feet and velocities between 0–1.5 feet/second. The SNA is believed to reflect the habitat needs of a larger suite of aquatic organisms and channel functions. Thus, the flows derived from the SNA are intended to support a higher aquatic biodiversity than flows derived from only IFIM analyses and growth modeling of resident trout.

Implementation of minimum instream flow releases specified in section 5.1 of the Settlement Agreement (table 2-1) would result in increased flows in all bypassed reaches compared to the No-Action Alternative. Minimum flows would be 2 to 3.2 times higher in the Lemolo Nos. 1 and 2 and Toketee bypassed reaches. In the Clearwater Nos. 1 and 2 bypassed reaches, minimum flows would be 8 to 12 times higher than under the No-Action Alternative. Minimum flow releases in reaches accessible to anadromous fish would also be substantially higher under the Settlement Agreement (table 2-1). For example, minimum flows in the Fish Creek and Slide Creek bypassed reaches would ultimately be 6.5 to 13 times and 9.6 times higher than under the No-Action Alternative, respectively.

Compared to the No-Action Alternative, the instream flow releases in the Settlement Agreement would increase the amount of habitat for both resident and anadromous fish (table 3-8). For example, depending on stream reach, flow releases in the Settlement Agreement would yield at least 81 percent of the peak WUA for adult rainbow trout. Most reaches would have between 95 and 100 percent of peak WUA for adult rainbow trout (Stillwater Sciences, Inc. 1998a, 2000b). The 275-cfs flow release in the Soda Springs bypassed reach would provide 94-99 percent of peak WUA for rearing of juvenile anadromous fish (steelhead, coho and chinook salmon), 87 percent of peak WUA for spring chinook salmon spawning, and 53 percent of peak WUA for coastal

cutthroat trout spawning. The delay of increasing instream flow releases from 95 to 275 cfs until September 1, 2005 (amended section 5.1 of the Settlement Agreement), would provide sufficient time for completion of the habitat restoration measures identified in amended section 8.3, which would result in the creation of additional salmonid habitat in this reach (PacifiCorp 2003a). Once fish passage is provided at Soda Springs dam, the Settlement Agreement instream flow releases in Fish Creek and the Slide Creek reach would provide at least 50 percent of peak WUA for steelhead spawning, and most often would provide over 75 percent of peak WUA for all other anadromous fish species and lifestages (Stillwater Sciences, Inc. 2000b). Consistent with the goals of the Settlement Agreement, these instream flow releases would provide increased habitat for anadromous and resident fish, amphibian populations, aquatic invertebrate production, and other aquatic attributes; reflect seasonal shifts in fish habitat use; and increase habitat for native resident fish species (rainbow trout).

Other provisions of the Settlement Agreement related to instream flows include:

- section 5.2 of the Settlement Agreement calls for results from the FS SNA of the Clearwater Creek No. 2 bypassed reach to be re-evaluated prior to implementation of the flows listed in table 2-1. A study plan to re-evaluate the SNA results would be developed by PacifiCorp and the agencies and provided to the Commission for approval;
- prior to the new license becoming final or 2004, whichever is earlier, the parties would reconsider instream flows and adjust them as appropriate (Settlement Agreement section 5.3);
- the discharge from Lemolo No. 2 powerhouse to Toketee Lake would be re-routed by the sixth anniversary of the new license (Settlement Agreement section 5.4) in order to reduce the daily ramping and provide stable habitat for aquatic-dependent species in this rare, low-gradient reach of the river. This would cause the Lemolo No. 2 full-flow reach to become an extension of the Lemolo No. 2 bypassed reach; the instream flow regime for the newly extended bypassed reach would be the same as for the Lemolo No. 2 bypassed reach shown in table 2-1;
- under Settlement Agreement section 5.5, PacifiCorp would install and maintain streamflow gage stations at the head of all bypassed reaches or elsewhere as required by OWRD to monitor compliance with instream flow requirements. Canal flow gages would be installed at the Lemolo Nos. 1 and 2, Clearwater Nos. 1 and 2, Fish Creek, and Slide Creek conveyance systems, and a penstock flowmeter would be installed at Toketee powerhouse to measure flows;
- up to 8 cfs would continue to be diverted from the Soda Springs penstock tap for use by the ODFW salmon-holding ponds adjacent to the Soda Springs bypassed reach for the duration of the new license (Settlement Agreement section 5.6);

- the instream flow releases agreed to in the Settlement Agreement (table 2-1) include flows necessary for proper operation and maintenance of fish passage facilities at Soda Springs, Fish Creek, and Lemolo No. 2 dams. No additional instream flows would be required for these purposes (Settlement Agreement section 5.7);
- the fish passage facilities at Soda Springs dam would be designed such that flows discharging from the facilities enter the Soda Springs bypassed reach upstream of the restored alluvial reach (Settlement Agreement section 5.8); and
- streamflows from the Clearwater No. 2 bypassed reach that are flowing from the Clearwater River through the new reconnection shall be used to supplement the Toketee bypassed reach instream flow releases (Settlement Agreement section 5.9).

These additional provisions would help assure that instream flow releases are monitored for compliance, are re-evaluated (and adjusted as needed), and are sufficient to allow the proper operation and maintenance of fish passage facilities and salmon-holding ponds. The § 401 Water Quality Certificate requires PacifiCorp to provide instream flow releases in accordance with Settlement Agreement sections 5 and 10.4, and to measure and report flows in accordance with Settlement Agreement section 5.5.

NGO Alternative

The Conservation Groups recommend that instream flow releases be increased substantially over both existing conditions (No-Action Alternative) and the flow releases recommended in the Settlement Agreement (table 2-1). For example, natural stream flows (no diversion) would be released into the Soda Springs bypassed reach year round, and no flow diversions would be allowed in Fish Creek from July through October. Minimum instream flow releases in the Slide Creek bypassed reach would be increased from 25 cfs to 400 cfs year round under this alternative. The Conservation Groups suggest that the proposed flow regimes: (1) would better mimic the natural hydrograph, (2) are within the natural range of variability, (3) would maintain aquatic processes, (4) provide properly functioning aquatic habitat for fish and macroinvertebrates, (5) improve water quality, and (6) further the goals of overall ecosystem integrity.

Compared to the No-Action Alternative, the instream flow releases associated with the NGO Alternative would usually increase the amount of habitat available to adult resident rainbow trout and anadromous fish (table 3-8). For example, the NGOs' proposed flow releases into the Soda Springs bypassed reach would provide 84 percent of the peak spring chinook salmon WUA for spawning and 100 percent for juvenile rearing, compared to 31 and 32 percent of the peak WUA under existing conditions and 87 and

95 percent of the peak WUA under the Settlement Agreement for spring chinook salmon spawning and juvenile rearing, respectively. The NGOs' proposed flow releases of 120 and 170 cfs in the Lemolo No. 2 bypassed reach would provide at least 90 percent of peak WUA for adult rainbow trout, compared to 78 to 89 percent under existing conditions and 81 to 99 percent under the Settlement Agreement. In Fish Creek, Settlement Agreement flows would provide about 50 percent of peak WUA for steelhead spawning and 90 percent for rearing, compared to about 60 percent and 90 percent, respectively, under the NGO flow recommendations (Stillwater Sciences, Inc. 2000b). The percent of peak WUA for various salmonid species and lifestages under the different instream flow release alternatives are tabulated in Stillwater Sciences, Inc. (1998a; 2000b). For most bypassed reaches, the NGO Alternative would provide somewhat larger percentage of peak WUA than the Settlement Agreement, at a considerable increase in the instream flow releases.

In addition to proposing larger instream flow releases than the other alternatives, the Conservation Groups do not believe that reconsideration (and possible readjustment) of instream flow releases prior to the new license becoming final (or 2004; Settlement Agreement section 5.3) is justified. They point out that the Settlement Agreement fails to specify what information or ecological criteria would be used to justify any changes in the proposed flow regime. They maintain that any provision that allows for modification of the instream flow releases must clearly specify the ecological objectives, the evaluation program by which the parties would determine whether goals are being met, the process for modifying flows, and the monitoring program to evaluate the altered flows.

While the Conservation Groups support the proposal to install and maintain gage stations to monitor compliance with required instream flow releases (Settlement Agreement section 5.5), they recommend that this effort include a comprehensive monitoring and evaluation program to determine whether specific ecological objectives are being met. In the event that the stream gaging and monitoring program indicate that the instream flow releases are not meeting the required objectives, the license should include provisions for increasing the instream flow releases.

Staff Alternative

The Staff Alternative includes all of the elements in the Settlement Agreement, and therefore, the benefits of the Staff Alternative would be the same as those under the Settlement Agreement. We generally agree with the Conservation Groups that any reconsideration or readjustment of instream flow releases should be based on clearly stated ecological criteria. For example, the draft study plan developed for the instream flow reevaluation of the Clearwater No. 2 bypassed reach, as stipulated in section 5.2 of

the Settlement Agreement, should include, as appropriate, biological or ecological objectives, procedures and criteria for evaluating the results of the FS SNA.

3.4.2.2 Ramping Rates

The term “ramping” refers to project-caused increases (up-ramping) and decreases (down-ramping) in river discharge, with associated changes in water surface elevation (PacifiCorp 2001a).

Up-ramping occurs when generation commences and large amounts of water begin to be discharged from the powerhouses. Because of the design and operation of the North Umpqua Project, this is most pronounced in the full-flow reaches below the Lemolo No. 2, Toketee, Slide Creek and Soda Springs powerhouses. Increases in water surface elevation (up-ramping) may displace eggs, juveniles, or adults of fish and other aquatic organisms, and increase turbidity.

The effects of rapid powerhouse shutdowns are also of concern. In this case, water would cease to be discharged from the powerhouse, thereby decreasing the amount of water in the full-flow reach (down-ramping) until the project commences generation again. Down-ramping can strand eggs, juveniles, and adults in dewatered or disconnected areas of the channel. Chinook salmon and steelhead fry and Pacific lamprey ammocoetes may be particularly susceptible to stranding since they rear along the margins of mainstem stream channels. Less mobile or less tolerant organisms such as benthic macroinvertebrates and mollusks are also affected by fluctuating water levels and the changes in water quality and habitat that may result. Water quality parameters such as temperature, DO, and turbidity may also be affected by project-induced water level fluctuations.

Adverse effects of intermittent operations on stream flow regimes can be either avoided by flow continuation mechanisms (in the case of unexpected shutdowns) or mitigated by adherence to ramping rate schedules. Ramping rates restrict the allowable rate of change of water diversion. Ramping rates are expressed as the maximum rate of change in river stage (e.g., feet/hour), determined at a cross-section within the bypassed reach and/or below the tailrace. In order to protect steelhead and/or salmon fry, the most vulnerable lifestage of fish, Hunter (1992) suggested as a general rule that ramping rates not exceed 0, 1, or 2 inches per hour, depending on time of year and time of day.

Because many disruptions in flow result from brief turbine shutdowns (e.g., because of load rejections), hydroelectric projects should be capable of providing several hours of continuous flow under powerhouse shutdown conditions. A flow continuation

measure would allow the flow regime in both the bypassed reach and downstream from the powerhouse to remain essentially unchanged during intermittent shutdown.

The parties to the Settlement Agreement have developed a number of measures to reduce the ecological effects of ramping in the project area and below, including: preventing or limiting ramping in the Wild and Scenic River Reach below Soda Springs dam; restricting ramping rates in all bypassed reaches during normal operations; and reducing the effects of ramping in one of the three full-flow reaches above Soda Springs dam. These ramping rate measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS, and Section 4(e) conditions from the FS.

The Conservation Groups believe that the North Umpqua Project should be operated in a run-of-river manner, with no ramping except for maintenance and emergencies (described further below).

No-Action Alternative

Under the No-Action Alternative the existing ramping rates shown in table 3-9 would continue. The project would be operated as a daily peaking facility, using the Soda Springs dam to re-regulate flows below the project. Under this operational scenario, the

Table 3-9. Maximum ramping rates (feet/hour) under three alternatives for operation of the North Umpqua Project.

Alternative	Bypassed reaches	Full-flow reaches	Fish Creek	Wild and Scenic River
No-Action	0.5	0.3 to 0.8	0.5	0.2
Settlement Agreement	0.5/0.0 ^a	variable ^b	0.5/0.0 ^a	0.0/0.1 ^c
NGO	0.0/0.1 to 0.4 ^d	0.0/0.1 to 0.4 ^d	0.0/0.1 to 0.4 ^d	0.0/0.1 to 0.4 ^d

^a Ramping rates would initially be restricted to 0.5 feet/hour; after the first year of the new license, all ramping rates would be eliminated except for maintenance and emergencies.

^b Ramping would be reduced below Lemolo No. 2 by routing flows into an expanded wetland complex. Ramping rates would be determined in Slide Creek. Ramping would not be restricted in Toketee reach.

^c Below 1,600 cfs, no ramping allowed. Above 1,600 cfs, ramping would be limited to 0.1 feet/hour.

^d No ramping allowed, except for project maintenance, where ramping rates could range from 0.1 to 0.4 feet/hour, depending on reach.

upper project developments would operate during the peak energy period (usually from 6 a.m. to 10 p.m. each day) and then shut down overnight during the off-peak period. During the off-peak period, Soda Springs Reservoir would be drawn down to maintain required flows to the river below the project. In addition to these planned operational changes in flow releases (load factoring), bypassed reaches may experience high ramping rates due to planned or unplanned shutdowns. Therefore, aquatic resources would continue to be subjected to rapid increases and decreases in stage resulting in stranding or displacement of organisms or dewatering of habitat. These ramping rates exceed the maximum values recommended by Hunter (1992) for the protection of anadromous fish fry. No new measures would be implemented to minimize effects to aquatic resources due to ramping.

Settlement Agreement

From the standpoint of evaluating the effects of ramping, river reaches in the project area may be divided into three categories: (1) full-flow reaches above Soda Springs dam; (2) the North Umpqua Wild and Scenic River downstream of Soda Springs powerhouse; and (3) bypassed reaches (Umpqua Watersheds 2000). The Settlement Agreement includes provisions (sections 6.1 through 6.9) to address the issue of flow fluctuations in all of these reaches, both during routine operations and during project maintenance and emergency shutdowns. The § 401 Water Quality Certificate requires PacifiCorp to implement ramping restrictions and measures in accordance with Settlement Agreement section 6.

Full-flow reaches

Full-flow reaches are those from which no diversion of flow occurs, but in which streamflows may be subject to substantial fluctuations because of daily variations in releases from the powerhouses. Full-flow reaches above Soda Springs dam include: (1) Lemolo No. 2 powerhouse downstream to Toketee Lake (0.9 mile long); (2) Toketee powerhouse downstream to Slide Creek dam (0.2 mile long); and (3) Slide Creek powerhouse downstream to Soda Springs Reservoir (0.2 mile long). Operating the project in a peaking mode would result in wide daily fluctuations in flow rates and water levels (i.e., high ramping rates) in these three full-flow reaches above Soda Springs dam. Ramping rates from 0.3 to 0.8 feet/hour have been reported on a daily basis in the full-flow reaches (FS 2001a). The Lemolo No. 2 full-flow reach contains low-gradient habitat (braided channels and unconfined side channels) and extensive spawning gravels utilized by brown trout. Aquatic organisms occupying such low gradient habitat are relatively susceptible to stranding associated with rapid declines in water levels. By contrast, the Toketee and Slide Creek full-flow reaches are relatively confined, such that stranding of

fish due to daily ramping is less likely and the impact on macroinvertebrates may be somewhat less than that in the Lemolo No. 2 full flow reach.

In order to protect low-gradient fish habitat, biodiversity, and water quality, while allowing the Lemolo No. 2 Development to operate as a peaking facility, peaking flows would be re-routed out of the Lemolo No. 2 full-flow reach into an expanded wetland complex around the Stinkhole Pond (Settlement Agreement section 6.1). By the sixth anniversary of the new license, flows would be directed to the Stinkhole area, using a pipe that may be partially buried or an open canal. The Stinkhole area would be recontoured to expand the existing wetland complex. This measure would reduce variations in water quality, eliminate project-induced flow fluctuations (e.g., stranding of fish and other aquatic organisms), and create valuable wetland and stillwater habitat in the area north of Toketee Lake. PacifiCorp would develop a draft plan for construction and operation of the pipe or open canal in consultation with the agencies, and submit it to the Commission for approval.

The Slide Creek full-flow reach would become accessible to anadromous fish under the fish passage provisions of the Settlement Agreement (section 3.4.2.3). Consequently, there would be a need to protect migratory habitat, spawning habitat (if any), and prevent fish stranding in this reach. Ramping in the Slide Creek full-flow reach would be unrestricted until the parties to the Settlement Agreement develop and implement an anadromous fish monitoring plan by the seventh anniversary of the new license (Settlement Agreement section 6.2.1). The monitoring would determine if anadromous salmonids use the Slide Creek full-flow reach for spawning or migratory movements. If either spawning or migrations are adversely affected by ramping, PacifiCorp would operate individual generating units in the Toketee powerhouse in a way that protects against rapid flow fluctuations (Settlement Agreement section 6.2.2).

Under section 6.3 of the Settlement Agreement, there would be no ramping restriction in the Toketee full-flow reach. Because the 0.2-mile-long Toketee full-flow reach consists of a deep, steep-sided bedrock pool, and would continue to be inaccessible to anadromous fish, ramping is not likely to have substantial effects on aquatic resources.

PacifiCorp has voluntarily restricted ramping rates in the North Umpqua River downstream from Soda Springs powerhouse since the 1970s; 95 percent of the flow changes downstream of the Soda Springs powerhouse from 1987 to 1991 were less than 0.2 feet/hour (table 3-9). Nonetheless, the frequencies and rates of flow changes occasionally cause stranding of fish from ramping down the water levels in this reach. Under the terms of Settlement Agreement section 6.4.1, at flows below 1,600 cfs, the project would be operated in such a way as to prevent ramping in the Wild and Scenic

River reach unless subsequent studies (Settlement Agreement section 6.4.3) show that this restriction is unnecessary.⁴⁹ This ramping limitation would be subject to a 5 percent or less variation in base flow due to equipment limitations at Soda Springs powerhouse. At flows above 1,600 cfs and up to a point where natural flows result in spilling at Soda Springs dam, ramping would be limited in the Wild and Scenic River reach to 0.1 feet/hour and 0.5 feet/day, unless studies show that additional fluctuations would not adversely affect aquatic resources (Settlement Agreement section 6.4.2).

Under section 6.4.4 of the Settlement Agreement, stage changes would be recorded downstream of Soda Springs powerhouse at USGS gage #14316500 near Copeland Creek. This monitoring would be useful for documenting compliance with the above provisions and allow for agency review of ramping operations.

Section 6.4.5 of the Settlement Agreement includes additional provisions to limit fluctuations in the Wild and Scenic River reach due to anticipated natural flow events and the drafting or refilling of Lemolo Reservoir. When Soda Springs Reservoir is not spilling, PacifiCorp would use all reasonable efforts to limit flow changes below the Soda Springs powerhouse to a 5-percent change per hour from the base flow conditions at the time, with a goal not to exceed 0.1 feet per hour, as many times a day as necessary to follow the anticipated natural flow event. During draft or refill of Lemolo Reservoir as described under section 9.3 of the Settlement Agreement, PacifiCorp would use all reasonable efforts to limit flow changes in the Wild and Scenic River reach to a 5-percent change per day from the base flow conditions at the time, but not exceeding 0.1 feet per day.

Bypassed reaches

The eight bypassed reaches (totaling about 35 miles of stream) generally receive only the water released from the diversions as minimum instream flow releases. When the project is not generating, water is stored in the reservoirs and forebays and not released over the dam into the bypassed reach. Consequently, these reaches experience little day-to-day flow fluctuations. The greatest amount of ramping in bypassed reaches

⁴⁹ Available evidence (Stillwater Sciences, Inc. 1998a) indicates that exposure of stranding habitat (e.g., flat bedrock and side channel areas) in the North Umpqua River below Soda Springs dam increases substantially at flows below 1,000 cfs, and especially at flows below 850 cfs. Virtually no potential stranding habitat would be exposed by the proposed ramping at flows above 1,600 cfs. The Settlement Agreement includes a provision for additional studies to determine if the agency resource goals for the Wild and Scenic River reach could be achieved under a more flexible ramping regime.

occurs during scheduled and emergency maintenance, between 1 and 5 times per year. Since 1995, PacifiCorp has voluntarily adopted ramping rates of 0.5 feet/hour in most of the bypassed reaches above Soda Springs dam (table 3-9); ramping rates in the Soda Springs bypassed reach are voluntarily restricted to between 0.2 feet/hour. Ramping of water released into the bypassed reaches during maintenance does not mimic the natural hydrograph, in that the ascending and descending limbs of the hydrograph are symmetrical, the peaks are flat, and the rates of flow change are different from those observed during natural high flows. Some stranding of fish and other aquatic organisms may occur during maintenance, particularly in those portions of the Lemolo No. 2, Fish Creek, and Soda Springs bypassed reaches that have low-gradient, unconfined channels.

Under Settlement Agreement section 6.5, the project's eight bypassed reaches would initially have restricted ramping rates: ramping would be limited to a target of no more than 0.2 feet/hour in the Soda Springs bypassed reach and a target of 0.5 feet/hour in all other bypassed reaches. PacifiCorp would also attempt to limit the ramping rate in the bypassed reaches other than Soda Springs to 0.2 feet per hour between June and October to protect rainbow trout fry. After the first anniversary of the new license, all ramping in the eight bypassed reaches would be eliminated, except during planned maintenance and emergency shutdowns (table 3-9). Additionally, in the event that the Lemolo 2 waterway is dewatered, ramping restrictions for Deer Creek would be in accordance with section 6.6.d of the Settlement Agreement which establishes the ramping rates based on the presence or absence of various lifestages of salmonid fry.

This measure would reduce the adverse effects of unrestricted ramping, including increased turbidity and strandings of fish and other aquatic organisms. The ramping restrictions were designed primarily to protect fish during their most vulnerable lifestages, particularly juvenile anadromous salmonids.

Project maintenance

Section 6.6 of the Settlement Agreement calls for minimizing the effects of project maintenance and emergency shutdowns by taking into consideration the time of year and length of shutdowns, planning maintenance so that resulting high flows would coincide with the high-flow period of the natural hydrograph, preventing violation of water quality standards, and adhering to a ramping rate schedule of either 0, 0.2, or 0.5 feet/hour, depending on time of day and the salmonid life stages present. Compliance with the ramping rate schedules would be determined through the streamflow gaging plan developed for monitoring instream flow releases (section 3.4.2.1). These measures would minimize the environmental effects of planned maintenance activities. The § 401 Water

Quality Certificate requires PacifiCorp to conduct scheduled maintenance in accordance with Settlement Agreement section 6.6.

Emergency shutdowns

Commencing on the first anniversary of the new license, in the event of emergency shutdowns PacifiCorp would adhere to the ramping restrictions outlined in section 6.6 d of the Settlement Agreement to the extent possible in view of potential risks to employee safety and environmental risks such as dewatering the Wild and Scenic River reach (Settlement Agreement section 6.7). If required by operating emergencies beyond the control of PacifiCorp, the prescribed ramping rate schedules could be temporarily modified for short periods. Compliance with ramping criteria would be aided by implementing measures such as installing a new or improved emergency bypass valve at the Soda Springs powerhouse (Settlement Agreement section 6.8). Upon the first anniversary of the new license, the parties to the Settlement Agreement would evaluate whether a new emergency bypass valve is needed at the Slide Creek powerhouse (or other project modifications) to prevent adverse impacts during emergency shutdowns (Settlement Agreement section 6.9).

In summary, the ramping rates established in the Settlement Agreement would eliminate ramping in the relatively rare habitats of the Lemolo No. 2 full-flow reach and in bypassed reaches, and reduce ramping to levels which would prevent stranding of anadromous fish in the Slide Creek full-flow reach and in the Wild and Scenic River below Soda Springs powerhouse (FS 2001d). Ramping rates would be lower than the maximum values recommended by Hunter (1992) for the protection of salmon and steelhead fry. The new ramping regime is already being implemented by PacifiCorp (as of the effective date of the Settlement Agreement), and monitoring provisions have been established to adjust ramping rates if unforeseen impacts occur to anadromous fish or riparian resources.

NGO Alternative

The Conservation Groups recommend that the entire project be operated in a run-of-river manner, thereby eliminating the wide daily flow fluctuations that characterize present operation. The only exception would be for project maintenance, where allowed ramping rates would range from 0.1 to 0.4 feet/hour, depending on stream reach and whether the project is down-ramping or up-ramping (table 3-9). The elimination of project-induced flow fluctuations would minimize adverse effects on aquatic habitats and consequent problems with stranding and mortality of aquatic organisms.

Like the Settlement Agreement, the NGO Alternative would result in lower ramping rates than the No-Action Alternative. After the first anniversary of the new license, the effects of the Settlement Agreement and the NGO Alternative are similar for the 35 miles of bypassed reaches above the Soda Springs dam in that ramping would not be allowed except for periodic maintenance and emergencies. Similarly, ramping rates in the Wild and Scenic River reach of the North Umpqua River would be low or not permitted under the two action alternatives. However, the NGO Alternative would not allow ramping in the Wild and Scenic River reach under any streamflows, whereas the Settlement Agreement would allow ramping at or below 0.1 feet/hour at streamflows above 1,600 cfs.

The greatest differences between the Settlement Agreement and the NGO Alternative concern the full-flow reaches, totaling 1.3 miles of stream above Soda Springs dam. The Conservation Groups recommend that no ramping be allowed in these reaches, whereas the parties to the Settlement Agreement recommend a variety of mitigative measures, including expanding a wetlands complex and future studies to determine the appropriate ramping rates, in order to preserve the ability of the North Umpqua Project to operate as a peaking facility. Of the three full-flow reaches above Soda Springs dam, only the 0.2-mile-long Toketee full-flow reach would not have ramping rate restrictions or other mitigative measures under the Settlement Agreement. The impacts to aquatic biota of ramping under the Settlement Agreement would be greater than under the NGO Alternative, but the affected full-flow reaches are short and do not contain particularly valuable aquatic habitat.

Staff Alternative

The Staff Alternative includes all of the elements in the Settlement Agreement, and therefore, the benefits would be the same as under the Settlement Agreement. Under the Settlement Agreement, ramping would be eliminated in the bypassed reaches. Limited ramping would be allowed in the Wild and Scenic River reach of the North Umpqua River at streamflows greater than 1,600 cfs, because relicensing studies showed that stranding habitat is inundated at higher river flows, and there would be no ramping at flows below 1600 cfs. We do not agree with the Conservation Groups' recommendation that ramping restrictions are needed in the Toketee full-flow reach, owing to the fact that it is a very short, confined reach, consisting of a deep, steep-sided bedrock pool above Slide Creek dam (i.e., not particularly sensitive to stage changes), and would not support anadromous fish. If operational monitoring shows that the ramping rates proposed in the Settlement Agreement for the Slide Creek full-flow reach prove to be too great, they can be further restricted. We recommend that the anadromous fish monitoring plan for the Slide Creek full-flow reach be developed for approval by the Commission and contain, as

appropriate, ecological criteria for determining and mitigating adverse impacts to fish spawning and migration.

3.4.2.3 Fish Passage

There are a number of natural and artificial barriers to passage of fish and other aquatic organisms in the project area. Natural waterfalls (such as Toketee Falls) and landslides that block streams can create barriers to fish movement. In addition to natural barriers, the North Umpqua Project dams prevent upstream passage. Similarly, by creating relatively stagnant pools of water, the larger project reservoirs may hinder both upstream and downstream passage of riverine organisms. These natural and manmade barriers eliminate the linkages among aquatic habitats—that is, they diminish aquatic connectivity. Connectivity can be improved by eliminating barriers to upstream passage (e.g., by removing dams or installing fish ladders) and by facilitating downstream passage (over spillways or screened bypasses). See section 3.4.2.7 for additional consideration of measures intended to restore aquatic connectivity.

Fish residing in the stream and impoundment above a diversion dam could be entrained in the water withdrawn for power generation and suffer injury or death from passage through the turbine. Turbine passage can be prevented by installation of screens at the intake structure. These screens must have (1) sufficiently small mesh sizes to prevent entrainment of juvenile trout and salmon, and (2) low approach or through-screen velocities to prevent impingement of fish against the screen. Screens must effectively exclude fish under a variety of streamflow, bedload, and debris-load conditions. Further, screens must be either self-cleaning or manually cleaned frequently enough that plugging or icing, which would increase through-screen velocities and impingement mortalities, is not a serious problem.

Salmon mortality has occurred at some hydroelectric projects in the Pacific Northwest as a result of the attraction of adult upstream-migrating fish to water being discharged from the powerhouse. Fish swimming upstream to spawn may move into the tailrace in low velocity areas along the margins. If these fish move close to the powerhouse, then dart into the high velocity water discharging from the draft tube, the extremely high shear stresses associated with acceleration can be sufficient to break the fish's spine (Hilgert 1992). Under lower turbine flow conditions (e.g., during start-up, shut-down, or extended operation below maximum capacity), velocities may be low enough for fish to swim up and contact the turbine blades. Steelhead, in particular, may attempt to jump around the turbine discharge and land on the bank. In a review of tailrace attraction problems at hydroelectric projects in the Pacific Northwest, BCI (1991) reported two projects where injury or mortality to adult salmonids occurred as a result of

direct contact with turbines or high-velocity discharges. Concern about the attraction of adult anadromous fish to turbine discharges has, in some cases, led resource agencies to recommend installation of a barrier to prevent fish from swimming upstream into the tailrace.

The parties to the Settlement Agreement have developed a number of measures to improve fish passage in the watershed, including: provision of a vertical-slot fish ladder at Soda Springs dam for upstream migration of anadromous fish, construction of fish screens and bypass facilities at Soda Springs dam to prevent entrainment mortality of downstream-migrating juvenile anadromous fish; maintenance of the existing fishway at the Fish Creek dam; improvement of the existing fishway at Lemolo No. 2 dam, installation of fish screens at the Fish Creek dam; modification of the trashrack at the Toketee intake to exclude large trout from entrainment; and, in lieu of fish passage at Slide Creek dam, both on-site and off-site enhancement of habitat for anadromous fish. These fish passage enhancements are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS, Section 18 fishway prescriptions from the FWS and NMFS, and Section 4(e) conditions from the FS and BLM.

The Conservation Groups believe that removal of Soda Springs dam is a more certain way of restoring anadromous fish populations to historical habitat within the project reaches. In addition, the NGO Alternative recommends construction of a tailrace barrier at the Slide Creek powerhouse; consideration of fish passage at Slide Creek dam and tailrace barriers at Toketee and Fish Creek powerhouses; and other fish passage mitigation measures similar to those in the Settlement Agreement (described further below).

No-Action Alternative

Under the No-Action Alternative, Soda Springs dam would continue to be a barrier to upstream movements of anadromous and resident fish. In addition, the lack of fish screens at the Soda Springs intake would result in entrainment and turbine passage mortality of resident fish that inhabit Soda Springs Reservoir. The fishway at Lemolo No. 2 would remain in its existing state and as such would not effectively pass resident trout; the entrance to the fishway is not easily located because most of the water flowing over the dam spills into the stilling basin (Stillwater Sciences, Inc. 1998a). It is believed that fish may be attracted to the high flows in the stilling basin, where they do not have access to the fish ladder entrance. On the other hand, the fish ladder at the Fish Creek dam appears to allow unimpeded upstream movements of resident fish. There would not be any fish passage facilities at the Slide Creek, Toketee, Clearwater Nos. 1 and 2, and Lemolo No. 1 dams.

Settlement Agreement

The goal for fish passage under the Settlement Agreement is to restore, maintain, and/or enhance native anadromous and resident fish populations, including summer and winter steelhead, spring chinook salmon, coho salmon, sea-run cutthroat trout, Pacific lamprey, and rainbow trout. The fish passage measures provided under the Settlement Agreement have undergone engineering and technical feasibility review and would be coordinated with implementation of other mitigation and enhancement measures contained in the Settlement Agreement such as modifications to reservoir operations, minimum flows, and ramping rates. For biological goals that cannot be met with specific fish passage measures or habitat measures, the Settlement Agreement provides for the establishment of mitigation funds to benefit fisheries resources within and near the project area (discussed below).

Specifically, section 4 of the Settlement Agreement addresses the issue of fish passage at Soda Springs dam, Slide Creek dam, and at diversions upstream of Toketee Falls and Fish Creek. The § 401 Water Quality Certificate requires PacifiCorp to implement fish passage measures in accordance with Settlement Agreement section 4.

Under the Settlement Agreement, Soda Springs dam would be equipped with a vertical-slot fish ladder designed in consultation with the NMFS, FWS, ODFW, and FS to promote the upstream passage of anadromous and resident fish. The fish passage facilities would be tested and functioning by the seventh anniversary of any new license. The effectiveness of the ladder would be monitored with a fish-counting facility using a video camera and video recording system; a post-construction evaluation plan including biological and hydraulic evaluations would be developed in consultation with the agencies for testing the effectiveness of the upstream fish passage facilities. To prevent migrating salmonids from swimming upstream into the tailrace and being injured or delayed from reaching the upstream passage facilities, a new tailrace barrier would be designed in consultation with the agencies and installed by the first anniversary of any new license.

To protect fish moving downstream, Soda Springs dam would be fitted with fish screens by the seventh anniversary of any new license designed in consultation with NMFS, FWS, ODFW, and FS that meet the performance standards outlined in Appendix B, Part 1, table 1 of the Settlement Agreement. PacifiCorp would develop in consultation with the agencies operational and maintenance plans, a post-construction evaluation program, and a long-term monitoring program. In the event that the performance measures outlined in Appendix B, Part 1, table 1 of the Settlement Agreement are not met during post-construction evaluation studies, the Settlement

Agreement specifies the options PacifiCorp should take to ensure proper performance of the facilities. In addition, by the seventh anniversary of any new license, the spillway would be modified after consultation with the agencies to further facilitate the safe and timely outmigration of juvenile anadromous fish.

Installation of a fish ladder at Soda Springs dam would provide access to at least 6.6 miles of additional anadromous fish habitat in the mainstem North Umpqua River and Fish Creek. Spring chinook salmon and steelhead are the anadromous species that are likely to benefit most from construction of fish passage facilities at Soda Springs dam. Fish screens at the Soda Springs dam intake and a downstream bypass system would promote the safe passage of downstream-migrating juvenile salmonids. Installation of a tailrace barrier at the Soda Springs powerhouse would reduce migration delays and injuries to adult anadromous fish. Monitoring of both upstream and downstream passage would be needed to ensure that these mitigative measures are effective.

Installation of a fish ladder at Slide Creek dam was considered and rejected in the Settlement Agreement. Fish passage facilities at Slide Creek dam would provide anadromous fish with access to an additional 1.4 miles of habitat in the North Umpqua River, to their historical upper limit at Toketee Falls. This reach of stream is confined in a steep-walled canyon cut into High Cascades (Toketee) basalt, where bedrock and large blocks of basalt have fallen from the canyon walls and strongly influence channel morphology by the creation of large roughness elements and deep pools. Because this stream reach has a relatively high-gradient and a confined channel that contains limited spawning gravels and other anadromous fish habitat, the parties to the Settlement Agreement agreed that other habitat enhancement measures would better address the goal of restoring anadromous fish populations. In lieu of fish passage at Slide Creek dam, PacifiCorp would provide funding to benefit anadromous and other migratory fish species on-site or in proximity to the project in accordance with section 19.1 of the Settlement Agreement (discussed below).

The Settlement Agreement includes additional fish passage provisions for the remaining North Umpqua diversions. PacifiCorp would continue to maintain the existing fishway facility at Fish Creek which currently complies with state standards for providing upstream passage of resident trout. At the only other existing fishway located at Lemolo No. 2, PacifiCorp would complete design improvements by the second anniversary of any new license. For both the existing Fish Creek facility and the renovated facility at Lemolo No. 2, operation and maintenance plans would be developed and a post-construction evaluation plan including biological and hydraulic evaluations would be developed in consultation with the agencies for testing the effectiveness of the upstream fish passage facilities.

To protect fish moving downstream, the Fish Creek intake would be fitted with a fish screen by the second anniversary of any new license designed in consultation with NMFS, FWS, ODFW, and FS that meet ODFW design criteria outlined in Appendix B, Part 2 of the Settlement Agreement. Installation of a fish screen is also a condition of the § 401 Water Quality Certificate. PacifiCorp would develop in consultation with the agencies operational and maintenance plans, and a post-construction evaluation program.

Maintenance of the functioning fish ladder at the Fish Creek dam is unlikely to enhance anadromous fish populations because a possible natural barrier in Fish Creek (at about RM 3.5, downstream from the dam) would probably block their migrations (Stillwater Sciences, Inc. 1998a). However, the ladder would continue to allow passage of resident rainbow trout, and installation of a fish screen at the dam would reduce losses of rainbow trout to entrainment. If anadromous fish can overcome the potential natural barriers downstream from the Fish Creek dam, the fish ladder and screen would facilitate the movements of these species as well.

Of the eight dams in the North Umpqua Project, Soda Springs dam was considered the highest priority for improvement in aquatic connectivity, including fish passage. It was estimated that the production of steelhead, chinook, and coho salmon could increase by 5 to 6 percent with passage at Soda Springs dam (FS 2001d). This increase would occur as a result of providing additional spawning and rearing habitat in the North Umpqua River and Fish Creek. Providing passage at Slide Creek dam might increase production by an additional 1 percent, but with only a low to medium confidence that steelhead and chinook salmon would benefit.

Improvement of the Lemolo No. 2 fishway would restore and enhance aquatic connectivity by improving passage conditions for resident rainbow and brown trout that inhabit this reach of the river.

The Settlement Agreement includes additional provisions related to downstream fish passage at Toketee Lake and the other project diversions. At the Toketee intake, PacifiCorp would modify the trashrack in consultation with ODFW by the fifth anniversary of any new license to minimize the downstream movement of trout longer than 5 inches. Specifically, modifications may include reducing the bar spacing to about 0.5 inches and increasing the surface area to reduce the approach velocity to 0.8 feet per second. The purpose of these modifications is to help maintain the fishery in Toketee Lake by minimizing the loss downstream of large resident trout. The low approach velocity and narrow bar spacing on the screens would allow larger trout to avoid entrapment in the intake flow.

The Settlement Agreement recognizes that some mortality of fish moving downstream where screens would be installed would be unavoidable, and therefore, funds would be set aside in an Enhancement Account (section 19.1.1 of the Settlement Agreement) to provide additional mitigation and enhancement measures. Those funds would also be available to provide mitigation for effects incurred at the facilities where screens would not be installed. In lieu of installing upstream fish passage facilities at Slide Creek dam and the remaining project diversions, funding would also be made available for mitigation and enhancement measures for anadromous and resident fish within the North Umpqua River Basin in accordance with section 19.1 of the Settlement Agreement and the ODFW MOU.

In order to compensate for the effects of Slide Creek dam on fish passage, the ODFW MOU would require off-site habitat enhancement measures be implemented in Rock Creek, Canton Creek, and East Fork Pass Creek. The Rock Creek Basin was selected because it contains alluvial habitat that is relatively rare in the basin, could provide high-quality spawning and rearing habitat for anadromous fishes, and is a high-priority fisheries enhancement area for ODFW. Three mitigation measures would be implemented in the Rock Creek Basin: (1) the Rock Creek diversion dam fishway would be upgraded to improve upstream passage for migratory fish and to allow for sorting of hatchery from wild fish; (2) LWD would be added to East Fork Rock Creek to enhance fish habitat; and (3) conservation easements would be purchased in order to increase riparian protection. If properly functioning (i.e., a goal of 100 percent upstream and downstream passage of adult and juvenile fish), the Rock Creek fishway could substantially increase the availability of spawning and rearing habitat for coho salmon, migratory coastal cutthroat trout, steelhead, and chinook salmon. Depending on the species, access to between 27 and 44 miles of habitat, including 27.5 miles of high-quality, low-gradient habitat for coho salmon, would be enhanced. Regarding LWD placement, East Fork Rock Creek is a low-gradient stream channel that lacks habitat complexity. Active placement of LWD would considerably accelerate habitat recovery, which would require at least 50 to 60 years under natural recruitment rates. Increasing instream habitat complexity would increase the winter carrying capacity for coho salmon, steelhead, coastal cutthroat trout, and Pacific lamprey.

Lastly, purchase of conservation easements on private land would guarantee the protection of riparian vegetation, with a consequent increase in stream channel shading and decrease in water temperatures in the mainstem Rock Creek and certain tributaries. These water quality improvements, coupled with long-term, natural recruitment of LWD, would benefit both resident and anadromous fish (especially the coho salmon and coastal cutthroat trout that spawn in tributaries). Private lands in the North Umpqua watershed have less protection than do public lands, and disturbance from logging on private lands

can have on-site and downstream impacts. The conservation easements under the Settlement Agreement would limit potential future sources of habitat degradation (e.g., such as might be caused by timber harvest) on private lands by compensating private landowners for undertaking habitat protection measures that would not be required under state and federal regulations. In the Canton Creek subbasin, for example, this would protect part of the 30 percent of the land that is privately-owned. This off-site measure, in combination with management guidelines included in the Forest Plan and other enhancement efforts, should substantially increase protection for riparian habitats in the North Umpqua River Basin (section 3.5.2.3). Although the primary purpose of these easement purchases is to benefit anadromous fish, they would also improve the habitat for other riparian-dependent species (e.g., amphibians). Providing off-site mitigation would have positive effects for those species dependent on such environments and would increase riparian protection in the watershed as a whole.

A Tributary Enhancement Program would be created (and funded by PacifiCorp) to support habitat restoration for native anadromous and resident fish and wildlife populations on private and other non-FS lands. This would include funding for resident fish habitat enhancement on private lands in the upper Canton Creek and East Fork Pass Creek subbasins, upstream from natural barriers to anadromous fish (ODFW MOU). Enhancement measures for improving resident fish habitat would include in-channel LWD placement and purchase of conservation easements along riparian corridors. These habitat enhancements would benefit resident native trout populations, potentially including resident coastal cutthroat trout. The Settlement Agreement also provides for a mitigation fund, which is administered by the FS and would be used to implement additional mitigation and enhancement measures that would further benefit aquatic and terrestrial species and habitats on National Forest System and BLM-administered lands within the North Umpqua Basin.

NGO Alternative

The Conservation Groups recommend the following measures to enhance fish passage:

1. remove Soda Springs dam and associated facilities within 5 years after issuance of the license;
2. construct a tailrace barrier at the Slide Creek powerhouse;
3. if recommended by a Technical Committee, provide upstream and downstream fish passage at Slide Creek dam, and construct tailrace barriers at Toketee and Fish Creek powerhouses;

4. maintain the existing fish ladder at Fish Creek and improve the existing fish passage facilities at Lemolo No. 2;
5. reduce entrainment at the Fish Creek intake; and
6. conduct a study of entrainment of Pacific lamprey and other anadromous fish.

Many of the recommended measures are similar to those in the Settlement Agreement: maintaining or improving existing fish ladders, reducing fish entrainment at project intakes, and installing a tailrace barrier at the Slide Creek powerhouse. All these measures would serve to improve fish passage and aquatic connectivity.

The major difference between the NGO Alternative and the Settlement Agreement involves the disposition of the Soda Springs dam. The Conservation Groups recommend that the Soda Springs dam be removed within 5 years of issuance of the license, rather than providing a fish ladder, intake screens, and downstream fish bypass system. Removing Soda Springs dam would ensure the elimination of a major barrier to movements of anadromous fish, resident fish, other aquatic organisms, and sediments and woody debris and eventually could restore the anadromous fish habitat that is presently inundated by the Soda Springs Reservoir. As with the Settlement Agreement, an additional 6.6 miles of anadromous fish habitat would become available. The Conservation Groups estimate that this action would increase smolt production by 1.6 percent for steelhead, 2.4 percent for chinook salmon, and 2.2 percent for coho salmon. In addition, dam removal would reduce the non-native brown trout population that currently inhabits Soda Springs Reservoir, and could restore the Soda Springs Reservoir reach to a functioning alluvial river channel that provides high quality habitat for anadromous fish and other aquatic organisms.

However, dam removal could entail significant additional environmental impacts (e.g., water quality degradation from fine sediments released from Soda Springs Reservoir). These potential adverse impacts of removing Soda Springs dam are described in *Evaluation of Alternatives for Providing River Flow Reregulation* (PacifiCorp et al. 2001). For example, an estimated 900,000 tons of fine sediment has accumulated behind the dam since 1952. The impacts of river erosion and downstream transport of these sediments are uncertain, but could include an increase in substrate embeddedness in the downstream reach (and a resultant decrease in salmonid spawning habitat). Although the effects of this relative rapid influx of fine sediments may be negligible over the long-term, improper dam removal could have significant short-term impacts on water quality and aquatic organisms.

The Conservation Groups disagree with a number of other aspects of the Settlement Agreement relating to fish passage, including the timing of implementation of

mitigation measures, adequacy of studies to determine effectiveness, and offsite mitigation. They believe that any passage-related measures should be implemented immediately upon license issuance, rather than as many as 7 years after issuance of the new license. The Conservation Groups contend that the Settlement Agreement does not provide sufficient details and performance criteria to ensure that the fish passage measures that would be implemented would achieve successful upstream and downstream passage. Such passage measures would include not only the vertical slot fish ladder and intake screens at Soda Springs dam, but also the management of Soda Springs Reservoir to facilitate upstream and downstream passage. Whereas the Conservation Groups support the Settlement Agreement commitment to improve the existing fish passage facilities at the Fish Creek and Lemolo No. 2 diversions, they recommend that greater details be provided on performance criteria for these measures.

The Conservation Groups object to the offsite mitigation measures developed in the Settlement Agreement in lieu of fish passage of Slide Creek. They maintain that the benefits of this effort are speculative, there is no comprehensive monitoring program, and in any case should have a lower priority than on-site, in-kind mitigation. They recommend instead that within 5 years of issuance of the new license a Technical Committee should determine whether effective fish passage should be developed at Slide Creek dam, depending on whether habitat conditions have recovered sufficiently in the Toketee bypassed reach. If passage is determined to be desirable, within one year PacifiCorp would design and construct fish passage facilities, as well as provide tailrace barriers at the Toketee and Fish Creek powerhouses. If passage at Slide Creek dam is not warranted, the Conservation Groups recommend that PacifiCorp contribute an additional \$5 million to a Habitat Restoration Fund for onsite mitigation.

Staff Alternative

The Staff Alternative includes all of the elements associated with fish passage in the Settlement Agreement, and therefore, the benefits would be the same as under the Settlement Agreement. Although full implementation of the passage measures would not be required for as much as 7 years after issuance of the new license, this timeline includes 2 years for testing of screens and ladders after construction to ensure that criteria are met during which fish passage would occur. Regarding the offsite mitigation proposed in the Settlement Agreement (in lieu of fish passage at Slide Creek), we consider the enhancement of habitats in Rock Creek, Canton Creek, and East Fork Pass Creek to have a substantially greater potential to increase stocks of anadromous fish than making available an additional 1.4 miles of moderate-quality habitat in the North Umpqua River above Slide Creek dam.

We agree with the Conservation Groups that implementation of fish passage measures should be accompanied by detailed plans for monitoring the effectiveness of these measures. Such post construction evaluation plans for both upstream and downstream fish passage facilities are stipulated in sections 4.1.1, 4.1.2, 4.3.1, and 4.3.2 of the Settlement Agreement and should include, as appropriate, ecological objectives, procedures, and criteria for evaluating the effectiveness of these facilities.

3.4.2.4 Restoration of Fluvial Geomorphic Processes

Fluvial geomorphic processes influence stream channel morphology and the types and quality of aquatic and riparian vegetation found within a watershed (PacifiCorp 2001g). The hydrologic regime, sediment regime, riparian vegetation, and LWD are important components of fluvial geomorphic processes.

Project dams and diversions can trap sediments and LWD that would normally move downstream and replenish the stream channel below the North Umpqua Project. Gravels that are needed for salmonid spawning or benthic macroinvertebrate habitat may become depleted below the dams. LWD provides important fish and aquatic invertebrate habitat in many streams. The amount and distribution of LWD are restricted by project dams and diversions, and by past efforts to remove LWD from the stream channels. The downstream transport and redistribution of sediments and LWD can be improved by restoring the fluvial geomorphic processes that influence stream channel morphology and the aquatic and riparian habitats in the North Umpqua watershed.

The parties to the Settlement Agreement have agreed to a number of measures to restore fluvial geomorphic processes in the watershed: spawning gravel augmentation below Soda Springs dam; promoting the passage of LWD over project dams; promoting the passage of sediments past the Slide Creek dam; and reconnection of numerous tributaries, including reconnecting the Clearwater River to the North Umpqua River. These measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS, and Section 4(e) conditions from the FS.

The Conservation Groups believe that fluvial geomorphic process can be restored most reliably by removal of the Soda Springs dam. In the absence of dam removal, they recommend implementation of a comprehensive monitoring program that would

determine whether the gravel augmentation and LWD/sediment passage activities need to be modified.

No-Action Alternative

Under the No-Action Alternative, the North Umpqua Project impoundments would continue to trap nearly all the bedload sediments transported from the upper reaches of the river. Bedload sediment delivery into the Slide Creek bypassed reach and the full-flow reaches would be limited, as well as bedload sediment deliveries into the Soda Springs bypassed reach and the reach from Soda Springs powerhouse to Boulder Creek. Sediment production associated with roads and timber harvests would replenish some of the bedload sediments below Boulder Creek. The effects of Soda Springs dam on downstream aquatic habitat would likely be limited to the reaches just below the dam; there is little evidence of channel change further downstream (e.g., downstream of Steamboat Creek). PacifiCorp would continue its current practice of providing for passage of woody debris that enter the Soda Springs and Slide Creek reservoirs, but this activity would be conducted without benefit of an approved operations plan.

Settlement Agreement

One of the goals of the ACS of the Forest Plan is to develop and restore and maintain the ecological health of watersheds and the aquatic ecosystems contained within them. Consistent with that goal, the Settlement Agreement implements measures that would restore fluvial geomorphic processes in the project area by a number of measures: (1) continue salmonid spawning gravel augmentation below Soda Springs dam; (2) augment spawning gravels in the Soda Springs bypassed reach (to create about 1,500 square feet of spawning habitat) and at additional sites in the mainstem North Umpqua River and its tributaries below Soda Springs dam; (3) promote passage of LWD over project dams; (4) promote passage of sediment past the Slide Creek dam; (5) place boulders in the Slide Creek bypassed reach to create up to 6,000 square feet of spawning habitat by trapping bedload from Fish Creek; and (6) reconnect the Clearwater River to the mainstem North Umpqua River.

Under the Settlement Agreement (amended section 7.1), PacifiCorp would continue its ongoing gravel augmentation program below Soda Springs dam, passing up to 400 cubic yards of gravel past the dam annually until December 31, 2004, a date corresponding with the completion date of habitat restoration/creation measures under amended section 8.3 of the Settlement Agreement. After completion of the measures required by amended section 8.3, a more comprehensive gravel augmentation program, as

outlined in amended section 7.2 of the Settlement Agreement, would be initiated to enhance habitat below Soda Springs dam (PacifiCorp 2003).

Amended section 7.2 of the Settlement Agreement has been revised in its entirety to include the preparation of an implementation plan (section 7.2.1) and a monitoring plan (section 7.2.2) for providing gravel augmentation below Soda Springs dam. These plans would be prepared in consultation with the FS, ODFW, NMFS, and FWS. PacifiCorp would fund the actions outlined in section 7.2 of the Settlement Agreement in an amount not to exceed \$227,500 in 2002 dollars (section 7.2.3).

To address passage of LWD, Settlement Agreement section 7.3 states that PacifiCorp would continue its practice of providing for passage of woody debris that enter Soda Springs and Slide Creek reservoirs past those developments' diversions by using existing facilities. PacifiCorp would also develop in consultation with the FS, ODEQ, NMFS, FWS, and ODFW an operations plan for passing LWD past Soda Springs and Slide Creek dams without modification of existing facilities. The plan would address the timing, size, and quantity of LWD to be passed.

To move sediment past Slide Creek dam, the Settlement Agreement includes a provision for passing sediment at Slide Creek dam through existing gates during periods of high flows. PacifiCorp would be required to coordinate any sediment releases with restoration programs occurring downstream from Slide Creek dam to minimize any adverse effects to those efforts.

In addition to the measures discussed above, the Settlement Agreement includes reconnections and modifications of various waterways within the basin to restore flows and geomorphic processes that would facilitate passage of sediment and LWD. Included among these measures, the Settlement Agreement would require reconnecting of the Clearwater River to the Toketee bypassed reach and the modification of the Clearwater No. 1 dam (section 3.4.2.7); reconnecting sediment and flow from the Clearwater River to the North Umpqua River; breaching diversions at Helen, Spotted Owl, Karen, Thorn, Mill, White Mule, Potter, and Deer creeks;⁵⁰ replacing culverts to accommodate 100-year flow events, and reconnecting aquatic sites throughout the North Umpqua Project area. The § 401 Water Quality Certificate requires PacifiCorp to implement fluvial geomorphic restoration measures in accordance with Settlement Agreement section 7.

⁵⁰ These creeks have recently been reconnected to the North Umpqua River, and the diversion structures would be removed under terms of the Settlement Agreement.

The parties to the Settlement Agreement expect that these measures would allow sediment and wood to be transported and redistributed from tributaries in the upper North Umpqua River watershed; much of that material would be transported down past the Slide Creek and Soda Springs dams into and below the Wild and Scenic River reach. The sediment passage and gravel augmentation activities would provide additional spawning habitat for anadromous and resident fish, as well as habitat for aquatic macroinvertebrates. This additional habitat is particularly needed in the area of the North Umpqua River between Soda Springs dam and Boulder Creek, and to a lesser extent in the reach between Boulder Creek and Steamboat Creek, where delivery of bedload sediments has been reduced by the project. Downstream passage and redistribution of LWD, the timing of which would be optimized by an operations plan, would also provide aquatic invertebrate habitat, as well as rearing habitat for juvenile salmonids.

NGO Alternative

The Conservation Groups recommend that the most effective means of restoring fluvial geomorphology in the North Umpqua River, including transport of bedload and other sediments and redistribution of LWD, is to remove Soda Springs dam. In the absence of dam removal, they suggest that the measures contained in the Settlement Agreement for restoring sediment require a comprehensive monitoring program with adaptive management in order to judge (and enhance) their effectiveness. The Conservation Groups also ask that PacifiCorp develop a LWD management plan that would restore the natural large wood regime to the extent possible. As with the sediment transport activities, the plan should include a monitoring program to determine the effectiveness of the LWD transport program.

Staff Alternative

The Staff Alternative includes all of the elements in the Settlement Agreement associated with restoration of fluvial geomorphologic processes, and therefore, the benefits would be the same as under the Settlement Agreement. We agree with the Conservation Groups that all monitoring plans that are developed to evaluate the effects of restoration of fluvial geomorphology (e.g., gravel augmentation below Soda Springs dam and sediment passage at Slide Creek dam) should include specific ecological objectives and detailed performance criteria. We expect that the monitoring plans, to be developed by the parties to the Settlement Agreement and submitted to the Commission for approval, would satisfy its need to ascertain ecological benefits.

3.4.2.5 Mainstem North Umpqua Anadromous Fish Spawning Habitat Enhancement

The North Umpqua Project affects channel conditions and anadromous fish habitat in the mainstem North Umpqua River. Soda Springs dam restricts the transport of bedload sediments to downstream reaches, which reduces the amount of potential spawning gravel (PacifiCorp 2001g). In addition, the Soda Springs Reservoir inundates a reach of the river that is believed to have contained relatively rare mainstem habitat with potentially suitable spawning, rearing, and holding habitat for anadromous salmonids. The reduction in flows below Soda Springs dam, and the rapid changes in flow in the full-flow reach between Slide Creek powerhouse and Soda Springs Reservoir (see section 3.4.2.2) can also reduce mainstem spawning habitat.

The Settlement Agreement outlines two major efforts to enhance anadromous fish spawning habitat in the mainstem North Umpqua River: (1) placement of boulders in the river from Slide Creek powerhouse upstream to the confluence of Fish Creek (section 8.2 of the Settlement Agreement), and (2) restoration or creation of salmonid spawning habitat in the Soda Springs bypassed reach and the mainstem North Umpqua River and its tributaries below Soda Springs dam (amended section 8.3 of the Settlement Agreement). These measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS, and Section 4(e) conditions from the FS. The § 401 Water Quality Certificate requires PacifiCorp to improve anadromous fish spawning habitat in accordance with Settlement Agreement section 8.1.

The Conservation Groups recommend removal of Soda Springs dam to restore mainstem habitat presently inundated by the reservoir. They consider the monitoring plans associated with the boulder placement and gravel augmentation efforts in the Settlement Agreement to be inadequate.

No-Action Alternative

Soda Springs dam and reservoir would continue to inundate 1.2 miles of the North Umpqua River channel, containing an estimated 14 acres of stream habitat. Some of this habitat would likely be suitable for spawning by salmonids, especially chinook salmon and steelhead trout. In addition to spawning habitat, Soda Springs Reservoir would also continue to inundate potential summer and winter rearing and adult holding habitat for steelhead and spring chinook salmon. Movements of bedload sediments, which provide spawning habitat throughout the mainstem North Umpqua River, would continue to be restricted by project reservoirs.

Settlement Agreement

In order to address the loss of spawning, juvenile rearing, and adult holding habitats in the North Umpqua River due to inundation by Soda Springs Reservoir, the Settlement Agreement calls for enhancement of spawning sites in the lower Slide Creek bypassed reach, the Soda Springs bypassed reach, and other sites near the project, particularly for chinook salmon and steelhead. The parties to the Settlement Agreement believe that this enhancement of relatively rare spawning habitat in the mainstem could increase the size of the anadromous fish stocks in the watershed.

Section 8 of the Settlement Agreement outlines the measures to be undertaken to restore, create, or enhance mainstem spawning habitat in the project area. Specifically, PacifiCorp would develop and implement a plan in consultation with FS, ODFW, FWS, and NMFS to enhance spawning habitat in the North Umpqua River from the Slide Creek powerhouse upstream to the confluence of Fish Creek by placing new boulders or repositioning existing boulders to trap bedload mobilized by Fish Creek. The parties to the Settlement Agreement estimate that about 6,000 square feet of habitat may be created by this enhancement measure. Because spawning habitat in the mainstem North Umpqua River is uncommon, this additional habitat may increase the production of chinook salmon and steelhead in the basin. Coho salmon are less likely to spawn and rear in this mainstem reach following completion of fish passage at Soda Springs dam (see section 3.4.2.3), but those that do could benefit from this enhancement measure. The Settlement Agreement includes provisions for conducting a baseline habitat survey prior to boulder placement, initial test placements of boulders, and a plan for monitoring the effectiveness of the boulder placement.

For the Soda Springs bypassed reach, the Settlement Agreement (section 8.1) requires PacifiCorp to maximize spawning habitat for anadromous fish, with a priority on chinook salmon spawning. After the Settlement Agreement was signed, field work and analysis indicated that due to natural constraints, such as the steep slope and high water velocities, only 1,500 square feet of spawning habitat could be created or restored in this reach, which was substantially less than the 5,000 to 15,000 square feet that was intended initially (PacifiCorp 2003). The Settlement Agreement was amended and the original section 8.3 was replaced in its entirety with a focus that is broader than simply the Soda Springs bypassed reach. Funding of the habitat restoration measures associated with amended section 8.3 would be the obligation of PacifiCorp and would not exceed \$410,000 in 2002 dollars.

A feasibility assessment, implementation plan, and monitoring plan for restoring or creating salmonid spawning habitat in the mainstem North Umpqua River and its

tributaries below Soda Springs dam would be prepared under amended section 8.3 of the Settlement Agreement. In combination with other proposed enhancements, this additional spawning habitat would likely increase the production of chinook salmon and steelhead in the basin. PacifiCorp would conduct a baseline survey of current spawning habitat at the selected habitat restoration or creation sites under existing flow and channel conditions in order to evaluate the success of the restoration measure and would complete the implementation of the measures. Habitat restoration or creation measures would be completed by December 31, 2004.

NGO Alternative

The Conservation Groups recommend that Soda Springs dam be removed in order to restore mainstem habitat for anadromous fish. Soda Springs dam and reservoir inundate one of the four alluvial features that occur within the North Umpqua Project area. The Conservation Groups estimate that spawning habitat created by removal of the dam and conversion of the reach now inundated by the reservoir could increase smolt production by 1.6 percent for steelhead, 2.4 percent for chinook salmon, and 2.2 percent for coho salmon. In addition, mainstem spawning areas upstream from the reservoir would now become available because of removal of the barrier to upstream migration posed by the Soda Springs dam.

The Conservation Groups argue that the gravel augmentation and boulder placement measures described in section 8 of the Settlement Agreement are deficient. They believe that the monitoring programs for both the Slide Creek Bypass Reach Habitat Enhancement Project and the Soda Springs Bypass Reach Alluvial Restoration Project are inadequate. They recommend that these monitoring programs include not only an evaluation of the quantity and quality of spawning habitat that is created, but also actual use and benefits of the spawning habitat (i.e., ecological goals). According to the FS, the monitoring associated with the Slide Creek bypassed reach project focused on physical habitat characteristics because the intent of the project is to collect gravels and provide spawning substrates before the re-introduction of anadromous fish; use of the habitat by spawning fish could be assessed following the re-introduction. Likewise, if spawner escapement is sufficient and fish use the additional habitat provided by the alluvial restoration project, spawner surveys could be conducted below Soda Springs dam. The American Whitewater Affiliation recommends that plans for boulder placement in the Slide Creek bypassed reach be developed in consultation with the whitewater community in order to avoid impacts to whitewater recreation (see additional discussion in section 3.8.2.3).

Staff Alternative

The Staff Alternative includes all of the elements in the Settlement Agreement associated with enhancement of anadromous fish spawning habitats in the mainstem North Umpqua River and its tributaries, and therefore, the benefits would be the same as under the Settlement Agreement. We agree with the Conservation Groups that all monitoring plans that are developed to evaluate the effectiveness of these measures should include, as appropriate ecological objectives, procedures, and criteria. These plans should be submitted to the Commission for approval.

3.4.2.6 Reservoir and Forebay Management and Mitigation

The North Umpqua Project includes three limited storage reservoirs (Lemolo Reservoir, Toketee Lake and Soda Springs Reservoir), an impoundment at Stump Lake, and four forebays (Lemolo No. 2, Clearwater Nos. 1 and 2, and Fish Creek). The reservoirs and forebays contain populations of resident fish that support recreational fisheries (mainly for native rainbow trout, as well as non-native strains of rainbow, brook, and brown trout). The size of the trout populations in these water bodies depends on habitat characteristics, water quality, loss due to entrainment into diversion and penstock intakes, and daily and seasonal water level fluctuations.

The parties to the Settlement Agreement have developed a number of measures to manage fish populations in the North Umpqua Project reservoirs, lakes, and forebays, including: stocking rainbow trout and developing a native rainbow trout broodstock; fish passage improvements; cooperative management of Lemolo Reservoir to balance the interests of power generation, fisheries, and recreation; enhancements of nearby stream habitats; modifications to the penstock intake at Toketee Lake and other habitat restoration measures. These measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS, and Section 4(e) conditions from the FS.

The Conservation Groups reiterated the need for a Soda Springs Reservoir management program that both maximizes the potential for successful fish passage and maximizes potential anadromous fish habitat in the vicinity of the reservoir. They argue that some of the provisions of the Settlement Agreement that relate to management of Lemolo Reservoir are unclear and require a monitoring and evaluation program.

No-Action Alternative

Under the No-Action Alternative, the reservoirs, lakes, and forebays would continue to experience wide fluctuations in water levels—thus few or no stillwater habitats would be available that are isolated from predation by brown and brook trout. Recreational fishing for native, resident rainbow trout in project reservoirs and forebays would be limited by present stocking rates. Deep drawdowns of Lemolo Reservoir would continue to impact resident fish populations and boater access.

Settlement Agreement

The ODFW uses the following guidelines for management of resident trout in the North Umpqua Project reservoirs and forebays: (1) give the highest priority to native rainbow trout; (2) reduce the abundance and distribution of brook trout and non-native rainbow trout strains; (3) reduce impacts from non-native fish on native species; and (4) provide “basic yield” fisheries (e.g., 0.5 trout/angler-hour) in all the reservoirs. Details of these management guidelines are contained in the ODFW Trout Plan (1987).

The parties to the Settlement Agreement realize that there are limited opportunities to enhance reservoir fisheries without significantly impacting project operations and economics. For example, water level fluctuations are a consequence of the daily peaking mode of operation of the North Umpqua Project. Eliminating or substantially reducing these fluctuations would reduce the amount and value of the electrical power. Instead of focusing only on reducing impacts within project reservoirs, a series of measures was developed to benefit fish and wildlife over the upper North Umpqua Basin as a whole. These measures include: stocking rainbow trout and developing a native rainbow trout broodstock; predator control (e.g., brown trout) in Soda Springs Reservoir; fish passage improvements; cooperative management of Lemolo Reservoir to balance the interests of power generation, fisheries, and recreation; enhancements of nearby stream habitats; modifications to the penstock intake at Toketee Lake; and other habitat restoration.

Under the Settlement Agreement, PacifiCorp would contribute \$15,000 annually to support the annual production of about 15,000 hatchery-reared catchable rainbow trout for ODFW to stock into project reservoirs and forebays.⁵¹ PacifiCorp would also make a one-time donation of \$10,000 to ODFW to fund the development of a rainbow trout brood stock to supply hatchery fish. The Settlement Agreement would include further

⁵¹ If the costs of rainbow trout production escalate significantly more than inflation, ODFW and PacifiCorp would consider adjustment of the funding level.

measures to enhance rainbow trout production in the upper North Umpqua watershed that are specified in the ODFW MOU, including a brook trout eradication program.

The management of water levels at Lemolo Reservoir is specified in detail under section 9.3 of the Settlement Agreement. Commencing with the effective date of the Settlement Agreement and continuing until the issuance date of any new license, Lemolo Reservoir would be maintained at an elevation at or near full pool (4,148.5 feet amsl) between Memorial Day and Labor Day with a maximum allowable drawdown of 3.5 feet, except during emergency situations. During a regional energy Alert 2 applicable to the state of Oregon, PacifiCorp after consultation with ODFW, ODEQ, and FS may draw down Lemolo Reservoir to elevation 4,142 feet amsl.⁵² As an additional interim measure, PacifiCorp in consultation with ODEQ, ODFW, and other interested parties would determine appropriate augmentation of base flows below Soda Springs powerhouse (as measured at Copeland Gage) for spawning chinook salmon.

For the term of any new license issued, under the Settlement Agreement, PacifiCorp would make reasonable efforts to limit the total annual drawdown of Lemolo Reservoir to 25 feet below an elevation of 4,148.5 feet amsl (i.e., to 4,123.5 feet amsl) after Labor Day and before the next Memorial Day. PacifiCorp would have the flexibility to establish the timing and quantity of water released during the first 10 feet of drawdown, subject to daily fluctuation limits described below. Drawdowns between 10 and 25 feet would be governed by a management plan developed by ODFW and FS in consultation with other entities. Factors that may limit PacifiCorp's ability to draw down the reservoir include Wild and Scenic River values including flows for anadromous fish, consistency with existing fish management plans, recreation at Lemolo Reservoir, ACS objectives, and water quality standards. The ODFW and FS would jointly manage drawdowns between 10 and 25 feet provided that Lemolo Reservoir is drawn down at least 25 feet by December 31 each year (elevation 4,123.5 feet amsl). Drawdowns greater than 25 feet may be permitted following consultation with ODFW and FS. On a daily basis, commencing by the first anniversary of any new license PacifiCorp would limit water level fluctuations to not more than 0.5 feet as measured at the staff gage on the outlet structure of Lemolo dam.

An additional provision of section 9 of the Settlement Agreement would require salvage of fish during maintenance shutdowns. PacifiCorp would be required to notify resource agencies at least 2 weeks prior to any contemplated maintenance shutdown.

⁵² The "Alert 2" is defined in the North American Reliability Council's *Compliance and Enforcement Program, Operating Policy and Standards Status, Appendix 9B-Energy Emergency Alerts*.

PacifiCorp would salvage live fish from project waterways and forebays during any maintenance shutdown. Relocation areas would be determined in consultation with ODFW.

The § 401 Water Quality Certificate requires PacifiCorp to manage the drawdown and reservoir operating levels in accordance with Settlement Agreement sections 9.3 and 9.4. These mitigation measures are consistent with the ODFW trout management guidelines; they should serve to enhance both resident rainbow trout populations and recreational fishing opportunities. Restriction of daily fluctuations of Lemolo Reservoir would minimize impacts on resident trout in that waterbody. Cooperative management of the seasonal drawdown of Lemolo Reservoir is specifically designed to minimize impacts on resident trout and recreation in the reservoir, and to provide a suitable flow regime for anadromous fish in the Wild and Scenic River reach below Soda Springs powerhouse in the fall. Fish salvage operations during maintenance shutdowns would minimize the risk of injury or mortality to fish.

NGO Alternative

The Conservation Groups reiterated the need for a Soda Springs Reservoir management program that maximizes the potential for both successful fish passage and anadromous fish habitat in the vicinity of the reservoir (these issues are considered in sections 3.4.2.3 and 3.4.2.5, respectively). In addition, they recommend that some of the provisions of the Settlement Agreement that relate to management of Lemolo Reservoir be clarified. For example, they recommend that the Settlement Agreement clearly state the point at which ODFW and FS would attain joint management of drawdowns between 10 and 25 feet in Lemolo Reservoir, and that a date be specified by which ODFW and FS must develop the annual or joint multi-year management plan. The Conservation Groups recommend that the provisions of the Settlement Agreement include a monitoring program to determine the impacts of the proposed Lemolo Reservoir management program on water quality standards in the Wild and Scenic River reach and other downstream resources.

Staff Alternative

The Staff Alternative includes all of the elements in the Settlement Agreement associated with management of North Umpqua Project reservoirs, lakes, and forebays, and therefore, the benefits would be the same as under the Settlement Agreement. Monitoring of flows in the Wild and Scenic River reach would continue, and additional water quality monitoring would be required under the § 401 Water Quality Certificate. If appropriate, other monitoring actions would be incorporated into the joint ODFW/FS Lemolo Reservoir management plan under the terms of the Settlement Agreement.

PacifiCorp's proposal does not include dredging beyond that currently done for maintenance purposes, and dredging is not addressed in the Settlement Agreement. Therefore, the evaluation of the Settlement Agreement in the EIS is based on the assumption that the amount of dredging would not change from existing levels under the proposed license renewal. The impacts on vegetation of increased dredge spoil disposal are, however, discussed in section 3.5.2.1 as part of the assessment of dam removal under the NGO Alternative. Any proposal to increase the amount of dredging would require ODEQ approval in accordance with Condition 4.h of the § 401 Water Quality Certificate. Also, under FS Section 4(e), Condition No. 18, reservoir and forebay dredging on NFS lands is restricted to actions that are consistent with the Umpqua National Forest Land and Resource Management Plan, as amended, within and below the project. Accordingly, any dredging proposals would be subject to review and authorization by the FS as described in Condition 6 of the 4(e) conditions, and subject to coordination with and approval by the Oregon Division of State Lands and ODFW.

3.4.2.7 Aquatic Connectivity

Connections among aquatic habitats are important features for maintaining healthy populations of aquatic organisms in the project area. Without connectivity, the resulting habitat fragmentation (i.e., reduction and isolation of habitat areas) reduces the available habitat for species and isolates subpopulations from one another, increasing the risk of local extirpation (Stillwater Sciences, Inc. 1998a). Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These linkages must provide chemically, thermally, and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species (ACS of the Forest Plan).

Eight tributary streams were until recently fully or partially diverted by small dam and diversion structures, including Helen, Potter, Spotted Owl, Karen, Deer, Thorne, and Mill creeks into the Lemolo No. 2 waterway and White Mule Creek into the Lemolo No. 1 waterway (Stillwater Sciences, Inc. 1998a). Only Deer Creek has minimum instream flow requirements. Consequently, the channels downstream from the other diversions were completely dewatered for much of the year. The lengths of the diverted stream reaches with reduced or no flows range from 0.06 to 2.7 miles, and total 5.1 miles. Passage of rainbow and brown trout in Deer, Mill, and Potter creeks is adversely affected by the reduced flows. As noted previously these streams have recently been reconnected to the North Umpqua River. Under the terms of the Settlement Agreement, the diversion structures on these streams would be removed, fully restoring habitat connectivity and passage of fish and wildlife.

Of the 3,028 miles of road within the North Umpqua River watershed, about 200 miles are used for the North Umpqua Project (Stillwater Sciences, Inc. 1998a). There are a large number of culverts and other road/stream crossings that, if inadequately sized or positioned, may affect habitat connectivity for fish and other aquatic and amphibious organisms. Undersized and shotgun culverts prevent species dependent upon stream bottom, stream riparian margin, or aquatic habitat from moving up and down the stream corridor. The movement of sediment and woody debris important for habitat maintenance is also impaired. The FS completed a survey of road stream crossing culverts for streams with potential or existing fish habitat on roads used by the project. Seven of these culverts were found to be barriers for fish passage and would be upgraded to provide fish passage as part of the Settlement Agreement. Additionally, the estimated 300 other stream crossing culverts and 600 ditch relief culverts on project access roads would be surveyed and evaluated as part of the Settlement Agreement to determine their ability to pass a 100-year flood flow.

Numerous perennial and intermittent stream channels are intercepted into project flumes and canals, eliminating habitat and species connectivity and preventing hydrologic functions and physical processes associated with functioning riparian and aquatic ecosystems at those locations. Schedule 10.6 of the Settlement Agreement lists the Priority 1 and 2 aquatic sites that are intercepted or would be reevaluated. This existing condition prevents movement of many riparian, aquatic, and terrestrial species up and down the immediate drainage channel. Physical processes, such as the movement of sediment and woody debris, are interrupted as well.

The parties to the Settlement Agreement have developed numerous measures to restore aquatic connectivity. In addition to increasing instream flow releases throughout the project (section 3.4.2.1) and providing upstream and downstream fish passage (section 3.4.2.3), Settlement Agreement section 10 outlines six measures aimed specifically at improving aquatic connectivity: construct a structure to permit the movements of aquatic amphibians and macroinvertebrates across the dam at Stump Lake; reconnect the Clearwater River to the North Umpqua River through the original channel; breach or modify diversions on eight tributary streams; restore riparian habitats along White Mule Creek and Potter Creek; reconnect Priority 1 and Priority 2 intercepted tributaries and drainages; and replace or remove culverts as needed at Priority 1 and Priority 2 aquatic sites. These measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS, and Section 4(e) conditions from the FS and BLM.

The Conservation Groups recommend similar measures to restore aquatic connectivity in the NGO alternative. In addition, they recommend that the Deer Creek diversion be removed (rather than modified, as in the Settlement Agreement) and

additional tributary streams be reconnected to the Clearwater River (Bear and Mowich Creeks) and to the North Umpqua River (Clearwater River and Warm Springs Creek).

No-Action Alternative

Under the No-Action Alternative, aquatic habitat would continue to be fragmented and isolated by North Umpqua Project structures and operations. The dam at Stump Lake would be a barrier to movements of amphibians and aquatic macroinvertebrates. The original confluence of the Clearwater and North Umpqua rivers would continue to be dewatered, preventing upstream movements of aquatic organisms and downstream transport of sediments and LWD. Movements of aquatic biota and sediment transport would continue to be restricted in numerous tributary streams with diversion dams, insufficient instream flow releases, and/or inadequately sized culverts.

Settlement Agreement

The Settlement Agreement includes numerous measures to restore aquatic and riparian connectivity in the North Umpqua River Basin, including the provision of increased instream flow releases (section 3.4.2.1) and fish passage facilities (section 3.4.2.3). In addition, the Settlement Agreement includes provisions along the Lemolo waterways, for the removal of diversion dams on seven tributary streams and modification of another (Deer Creek; Settlement Agreement section 10.4), restoration of riparian vegetation along two tributary streams (section 10.5), reconnection of up to 67 small tributary streams (excluding the eight streams with dams that would be removed or modified) intercepted or blocked by project waterways (section 10.6), enhancement of connectivity between Stump Lake and the Clearwater No. 1 bypassed reach at the Clearwater No. 1 dam, and reconnection of the Clearwater River to the North Umpqua River at Toketee dam. The § 401 Water Quality Certificate requires PacifiCorp to implement aquatic connectivity measures in accordance with Settlement Agreement sections 10.1, 10.2, 10.3, 10.4, 10.6, and 15.6.

Specifically, PacifiCorp in consultation with the ODFW and FS would be required to design and construct a structure that permits the movement of aquatic amphibians and macroinvertebrates (but not fish) across the dam at Stump Lake during the second year of any new license. Commencing upon the issuance date of a new license, PacifiCorp would design and construct a structure to reconnect the Clearwater River and the North Umpqua River and permit movements of fish, amphibians, and macroinvertebrates. The reconnection would allow a portion of the Clearwater No. 2 bypassed reach flows to travel down the original Clearwater River channel to the confluence of the North Umpqua River downstream of Toketee dam. When flows are spilling at Toketee dam, all flows would be directed down the reconnected channel. At other times, the flow needed in the

Toketee bypassed reach as specified in Appendix C, tables 1 and 2 to the Settlement Agreement would be provided to the reconnected channel and all additional flows up to the limit of the applicable water right would be passed into Toketee Lake.

Passage of resident fish into the tributaries that flow into the North Umpqua River above the Lemolo No. 2 powerhouse would be restored under section 10.4 of the Settlement Agreement. PacifiCorp has restored full stream flows to Helen, Spotted Owl, Karen, Thorn, and Mill Creeks on the Lemolo No. 2 waterway and to White Mule Creek on the Lemolo No. 1 waterway. During the first year of a new license, PacifiCorp would remove the diversion structures on these streams to restore fish movement and riparian processes. By the first anniversary of a new license, PacifiCorp would also remove the diversion structure on Potter Creek, modify the Deer Creek diversion, and return full flows to both streams.

The Settlement Agreement includes a provision for restoring riparian habitats along White Mule Creek and Potter Creek by the second anniversary of a new license or 2006, whichever is earlier. Restoration measures would include native species plantings and would be coordinated with erosion-control activities provided for under section 14 of the Settlement Agreement (section 3.3.2.2). Under the Settlement Agreement, PacifiCorp would also reconnect Priority 1 and Priority 2 intercepted tributaries and drainages and replace culverts associated with these aquatic sites (schedule 10.6 of the Settlement Agreement).

Reconnection of the Clearwater River to the North Umpqua River would provide upstream and downstream movement of aquatic and riparian-dependent organisms, and, along with increased instream flows, would improve sediment and large wood regimes. These beneficial effects are expected to meet the management goal established in the Watershed Analysis to maintain habitat in conditions sufficient to maintain ecological processes and interconnected and well-established populations of native species (FS 2001d).

As needed, PacifiCorp would upgrade existing culverts, construct new passageways underneath on-grade flumes, and add new canal covers to prevent the flows of small, intermittent or perennial tributaries from being intercepted into project waterways. These actions would have beneficial effects on the movements of sediments, LWD, amphibians, and aquatic invertebrates in all tributaries, and would improve the passage of resident trout in the larger tributaries.

NGO Alternative

In addition to increased minimum flows and the removal of Soda Springs dam discussed in sections 3.4.2.1 and 3.4.2.3, respectively, the Conservation Groups recommend the following measures to enhance aquatic connectivity:

1. reconnect the following areas such that upstream and downstream movements of aquatic organisms, flow, sediment, and large wood are fully restored: a) Bear Creek to the Clearwater River; b) Clearwater River to the North Umpqua River below Toketee dam; and c) Warm Springs Creek and the Riparian Reserve corridor with the North Umpqua River;
2. modify the powerhouse and canal at Clearwater No. 2 to functionally reconnect Mowich Creek and the Riparian Reserve corridor to the Clearwater River;
3. remove diversions on Helen, Spotted Owl, Karen, Thorn, Mill, White Mule, Potter, and Deer Creeks; and
4. restore aquatic connectivity in small tributaries and headwater streams within the project area.

Many of the recommended measures are similar to those in the Settlement Agreement, including removing diversions and restoring connectivity within tributaries to the Lemolo Nos. 1 and 2 bypassed reaches and reconnecting the Clearwater River to the North Umpqua River below Toketee dam. All these measures would serve to improve aquatic connectivity.

The Conservation Groups recommend that the Deer Creek diversion be removed, as opposed to the Settlement Agreement recommendation to modify the diversion to enhance fish passage and increase instream flow releases in Deer Creek. Removing the diversion would ensure passage and unaltered streamflows for resident trout. Also, the NGO Alternative includes reconnecting Bear Creek to the Clearwater River, Warm Springs Creek and Riparian Reserve corridor with the North Umpqua River, and modifying the powerhouse and canal at Clearwater No. 2 to functionally reconnect Mowich Creek and the Riparian Reserve corridor to the Clearwater River, in order to fully restore upstream and downstream movements of aquatic organisms, flow, sediment, and large wood. No information was provided by the Conservation Groups to support the need for these additional project modifications. Neither Warm Springs Creek nor Mowich Creek is diverted or intercepted by the project; the FS considers these streams to already have a sufficient level of aquatic and riparian connectivity to meet its management direction (FS 2001d).

In addition, the Conservation Groups recommend that PacifiCorp conduct a study to determine what modifications of the Fish Creek dam are necessary to ensure that

coarse sediment is delivered down Fish Creek, as opposed to being trapped behind the current structure. They recommend that such modifications be implemented within 2 years of issuance of the new license. Although the Fish Creek dam traps some sediment, large volumes of sediment are still delivered to the North Umpqua River from the Fish Creek Basin. This is evidenced by the greater amount of deposited gravel in the Slide Creek bypassed reach downstream of the Fish Creek confluence (compared to upstream of the confluence). In order to trap bedload sediments presently mobilized from Fish Creek, Settlement Agreement section 8.2 includes a provision for boulder placement in the lower Slide Creek bypassed reach. Increased instream flow releases, seasonally high stream flows, and the design and maintenance of the Fish Creek dam should ensure that sufficient coarse sediments are delivered downstream (FS 2001a).

Staff Alternative

The Staff Alternative includes all of the elements in section 10 of the Settlement Agreement related to restoration of aquatic connectivity, and therefore, the benefits would be the same as under the Settlement Agreement.

3.5 TERRESTRIAL RESOURCES

3.5.1 Affected Environment

3.5.1.1 Vegetation

The North Umpqua River Basin encompasses four major vegetation zones: mixed conifer, western hemlock forest, subalpine forest, and interior valley (Franklin and Dyrness 1973). The topography, geographical location, and elevational range of the project area, along with disturbances such as fire, timber management, and grazing, have resulted in diverse plant communities representing a variety of successional stages. Conifer forests of different ages are the dominant vegetation type, occupying more than 75 percent of the over 18,000-acre North Umpqua Project vicinity. Douglas-fir (*Pseudotsuga menziesii*) is the most common tree species, except at elevations above 4,000 feet amsl where forests of mixed fir (*Abies* spp.), hemlock (*Tsuga heterophylla* or *T. mertensiana*), and lodgepole pine (*Pinus contorta*) are prevalent. Broadleaf forest types are generally restricted to riparian and previously disturbed areas, particularly in the upper portion of the basin between Rock Creek (RM 35.7) and Lemolo Reservoir. Oak (*Quercus* spp.) and madrone (*Arbutus menziesii*) stands occur on undisturbed upland sites and are relatively common throughout the lower portion of the project downstream of Rock Creek. In the lower basin near Dixonville agriculture and pasture lands dominate the landscape. The Oregon Natural Heritage Program (ONHP) has designated the entire

North Umpqua River canyon from Lemolo Reservoir to the town of Glide as a sensitive plant area (PacifiCorp 1995a).

Because of timber harvest and natural disturbances, over half of the forest stands in the upper watershed are in early and mid-seral successional stages with Douglas fir most often the dominant species (Stillwater Sciences, Inc. 1998a). Douglas fir forests from about 30 to 60 years old (i.e., mid-successional stage) dominate the area within 200 feet of most waterways and forebays. In the Umpqua National Forest as a whole, over 50 percent of the area (about 535,000 acres) was classified as old-growth forest in 1990 (FS 1990).

In addition to plant species listed as threatened, endangered, or candidates by FWS or the state (see section 3.6), a variety of other rare plant species are known or suspected to occur in the project area (see Appendixes B and C). These plants include FWS species of concern⁵³, FS sensitive species,⁵⁴ BLM sensitive and assessment

⁵³ Species of concern are those plants and animals whose conservation status is of concern, but for which the FWS needs further information to determine if they should be proposed for federal listing (FWS 2001a).

⁵⁴ FS sensitive species are those species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current and predicted downward trends in population numbers, density, and/or habitat capability that would reduce a species' existing distribution (FS 1995). Sensitive species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that could result in the need for federal listing. It is FS policy to prepare a biological evaluation as part of its NEPA process to determine the potential effect of its programs and activities on sensitive species.

species,⁵⁵ and species with special management considerations as defined by the Forest Plan (i.e., survey and management species⁵⁶).

The FWS lists 10 plants as species of concern that may occur within the existing North Umpqua Project area. Six of these species [Koehler's rockcress, Umpqua mariposa lily (see section 3.6), Mount Mazama collomia, clustered lady's slipper, meadow-foam, and red-root yampah] are known to occur in or near the project vicinity (PacifiCorp 1995a) (see Appendix B).

A total of 32 plant species on the Regional Forester's Sensitive Plant Species list are known (16 species) or suspected (16 species) to occur on the Umpqua National Forest (FS 1999a). Eleven of these species are known, historically or currently, to occur in or near the project vicinity (PacifiCorp 1995a) (see Appendix B). FS sensitive plant species that PacifiCorp identified within the primary study area⁵⁷ [including under transmission line right-of-way (ROWs) (see figure 3-23)] include Umpqua mariposa lily (see section 3.6), red-root yampah (also a FWS species of concern), California sword-fern, Thompson's mistmaiden, and Columbia water-meal. In addition, the FS states that

⁵⁵ BLM sensitive species are species that could easily become endangered or extinct in a state (BLM 2000). They include those species that are eligible for federal or state listing or candidate status and that have been designated as sensitive by the State BLM Director. Sensitive species include animals listed by the state of Oregon as Critical, plants listed by the state of Oregon as Candidates, and plants or animals on List 1 of the Oregon National Heritage Data Base (ONHP 2001). BLM assessment species are plant and vertebrate animal species (but not invertebrates or fungi) not eligible for official federal or state status but which are of concern in Oregon and may, at a minimum, need protection or mitigation in BLM activities (BLM 2000). They include species on List 2 of the Oregon Natural Heritage Data Base (ONHP 2001).

⁵⁶ Survey and manage species are late-successional and old-growth forest-related species within the range of the northern spotted owl whose viability would be uncertain without additional consideration.

⁵⁷ The primary study area defined in PacifiCorp 1995a is that area potentially affected by the project (see figure 3-23).

Umpqua *kalmiopsis* has been documented in the project area (FS 2001d). Other sensitive species that the FS indicates have a good potential for occurring in the project area include shasta arnica, grass-fern, Victorin's grape-fern, Crawford's sedge, sawtooth sedge, tall bugbane, broad-bracted globe mallow, and adder's tongue.

The Forest Plan Records of Decision (RODs) (FS/BLM 1994b, 2001b) identify survey and manage plant species, including a number of bryophytes (i.e., mosses and liverworts), lichens, fungi, and vascular plants associated with late-successional habitat whose viability would be uncertain without additional consideration. Two wetland and riparian bryophytes (*Schistostega pennata* and *Tritomaria exsectiformis*) that are survey and manage species are known to occur in the project area or its immediate vicinity (FS 2001d).

One survey and manage plant species, the clustered lady's-slipper, *Cypripedium fasciculatum*, was observed by PacifiCorp in the secondary study area [i.e., the area beyond the land directly affected by current project operations (see figure 3.23)]. It was found near the transmission line ROW southeast of Steamboat within 100 feet of the primary study area. The species is listed as a category C Survey and Manage species—that is, it is uncommon and pre-disturbance surveys for it are practical (FS/BLM 2001b). The management direction⁵⁸ for category C species is to manage high-priority sites, conduct surveys prior to habitat-disturbing activities, and undertake strategic surveys to gather information to either develop or revise management recommendations (FS/BLM 2001b). Management recommendations for the lady's slipper, limited to the Klamath Province, are found in Seevers and Lang (1998). These recommendations include maintaining or restoring habitat for the species, avoiding activities that would alter such habitat, and managing biological and ecological requirements for each life stage. The species is also listed by FWS as a species of concern, by the FS as a Regional Forester's sensitive species known to exist on the Umpqua National Forest, by BLM as a Bureau sensitive species in Oregon, and by the state as a candidate species. Since the

⁵⁸ Standards and guidelines for management of habitat for survey and manage species were provided in Attachment A to the initial Record of Decision for the Forest Plan (FS/BLM 1994b). In early 2001 the FS and BLM amended some of the mitigation measures related to these species (FS/BLM 2001b). On October 21, 2002, FS and BLM issued a notice of intent to prepare a supplement to the final EIS for the Northwest Forest Plan to evaluate removing the survey and manage mitigation measures standards and guidelines (*Federal Register* 67, 64601). Habitat needs of the affected rare or little-known species would rely on other elements of the Forest Plan and the existing FS sensitive species and BLM special status species programs.

Figures

Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-13, 2-15, 2-16, 2-18, 2-19, 2-21, 3-2, 3-6, 3-129, and 3-143

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species is a FS sensitive species, FS policy requires preparation of a biological evaluation to determine the potential effect of FS programs and activities on it as part of the FS NEPA process.

3.5.1.2 Wildlife

Surveys conducted by PacifiCorp between 1992 and 1994 found that the project area supported at least 199 vertebrate species (i.e., 10 amphibians, 13 reptiles, 147 birds, and 29 mammals) (PacifiCorp 1995a). Mixed conifer forests and open water (e.g., lakes) provide habitat for the greatest number of wildlife species, 105 and 125, respectively. Eighteen wildlife species were observed in the riverine deepwater habitat type. Although wetlands in the project vicinity are generally small, they support a diversity of wildlife: 49 species were observed in the marshy scrub-shrub type and 36 species in emergent wetlands. Eighty-seven species were observed in disturbed habitats.

The Umpqua National Forest has an estimated population of approximately 2,500 to 3,000 elk and 8,000 to 14,000 black-tailed deer (PacifiCorp 1995a). The number of deer occurring in the primary watershed study area (see figure 3-23) is unknown, but an estimated 900 to 1,500 elk potentially occur on winter ranges within or close to that area.

In addition to animals listed as threatened, endangered, or candidates by FWS, NMFS, or the state (see section 3.6), a variety of other rare terrestrial wildlife species are known or suspected to occur in the project area (see Appendixes B and C). These include FWS species of concern, FS sensitive species, and species with special management considerations (i.e., survey and manage species and management indicator species⁵⁹) as defined by the Forest Plan (see definitions above).

Animals listed by the FWS as species of concern (in addition to the fish discussed in section 3.4) include 8 mammals, 4 birds, 6 amphibians, 1 reptile, and 7 invertebrates. Of these, no mammals, 1 bird (northern goshawk), 3 amphibians (tailed frog, northern

⁵⁹ A management indicator species is a species whose welfare is presumed to be an indicator of the welfare of other species using the same habitat (FS 1990). That is, it is a species whose condition can be used to assess the impacts of management actions on a particular area. The requirement to identify management indicator species was detailed in section 19 of the 1982 version of 36 CFR 219, Subpart A, National Forest System Land and Resource Management Planning. However, management indicator species were not included in the 1990 revision of that regulation (*Federal Register* 65, 67513-67581). Because the 1990 LRMP document for the Umpqua National Forest was prepared following the requirements of the 1982 regulation, management indicator species for the Umpqua National Forest were identified in it.

red-legged frog, and Cascades frog), 1 reptile (northwestern pond turtle), and no invertebrates were observed in the primary and/or secondary study area during relicensing surveys (PacifiCorp 1995a).

A total of 4 birds, 5 mammals, 3 amphibians, and 2 reptiles on the Regional Forester's Sensitive Animal Species list that are known or suspected to occur on the Umpqua National Forest are potentially affected by the project (see Appendixes B and C) (FS 2001d). Of these the northern peregrine falcon (see section 3.6), bufflehead, southern torrent salamander, northwestern pond turtle, and common kingsnake have been observed in the study area (PacifiCorp 1995a).

The Forest Plan Records of Decision (FS/BLM 1994b, 2001b) identify survey and manage animal species, including a number of mammals, mollusks, arthropods, birds, and bats associated with late-successional habitat whose viability would be uncertain without additional consideration. Two survey and manage animal species, the great gray owl (listed by the state as sensitive vulnerable) and the black-backed woodpecker (listed by the state as sensitive critical), were observed by PacifiCorp in the primary or secondary study areas of the project (PacifiCorp 1995a) (see Appendix C). In addition, there was an unconfirmed report of a pygmy nuthatch.

A single great gray owl was observed on four occasions about 1.5 miles south of Toketee Lake in the secondary study area (PacifiCorp 1995a). The species is listed as a category C Survey and Manage species (FS/BLM 2001b; see section 3.5.1.1). Management recommendations for the owl are to be developed following the standards and guidelines in FS/BLM (2001b). Until they are approved, management of known sites would follow the former Forest Plan Protection Buffer direction, latest information, and best professional judgement.

Black-backed woodpeckers were observed in lodgepole pine forests in the primary and secondary study areas near Lemolo Reservoir (PacifiCorp 1995a). The black-backed woodpecker would not be sufficiently aided by application of mitigation measures for riparian habitat protection or other elements of the Forest Plan (FS/BLM 2001b). Therefore, additional mitigation for the species needs to be applied to ensure its numbers do not severely decline. This mitigation includes maintaining adequate numbers of large snags and green-tree replacements for future snags within the species range in appropriate forest types.

In addition, the FS states that the project area or vicinity has potential suitable habitat for a number of other wildlife survey and manage species including the red tree vole, white-headed woodpecker, flammulated owl, fringed myotis, silver-haired bat, long-

eared myotis, long-legged myotis, pallid bat, Townsend's big-eared bat, and 6 species of mollusks (FS 2001d).

A number of management indicator species were identified in the Umpqua National Forest plan (FS 1990). Three of them, peregrine falcon, Roosevelt elk, and black-tailed deer, are discussed above. Two others, bald eagle and spotted owl, are discussed in section 3.6.1.1. Other species known or suspected to occur in the project area are the pine marten, pileated woodpecker (see Appendix C), and other cavity nesters (FS 2002).

3.5.1.3 Wetlands and Riparian Habitats

About 98 percent of the stream channels in the North Umpqua system are confined—that is, they flow through narrow valleys with little or no floodplain and nowhere to meander (see section 3.2.1.1). Because of this steep topography along the North Umpqua River, riparian forest is often limited to narrow bands, and in some areas the canyon walls are too steep to support any riparian vegetation. However, a number of wetlands, often small, do occur along the rivers, creeks, and waterbodies in the North Umpqua River Basin. These wetland areas support a diversity of plants (e.g., mosses, lichens, algae), invertebrates (e.g., aquatic insects, crustaceans, mollusks), and vertebrates (e.g., amphibians), many of which depend on the cool, moist conditions found there. Rare plants that depend on wetland and riparian ecosystems include adder's tongue, bladderwort, and sedge species (FS 2001d). Maple (*Acer* spp.) and Douglas fir trees grow on the upper stream banks, where they form a transition zone between aquatic and terrestrial habitats (Stillwater Sciences, Inc. 1998a).

Wetlands in the project area are now most commonly associated with impoundments and areas under waterway flumes (Stillwater Sciences, Inc. 1998a). These wetlands range in size from less than 0.5 acre to about 23 acres. The largest wetlands in the project area are associated with Toketee Lake (almost 23 acres), the inlet of Lemolo Reservoir (22 acres), and the Clearwater No. 1 diversion, also called Stump Lake (18 acres). Slide Creek is the only development with no associated wetlands (PacifiCorp 1995a).

The character of many riparian areas and wetlands in the watershed has been altered by human disturbances (Stillwater Sciences, Inc. 1998a). Wetland and riparian habitats that have persisted or developed as a result of inundation of the former streams and wetlands and the creation of project reservoirs are generally simplified plant and animal communities that have been altered through introduction of exotic species (FS 2001d). They also are often occupied by recreation facilities and subject to water fluctuations. Due to the occurrence of predatory trout, lack of vegetative cover around

project reservoirs, water level fluctuations, and entrainment into project waterways there is little habitat with value to amphibians (e.g. frogs) that typically seek out slower, stillwater habitats for reproduction (Stillwater Sciences, Inc. 1998a). Although six native species of amphibians (northwestern salamander, rough-skinned newt, western toad, Cascades frog, red-legged frog, and Pacific chorus frog) are known to occur in the vicinity of the project, reproduction by amphibians appears to be limited to Stump Lake (northwestern salamander, western toad, Pacific chorus frog, and Cascade frog) and Clearwater No. 2 forebay (Pacific chorus frog). Moreover, it is not known if the young produced in those two areas survive to maturity.

3.5.2 Environmental Impacts and Recommendations

3.5.2.1 Vegetation Impacts and Management

Vegetation management is interrelated with a number of other resource concerns: erosion control; introduction and spread of noxious invasive plant species; and establishment and enhancement of functioning, interconnected wildlife habitats. Project construction and maintenance activities have resulted in extensive areas of bare, compacted ground that are prone to erosion. The relatively sterile soils of these areas inhibit the reestablishment of native vegetation. Other areas contain vegetation primarily dominated by non-native, invasive species that can reproduce and spread to surrounding National Forest lands. Project facilities and maintenance activities along roads, canals and flumes, reservoirs, penstocks, and transmission lines have created broad zones of poor and unsuitable wildlife habitat. In some cases these facilities have fragmented high quality habitat [e.g., LSR, Riparian Reserves, big game winter range].

To address these issues, PacifiCorp and the parties to the Settlement Agreement have agreed to develop a comprehensive VMP. This plan (described in more detail below) would establish procedures to be followed in managing vegetation over the course of any new license. PacifiCorp would develop the VMP, in consultation with the FS and BLM by April 2003 (PacifiCorp 2002e). The VMP would be fully implemented after it is approved by the FS and BLM and any new license becomes final. Pending implementation of the VMP, PacifiCorp would continue its current vegetation management practices.

The Conservation Groups believe the development of a vegetation management plan at a future date is inadequate and recommend that PacifiCorp be required to implement a vegetation management program consistent with the FS's August 2000 preliminary recommendations (described further below). [The FS's 2000 preliminary recommendations have been replaced by the December 2001 FS justification statement

for section 12 of the Settlement Agreement (FS 2001d) that describes the components envisioned to be in the VMP.]

Both ODFW and FWS recommend, pursuant to Section 10(j) of the FPA, that PacifiCorp develop the VMP consistent with the terms of the Settlement Agreement. Development of the VMP is also a requirement of the FS and BLM Section 4(e) conditions.

No-Action Alternative

Under the No-Action Alternative PacifiCorp would continue to operate the project under the terms and conditions of the existing license and would continue current vegetation management practices. As such, project maintenance activities would continue to provide favorable habitat for noxious weeds and would likely contribute to their spread. A number of noxious weeds are known to be established in the project area including yellow star thistle, spotted knapweed, scotch broom, tansy ragwort, St. John's wort, meadow knapweed, yellow toadflax, Canada thistle, and bull thistle. Vehicle traffic is a major vector in weed dispersal, and movement of PacifiCorp equipment between North Umpqua and other locations increases the potential for their introduction and spread. Historical attempts to establish vegetative cover on eroding sites have concentrated on hydroseeding with exotic grasses that would not likely provide long-term coverage and have limited value to wildlife species. Management of vegetation along project transmission lines, canals, flumes, and road ROWs would continue to prevent natural plant succession from occurring. Thus, the habitats would continue to be maintained in early successional stages. No new construction would be likely; therefore, additional disturbance or loss of vegetation would not result.

Settlement Agreement

Parties to the Settlement Agreement established specific vegetation management objectives for lands within the project boundary and other lands directly affected by the project: prevent the establishment and spread of noxious weeds; inventory, monitor, and evaluate weeds as part of a long-term adaptive management program; establish effective ground cover; reduce erosion; and reestablish native plant species.

To achieve these objectives, PacifiCorp proposes to develop a comprehensive VMP that would define procedures that would allow for the continued operation and maintenance of the hydroelectric facilities and transmission and distribution system in a

reliable, safe, and environmentally responsible manner. The procedures, consistent with FS and BLM objectives and plans for noxious weeds and vegetation management on federal lands, would include, but would not be limited to: noxious-weed control strategies and treatments; weed inventory and monitoring; erosion control; vegetation establishment consistent with ground cover, native plant species, wildlife habitat, visual resource, and riparian reserve objectives; weed-free seed certification; a monitoring and evaluation schedule for the length of the new license; and adaptive management provisions. The procedures would also be consistent with hazard tree control practices that ensure the integrity and reliability of the transmission line and hydroelectric facility operation. A schedule for implementing the VMP would be included in the final VMP.

Maintenance of the project transmission lines, canals, flumes and other facilities inherently requires the use of trucks and other vehicles and dictates an earlier successional vegetation stage than might normally develop and be desired under the Northwest Forest Plan. Funds that would be established under section 19 of the Settlement Agreement—specifically the Mitigation Fund—could be used to implement mitigation and enhancement measures on NFS lands and BLM-administered lands within the North Umpqua Basin, over any new license term, in order to restore early seral condition terrestrial habitats elsewhere in the North Umpqua Basin to later successional conditions (FS 2001d).

Ensuring the reliability of project transmission lines requires that right-of-way vegetation be maintained at heights and widths that (1) do not create the potential for flash overs between the transmission line and adjoining vegetation, which could result in fires and loss of electricity, and (2) continue to provide adequate access for routine maintenance. Hazard trees (i.e., those trees that could fall into the transmission line or onto other facilities) must be removed where they threaten the integrity of the project features. However, through appropriate vegetation management and operating procedures, these potential hazards can reasonably be protected against, and the routine maintenance required of the project facilities can be accomplished in a manner that at the same time improves wildlife habitats. The Settlement Agreement establishes the planning mechanism to integrate fire management and power reliability concerns into the VMP (FS 2001d).

Selection and use of native species that both meet height requirements within the right-of-way and are beneficial to and selected by wildlife for forage and cover would improve wildlife habitat, reduce forest fragmentation impacts, help control the occurrence of non-native invasive species, and avoid the introduction and spread of weedy species. Using native species may also in some cases improve the aesthetics of the area (see

section 3.9.2). Finally, native species may be better suited to long-term establishment of effective ground cover and, thus, improve erosion control.

The FS (2001d) expects that the final VMP would incorporate its integrated weed management approach to controlling noxious weeds, which includes prevention of weed establishment, control strategies (e.g., early treatment of new infestations), treatments for managing existing infestations, and inventory and monitoring. According to the FS (FS 2002), under section 12.2 of the Settlement Agreement, PacifiCorp would commence measures prior to license issuance to control and prevent the spread of noxious weeds in conjunction with actions coordinated by the RCC. These actions would emphasize known populations of noxious weeds that need control as soon as possible. The RCC's 2001-2002 Annual Report (PacifiCorp 2002e) indicated that the noxious weed inventory should be in progress by July 2002. In the draft EIS (DEIS) staff assumed that the provision in section 12.2 of the Settlement Agreement was intended to focus PacifiCorp's efforts on ensuring that proposed enhancement measures (e.g., construction of recreation facilities, creation of wetland habitats, construction of wildlife bridges) that would result in land disturbance would follow necessary precautions to prevent the spread of known populations of noxious weeds. The FS clarified (FS 2002) that section 12.2 of the Settlement Agreement was also intended to integrate noxious weed control into ongoing maintenance and monitoring activities that would be coordinated through the RCC each year.

Disturbance and loss of vegetation associated with new construction are not expected to be significant. Construction under the Settlement Agreement would include upgrading existing facilities [e.g., the Lemolo No. 2 fishway (see section 3.4.2.3), boat ramps (see section 3.8)] and building new ones [e.g., additional wildlife bridges (see section 3.5.2.2), new recreational facilities (see section 3.8.2.1)]. Construction would be localized in small areas, in most cases less than an acre in size. Most construction would take place in areas already affected by initial development of the project dams and other facilities. Construction in undisturbed areas would be limited, and impacts in those areas would likely be minor if facilities are sited carefully and potential impacts are carefully considered in the construction plans. Nonetheless, PacifiCorp proposes to undertake a number of measures to ensure that vegetation impacts, and associated wildlife impacts, are minimized:

- Construction plans would be coordinated with those provisions of the VMP that require the use of native species in revegetation to the extent practicable to establish an effective ground cover.
- Under section 21.5 of the Settlement Agreement PacifiCorp would develop plans for constructing new facilities or modifying existing ones in consultation with FS,

NMFS, FWS, ODFW, and ODEQ. This would allow those agencies an opportunity to ensure that construction follows the requirements of the VMP. Before initiating any construction, completed plans would be submitted for review and approval by the FS and any other agencies that may be required to approve them under provisions of the Settlement Agreement, which would include the Commission.

- PacifiCorp would notify the parties to the Settlement Agreement 90 days before the start of any project construction or related ground- or habitat-disturbing activities and again when construction is completed (PacifiCorp 2001a).

We discuss measures for the protection of threatened and endangered plant species in section 3.6. In addition to those listed species, a variety of other rare plants are known or suspected to occur in the project area (see section 3.5.1.1). These plants include FWS species of concern, FS sensitive species, BLM sensitive and assessment species, and species with special management considerations as defined by the Forest Plan (i.e., survey and management species). We discuss these species in section 3.5.2.5 and Appendix C.

While the details of the VMP have not been fully developed, and once completed should be filed for Commission approval, we believe that development of a VMP would be consistent with prudent land stewardship and would contribute to meeting many of the resource goals identified in the Watershed Analysis (Stillwater Associates, Inc. 1998a) and Forest Plan. These goals include maintaining or restoring the geomorphic and ecological processes characteristic of the watershed in order to maintain habitat and interconnected and well-distributed populations for native species and to promote the long-term health of the watershed, restoring function of Riparian Reserves, and maintaining and restoring the species composition and structural diversity of plant communities.

NGO Alternative

Under the NGO Alternative PacifiCorp would develop a VMP in consultation with the FS within 1 year of license issuance and before starting any new land- or vegetation-disturbing activities on FS land. The plan would be approved by the FS and filed with the Commission. At a minimum the NGO-recommended plan would include the following measures:

1. identification and prioritization of areas to be revegetated and a schedule for that work to be completed;
2. a tentative list of species to be used (favoring local native species) with planting locations, methods, and densities;

3. identification of site preparation, irrigation, mulch, fertilizer, and herbivore protection requirements for plant establishment;
4. identification of methods for prevention and control of noxious weeds;
5. identification of vegetation control methods (e.g., mowing, trimming, cutting) to be used near project facilities (e.g., transmission lines, canals, forebays);
6. discussion of how revegetation and vegetation control methods and materials would meet the objectives for noxious weed management, erosion control, and wildlife management (including objectives for LSRs, Riparian Reserves, and winter range);
7. a monitoring program to evaluate the effectiveness of revegetation, vegetation control, and noxious weed control measures; and
8. a description of procedures to be followed if monitoring reveals that revegetation and vegetation are not successful or do not meet intended objectives.

The Conservation Groups do not explain why the proposed Settlement Agreement provisions are inadequate or untimely. In fact, the VMP would be completed sooner under the Settlement Agreement than under the NGO Alternative.

The Conservation Groups' recommendations are based on earlier (August 2000) FS recommendations. In the FS's reply to the Conservation Groups' comments on the Settlement Agreement (FS 2001a), it notes that the VMP agreed to in the Settlement Agreement would be developed in coordination with and approved by the FS and that appropriate components of its earlier recommendations would be incorporated in the VMP; however, the FS does not define those components. Based on staff's review of the Settlement Agreement and filed comments, it appears that, while spelled out differently, the concepts and components of a VMP recommended by the Conservation Groups are also inherently incorporated in the provisions of the Settlement Agreement. FS has indicated that it concurs with our analysis (FS 2002). Consequently, we would expect that any VMP filed for Commission approval would address the Conservation Groups' recommendations. Therefore, we conclude that the long-term benefits of and impacts associated with the NGO Alternative would be similar to those described above for the Settlement Agreement. One difference between the Settlement Agreement and NGO Alternative is in timing. Under the Settlement Agreement the VMP would be completed, and some parts of it would be initiated, prior to license issuance. Under the NGO Alternative the VMP would be developed within 1 year of license issuance. Thus, in the short term, the benefits of the Settlement Agreement would likely be greater than those of the NGO Alternative as some populations of noxious weeds would be controlled earlier.

The Conservation Groups would also require that vegetation management in the transmission line corridor be reviewed and agreed upon annually by the FS and that this

review must include an analysis of potential habitats and effects to threatened, endangered, sensitive, and survey and manage species within or adjacent to the treatment area. Hazard tree treatments would similarly require consideration of the habitat value to these species, and site- and species-specific mitigation would be required if the treatment would affect a habitat area or nest tree of a species of concern. Seasonal restrictions on human activities associated with hazard tree removals would be based upon site-specific information, and any removal of such trees would be weighed at each site of concern with evidence of a clear and imminent hazard. Where needed to meet Forest Plan objectives for snag retention, PacifiCorp would be required to top snags or otherwise retain these trees unless it was clearly infeasible. All trees felled would be left onsite to meet species' requirements in accordance with the Forest Plan, and woody debris from smaller stem slash treatments would be handled and left unburned in at least 10 percent of the treatment area to provide microhabitat conditions and to facilitate connectivity for wildlife across the corridor. Additionally, vegetation would be managed for native species composition and structure in relation to the potential plant association of a particular area. Areas capable of growing trees and shrubs would be managed to recover and/or retain at least 60 percent canopy closure in shrubs and trees averaging 4 feet or higher to facilitate movement across the transmission line corridor. Transmission lines occupying or crossing riparian reserve land allocations defined in the Forest Plan would be managed for greater than 70 percent canopy closure.

We note here that vegetation management prescriptions under the Settlement Agreement might incorporate many of the elements sought by the Conservation Groups. However, we also note that some of the vegetation measures (e.g. vegetative height recommendations, leaving debris in the transmission corridor) recommended by the Conservation Groups might be incompatible with system reliability and safety concerns for the reasons discussed above under the Settlement Agreement. Under the Settlement Agreement system reliability and wildlife habitat compatibility concerns would be addressed through consultation with the FS and BLM. Consultation with the BLM was not specified by the Conservation Groups.

The Conservation Groups also recommended removal of Soda Springs dam. This action could result in both beneficial and adverse impacts to vegetation and riparian habitat. The ecological responses of dam removal are complex because of the interactions between adjacent terrestrial and aquatic ecosystems, predator-prey interactions, competition, succession, and dispersal of aquatic and terrestrial organisms (Gregory et al. 2002). Given a sufficient amount of time, many of the ecological impacts that dams have on rivers may be largely reversed following dam removal, but no studies have continued long enough to determine the response rates of all ecosystem components (Hart et al. 2002). Thus, the ecological responses to dam removal cannot be predicted

with a high degree of certainty in complex river ecosystems, and dam removal should not be expected to always restore riparian ecosystems to their predam condition (Gregory et al. 2002, Shaforth et al. 2002).

The degree of impact would depend, in part, on the method of dam removal (see sections 3.2.2.2 and 3.4.2.3). If the dam were removed by blowing it up and letting the water behind it flood out all at once, a large pulse of the coarse and fine sediment that has accumulated behind the dam would be released to downstream reaches (see section 3.4.2.4; PacifiCorp et al. 2001). Because there is little floodplain area directly below the dam, this sediment would mostly flow downstream. Eventually, any sediment that did not settle in the river itself would settle out on floodplain areas far below the dam, potentially covering the riparian vegetation there (Bednarek 2001, Hart et al. 2002, Shaforth et al. 2002). Depending upon the amount of vegetation covered, there could be a temporary effect on wildlife that depends on such vegetation. However, this impact would not last long as most vegetation and animals that live in or depend on riparian areas would recover or be naturally replaced in a short period of time. Also, if redeposition of sediments from the reservoir area resulted in the formation of new islands in the river, these could be colonized by plants that would provide some additional habitat for wildlife.

If the dam were removed by a slower process (e.g., cutting a notch in the top of the dam to let the water flow out slowly and gradually increasing the depth of the notch until the reservoir had been emptied), the sediment now behind the dam could be flushed downstream during high flows or could be dredged before dam removal began (PacifiCorp et al. 2001). Flushing during high flows would result in impacts similar to, but likely of less magnitude than, those discussed above for a "blow and go" type of dam removal. The impacts of dredging would depend on where the sediments were placed. The quantity of spoil that would be generated is unknown, but it would likely equal or exceed 266,000 cubic yards based on a PacifiCorp proposal in its original application to dredge about that amount of sediment from nearly the entire length of Soda Springs Reservoir (PacifiCorp 1995a). That sediment would have been placed on an 8.4-acre site of mostly disturbed land (5.8 acres) or mid-succession conifer/deciduous forest (2.2 acres). The storage site would have been contoured and replanted after dredging had been completed. Wildlife would not have been able to use the spoil disposal site during most of that period, but the impact would have been minor because the period of dredging would not have been lengthy. If similar areas were used for sediment dredged before dam removal, the impacts likely would be similar.

If the entire dam were removed, riparian habitat connectivity between areas above and below the dam site would eventually be restored (Stillwater Sciences, Inc. 1998a,

PacifiCorp et al. 2001, Bednarek 2001). If only the center of the dam were removed (i.e., leaving the sides of the dam in place), riparian habitat connectivity would not increase across the dam itself.

Biota respond to the physical removal of the barrier, as well as to changes in water chemistry, habitat, and flow regime (Hart et al. 2002). The potential for recovery of various taxa following dam removal varies markedly, depending in part on their ability to colonize and thrive in new habitats. Removing the dam would drain the approximately 32-acre reservoir behind it, and most of that area would eventually change from aquatic to riparian and upland habitat (see section 3.2.2.2). A shift in wildlife from species dependent on a lentic system to those that use a lotic system and adjoining habitats would follow. While the reservoir bottom after the dam is removed would initially have little vegetation growing on it, over time the area could return to a more natural, riparian habitat. Initial colonization could be rapid, but population recovery in the former impoundment and downstream reaches ultimately depends on restoration of habitat conditions that are strongly influenced by channel morphology, flow regimes, and riparian vegetation (Hart et al. 2002). In addition, dam removal may lead to mortality of vegetation along the former reservoir margin. Initial plant colonists of sites characteristic of former reservoir bottoms tend to be weedy plants and may include a relatively high fraction of invasive, non-native species. The timing and pattern of drawdown heavily influences the species composition of bare, moist areas by exposing sites at times that do or do not match the life history characteristics of various species with respect to germination and early seedling establishment requirements (Shaforth et al. 2002). However, following the vegetative management practices proposed in the VMP could ensure that native species would be planted. Planting native species, which would benefit wildlife, should minimize colonization by non-native, invasive plants.

In addition, dams are usually not the only factor impairing river ecosystems, which can lead to unrealistic expectations about recovery following dam removal (Hart et al. 2002). On rivers with multiple dams, removing one dam may result in only spatially limited or partial restoration of natural flows (Shaforth et al. 2002). Thus, dam removal might not result in a return to natural river conditions because of cumulative impacts in the watershed from other stressors (e.g., logging) that would continue (see section 5.2).

Staff Alternative

We recommend that any new license issued require development and implementation of the VMP as proposed in the Settlement Agreement without modification. Therefore, the benefits described above for the Settlement Agreement would be the same under the Staff Alternative.

3.5.2.2 Wildlife Entrapment and Barriers to Wildlife Movement

Project facilities include 21.7 miles of open gunite canals, 9.8 miles of single and double walled flumes, 5.8 miles of penstocks and tunnels, 8 dams and associated diversion structures, 4 reservoirs, 4 forebays, 117.5 miles of transmission lines, and about 200 miles of roads [approximately half of these roads are required exclusively for the project, including 36 miles of access road; the other half are used jointly by the FS and PacifiCorp (Stillwater Sciences, Inc. 1998a)]. These facilities sever riparian and aquatic habitats and can represent physical barriers to terrestrial wildlife movement. Additionally, wildlife can become entrapped and drown in the open gunite canals.

Connectivity (i.e., the extent to which the landscape pattern of the ecosystem provides for biological flows that sustain animal and plant populations) is one of the key attributes that characterize an ecosystem (FS 2001d). Improving aquatic and terrestrial habitat connectivity in the project area was a major focus of the discussions in the licensing proceedings and of the Settlement Agreement. Project facilities cross or pass through Riparian Reserves, but they do not completely eliminate their functions. Management of Riparian Reserves above and below project canals and flumes emphasizes these functions, resulting in the ability of species to move up and down slope between the riparian or aquatic zone and terrestrial areas. Only in the immediate area where a canal or flume intersects the Riparian Reserve is movement restricted up and down the drainage.

PacifiCorp proposes a number of measures, discussed in other sections of the EIS, to improve riparian and aquatic habitat connectivity that would benefit wildlife. These measures include increasing instream flows (discussed in section 3.4.2.1); reconnecting Priority 1 and 2 intercepted tributaries and drainages (section 3.4.2.7); enlarging culverts to accommodate 100-year flood events (section 3.4.2.7); purchasing conservation easements (section 3.4.2.3); restoring the connections between the Clearwater River and North Umpqua River (section 3.4.2.7); increasing the amount of LWD in project waterways (section 3.4.2.4); and building a structure that would permit the movement of amphibians and macroinvertebrates, but not fish, across the dam at Stump Lake (section 3.4.2.7).

As discussed in section 3.5.2.1 above, the VMP would define management practices that would help improve habitat quality associated with transmission line and road ROWs and other project facilities. Also, under the Settlement Agreement PacifiCorp would decommission several miles of hydro and transmission roads (section 3.10.2.2). These changes would enhance wildlife habitat and reduce habitat fragmentation effects.

Here, we focus on proposed measures to improve movement across the terrestrial landscape and reduce potential wildlife mortality associated with entrapment in the project waterways (e.g., canals, flumes). PacifiCorp proposes to increase the width of existing big-game bridges, add 34 new wildlife crossings, and excavate at least 9 wildlife underpasses. Based on monitoring results, PacifiCorp would add up to 5 additional wildlife crossings. In addition, PacifiCorp would reconnect Priority 1 and 2 intercepted tributaries and drainages (Settlement Agreement section 10.6) and enlarge culverts to accommodate 100-year flood events (Settlement Agreement section 10.7) and to contribute to improved movement for many terrestrial animals (see discussion of aquatic connectivity in section 3.4.2.7.).

The Conservation Groups do not believe the combination of bridges, underpasses, and wetland habitat improvements offered in the Settlement Agreement would achieve the management goals set forth in the North Umpqua Watershed Analysis. The Conservation Groups recommend that PacifiCorp cover, bury, or elevate canals and flumes along the waterway system in priority riparian reserves (shown in figure 3-24 and described in table 3-10) (see below for further details) and add 36-foot-wide wildlife bridges over gunite canals between other riparian areas such that there is a wildlife crossing every 400 feet.

Figures

Pages 1-2, 2-2, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9,
2-10, 2-11, 2-13, 2-15, 2-16, 2-18, 2-19,
2-21, 3-2, 3-6, 3-129, and 3-143

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

Table 3-10 NGOs' descriptions and assessments of areas in figure 3-24.¹

Area	Description
1	Area 1 is in the Lemolo No. 2 canal/flume system, the longest canal system on the project traversing 13 miles through the upper North Umpqua fifth field watershed. Area 1 and Areas 2 through 4 have a high density of Riparian Reserves interrupted by the canal and flumes. The canal in Area 1 is in a strategic location in relation to connectivity to and from the large LSR 222 and the rest of the upper North Umpqua watershed. Area 1 is ranked high in biological diversity including earthflow terrain, unique and mosaic habitats, and big game winter range habitat along with a mix of late and early successional forest matrix.
2	Area 2 is also on the Lemolo No. 2 system, the longest canal/flume system on the project. This portion of the project occupies and affects the function of the mainstem Riparian Reserve of the North Umpqua River as well as interrupts a high density of small headwater streams as compared to the other areas. This area is important because it connects the upper to the lower North Umpqua via the Riparian Reserve network and also connects a number of small LSRs, unique habitats, winter range habitat, and matrix to the Riparian Reserve corridors.
3	Area 3 is on the Clearwater No. 2 canal/flume system. This area has a high density of Riparian Reserves interrupted by the project canals/flumes and is within an area having high biological diversity with numerous unique habitats and forest conditions. Lateral connectivity between the Clearwater River corridor, a small LSR, and the upland matrix lands and unique habitats is severed. This area is located lower in the Clearwater system near the confluence of the Clearwater with the North Umpqua River, which is a strategic landscape location for connecting the ridgeline and north/south slope terrestrial habitats in between the North Umpqua and the Clearwater Rivers.
4	Area 4 is on the Fish Creek canal/flume system. This area occupies mainstem Fish Creek Riparian Reserve corridor habitat and also has a high density of small headwater stream Riparian Reserves interrupted by the canal/flume. Unique habitats, small LSRs, and matrix lands are disconnected from the Fish Creek Riparian Reserve corridor and ultimately LSR 222 at the lower end of the drainage.
5	Area 5 is at the beginning of the Clearwater No. 2 canal/flume system. This portion of the project affects the function of Mowich Creek Riparian Reserve corridor and the mainstem Clearwater River corridor. Two small LSRs and a unique habitat area are also disconnected from the mainstem Clearwater River Riparian Reserve. A smaller number of headwater stream Riparian Reserves are affected in this area as compared to Areas 1-4.
6	Area 6 is in the Slide Creek canal/flume system. This area is both within the mainstem lower North Umpqua Riparian Reserve and LSR 222. Small headwater stream Riparian Reserve interruption by the project is less than in Areas 1 through 5 above. Unique habitat and big game winter range are disconnected from the mainstem Riparian Reserve corridor.
7	Area 7 is on the Lemolo No. 2 canal/flume system. This area has a lower density of interrupted Riparian Reserves as compared to Areas 1 through 4. The biological diversity ranking of this area is high with a mixture of earthflow terrain, unique habitats, and winter range along with diverse matrix forest conditions that are interrupted by project canals and flumes and laterally disconnected through the matrix to the mainstem North Umpqua Riparian reserve.

Table 3-10. Continued.

Area	Description
8	Area 8 is on the lower Fish Creek canal/flume system. This area is adjacent to LSR 222. However, the general area surroundings have been affected by topsoil removal to line the project forebays (Fish Creek Desert) causing a change in the potential vegetation, diversity, and habitat quality such that this area was rated lower with greater reliance strategically on the landscape placed upon Area 4. The area does not have small LSRs or designated unique habitats. Area 8 does not have Riparian Reserves affected by the project. The main Riparian Reserve in the area is associated with a long elevated trestle.
9	Area 9 is on the Lemolo No. 1 canal/flume system. The general area is High Cascades influenced with a trend toward more simplified and less productive and diverse forest habitats as compared to Areas 1 through 8 at lower elevations. There are comparatively low densities of Riparian Reserves and drier upslope conditions in this area making the Riparian Reserves a focal point in terms of their contribution to the diversity and productivity of the area. The canal flume system occupies important and unique mainstem Riparian Reserve Habitat at the point of diversion down through White Mule Creek and below affecting the function of the reserve as a corridor. The canal/flumes also separate several small LSRs, unique habitat patches, and matrix from the mainstem North Umpqua Riparian Reserve corridor.
10	Area 10 is on the Clearwater No. 1 canal/flume system. The area, like Area 9, is High Cascades influenced with a trend toward more simplified and less productive and diverse forest habitats as compared to Areas 1 through 8 at lower elevations. There are comparatively low densities of Riparian Reserves and drier upslope conditions in this area making the Riparian Reserves a focal point in terms of their contribution to diversity and productivity of the area. Area 10 has notably long segments of immediately adjacent habitat (in the cut/fill) that provide high suitability due to gentler topography, and therefore, smaller project clearing widths and better vegetative cover conditions. This area is also a high use area by wintering elk. There are no small LSR or unique habitats currently identified in the area.

¹ Source: From EIA Module 1A, pages 19-20, attachment to Umpqua Watersheds 2001a.

Both FWS and ODFW recommend pursuant to Section 10(j) of the FPA that PacifiCorp implement the improvements to big-game bridges and wildlife crossings identified in the Settlement Agreement. The FS and BLM also require these measures pursuant to Section 4(e) of the FPA.

No-Action Alternative

Under the No-Action Alternative PacifiCorp would continue to operate the project under the terms and conditions of the existing license. Existing barriers in the project area (e.g., hydroelectric project waterways, roads, transmission lines) that have fragmented habitat and restricted movement of many wildlife species would not be modified. The project's canals, flumes, and penstocks would continue to at least partially impede movement for some, less mobile terrestrial amphibians, reptiles, and small mammals. Access across the project waterways would continue to be provided by 25 elevated flume trestle underpasses; 29, 8-foot-wide, dirt-covered, big-game wildlife

bridges; 24 vehicle bridges; and 2 foot bridges. Distances between adjacent crossing opportunities would range from 20 to 3,900 feet.

Habitat conditions associated with the big-game wildlife bridges, vehicle bridges, and foot bridges may not be suitable for all wildlife species. Lack of cover and suitable microclimate on the approaches to some bridges and on the bridges themselves may continue to deter some animals from using them or may make the animals vulnerable to predation while crossing (Stillwater Sciences, Inc. 1998a).

In addition, habitat fragmentation resulting from the project waterways would continue to prevent the unrestricted movement of nearly all amphibian, reptile, and mammalian species in the area. The impact of this habitat fragmentation would continue to be greatest on species with limited dispersal ability and patchy distributions, such as small mammals and terrestrial amphibians (Stillwater Sciences, Inc. 1998a). All of these existing impacts would continue under this alternative.

Settlement Agreement

As described in the watershed analysis (Stillwater Science, Inc. 1998a), the management goal for the North Umpqua watershed for terrestrial wildlife species is to maintain terrestrial habitat connectivity so that dispersal, migration, and interbreeding among sub-populations can occur. This goal includes modifying the waterway system so that effects on wildlife populations in the project vicinity are insignificant and wildlife entrapment-related injury and mortality of individuals are minimized.

To improve terrestrial connectivity, PacifiCorp would undertake the following measures:

- within the first year after the new license becomes final or by 2004, whichever is later, increase the width of the 29 existing big-game bridges across project waterways from 8 feet to 36 feet wide and provide suitable habitat components on crossing surfaces to facilitate use by all classes of terrestrial species;⁶⁰
- within 4 years after the new license becomes final, install 34 new wildlife crossings that are 36 feet wide. The bridges would be constructed at locations that would maximize opportunities for wildlife movement as determined through

⁶⁰ One of the projects selected by the RCC for early implementation during 2002 is expansion of three existing wildlife bridges in the Lemolo No. 2 reach (PacifiCorp 2002e).

consultation with FS and ODFW. Prior to final locations being determined for these crossings, PacifiCorp would conduct Survey and Manage species protocol surveys within 200 feet of the waterway system in the vicinity of each location where a crossing is proposed;

- within 3 years of the new license becoming final or 2007, whichever is earlier, and implemented at once when upgrading existing wildlife crossings and when installing new crossings, PacifiCorp would develop and implement a monitoring plan to evaluate the efficacy of the wildlife crossings. Based on the monitoring results, the FS and ODFW may require PacifiCorp to install up to a total of 5 additional wildlife crossings by the fifth anniversary of the new license; and
- by the second anniversary of the new license or 2006, whichever is earlier, excavate at least 9 wildlife underpasses below project penstocks at locations determined in consultation with the FS and ODFW.

Connectivity has been identified as one of the key attributes that characterize the quality and quantity of an ecosystem (FS 2001d). Connections between different habitat areas are important as they allow wildlife to move, disperse, migrate, and interbreed with other sub-populations. The Settlement Agreement includes provisions to reestablish the channel and floodplain at the points where the drainage is interrupted or intercepted, resulting in a much higher probability that species using the riparian zone would be able to move across or through these project features. While there would be potentially greater benefits to providing connectivity across or under the canals and flumes for the entire Riparian Reserve width, this is not necessary in order to restore physical processes and significantly improve species habitat connectivity (FS 2001d). Improving connectivity at project features under this alternative would reduce the local effects of the project and ensure that it does not contribute significantly towards connectivity concerns at the larger watershed or landscape scale.

The adverse effects caused by the existing barriers created by the project are greatest on species with limited dispersal ability and patchy distribution (e.g., small mammals and amphibians) (Stillwater Sciences, Inc. 1998a). For some species the waterways may completely eliminate movement across an area, isolating subpopulations. For other species the waterways may hinder, rather than prevent, movement, thus requiring animals to expend more energy to travel to a place where they can cross. According to the watershed analysis (Stillwater Science, Inc. 1998a), it is unknown if small mammals and amphibians use the existing wildlife, road, and foot bridges over project waterways.

Project waterways do not generally prevent movement by large and medium-sized animals (e.g. deer, elk, American marten, fisher, wolverine, ringtail), but they may alter

movement patterns or corridors, making individual animals more susceptible to predation or hunting mortality (Stillwater Sciences, Inc. 1998a). The watershed analysis indicates that it is unlikely that the project waterways represent barriers to American marten and fisher, wide-ranging, highly mobile species with relatively large home ranges. Fisher, for example, travel an average of 3 to 4 miles per day (Powell and Zielinski 1994). Thus, navigating the distances between crossings, which would be an average of 1,000 feet following implementation of the Settlement Agreement, would be within the capability of such mobile species. Wolverine are also wide-ranging, traveling 19 to 25 miles per day (Banci 1994), but the effect of the waterways on their movements is unknown (see section 3.6.2.2). Ringtails (also known as ringtail or miner's cats) are related to and look like racoons. They have a relatively small home range and would probably use existing crossings; thus, it is likely that the waterways pose an impediment but not a barrier to their movement.

Large mammals are limited in where they can cross the flume or canal, but because they are more mobile than smaller species, they have a greater likelihood of finding places to cross (FS 2001d). Relicensing studies demonstrate that big game and other large mammals use the existing wildlife and vehicle bridges to cross the waterways, and elk have been observed jumping over gunite sections (PacifiCorp 1995a). Well-used game trails lead to most of the wildlife bridges and are evident under the elevated flume trestles. Obvious game trails also parallel many sections of the waterways, and it appears that deer and elk travel along a waterway until they can cross it on a bridge or under a flume trestle. However, heavy snow accumulation may at some times make the wildlife bridges difficult for deer and elk to use. At those times deer and elk may change their movement patterns, increasing the likelihood that they inadvertently enter the waterway and become entrapped (as discussed below) due to the steep banks.

Waterways associated with the project have caused animal entrapment and related mortality. Based on data collected by PacifiCorp between 1983 and 1993, approximately 11 deer and 4 elk become trapped and die in project waterways each year (PacifiCorp 1995a). Mortality varies from year to year and appears to be highest when deep snow causes large concentrations of big game to use habitats near the waterways. It is likely that entrapment as a source of big game mortality is low compared to other sources of mortality in the study area (e.g., vehicle collisions on State Route (SR) 138, hunter harvest) (PacifiCorp 1995a). The Fish Creek, Clearwater No. 2, and Lemolo No. 2 waterways cause the most big game mortality, probably due to heavy use of the habitats adjacent to these areas during the winter.

Smaller mammals, amphibians, and reptiles present near the waterways may also be entrapped, but they are not well represented in the entrapment data. However, records

since 1983 indicate that one cougar and one beaver have been killed in the Slide Creek waterway. Thus, the degree to which species other than big game are entrapped in the project waterways is unknown. In addition, indirect losses of stressed or injured animals of all sizes that escape the waterways may also occur, but numbers are unknown.

The watershed analysis determined that the addition of crossing structures for wildlife at the gunite canals provides the best opportunity for improving habitat connectivity because they amount to about 21.7 miles (69 percent) of the waterway that act as a barrier to wildlife movement and their top edges are nearly flush with the ground surface (Stillwater Sciences, Inc. 1998a). The concrete and concrete/rock flumes provide more limited opportunities for improving wildlife movement because these sections represent only about 8.6 miles (27 percent) of the waterway, often transect very steep terrain that naturally prevents or inhibits wildlife movement, and would be difficult to modify to improve connectivity. Because they are elevated on trestles, the 1.2 miles of steel flumes are not major barriers to wildlife movement. Of the 4.5 miles of penstock, about 2.8 miles (62 percent) provide adequate clearance (2 to 4 feet) for deer; however, only about 0.1 mile (2 percent) provides adequate clearance (4 feet) for elk. The penstocks do not restrict passage for most small animals except perhaps in places where they are on or very close to the ground.

Under the Settlement Agreement there could be up to 128 opportunities (i.e., 25 existing and 9 new flume trestle underpasses, up to 68 wildlife bridges each 36 feet wide, 24 vehicle bridges, and 2 foot bridges) for many wildlife species to cross the project waterways. In addition, reconnecting Priority 1 and 2 intercepted tributaries and drainages and enlarging culverts to accommodate 100-year flood events (see section 3.4.2.7) would contribute to improved movement up and down the immediate drainage for most riparian species except, possibly, big game. This would add up to 67 additional opportunities for many terrestrial species to cross waterways affected by the project.

New crossing opportunities would be located, in consultation with FS and ODFW, so as to maximize opportunities for wildlife movement (including big game) and improve habitat connectivity for most species. The Settlement Agreement does not specify locations for new crossings, but preliminary locations of many new crossings were included in PacifiCorp's license application (PacifiCorp 1995a). Additional field reviews, including surveys for survey and manage species within 200 feet of proposed new crossing locations, would be conducted to help determine the final locations of new crossing structures and to identify areas where wildlife crossing would maximize benefits to rare, endemic species.

The surfaces of the existing bridges and new crossings would include habitat components (e.g. native soil, bark, twigs, logs), as determined by the FS, that would increase their use by species other than big-game (e.g., small mammals) that may not use the existing bridges because of lack of suitable cover. According to the watershed analysis (Stillwater Science, Inc. 1998a), even 12-foot-wide wildlife bridges would both improve habitat connectivity for small mammals and amphibians and increase connectivity for large wildlife. The FS has stated (FS 2001d) that expanding wildlife bridges to 36 feet should allow sufficient space for both big game and smaller species to cross, and we concur.

Under the Settlement Agreement PacifiCorp would develop and implement, in consultation with FS and ODFW, a monitoring program to evaluate the efficacy of the wildlife crossings. The monitoring plan would be based on the final site plans for the crossings and would be designed to fit the site-specific situations.

Monitoring is an integral part of evaluating and modifying measures to achieve desired goals and should be incorporated in any approach to improve wildlife connectivity. Monitoring would be used to identify the terrestrial species present in the area that may use the crossings and to determine what species are using the crossings. Based on the results of the monitoring program, the FS and ODFW may require PacifiCorp to install up to an additional five wildlife crossings by the fifth anniversary of the new license. Alternatively, monitoring results could lead to the potential movement of structures to better locations where other terrestrial species might be benefitted (FS 2001d). The Settlement Agreement did not specify how the monitoring would be conducted or for how long. The North Umpqua watershed analysis, however, discussed a number of monitoring options ranging from track plates to remote cameras and video stations. Appropriate monitoring methods would be developed in conjunction with the RCC and modified as necessary over the course of any new license.

As indicated in volume 2, section 8.33 of the watershed analysis (Stillwater Sciences, Inc. 1998a), the effects of the penstocks on big-game passage are variable. Under the Settlement Agreement PacifiCorp would provide nine additional wildlife crossings under penstocks. As the Conservation Groups point out, the Settlement Agreement does not specify any details on location, dimension, or specifications. The FS (2001d) clarified that the need for excavations in nine locations was based on a field review conducted in June 2000 and that expanded underpasses sufficient to allow big game to pass are primarily needed in the Lemolo No. 1 penstock because of its length (1.4 miles) and location through a topographically gentle forest landscape. The FS (2001d) also indicated that passages would need to be provided at an interval no greater than 0.25 miles, with openings a minimum of 8 feet high by 23 feet wide or greater. The

actual interval and dimensions would be based on site-specific conditions. Thus, the addition of nine underpasses would further improve movement by deer and elk.

The addition of new crossings in combination with existing crossings should provide an average distance of about 1,500 feet between waterway crossings. Including the reconnected Priority 1 and 2 intercepted tributaries and drainages and enlarged culverts (see section 3.4.2.7), opportunities for many terrestrial species, except possibly, big game, to cross waterways affected by the project would be an average of 1,000 feet apart. PacifiCorp's proposed measures would provide additional wildlife crossings, would increase the probability of animals (wintering deer and elk in particular) finding suitable crossing locations, and would decrease the chances of entrapment in the canal in areas near the new crossings.

Finally, under the Settlement Agreement, PacifiCorp would establish a Mitigation Fund to be administered by the FS to offset adverse impacts to terrestrial resources caused by the project. Thus, additional measures necessary to minimize wildlife entrapment-related injury and mortality of individuals could be implemented using this fund.

We believe that providing additional wildlife bridges and underpasses in combination with modifications to existing bridges and aquatic connectivity measures (section 3.4.2.7) would ensure that conditions at the project are capable of supporting healthy, interconnected, and well-distributed populations of terrestrial and riparian species. Final plans for providing wildlife crossings and the wildlife underpasses should be filed with the Commission for approval and should include locations of the crossings, monitoring methods, and criteria for deciding if additional crossings would be required.

NGO Alternative

To restore terrestrial habitat connectivity, the Conservation Groups would require PacifiCorp to:

1. within 7 years of license issuance cover, bury, or elevate canals and flumes along 12.35 miles of the waterway system in Priority 1 terrestrial habitat Riparian Reserves (areas 1 to 4 of figure 3-24), as described in table 3-10, to allow continuous unencumbered wildlife movement and other ecological processes;
2. within 7 years of license issuance restore 18 Priority 1 Riparian Reserves in terrestrial areas 5 to 10 of figure 3-24 for a total additional 1.0 mile of canal or flume treatment;

3. within 15 years of license issuance add 36-foot-wide wildlife bridges over gunite canals between the restored Priority 1 Riparian Reserves in terrestrial areas 5 to 10 in figure 3-24 so there is a wildlife crossing every 400 feet; and
4. within 7 years of license issuance reconnect stream channel and bank habitat for those road and stream crossings identified as having connectivity problems.

Measures proposed under this alternative would significantly improve habitat connectivity for wildlife, except birds, in the project area. Covering, burying, or elevating canals and flumes along the waterway system would eliminate wildlife entrapment along 13.35 miles of waterway and significantly increase wildlife crossing opportunities and exchange between populations. Relative to the measures proposed in the Settlement Agreement, the addition of 36-foot-wide crossings at 400-foot intervals would provide more crossing opportunities in other riparian corridors.

Overall, this alternative would have greater beneficial effects for terrestrial species habitat connectivity than the Settlement Agreement. However, as the FS points out (FS 2001d), there is little evidence to indicate that any particular species has been affected to a significant degree (i.e., population persistence or viability) by project-induced loss of connectivity or entrapment for either terrestrial or riparian/aquatic species, particularly at the landscape level. Complete unencumbered movement of wildlife is not identified as a standard and guideline in the Forest Plan. In addition, it would be extremely difficult to achieve without removal or significant modification of all project waterways, elimination of other project facilities and access roads, and the restoration of habitat to pre-project conditions.

Staff Alternative

We recommend that any new license issued require the improvements to the big-game bridges, the additional wildlife crossings and underpasses, and monitoring as proposed in section 11 of the Settlement Agreement. We also recommend that after any new license is issued, final plans for providing wildlife crossings and wildlife underpasses be filed with the Commission for review and approval as anticipated by the FS (FS 2002). The plans should include locations of the crossings or underpasses, monitoring methods, and criteria for deciding if additional crossings would be required. With that amplification, the benefits described under the Settlement Agreement would be the same under the Staff Alternative.

3.5.2.3 Impacts on Wetland Habitat

The quantity and quality of wetland habitats in the project area are limited and often adversely affected by project operations, recreational facilities, and the occurrence of non-native exotic species, including several trout species managed for recreational purposes. Although the discussion in this section focuses on stillwater amphibians, it must be remembered that wetlands are unique and significant ecosystems that are valuable in providing a high degree of diversity of plant and animal species and improving water quality.

To improve the quality and quantity of wetland systems and provide habitat for stillwater wildlife adapted to such systems, PacifiCorp proposes to enhance or create new wetlands in eight locations and to reconnect Priority 1 and 2 intercepted tributaries and drainages and enlarge culverts to accommodate 100-year flood events (see section 3.4.2.7).

The Conservation Groups recommend maintaining stable water levels in reservoirs and forebays in addition to creating and improving at least eight wetlands. They also point out that PacifiCorp's proposal lacks design details and requirements for monitoring to determine if the wetlands function.

The FWS and ODFW recommend, pursuant to Section 10(j) of the FPA, that PacifiCorp create and enhance the wetland habitats as proposed in the Settlement Agreement. The FS and BLM also require in their preliminary Section 4(e) conditions the creation and enhancement of the wetland habitats as stipulated in the Settlement Agreement.

No-Action Alternative

Under the No-Action Alternative the project would continue to operate under its current license. Wetland habitats near the project would continue to be provided primarily by the project reservoirs and would not be enhanced. Reproductive habitat for stillwater amphibians likely would not change. The abundance and distribution of these species may remain similar to current levels, but this would depend on the distribution and abundance of bullfrogs and non-native predatory fish.

Settlement Agreement

The Settlement Agreement identifies goals to reduce project impacts on riparian and wetland habitats and the species dependent on them (PacifiCorp 2001a). These goals

include (1) maintaining and/or restoring riparian connectivity across the landscape on FS lands to comply with the ACS Riparian Reserve management goals and (2) creating an environment that supports healthy populations of stillwater amphibians in the watershed.

We discuss the benefits of other riparian restoration measures proposed in the Settlement Agreement elsewhere (see sections 3.4.2.3, 3.4.2.7, 3.5.2.1, and 3.5.2.2). Here we focus on measures intended to improve habitats for stillwater amphibians that are not discussed elsewhere.

Under the Settlement Agreement PacifiCorp would enhance or create new wetlands in eight locations. Wetlands would be enhanced or created near the Lemolo Reservoir campgrounds by the first anniversary of any new license, at Stump Lake by the second anniversary, at Fallen Mountain Creek in the vicinity of the historic channel by the fourth anniversary, at the expanded Lemolo 1 forebay by the fifth anniversary, and in the Stinkhole area by the sixth anniversary. At Lemolo Reservoir PacifiCorp would make necessary modifications to campgrounds and restore vegetation to improve wetland species diversity. By the eleventh anniversary of the new license PacifiCorp would enhance or create an additional three wetlands at locations to be determined in consultation with FS and ODFW. Locations for these additional three wetlands could include Ranawapiti Pond, Fallen Mountain Creek, Lemolo Reservoir, and Toketee Lake. The § 401 Water Quality Certificate requires PacifiCorp to design the expanded Lemolo No. 1 forebay to allow mechanical removal of macrophyte growth (see section 2.2.3).

Although no native stillwater amphibians species are known to have been extirpated from the watershed, there is some anecdotal evidence of a decline in their abundance (Stillwater Sciences, Inc. 1998a). Four factors are considered to be the probable cause for the apparent scarcity of stillwater amphibians, particularly eggs and tadpoles, in the impoundments: the presence of predaceous fish, a lack of habitat structural diversity, water level fluctuations, and entrainment (Stillwater Sciences, Inc. 1998a).

Enhancing or creating eight wetlands under the Settlement Agreement would be beneficial to stillwater amphibians. The modified wetlands would have greater structural habitat diversity and would be more likely to isolate amphibians from predatory fish. The FS has described projects that could be undertaken to improve wetland habitats for amphibians (FS 2001d). Projects at Lemolo Reservoir (e.g., moving the road that leads to the Inlet Campground), Stump Lake (e.g., recontouring it to isolate multiple ponds), and adjacent to the expanded Lemolo No. 1 forebay (e.g., wetland creation) would allow for management of moderate to high elevation species of stillwater amphibians (e.g., Cascades frog, long-toed salamander, rough-skinned newt). Expanding the wetland

associated with the abandoned channel of Fallen Mountain Creek adjacent to the Lemolo No. 2 forebay would allow management of moderate elevation species (e.g., Northern red-legged frog, Cascades frog, Western toad). Creating a permanent, shallow pond at Stinkhole would allow low to moderate elevation amphibian species (e.g., Northern red-legged frog, Western toad, Western pond turtle) to breed in isolation from predatory fish that reside in deeper water. Additional investigations would be needed to select the remaining three wetland areas to be developed or enhanced under the Settlement Agreement Alternative.

Amphibian reproduction appears to currently be limited to Stump Lake and Clearwater No. 2 forebay (see section 3.5.1.3). The other reservoirs have little habitat that would isolate amphibians from predation by non-native fish species, and rapid water level fluctuations can desiccate amphibian egg masses that are attached to vegetation at the water's surface (FS 2001d). Under the Settlement Agreement water level fluctuations in most forebays and reservoirs would increase (see section 3.4.2.6). The only forebay that would not have larger fluctuations than under current conditions would be the Stinkhole area located above Toketee Lake and below the Lemolo No. 2 powerhouse where the existing wetland complex would be recontoured and expanded. Thus, even if the wetland enhancement or creation measures in the Settlement Agreement provide habitat that would isolate amphibians from predation and if the number of non-native fish is reduced (see section 3.4.2.7), water level fluctuations might still limit their reproduction. The FS has indicated, however, that water level fluctuations in adjacent reservoirs or forebays would be considered during the development of site plans for creating or restoring wetlands (FS 2002). In most cases, and to the extent possible, the wetlands would be hydraulically disconnected from the adjacent water body. If reconnections were to occur, water level fluctuations might affect amphibian reproduction, but even so, the wetlands should provide additional and higher quality habitat than that which currently exists.

Several funds would be established under section 19 of the Settlement Agreement. Money in those funds would be administered by the FS to implement mitigation and enhancement measures on NFS lands and BLM-administered lands within the North Umpqua Basin. Over the term of any new license the FS would be able to use these funds to replace or provide substitute resources and environments. The FS has indicated it would acquire, restore, or construct at least 17 acres of wetland habitats similar to the rare sphagnum bogs inundated by Lemolo reservoir and acquire or restore at least 84 acres of riparian reserve habitats (FS 2001d). These measures would benefit habitats for stillwater amphibians.

The FS has developed preliminary criteria and design elements that address how wetlands could be enhanced, restored, or created (FS 2001d). PacifiCorp would consult with the FS and ODFW in developing site-specific plans for those wetlands, and FS would use its criteria and design elements during that process. Specific aspects of the plans would address issues such as amphibian breeding habitat, protection from predatory fish, native plant selection and propagation, and monitoring. The final plans would be developed and filed for Commission approval.

The Settlement Agreement does not specifically include any requirement for monitoring to determine if the wetlands are functioning as intended. However, the FS has indicated (FS 2002) that final site plans for wetlands would include a monitoring program based on actual site conditions and the proposed wetland creation or restoration action. The FS also states that an adaptive management strategy might be appropriate in some instances. We recommend that these final site plans include provisions for a monitoring program based on actual site conditions and the proposed wetland creation or restoration action. We recommend that the following elements be included in the monitoring programs and be implemented, as appropriate: (1) measures to evaluate how well the rehabilitated or created wetlands meet goals and objectives and (2) an adaptive management strategy that could be implemented if monitoring revealed that any of the wetlands were failing to meet their goals and objectives. The monitoring program would be developed by PacifiCorp in consultation with the FS, ODFW, and FWS and submitted to the Commission for approval before initiating wetland restoration or creation.

In conclusion, the creation and rejuvenation of wetlands under the Settlement Agreement would restore and help to maintain the physical and biological processes necessary for aquatic and riparian-dependent species (e.g., amphibians), although it is uncertain if increased water level fluctuations in some of the reservoirs would negate some of the improvements. Also, removal or replacement of inadequately-sized culverts (section 10.7 of the Settlement Agreement; see section 3.4.2.7) would allow animals and materials to move up and down the water and stream margins. We conclude that these measures would improve habitat for riparian-dependent species such as amphibians.

NGO Alternative

The NGO Alternative would require PacifiCorp to develop within 1 year following the date of the new license site-specific plans for creation and improvement of at least eight wetlands within or in the immediate vicinity of the project area. The plans would be developed in consultation with the FS and filed with the Commission. Within 5 years of license issuance wetland rehabilitation would occur at existing reservoirs and wetlands as follows:

- Stump Lake would be recontoured to isolate multiple ponds of stillwater amphibian habitat for high to moderate elevation species;
- spoils would be removed at Stinkhole, and the shallow south arm of the pond would be partially filled and contoured to create a wetland and permanent pond or ponds to provide habitat for low to moderate elevation amphibian species;
- adjacent to the Lemolo No. 2 forebay, the wetland associated with the abandoned channel of Fallen Mountain Creek would be expanded to provide habitat for moderate elevation amphibian species; and
- the road entrance to Inlet Campground would be removed, and the area rehabilitated to a wetland to provide habitat for moderate to high elevation amphibian species.

In addition, a wetland would be created as part of the expanded Lemolo No. 1 forebay. Stillwater amphibians to be managed in that area would be high to moderate elevation species. Additional wetlands might also be created in unidentified areas in order to meet wildlife habitat needs that are being disrupted by the project. Wetland creation or rehabilitation at the additional sites would occur within 10 years of license issuance.

The site-specific plans to be developed under this alternative would include specific designs for amphibian breeding habitat and prevention of introduction or survival of non-native fish including the potential for unauthorized stocking. Plans would also include a list, developed in coordination with North Umpqua Forest specialists, of local, native plant species along with propagation and planting techniques to be used. Finally, the plans would include monitoring measures to evaluate how well the rehabilitated or created wetlands meet objectives for hydrologic regime, plant community diversity, and reproductive success of targeted wildlife species and an adaptive management strategy to be followed if monitoring reveals that any of the wetlands were failing to meet their objectives.

The Conservation Groups also state that stable water levels should be maintained in reservoirs and forebays instead of creating artificial wetland habitat. The Conservation Groups do not clarify this requirement, which appears to contradict their proposals for enhancement and creation of wetlands as described above.

With the exception of stable reservoir operations, the differences between the NGO Alternative and the Settlement Agreement appear to be minor. The specific wetland creation and restoration measures proposed by the Conservation Groups are very similar to those discussed by the FS (FS 2001d). Under the NGO Alternative the beneficial effects of creating or rehabilitating wetlands would be similar to those under the Settlement Agreement, although the timing of rehabilitation would differ slightly. The NGO Alternative would require restoration of eight riparian areas within either 5 or 10 years (NGO 2001b). Three of the four wetlands that would be rehabilitated within 5 years under the NGO Alternative would be rehabilitated within the same period under the Settlement Agreement, while the fourth wetland, in the Stinkhole area, would be rehabilitated by the sixth anniversary of the new license under the Settlement Agreement. Under the NGO Alternative an additional four wetlands would be created or rehabilitated. One of these four wetlands would be at the expanded Lemolo No. 1 forebay and would be created by the fifth anniversary of the new license under the Settlement Agreement. The other three wetlands that would be created or rehabilitated under the NGO Alternative have not been identified. Under the Settlement Agreement three more (also unidentified) wetlands would be created or enhanced.

The NGO Alternative would result in a reduction in water level fluctuations in the watershed (see section 3.3.2.1). This would reduce erosion and improve habitat conditions for vegetation and some animals. However, the presence of non-native predatory fish could still preclude or hamper population increases for stillwater amphibians.

The NGO Alternative would require development and implementation of a monitoring program and use of an adaptive management strategy. As noted above, we recommend that any wetlands restoration plan developed under the Settlement Agreement include monitoring measures and an adaptive management strategy.

Overall, the differences in effects on riparian areas between the NGO Alternative and the Settlement Agreement would be minor. Whether reproduction of stillwater amphibians would be improved more by measures in the NGO Alternative than by those in the Settlement Agreement is uncertain because non-native predatory fish would still be present. Thus, we conclude that the benefits of enhanced or created wetland habitats to species such as stillwater amphibians would be essentially the same for the NGO Alternative and the Settlement Agreement.

Staff Alternative

We recommend that any new license issued require the measures to improve wetlands and protect habitat for stillwater amphibians as proposed in the Settlement Agreement. We also recommend that the monitoring plans that PacifiCorp would develop, in consultation with the FS and other interested parties, be based on actual site conditions and the proposed wetland creation or restoration action and be submitted to the Commission for approval before initiating wetland restoration or creation. We recommend that the following elements be considered, as appropriate: (1) measures to evaluate how well the rehabilitated or created wetlands meet goals and objectives and (2) an adaptive management strategy that could be implemented if monitoring revealed that any of the wetlands were failing to meet their goals and objectives. With these recommended additions, the benefits described under the Staff Alternative would be the same as those under the Settlement Agreement.

3.5.2.4 Avian Protection

The project has about 117.5 miles of overhead transmission lines that pose potential hazards for migrating birds, waterfowl, and raptors. Large raptors, in particular, could be affected due to collision and electrocution hazards. Project operation and maintenance activities, including helicopter surveys of project transmission lines, can disturb nesting raptors. Historically, the presence of overhead lines on the landscape poses potential hazards for many avian species from collisions or electrocution. However, the FS has not identified specific instances of bird species of concern colliding with the project's transmission or distribution lines or any problems with raptor electrocution associated with the project (FS 2001d).

PacifiCorp proposes to implement measures to minimize adverse interactions between power lines and birds, to schedule project operation and maintenance activities within 400 meters (1,312 feet) of active raptor nests outside the nesting season unless nesting failure has been confirmed by the FS, to conduct helicopter surveys of project transmission lines in compliance with conditions outlined in the Rattlesnake Rock Peregrine Falcon (FS 1992) and the Toketee Lake Bald Eagle nest site plans (FS 2000e), and to continue to follow the existing *Agreement for Management of Birds on Power Lines*, among PacifiCorp, ODFW, and FWS (dated February 18, 1988). On August 23, 2002, FWS filed modified Section 10(j) recommendations that it developed in consultation with PacifiCorp and the FS (FWS 2002a). One revised recommendation would require PacifiCorp to (1) evaluate the raptor electrocution risk posed by all power distribution facilities within 1 mile of the Toketee bald eagle nest and (2) retrofit any

structures that represent an electrocution risk in accordance with *Suggested Practices for Raptor Safety on Power Lines: The State of the Art in 1996* (APLIC 1996).⁶¹

The Conservation Groups generally support the provisions in the Settlement Agreement for raptor protection. However, they also recommend some additional survey requirements to identify and monitor avian mortality.

Both FWS and ODFW recommend pursuant to Section 10(j) that PacifiCorp implement the measures identified in the Settlement Agreement to reduce avian collisions and electrocution hazards. The FS and BLM also require these measures pursuant to Section 4(e) of the FPA.

No-Action Alternative

Under the No-Action Alternative PacifiCorp would continue to operate the project under the terms and conditions of the existing license and would continue its current avian protection practices. There are no records of raptors, including bald eagles and spotted owls, being electrocuted in the project area. Spacing between conductors and grounded parts of project transmission lines is sufficient to avoid electrocutions and would continue to be so under the No-Action Alternative. (Distribution lines represent a greater risk of electrocution because of the narrow spacing between conductors and grounded parts. However, they are not, as noted above, under Commission jurisdiction.) The existing *Agreement for Management of Birds on Power Lines* (PacifiCorp et al. 1988) establishes a broad framework for dealing with bird mortality and problem nests within the project boundaries. In addition, the Rattlesnake Rock Peregrine Falcon and Toketee Lake Bald Eagle nest site plans provide protection for those particular nest sites on the Umpqua National Forest and are being implemented by PacifiCorp in conjunction

⁶¹ FWS does not define “power distribution facilities.” We caution FWS and others that the Commission’s jurisdiction extends only to facilities that carry project power and that are not part of the distribution or interconnected transmission system (18 CFR §2.2). Project lines include transmission lines 39, 42, 46, 51, 53, 55, and 57. (See figure 3.9-1 in Exhibit A of PacifiCorp’s license application for a one-line diagram of project transmission lines.) To the extent that PacifiCorp’s review of power poles and proposed retrofitting measures would include “distribution lines” not under Commission jurisdiction, such measures could not be imposed within the Commission’s FPA licensing authority. Nonetheless, we would encourage PacifiCorp to undertake such a review and implement the measures as apparently they have agreed to do (FWS 2002a).

with the FS. Under the No-Action Alternative PacifiCorp would continue to implement the agreement and the nest site plans as they have done since the plans were adopted.

Settlement Agreement

Under the Settlement Agreement PacifiCorp would continue to implement measures to minimize adverse interactions between project power lines and birds (PacifiCorp 2001a). Any pole involved in a bird fatality would be retrofitted or rebuilt, following guidelines in the most current version of *Suggested Practices for Raptor Safety on Power Lines: The State of the Art in 1996* (APLIC 1996). Compliance with this measure began on June 13, 2001, the effective date of the Settlement Agreement.

Since the effective date of the Settlement Agreement, PacifiCorp is committed to follow the most current spatial and temporal guidelines for avian protection during project operation and maintenance activities. Unless otherwise agreed to between PacifiCorp and the FS, maintenance activities within 1,300 feet of active raptor nests are being conducted outside the nesting season unless nesting failure has been confirmed by the FS.

Also, since the effective date of the Settlement Agreement, helicopter surveys of project transmission lines are required to comply with conditions outlined in the Rattlesnake Rock Peregrine Falcon and Toketee Lake Bald Eagle nest site plans. These plans describe the history of bird use of the sites, current management directions and guidelines, seasonal use restrictions, and suggested recommendations and opportunities for improvements. The measures appear to be effective in protecting these nesting sites and should continue to be followed.

Finally, under the Settlement Agreement PacifiCorp would continue to implement the existing *Agreement for Management of Birds on Power Lines* (PacifiCorp et al. 1988). This agreement (see Appendix G to the Settlement Agreement) describes guidelines for managing bird nests on power lines and bird mortalities due to power lines. It includes separate guidelines for (1) eagles and other endangered species and (2) non-endangered species other than eagles. In addition, under the Settlement Agreement records of dead birds found near project facilities would be kept in a database. Annual reports that summarize program activities within the project area would be submitted to FWS and the FS. By 2004, the FS and BLM would review the 1988 agreement and determine if they need to become signatories to it.

The FS indicated a need for PacifiCorp to monitor powerlines to determine if they become significant mortality factors for birds in the future and to report instances of electrocution to the appropriate agencies so that needed corrective measures can be

evaluated (FS 2001d). Under the Settlement Agreement records of bird mortality would be kept and appropriate agencies informed. We recommend that the annual reports summarizing program activities within the project area that would be submitted to the FS and FWS also be submitted to the Commission.

The present management agreement establishes a broad framework for dealing with bird mortality and problem nests (PacifiCorp et al. 1988). If the FS and BLM become signatories to that agreement, the framework for dealing with bird mortality and problem nests would be broadened. Also, the existing nest site plans provide adequate protection for bald eagles and peregrine falcons at those specific sites.

Measures (e.g., VMP, scheduling maintenance during appropriate seasons, power pole modifications where needed) proposed by PacifiCorp under the Settlement Agreement are expected to minimize the potential for take of migratory birds. The likelihood and magnitude of impacts to birds from transmission lines should be slightly less under the Settlement Agreement than under the No-Action Alternative, but potential impacts would be minor under both alternatives.

NGO Alternative

The NGO Alternative supports the bird protection provisions of the Settlement Agreement, provided they are consistent with the following requirements (Umpqua Watershed 2001a):

1. any new license must comply with the Migratory Bird Treaty Act;
2. surveys, conducted by an independent third party or the FS, should be required in association with the bird fatality issue;
3. surveys for raptor nests should be conducted within at least 1,300 feet of any proposed activity and, if any are found, they should be protected year round;
4. helicopter surveys must not disturb the Pig Iron peregrine falcon site, spotted owl core areas, and any additional sites identified during the term of any new license; and
5. the existing 1988 *Agreement for Management of Birds on Powerlines* should be reviewed and brought into compliance with current information and law.

Many of these requirements are included in the Settlement Agreement.

Raptor nests would be protected year round under the NGO Alternative, even if nesting had not occurred. Raptors are most sensitive to disturbance during the nesting period. Disturbances can result in nest abandonment, alteration of feeding patterns, and

loss of young. Measures under the Settlement Agreement as well as the NGO Alternative would reduce adverse effects during this critical period.

What is meant by “surveys . . . in association with the fatality issue” (item # 2 above) is unclear. This could mean that surveys should be conducted specifically to determine if there are bird fatalities. However, we feel that specific surveys for bird fatalities, separate from normal surveys conducted as part of transmission line maintenance, would be unnecessary as there are no known problems of bird collisions or raptor electrocution associated with the project (FS 2001d). Also, the extreme length of the transmission lines would make such surveys difficult and very costly. Bird fatalities are currently recorded as part of regular project maintenance of the transmission lines and are reported to the appropriate authorities following the 1988 programmatic agreement.

We agree that it would be useful to review the existing 1988 agreement to determine if it still reflects current information and law (item no. 5 above). That review could be included as part of the FS/BLM’s review under the Settlement Agreement to determine if they should also sign the agreement.

Thus, we find that there would be no advantages over the Settlement Agreement in implementing the NGO Alternative.

Staff Alternative

Under the Staff Alternative we recommend that any new license issued for the project include all the measures proposed in the Settlement Agreement for avian protection. Thus, the benefits under the Settlement Agreement would be the same under the Staff Alternative.

3.5.2.5 FS Sensitive Species, BLM Sensitive and Assessment Species, and Survey and Manage Species

Some plant, fish, and wildlife species that are listed by the FS as sensitive species and by BLM as sensitive and assessment species, as well as a number of survey and manage species identified for special consideration under the Forest Plan, are known to be present or suspected to occur in the project area (FS 2001d, BLM 2001) (see section 3.5.1 and Appendixes B and C). FS policy is to complete a biological evaluation of the effects of an action on sensitive species present in the area of all actions proposed on NFS lands. Appendix C provides additional information on rare species that are not discussed in detail in this section or in section 3.6. The FS can use this information, as appropriate, for its biological evaluations of these species.

Under the Settlement Agreement PacifiCorp would conduct surveys consistent with current protocols for sensitive species and survey and manage species within 400 feet of any ground- or habitat-disturbing activity that might result from the Settlement Agreement.

The NGOs did not specifically mention this issue in their February 2001 comments and recommendations (attached to Umpqua Watersheds 2001a) or in their July 2001 comments on the Settlement Agreement (Umpqua Watersheds 2001a). However, attachments to the latter document included EIA modules that discuss sensitive and survey and manage species. These EIA modules contain preliminary terms and conditions that are similar to those, discussed below, that the FS has identified as Section 4(e) conditions. The NGOs do not, however, state whether these terms and conditions would be part of their alternative.

As Condition No. 15 of its preliminary Section 4(e) conditions, the FS would require PacifiCorp to develop, in consultation with and approved by the FS, a sensitive species plan that describes how PacifiCorp would coordinate with the FS for the conservation and management of sensitive species. The plan would be filed with the Commission within 1 year of issuance of any new license. The plan would require PacifiCorp in consultation with the FS, to do the following:

- identify criteria and approval elements for biological evaluations necessary to meet FS standards and management direction in evaluating the effects of proposed actions on sensitive species;
- develop and maintain a list of sensitive species that may be present in the project area;
- complete biological evaluations of the potential effects of proposed actions on sensitive species;
- conduct surveys for sensitive species in connection with proposed actions; and
- update the plan as the Regional Forester's Sensitive Species List changes or new information indicates that changes to the plan are warranted.

As Condition No. 17 of the FS preliminary Section 4(e) conditions, the FS would require PacifiCorp to develop, in consultation with and approved by the FS, a Survey and Manage Species Plan that describes how PacifiCorp would coordinate with the FS for the conservation and management of survey and manage species. The plan would be filed with the Commission within 1 year of issuance of any new license. PacifiCorp would be required to conduct surveys and provide appropriate mitigation consistent with the Umpqua National Forest Land and Resource Management Plan, as amended, and

applicable regulations. The plan would also contain provisions for updating or revising due to changes in management direction or the list of survey and manage species.

As Condition No. 9 of its preliminary Section 4(e) conditions, BLM would require PacifiCorp, when planning and conducting proposed actions, to include management procedures for BLM special status species⁶² consistent with the management direction provided in the most current BLM Roseburg District Resource Management Plan (RMP). Throughout the term of any new license PacifiCorp's management procedures for BLM sensitive species would be adaptive and consistent with current BLM management direction. Current management direction in the BLM Roseburg District RMP that PacifiCorp would have to initially follow requires:

- reviewing all proposed actions to determine whether BLM special status species occupy or use the affected area or if the habitat for such species is affected;
- conducting field surveys according to established protocols and procedures;
- modifying, relocating, or abandoning a proposed action to avoid contributing to the need to list federal candidate, state-listed, and BLM sensitive species or their habitats under the ESA;
- coordinating and cooperating with the state of Oregon to conserve state-listed species;
- protecting BLM assessment species where possible so as not to increase their status;
- buffering BLM special status plant species by 100 to 300 feet from all surface disturbance and timber harvest where it is biologically appropriate and consistent with species' recovery plans;
- coordinating with other agencies and groups in managing species across landscapes through conservation plans or similar agreements that identify actions to conserve single or multiple species and/or habitats; and
- continuing with the prescribed conservation actions if plans exist for species no longer on the special status species list when it is determined to be necessary to avoid re-listing or future consideration for listing.

In addition BLM would require PacifiCorp to:

⁶² BLM special status species are plant or animal species falling in any of the following categories (BLM 1995b): federally listed threatened or endangered species; federally proposed threatened or endangered species; federal candidate species; state-listed species; BLM sensitive species (see section 3.5.1.1); and BLM assessment species (see section 3.5.1.1).

- coordinate with the BLM Roseburg District at least once a year to obtain the most current list of special status species;
- use qualified personnel knowledgeable in the taxonomy and ecology of District special status species to perform surveys and environmental analyses;
- document all sites located during field surveys in accordance with District standards; and
- forward copies of all documentation to the BLM Roseburg District.

As Condition No. 10 of its preliminary Section 4(e) conditions, the BLM would require PacifiCorp, when planning and conducting proposed actions, to include management procedures for BLM survey and manage species consistent with the management direction provided in the most current BLM Roseburg District RMP. Throughout the term of any new license PacifiCorp's management procedures for BLM survey and manage species would be adaptive and consistent with current BLM management direction. Current management direction in the BLM Roseburg District RMP requires pre-disturbance surveys for all habitat-disturbing activities and the protection of known sites for specific plant, fungi, and animal survey and manage species. (Note that under current management direction routine maintenance is not considered a habitat-disturbing activity.) BLM would also require PacifiCorp to:

- protect known sites and conduct pre-disturbance surveys in accordance with the most current list of survey and manage species, which may change as a result of annual species reviews required under the Forest Plan (FS/BLM 2001b);
- use qualified personnel knowledgeable in the taxonomy and ecology of District survey and manage status species to conduct surveys and environmental analyses;
- document all sites located during field surveys in accordance with District standards; and
- forward copies of all documentation to the BLM Roseburg District.

These additional recommendations would become a requirement of any license issued. PacifiCorp did not comment on them. The Conservation Groups included similar terms and conditions in attachments to one of their submittals, but did not specifically indicate that they were part of their alternative.

No-Action Alternative

Under the No-Action Alternative PacifiCorp would continue to operate the project under the terms and conditions of the existing license. Thus, no surveys or changes in current management practices to address the species would occur.

Settlement Agreement

Some of the FS preliminary Section 4(e) terms and conditions regarding sensitive species and survey and manage species seemingly are not included in the Settlement Agreement. However, the FS has indicated that the preliminary terms and conditions are inherent in the provisions of sections 21.5 and 21.7 of the Settlement Agreement (FS 2002). The FS Section 4(e) conditions are intended to be more descriptive of the requirements for these species and do not conflict with the provisions of the Settlement Agreement. The development of the particular plans would ensure that PacifiCorp is knowledgeable of and would meet FS management direction by performing the necessary surveys and managing for these species throughout the term of any new license.

Some of these species were considered to some extent in the development of the license application. However, a number of additional species that are known or suspected to occur in the Umpqua National Forest could potentially occur within the project area (FS 2001d). For example, northwestern pond turtles are known to exist in the Stinkhole area and would be directly impacted by the PM&E measures proposed by the Settlement Agreement in that area (FS 2001d) (see Appendix C). The FS indicates that there would be a continuing need to evaluate and monitor the effects of these actions on this species. Thus, surveys for these species before ground- or habitat-disturbing activities are initiated would ensure that potential impacts to them would be avoided or minimized and that FS and BLM management objectives for them would be met.

Settlement Agreement measures considered in other sections of the FEIS could also benefit these species in the long-term. Wetlands restoration and creation (see section 3.5.2.3) and development of a VMP (see section 3.5.2.1) that emphasized the use of native species would provide an opportunity for enhancement of sensitive plant species. Potential candidates for planting in restored wetland habitats include adder's tongue (*Ophioglossum pusillum*), two species of sedge (*Carex crawfordii* and *C. serratodens*), and the locally rare small bladderwort (*Utricularia minor*) (FS 2001d). It is also possible that there might be some short-term adverse impacts to some species from disturbance during project implementation. However, these would be offset by the long-term beneficial habitat improvements.

Thus, the Settlement Agreement could have potential long-term benefits for sensitive and survey and manage species.

NGO Alternative

Rock cliff habitat for the California sword-fern (*Polystichum californicum*), a plant on the FS Sensitive Species list, was inundated behind the Soda Springs dam. The NGO Alternative includes removing that dam, potentially providing an opportunity for reestablishment of this plant species in that area.

The Conservation Groups' measures considered in other sections could also benefit these species. Wetlands restoration and creation (see section 3.5.2.3) and development of a VMP (see section 3.5.2.1) that emphasizes the use of native species would provide an opportunity for enhancement of sensitive plant species similar to that provided by the Settlement Agreement.

Thus, this alternative could have potential long-term benefits for some sensitive and survey and manage species.

Staff Alternative

The Staff Alternative would include all of the FS and BLM Section 4(e) conditions as described above. The development and implementation of a sensitive species plan by PacifiCorp would ensure that (1) a list of sensitive species that may be present in the project area is maintained and updated as necessary, (2) criteria for biological evaluations are identified, (3) biological evaluations to analyze the potential effects of proposed actions are completed in a timely manner, and (4) coordination is continued with the FS and BLM on management of sensitive species. Thus, implementing a sensitive species plan would ensure that project operations and facilities are managed throughout the term of any new license so as not to contribute to reductions in species abundance that might lead to a loss of viability of sensitive species or a need for adding them to the federal threatened and endangered species list.

Similarly, the Section 4(e) terms and conditions for survey and manage species would ensure that project operations and facilities are managed throughout the term of any new license so as not to contribute to reductions in species abundance that might lead to a loss of viability of survey and manage species or a need for adding them to the federal threatened and endangered species list.

3.6 THREATENED, ENDANGERED, AND OTHER RARE SPECIES

3.6.1 Affected Environment

3.6.1.1 Federally Listed Threatened and Endangered Species

On May 31, 2001, staff requested updated lists of federal threatened and endangered species that may occur in the area of the North Umpqua Project from the FWS and NMFS. In their responses, the FWS (2001a) and NMFS (2001a) identified three endangered species (Oregon chub, Columbian white-tailed deer, and rough popcorn flower); five threatened species (Oregon Coast coho salmon, Canada lynx, bald eagle, northern spotted owl, and Kincaid's lupine); and two species that are candidates for listing⁶³ (Oregon Coast steelhead and Oregon spotted frog) (table 3-11). In addition, the FWS identified 39 species of concern⁶⁴ (see Appendix B). Species of concern that have been observed in or may be present within the area of the existing project include 8 mammals, 4 birds, 6 amphibians, 1 reptile, 3 fish, 7 invertebrates, and 10 plants.

On August 20, 2001, PacifiCorp was designated as the Commission's non-federal representative for purposes of conducting informal Section 7 consultation with the FWS and the NMFS under the ESA. PacifiCorp filed a *Draft Biological Assessment (BA) and Essential Fish Habitat Assessment* with the Commission on February 15, 2002,⁶⁵ and also submitted it to NMFS and FWS. The BA provided detailed information on the species identified by FWS and NMFS and an assessment of the impacts of implementing the proposed Settlement Agreement on those species. Two of the species listed by the FWS (2001a), the Oregon chub and the Oregon spotted frog, were not included in the BA because neither is believed to occur in the project area. The following paragraphs provide background information on each of the species for which consultation was conducted.

⁶³ Candidate species have no protection under the ESA but are included because they could be listed prior to project completion.

⁶⁴ These are species whose conservation status is of concern, but for which further information is still needed to determine if they should be proposed for federal listing (FWS 2001a).

⁶⁵ The BA may be viewed by accessing the Commission's Federal Energy Regulatory Records Information System (FERRIS) on the Commission's web page: <http://www.ferc.gov>.

Table 3-11. Federally and state-listed threatened and endangered species and candidate species that may occur in the North Umpqua Project area.

Common Name	Scientific Name	Status				Comments
		FWS/ NMFS ¹	FS ²	BLM ³	State of Oregon ⁴	
Oregon Coast coho salmon	<i>Oncorhynchus kisutch</i>	T	–	–	SC	Occurs downstream of Soda Springs dam; designated critical habitat includes all Oregon coastal river reaches accessible to listed coho salmon between the Columbia River and Cape Blanco, excluding tribal lands and areas above specific dams or above long-standing natural barriers.
Oregon coast steelhead	<i>Oncorhynchus mykiss</i>	C	SD	–	SC	Includes both summer and winter steelhead in the North Umpqua River; occurs downstream of Soda Springs dam; no critical habitat has been designated.
Umpqua coastal sea-run cutthroat trout	<i>Oncorhynchus clarki clarki</i>	SOC ⁵	SD	–	SV	Occurs downstream of Soda Springs dam; Umpqua River cutthroat trout population was incorporated into the Oregon Coast Evolutionarily Significant Unit and the FWS determined that listing was not warranted.
Oregon chub	<i>Oregonichthys crameri</i>	E	–	–	SC	Endemic to the Willamette River; not documented to occur in the North Umpqua River.
Oregon spotted frog	<i>Rana pretiosa</i>	C	SS	–	SC	Historical distribution of the Oregon spotted frog does not include the Umpqua River Basin (Hayes 1997 as cited in PacifiCorp 2002a); no designated critical habitat.
Canada lynx	<i>Lynx canadensis</i>	T	–	–	–	Not known to occur in project area; no designated critical habitat.

Table 3-11. Continued.

Common Name	Scientific Name	Status			State of Oregon ⁴	Comments
		FWS/ NMFS ¹	FS ²	BLM ³		
Columbian white-tailed deer	<i>Odocoileus virginianus leucurus</i>	E	—	—	SV	Occurs along transmission line ROW west of Glide; delisting has been proposed for Douglas County population.
California wolverine	<i>Gulo gulo luteus</i>	SOC	SD	BS	T	Sighted in the North Umpqua Basin.
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	—	—	T	Observed within project area; delisting has been proposed
Northern spotted owl	<i>Strix occidentalis caurina</i>	T	—	—	T	Observed within the vicinity of the project; designated critical habitat is present in the project area.
Peregrine falcon	<i>Falco peregrinus anatum</i>	(de-listed)	SD	BS	E	Occurs in project area; species was removed from the federal list on August 25, 1999.
Wayside aster	<i>Aster vialis</i> (= <i>Eucephalus vialis</i>)	SOC	SS	—	T	Not observed in project area.
Umpqua mariposa lily	<i>Calochortus umpquaensis</i>	SOC	SD	—	E	Observed under transmission line ROW south of Glide.
Kincaid's lupine	<i>Lupinus sulphureus</i> var. <i>kincaidii</i>	T	—	—	T	Not observed in project area; no designated critical habitat.
Rough (or hairy) popcorn flower	<i>Plagiobothrys hirtus</i>	E	—	—	E	Documented only in secondary study area; no designated critical habitat.

¹ T=Threatened, E=Endangered, C=Candidate, SOC=Species of Concern (FWS 2001a, NMFS 2001a).

² SD=Species documented to occur on the Umpqua National Forest that are on the FS Region 6 Forester's 1998 Sensitive Animal List or the 1999 Sensitive Plant List; SS=FS sensitive species suspected to occur on Umpqua National Forest.

³ BS = BLM sensitive species.

⁴ State status is listed only for species in Western Cascades region; SC=sensitive critical species—listing as threatened or endangered is pending, or listing as threatened or endangered may be appropriate if immediate conservation actions are not taken. SV=sensitive vulnerable species—listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protective measures and monitoring; T=threatened; E=endangered.

⁵ FWS (2001a) lists this species as a species of concern, but for purposes of analysis we consider it a candidate species.

Oregon Coast Coho Salmon

The Oregon coast coho salmon Evolutionarily Significant Unit (ESU) inhabits the lower reaches of the Umpqua River. It was listed by NMFS as threatened on August 10, 1998.⁶⁶ On February 16, 2000, critical habitat was designated for this ESU,⁶⁷ including all waterways, substrate, and adjacent riparian zones below Soda Springs dam on the North Umpqua River. Subsequent to these notices, in *Alsea Valley Alliance v. Evans* (99-6265-HO, D. OR, September 12, 2001), the U.S. District Court in Eugene, Oregon, set aside NMFS' 1998 ESA listing of Oregon Coast coho salmon and ruled that NMFS' treatment of hatchery populations within an ESU was arbitrary and capricious (*Alsea* decision). On December 14, 2001, the U.S. Court of Appeals for the Ninth Circuit (01-36071) granted intervenors-appellants an emergency motion to stay the district court judgement in the *Alsea* decision. Accordingly, the Oregon Coast coho salmon ESU remains listed as a threatened species pending final decision of the appeal.

Oregon Coast Steelhead

On August 9, 1996,⁶⁸ NMFS completed a comprehensive status review of West Coast steelhead stocks and proposed that the Oregon Coast steelhead ESU be listed as threatened. Subsequently, on March 19, 1998,⁶⁹ NMFS determined that listing was not warranted for the Oregon Coast steelhead ESU. However, the ESU is designated as a candidate for listing due to concerns over specific risk factors. The ESU includes steelhead from Oregon coastal rivers between the Columbia River and Cape Blanco, including the North Umpqua River. Because consultation is only required for listed and proposed species (NMFS 2002), candidate species, such as the Oregon Coast steelhead, were not addressed in the BO issued by NMFS. This species is listed by the state as a sensitive critical species.

Umpqua River Coastal Cutthroat Trout

The coastal cutthroat trout is found in streams in coastal temperate rainforests from southeast Alaska to northern California, including the Umpqua River Basin. The

⁶⁶ *Federal Register* 63, 42587.

⁶⁷ *Federal Register* 65, 7764.

⁶⁸ *Federal Register* 61, 41541.

⁶⁹ *Federal Register* 63, 13347.

Umpqua River coastal cutthroat trout ESU was listed as endangered on August 9, 1996,⁷⁰ and critical habitat was designated on January 9, 1998.⁷¹ Subsequently, NMFS conducted an expanded review of the coastal cutthroat trout and concluded that the Umpqua River cutthroat trout population is not a valid ESU, but rather is part of the larger Oregon Coast ESU that did not warrant listing under the ESA. The FWS concurred and removed the Umpqua River coastal cutthroat trout ESU from the Federal List of Endangered and Threatened Wildlife on April 26, 2000.⁷² The delisting action removed all of the ESA's protections, including critical habitat designation, for the population of coastal cutthroat trout in the Umpqua River Basin. The Umpqua coastal cutthroat trout is listed by the state as a sensitive vulnerable species and is included on the FS Sensitive Species list.

Oregon Chub

The Oregon chub (*Oregonichthys crameri*), a small minnow endemic to the Willamette River Basin in western Oregon, was listed as endangered in 1993⁷³ and is listed by the state as a sensitive critical species. The FWS published a recovery plan for this species in 1998. Oregon chub occupy off-channel habitats such as beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, and flooded marshes (NMFS 1999). Oregon chub habitats usually have little or no water flow, silty and organic substrate, and considerable aquatic vegetation as cover for hiding and spawning. Neither the Oregon chub nor the closely related Umpqua chub [a federal species of concern, a FS sensitive species, and a state sensitive, vulnerable species (see Appendix B)] is known to occur in the project area (PacifiCorp 2002a).

Oregon Spotted Frog

The FWS (2001a) identified the Oregon spotted frog as a candidate species for potential listing. This species is not listed by the state. The historical distribution of the Oregon spotted frog does not include the Umpqua River Basin (Hayes 1997 as cited in PacifiCorp 2002a).

⁷⁰ *Federal Register* 61, 41514.

⁷¹ *Federal Register* 63, 1388.

⁷² *Federal Register* 65, 24420.

⁷³ *Federal Register* 58, 53804.

Canada Lynx

The Canada lynx is a federally listed threatened species,⁷⁴ but it is not listed by the state. The species is a secretive cat that occurs primarily in the boreal, sub-boreal, and western montane forests of North America that support its primary prey, snowshoe hares. The Northern Rockies/Cascades Region supports the most viable resident lynx populations in the contiguous U.S., but the species is considered to be extremely rare everywhere in the lower 48 states. FWS in its final rule listing the lynx indicated that insufficient information is available to confirm the historical or current presence of a resident lynx population in Oregon. If present in the North Umpqua area, lynx would most likely be found in the upper reaches of the watershed in older, mature forests. However, recent information indicates that no suitable lynx habitat occurs in the Umpqua National Forest (FS 2002).

Field surveys for lynx utilizing DNA technology have been done in the North Umpqua watershed, although no field surveys were conducted for the species specifically in the project area (FS 2002). Surveys using FWS protocol were conducted in several locations in 1999, while surveys conducted according to FS protocol were conducted in 1999, 2000, and 2001. DNA results, only available for the 1999 and 2000 surveys, did not detect any lynx. Additionally, the Lynx Biology Team (an interagency group that includes FWS) recommended in July 2000 that the Lynx Conservation Strategy not be applied west of the Cascade Crest. According to the FS, this recommendation was formalized in regional direction on September 19, 2000 (FS 2002).

Columbian White-Tailed Deer

The Columbian white-tailed deer is listed by the FWS as an endangered species. The Coast Range population of the species, which does not include the population in the Umpqua National Forest, is listed by the state as a sensitive, vulnerable species. On May 11, 1999, the FWS proposed to delist the Douglas County, Oregon, population of this species (where this project is located) because it had increased from a low of fewer than 300 deer in 1940 to a total of approximately 5,500 individuals and its range had increased.⁷⁵ On June 21, 2002, the FWS published a supplemental proposed rule to establish two distinct population segments of the species and to remove the Douglas County population from the list of endangered and threatened species based upon new

⁷⁴ *Federal Register* 65, 16051–16086.

⁷⁵ *Federal Register* 64, 25263–25269.

information.⁷⁶ According to the FWS, the recovery of this population of the species has primarily been the result of acquiring and managing deer habitat, restricting hunting, and applying local ordinances designed to protect the deer population. The FWS' projected date for final action on the proposed delisting is June 2003.⁷⁷ If the proposed delisting is finalized, the FWS would implement a monitoring program for the population for not less than 5 years, as required by Section 4(g)(1) of the ESA. Also, it is assumed that the FS would add the species to its Regional Forester's sensitive species list as it has done for the delisted peregrine falcon and has stated it would do if the bald eagle were delisted (FS 2001d).

Columbian white-tailed deer occur commonly throughout the foothills surrounding Roseburg in mixed hardwood (i.e., oak and madrone) forests, narrow riparian areas, and early successional conifer forests (PacifiCorp 1995a). Their distribution in the North Umpqua River Basin is restricted to the lower portion of the project vicinity along the transmission line ROW. The species is commonly seen along portions of the approximately 22.5 miles of transmission line ROW from Glide to Dixonville. PacifiCorp's field surveys recorded 1 to 14 deer on or adjacent to the transmission line ROW west of Glide at various times (PacifiCorp 1995a).

Bald Eagle

The bald eagle is a federally and state-listed threatened species that is known to occur in the Umpqua National Forest. On July 6, 1999, the FWS proposed to remove the bald eagle in the lower 48 states from the list of endangered and threatened species because, according to the FWS, available data indicate that the species had recovered.⁷⁸ As of the date of this final EIS, the FWS had not published a final rule in the *Federal Register*, and final action was undetermined.⁷⁹ If the bald eagle is delisted, the FS and BLM intend to manage it as a sensitive species (see sections 3.5.1.2 and 3.5.2.5).

Bald eagles have been observed using the North Umpqua River drainage for breeding, foraging, and wintering (FS 2000e, PacifiCorp 1995a). PacifiCorp surveys recorded eagles during breeding season foraging at Lemolo Reservoir, Toketee Lake, and

⁷⁶ *Federal Register* 67, 42217–42229.

⁷⁷ *Federal Register* 67, 74612.

⁷⁸ *Federal Register* 64, 36453–36464.

⁷⁹ *Federal Register* 67, 74624.

Lemolo No. 2 forebay. A bald eagle nest site located near Lemolo Reservoir successfully fledged young every year from 1985 to 1993; the site was inactive in 1994. Nesting was also observed at Lemolo in 2000, 2001, and 2002; one young fledged from the nest in 2000 and 2001, but nesting was not successful in 2002 (personal communication from Jeff Bohler, FS, to M.S. Salk, ORNL, September 5, 2002). Nesting attempts on the south shore of Toketee Lake were confirmed in 2001 and 2002; one young fledged from the nest in 2001. Winter surveys found bald eagles at Lemolo Reservoir, Toketee Lake, Stump Lake, Clearwater No. 1 forebay, and downstream of the Soda Springs powerhouse along the transmission line ROW (PacifiCorp 1995a). Bald eagles are also known to winter along the North Umpqua River downstream of Toketee Lake.

Northern Spotted Owl

The northern spotted owl is a federally and state-listed threatened species known to occur in the Umpqua National Forest.⁸⁰ PacifiCorp did not survey specifically for the northern spotted owl during relicensing studies, but the species has been sighted in the secondary study area during surveys conducted by the FS and BLM (PacifiCorp 1995a). Those surveys revealed over 220 activity locations (e.g., nest sites, alternate sites, single birds) within 2 miles of the project area between 1980 and 1993. FS and BLM have recorded 14 spotted owl nest sites within 1 mile of the project near the Clearwater Nos. 1 and 2, Fish Creek, and Lemolo No. 2 developments (PacifiCorp 1995a).

Kincaid's Lupine

Kincaid's lupine (*Lupinus sulphureus* var. *kincaidii*) is a federally and state-listed threatened species known to occur in the Umpqua National Forest.⁸¹ No critical habitat has been designated for it. The species has been reported from four sites in the Umpqua Valley of Douglas County, which is at the southern edge of its range. These sites are in the vicinity of the confluence of the Umpqua River and the North Umpqua River, about 48 miles downstream of Soda Springs dam and 14 miles west of the towns of Glide and Dixonville. Its distribution is closely associated with native upland prairie sites. At its southern limit it occurs on well-developed soils adjacent to serpentine outcrops, often under scattered oaks. Habitat for it occurs in oak openings under project transmission lines at lower elevations (FS 2001d). Although a population occurs in the Umpqua

⁸⁰ *Federal Register* 55, 26194.

⁸¹ *Federal Register* 65, 3875.

National Forest, PacifiCorp did not record its presence in the project area during its 1992 to 1994 relicensing surveys (PacifiCorp 1995a).

Rough Popcorn Flower

Rough (or hairy) popcorn flower (*Plagiobothrys hirtus*) is a federally⁸² and state-listed endangered species. No critical habitat has been designated for it. The species is restricted to seasonal wetlands (i.e., wet swales and meadows) in the interior valley of the Umpqua River. Only 17 habitat patches are known to exist for the species in the vicinity of Sutherlin and Yoncalla, Oregon, most of which have only a few individuals. These habitat patches are located about 41 and 50 miles downstream of Soda Springs dam and about 7 and 16 miles west of the towns of Glide and Dixonville, respectively (PacifiCorp 2002a). Of these occupied habitat patches 15 occur on private or commercial land. Three of these are owned and managed by The Nature Conservancy, while 12 sites have no protective management. The two remaining known sites occur on public land owned by the Oregon Department of Transportation, one of which is partially on private land as well. This species was not documented as occurring in the primary study area during relicensing studies. However, it was documented in the secondary study area (i.e., the area beyond the land directly affected by current project operations) (PacifiCorp 1995a). These are likely one or more of the habitat patches the FWS included in the rule listing the species.

3.6.1.2 Other State-listed Threatened and Endangered Species

In addition to those species discussed above that are both federally and state-listed, four other species—the California wolverine, the peregrine falcon, the Umpqua mariposa lily, and the wayside aster—are listed by the state as endangered or threatened (table 3-11). The peregrine falcon was once, but is no longer, on the federal list, while the other three species are identified as federal species of concern. All of these species except the wayside aster are known to occur in the project area. The state also includes eight plant species that are candidates for state listing and 34 sensitive species (see Appendix B).

California Wolverine

The California wolverine is a state-listed threatened species, a FWS species of concern, a BLM special status species, and a FS sensitive species that is known to occur

⁸² *Federal Register* 65, 3866.

in the Umpqua National Forest. Wolverines are wide-ranging, secretive mammals occurring in the northern part of the continent and extending southward along the Sierra-Cascade axis through Oregon. In Oregon they are found in montane areas, particularly in Douglas-fir, lodgepole pine, and mixed conifer forests (Chapman and Feldhammer 1982, as cited in PacifiCorp 1995a).

The wolverine is one of North America's rarest mammals and least known large carnivores (Banci 1994). The lack of information is largely due to the difficulty and expense of studying a solitary, secretive animal that is usually found in remote places. Its distribution and movements are believed to be primarily limited by human activity since they normally occupy habitats that are remote from humans and human developments. But human presence alone is not a deterrent to their presence. A combination of factors likely underlie the presence or absence of self-sustaining wolverine populations.

No wolverines were observed in the project area during PacifiCorp's 1992 to 1994 field surveys, but they have been observed historically in or near the project area (PacifiCorp 1995a). The Diamond Lake Ranger District has recent sighting records of the wolverine in the North Umpqua Basin (FS 2002). Since wolverine characteristically occur at low densities (Banci 1994), their level of occurrence in the Umpqua National Forest is likely to be typical of the species.

Peregrine Falcon

The peregrine falcon is a state-listed endangered species, a BLM special status species, and a FS sensitive species (FS 2001d, BLM 1999) (see sections 3.5.1.2 and 3.5.2.5). In 1999 the FWS removed the peregrine falcon from the federal list of endangered and threatened species as it is considered to be recovered.⁸³ Under federal regulations implementing the ESA this species must continue to be monitored for at least 5 years.

Peregrine falcons use the area in the vicinity of several of the existing project facilities year-round for nesting, foraging, and wintering (PacifiCorp 1995a). Falcons were observed during relicensing studies at Toketee Lake and the Clearwater No. 2 forebay as well as at two historic eyrie sites located within 1 mile of the project transmission line ROW. A management plan for the historic sites at Rattlesnake Rock and Eagle Rock, where successful nesting was first confirmed in 1986, was developed in the early 1990's (FS 1992). These nests are near the transmission line ROW about

⁸³ *Federal Register* 64, 46542-46558.

2.5 miles west of the Soda Springs powerhouse. In addition, in 1993 the FS and BLM reported two new eyrie sites located 1.5 mile and 0.8 mile from the transmission line ROW. A number of young have been successfully fledged from each of these sites (PacifiCorp 1995a).

Umpqua Mariposa Lily

The Umpqua mariposa lily (*Calochortus umpquaensis*) is listed as an endangered species by the state, as a species of concern by FWS, as a special status species by BLM, and as a sensitive species by the FS. It was once listed as a federal candidate species, but was removed from that list in 2000.⁸⁴ This lily is endemic to southwest Oregon where it is restricted to serpentine soils in southern Douglas and northern Josephine and Jackson counties (BLM and FS 1995). Populations of the species are generally isolated from one another, with little opportunity for genetic exchange. Populations are known to occur in the Umpqua National Forest. During PacifiCorp's 1992 to 1994 field surveys, a population of more than 600 plants was found in open, grassy meadows with serpentine soils under or adjacent to a 2-mile segment of transmission line ROW south of Glide (PacifiCorp 1995a).

Wayside Aster

The wayside aster (*Aster vialis*) is a state threatened species, a FWS species of concern, a BLM special status species, and a FS sensitive species. It is found in western Oregon's interior valleys and in segments of the Coast Range mountains where it grows in coniferous forests at elevations ranging from 500 to 5,100 feet (FS 1999). Typically it occurs on relatively dry upland sites dominated by Douglas fir. This aster was once thought to be extinct, but it was rediscovered in 1980 near Eugene, Oregon (ODT 2002). It was not observed during relicensing studies in the primary or secondary study areas (PacifiCorp 1995a), but the FS lists it as suspected of being present in the Umpqua National Forest.

3.6.1.3 Other rare species

A number of other rare species (e.g., FS sensitive species, BLM sensitive and assessment species, survey and manage species) are known to occur in the project area. These species are discussed in section 3.5.2.5 and Appendix C.

⁸⁴ *Federal Register* 65, 63044-63047.

3.6.2 Environmental Impacts and Recommendations

The following sections discuss the effects of the No-Action Alternative, the Settlement Agreement, the NGO Alternative, and the Staff Alternative on federally listed and state-listed species. The effects on other rare species are discussed in Appendix C.

Under the Settlement Agreement, PacifiCorp would conduct protocol surveys for sensitive and survey and manage species within 400 feet of any ground- or habitat-disturbing activity. In addition, changes in the project under the Settlement Agreement would, in general, improve habitat conditions for most aquatic and terrestrial species (see sections 3.4 and 3.5).

A number of measures are included in the NGO Alternative (e.g., increasing instream flows in bypassed reaches, limiting water level fluctuations with ramping restrictions, restoring fluvial geomorphic processes, enhancing LWD transport, creating and improving wetlands) to minimize and mitigate project effects on aquatic and terrestrial species, including listed species.

FWS, NMFS, and ODFW recommend pursuant to Section 10(j) of the FPA that PacifiCorp implement the measures identified in the Settlement Agreement for protecting listed species (section 5.3). In addition, FWS recommends that the Commission include in any new license a specific condition reserving the Commission's right to amend the license as necessary to comply with its obligations under the ESA, including reinitiating ESA Section 7 consultation at the FWS's request. NMFS also requests that the Commission include in any new license a specific ESA reopener provision and other appropriate reservations of authority to ensure full compliance with ESA requirements during the term of any new license.

As discussed in section 2.2.5, NMFS and FWS filed BOs with the Commission that (1) identify reasonable and prudent measures to minimize take of certain listed species and (2) specify terms and conditions for implementing those measures.

FS and BLM also require implementation of all Settlement Agreement measures pursuant to Section 4(e) of the FPA. Condition No. 16 of the FS's preliminary Section 4(e) conditions deals with proposed, threatened, and endangered species. The FS would require PacifiCorp to confer with it in the event that ESA Section 7 consultation is reinitiated during the term of any new license. This additional recommendation would become a license requirement. PacifiCorp did not comment on it.

3.6.2.1 Federally Listed Species

No-Action Alternative

Under the No-Action Alternative there would be no changes from current conditions in the project area. Soda Springs dam would continue to prevent upstream movement of anadromous fish species, preventing access to spawning and rearing habitat upstream of that dam. The downstream transport and redistribution of gravel and LWD, which form important habitat elements for aquatic organisms, would continue to be restricted. Flow fluctuations and water temperatures below Soda Springs dam may be greater than optimal for the restoration of anadromous salmonids.

Project waterways would continue to be minor barriers to wildlife movement, but there are no records of federally protected terrestrial wildlife species dying from entrapment in them. However, under this alternative there would be no additional crossing opportunities for such species. Also, there would be no modifications to project facilities to improve habitat conditions for federally listed species or to improve habitat conditions in the Rock Creek and Canton Creek Basins.

Settlement Agreement

The Settlement Agreement would include measures to preserve federally protected species. Before any ground-disturbing activities, PacifiCorp would conduct surveys for plants and animals that have federal protection. Impacts on specific species are discussed below.

Coho Salmon, Steelhead, and Coastal Sea-Run Cutthroat Trout

We evaluate the effects of the Settlement Agreement on anadromous fish species in section 3.4.2 and in the BA. Based on this analysis, we conclude that implementation of the amended Settlement Agreement would benefit populations of coho salmon, steelhead, and coastal sea-run cutthroat trout as a whole by reducing and mitigating the adverse effects of the North Umpqua Project.

The proposed PM&E measures in the Settlement Agreement, which are included in the terms and conditions specified in section 9.4 of NMFS' BO, would substantially improve the quantity and quality of habitat for these salmonids in the North Umpqua River Basin. In summary, these benefits would include:

- providing fish passage at Soda Springs dam would likely benefit steelhead and spring chinook salmon the most, by providing access to at least 6.6 miles of additional habitat in the mainstem of the North Umpqua River and Fish Creek;
- increasing minimum instream flows in bypassed reaches would improve the amount of available habitat to these species in the Soda Springs, Slide Creek, and Fish Creek bypassed reaches, as well as improve habitat quality by reducing water temperatures and improving water quality;
- implementing restrictions on ramping rates and increasing spawning and rearing habitat quality in bypassed reaches by increasing minimum instream flows would help minimize the likelihood of redd dewatering and juvenile stranding events for Oregon Coast steelhead;
- improving fish passage at the Rock Creek diversion dam would provide access for all three salmonid species to high-quality, low-gradient spawning habitat above the dam;
- placing in-channel LWD in the East Fork Rock Creek Basin would enhance winter rearing habitat for coho salmon and Oregon Coast cutthroat trout and spawning and rearing habitat for Oregon Coast steelhead;
- acquiring riparian conservation easements in the Rock Creek Basin would enhance summer rearing habitat for coho salmon and Oregon Coast cutthroat trout by reducing water temperatures that may limit production during summer low flow periods;
- constructing a sorting facility at the Rock Creek diversion dam would help prevent the release of hatchery coho salmon to reaches upstream of this dam, thereby reducing competition for spawning and rearing habitat and interbreeding with wild coho salmon; and
- providing LWD enhancement and acquiring riparian conservation easements in the Pass Creek subbasin would improve spawning and rearing habitat for Oregon Coast cutthroat trout.

Even though the overall effects of the proposed measures would be beneficial to coho salmon and its critical habitat, the following adverse effects would still occur:

- the proposed fish passage facilities at Soda Springs dam could result in injury and mortality to fish;
- the proposed fish ladder at Soda Springs dam could delay upstream migration of anadromous species if inadequately designed and/or operated; and
- high flows that may occur during unavoidable emergency shutdowns of the project could displace eggs, alevins, or fish present in the additional habitat made available upstream of Soda Springs dam.

Because no critical habitat has been designated for coho salmon upstream of Soda Springs dam, only effects on downstream habitat are considered. Potential effects related to flows released from the project (e.g., releases during emergency shutdowns) and water quality (e.g., turbidity) would be minimal and would not diminish this habitat for the survival and recovery of the species.

The NMFS BO concluded that the proposed relicensing is not likely to jeopardize the continued existence of the Oregon Coast coho salmon based on the following findings:

1. most aspects of the proposed action would not be likely to impair properly functioning habitat, reduce appreciably the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward properly functioning condition;
2. for those project activities or features that would be expected to reduce, retard, or impair habitat conditions, the effects would largely be mitigated by short duration or by the expectation that few Oregon Coast coho salmon would be exposed or affected by them;
3. ongoing project operations and conservation measures would be expected to increase coho salmon spawning and rearing habitat quantity and quality in the action area in both the short-term and long-term, which should increase overall production in the basin; and
4. nearly every aspect of proposed project operation and configuration would represent a reduction or elimination of historical adverse effects of the project, which influenced the habitat condition and species status under the environmental baseline—these changes would be likely to result in improved status of the local population of this ESU.

Oregon Chub, Umpqua Chub, and Oregon Spotted Frog

The federally listed endangered Oregon chub is endemic to the Willamette River Basin and is not known to be present in the North Umpqua River Basin. The closely related Umpqua chub, a federal species of concern (Appendix B), and the Oregon spotted frog, a candidate species for potential Federal listing (table 3-11), are also not known to occur in the North Umpqua River Basin. Thus, we conclude that the Settlement Agreement would not affect these species.

Bald Eagle and Northern Spotted Owl

We evaluate the effects of the Settlement Agreement on birds in general in section 3.5.2. That assessment would also apply to the bald eagle and the northern spotted owl.

In the long term, implementation of the Settlement Agreement would benefit populations of bald eagles and northern spotted owls by protecting and enhancing their nesting and foraging habitats, minimizing potential disturbances to nesting birds, and preserving habitat through conservation easements. Proposed PM&E measures under the Settlement Agreement that would benefit or reduce effects on these species include:

- providing fish passage at Soda Springs dam, improving fish passage at Rock Creek diversion dam, increasing instream flows in project bypassed reaches, enhancing spawning habitat in the Slide Creek and Soda Springs bypassed reaches, producing and stocking rainbow trout, and managing Lemolo Reservoir to restrict water level fluctuations would increase the abundance of anadromous and resident salmonids that provide food for bald eagles;
- enhancing and creating wetland habitats (e.g., at Stinkhole Pond) could increase and improve habitat for waterfowl and other birds that are prey for bald eagles;
- acquiring riparian easements in the Rock Creek Basin and enhancing habitat in the Pass Creek subbasin would be likely to directly improve nesting, foraging, and dispersal habitat for the northern spotted owl by helping preserve and improve the function of portions of LSRs and indirectly by improving habitat quality, quantity, and connectivity for prey species;
- complying with conditions outlined in the Toketee Lake bald eagle nest site plan, including seasonal restrictions on activities, would prevent disturbance to nesting eagles;
- restoring riparian habitats on White Mule and Potter Creeks, reconnecting tributary streams affected by project waterways, and enhancing and monitoring wildlife crossings of project waterways would improve habitat quality, quantity, and connectivity for small mammal prey species for the northern spotted owl; and
- modifying power poles that represent electrocution hazards,⁸⁵ scheduling

⁸⁵ In 2002, the FS reinitiated consultation with the FWS on their fiscal year 2000 program activities that included a decade-long powerline and power distribution facilities maintenance program being implemented by PacifiCorp for the North Umpqua Project (FWS 2002c). During that consultation, potential electrocution risks for bald eagles were
(continued...)

operations and maintenance activities and helicopter surveys of transmission lines near active raptor nests so they occur outside the nesting season unless the site is not occupied or nesting efforts have failed and there is no possibility of continued nesting, and continuing the *Agreement for Management of Birds on Powerlines* would reduce the risk of electrocution⁸⁶ and disturbance of bald eagles and northern spotted owls and would maintain the current level of reporting on incidences of raptor mortality.

Several funds are established under section 19 of the Settlement Agreement. The Mitigation Fund described in section 19.3 could be used by FS and BLM to do the following (FS 2001d):

- acquire and/or restore 1.6 or more miles of anadromous habitat;

⁸⁵(...continued)

discussed. PacifiCorp agreed to implement measures to minimize those risks around bald eagle nests when eaglets were considered most at risk. FWS issued a modified final BO to the FS on July 25, 2002, that incorporated the agreed-to-measures as reasonable and prudent measures to minimize and avoid the incidental take of bald eagles (FWS 2002c).

The measures in the July 25, 2002, BO are more specific than the measures described in section 13 of the Settlement Agreement, but FWS and PacifiCorp do not view them as differing either materially or significantly from those agreed to in the Settlement Agreement (FWS 2002c). Accordingly, FWS revised their preliminary Section 10(j) fish and wildlife recommendation number 12 under the FPA to harmonize with the July 2002 BO. That recommendation includes reviewing all distribution lines within 1 mile of the Toketee bald eagle nest site on the south shore of Toketee Lake and retrofitting power poles that pose an electrocution risk to bald eagles to raptor-safe standards as defined in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* (APLIC 1996). This would avoid or minimize electrocution risks to bald eagles and other raptors (Interior 2002).

⁸⁶ Note that, as discussed in section 3.5.2.4, the Commission only has jurisdiction over project transmission lines, not over distribution lines. Nonetheless, PacifiCorp's policy of constructing all new or rebuilt lines to raptor-safe standards and upgrading powerlines to such standards when electrocutions occur, as well as their agreement to assess distribution lines within 1 mile of the Toketee bald eagle nest and to retrofit any power poles that pose an electrocution risk, would effectively ensure that the electrocution risk was negligible. Such measures would benefit the bald eagle population and are consistent with the objectives of the ESA.

- acquire, restore, or construct at least 17 acres of wetland habitats similar to the rare sphagnum bogs inundated by Lemolo Reservoir;
- acquire or restore at least 84 acres of riparian reserve habitats;
- restore early seral condition terrestrial habitats elsewhere in the North Umpqua Basin to later successional conditions;
- acquire, restore, or construct approximately 64,000 square feet of anadromous spawning and rearing habitat; and
- restore resident and anadromous fish habitat on 35 miles of streams on existing or future NFS lands within the North Umpqua Basin.

These types of measures would further improve habitat conditions for bald eagles and spotted owls.

Implementation of a RRMP (see section 3.8.2.1) could result in increased recreation at Lemolo Reservoir and Toketee Lake, which could disturb the breeding and foraging activities of bald eagles. The extent and potential impacts of increased recreational activities on bald eagles are unknown. However, controlling recreation under the RRMP might benefit bald eagles by focusing recreational activity in defined areas and establishing procedures and funding for monitoring and law enforcement (PacifiCorp 2002a). Also, construction and maintenance activities, including those related to recreation, would be scheduled outside the nesting season unless nesting failure has been confirmed by the FS. Planning and scheduling such activities would be coordinated by the RCC that would be created by the Settlement Agreement. Occasional human intrusions, such as solitary hiking, should not disturb the eagles in most cases and would, thus, not have to be restricted during nesting periods. The Settlement Agreement would include funds for meeting the compliance requirements of the Umpqua National Forest plan (FS 1990), including implementing the Toketee Bald Eagle Nest Plan (FS 2000e). That plan contains guidelines for managing activities that might impact eagles. These guidelines prohibit development of new major recreation facilities near current and potential alternate nest stands, high use perching areas, and foraging sites, unless no reasonable alternative exists. It also includes continued monitoring of nest site use and productivity and timing of nesting activities. Thus, with implementation of these provisions of the Settlement Agreement, impacts of recreation on bald eagles should be negligible.

Based on the discussion above, we concluded in the BA that the Settlement Agreement would not be likely to adversely affect the bald eagle and northern spotted owl (PacifiCorp 2002a).

There is no designated critical habitat for bald eagles in the project area. The Settlement Agreement may benefit critical habitat for the northern spotted owl by the acquisition of riparian conservation easements in the Rock Creek Basin and the Pass Creek subbasin (PacifiCorp 2002a).

Subsequent to the issuance of the Draft EIS, FWS issued a concurrence letter and its BO on licensing the project consistent with the terms of the Settlement Agreement. The FWS found that most actions associated with the Settlement Agreement could be (1) undertaken without loss or degradation of habitat; (2) conducted outside of the nesting period; and (3) implemented without harming, harassing, or otherwise adversely affecting or causing incidental take of the species. For these actions, the FWS concurred with the staff's assessment that implementing those proposed Settlement Agreement activities would not be likely to adversely affect the northern spotted owl or bald eagle or adversely modify designated spotted owl critical habitat.

Based on its review of the Settlement Agreement, the BA, the draft EIS, and other information, the FWS found that some activities inherent in the operation of the project and implementation of the Settlement Agreement could result in (1) habitat loss or degradation for spotted owls and bald eagles, (2) disturbance to these species during nesting, and (3) electrocution. Specifically, activities associated with transmission line and road ROW maintenance (i.e., mowing, brush removal, tree felling and herbicide treatment) could have adverse impacts to habitat or result in disturbance to these species in the short term. For example, removal of some habitat could affect adult or juvenile spotted owls by potentially reducing their nesting, roosting, or foraging opportunities (FWS 2002b). In addition, noise from management activities within 0.25 mile of a nest during the critical nesting period might disrupt normal spotted owl behavioral patterns. Of the approximately 85,000 acres of suitable spotted owl nesting, roosting, or foraging habitat within designated critical habitat in the action area, approximately 2 acres could potentially be degraded under the proposed action by removal of hazard trees along the ROWs. FWS further estimates that 10 acres of spotted owl nesting, roosting, and foraging habitat not designated as critical habitat would be degraded or lost from removal of potential nesting and roosting trees and from noise disturbance during powerline maintenance activities. These maintenance activities could also impact eagles if the trees are or could be used as hunting perches. FWS also notes that any such incidental take due to degradation of nesting, roosting, or foraging habitat would be difficult to detect. However, section 21.5 of the Settlement Agreement would require PacifiCorp to develop site-specific construction plans in consultation with FWS and other resources agencies in order to minimize effects to listed and sensitive species caused by ground and habitat-disturbing construction activities, thereby mitigating the level of harm to these species. FWS also anticipates some level of take of bald eagles as a result of powerline operations

or maintenance, including incidental take of one bald eagle due to electrocution during the 35-year term of the proposed new license. [Note that this level of take supercedes the anticipated level of take authorized by the FWS in its July 2002 BO with the FS (FWS 2002c)].

Although FWS anticipates some incidental take of these species from the proposed actions, it concluded that the implementation of the proposed Settlement Agreement is not likely to jeopardize the continued existence of the spotted owl or bald eagle or to adversely modify designated spotted owl critical habitat. They based those conclusions on the following:

- the Forest Plan provides a well distributed set of reserves that protects suitable habitat across the range of the affected species;
- the reserves delineated in the Forest Plan provide for regeneration of additional acres of suitable habitat that are expected to provide for more effective populations within the reserves;
- the proposed projects would not preclude the recovery contributions afforded the affected species by the Forest Plan;
- the Settlement Agreement includes processes for addressing and minimizing effects to listed species as a result of construction of enhancement measures; and
- potential impacts to the species would have a minimal effect on their local and regional populations.

As discussed in section 2.2.5, the FWS has identified reasonable and prudent measures to minimize take of these species, including preventing disturbances to spotted owl and bald eagle pairs and their progeny during the nesting season and protecting the nest grove of active spotted owl pairs and active bald eagle nests. To implement these measures, FWS specified the terms and conditions listed in section 2.2.5. By taking these measures into consideration during the development and implementation of the various plans outlined in the Settlement Agreement, the level of harm to bald eagles and spotted owls should be minimized. Because these measures have been developed in consultation with PacifiCorp, agreed to by PacifiCorp, and would be prudent in protecting and preserving these species, we recommend that they be included in any license issued for the project.

Canada Lynx

The federally threatened Canada lynx has not been observed in the North Umpqua watershed. Lynx tracks have, however, been observed in adjacent watersheds. If present in the area, lynx would most likely be found in the upper portions of the watershed in

older, mature forests. Field surveys to determine lynx presence in the North Umpqua watershed have not detected any individuals of the species (FS 2002).

Although ongoing maintenance of transmission line ROWs could disturb any individual lynx present in the project area, such disturbance would be temporary and unlikely to affect lynx populations as a whole. Proposed PM&E measures that would improve wildlife connectivity (see section 3.5.2), including enhancing and monitoring wildlife crossings of project waterways and acquiring riparian conservation easements in Rock Creek Basin, would be beneficial to any lynx that might be present in the area. Implementation of the RRMP would not alter ongoing recreation activities, and they would continue to increase in the future. Increased recreation in the project area, especially activities such as snowmobiling and skiing during winter months, could disturb any lynx that were present. However, controlling recreation under the RRMP may benefit lynx by focusing recreational activity in defined areas and establishing procedures and funding for monitoring and law enforcement (PacifiCorp 2002a).

We conclude that the Settlement Agreement would not be likely to adversely affect the Canada lynx because the species is not known to occur in the project area (PacifiCorp 2002a). Proposed PM&E measures under the Settlement Agreement are likely to benefit the species should individuals be present. Because there is no designated critical habitat for the Canada lynx, there would be no effects of the Settlement Agreement on critical habitat.

FWS concurred with the Commission's determination that the proposed action would not be likely to adversely affect the lynx (FWS 2002b). It also noted that the action area lies, at least in part, within the historic range of the species and contains potential habitat for it. Thus, the FWS stated that if the presence of lynx is documented in the action area during the license period, the Commission would need to evaluate the potential impacts to the species from implementation of the proposed action and possibly reinstate formal consultation with the FWS.

Columbian White-tailed Deer

The Columbian white-tailed deer is listed as a federally endangered species, but the FWS has proposed to delist the population of this species in Douglas County where the project is located. PacifiCorp's field surveys recorded 1 to 14 deer along the transmission line ROW from Glide to Dixonville (PacifiCorp 1995a). Ongoing maintenance of the transmission line ROW and helicopter surveys could disturb the deer and remove cover habitat; however, disturbance would be temporary and short-term if it were undertaken outside the fawning season. Implementation of the proposed VMP,

increased control of noxious weeds, and increased use of native plant species in revegetation programs could benefit the Columbian white-tailed deer populations in this area by promoting more desirable plant communities. Thus, as discussed in the BA, we found that the Settlement Agreement would not be likely to adversely affect the current Columbian white-tailed deer populations (PacifiCorp 2002a). Because there is no critical habitat designated for this species, there would be no effects of the Settlement Agreement on critical habitat.

While the FWS agreed in its BO (FWS 2002b) that most actions within the Settlement Agreement would not be likely to adversely affect the Columbian white-tailed deer, certain activities associated with transmission line and road ROW maintenance could affect the deer through the loss or degradation of habitat and from disturbance during the fawning season.

FWS concluded that the proposed relicensing of the project under the terms of the Settlement Agreement would not be likely to jeopardize the continued existence of the deer. This conclusion was based on the large habitat preservation benefits provided by the Forest Plan, the Settlement Agreement's processes for addressing and minimizing effects on listed species, and the minimal effect of the Settlement Agreement on the Columbian white-tailed deer population. The FWS also stated that if certain activities occurred outside the critical fawning season of May through July, they would either result in an insignificant, short duration disturbance (e.g., mowing, brush removal) or a discountable, longer duration disturbance (e.g., construction, road maintenance and decommissioning, trail maintenance). However, during the critical fawning season, these activities could cause incidental take as the deer could not move into nearby areas to avoid the disturbance. Thus, to prevent impacts to and minimize take of deer, FWS included as terms and conditions of the incidental take statement a requirement that the applicant must perform vegetation management and powerline maintenance activities outside of the fawning period (May through July) whenever feasible. Also, any activities that must be conducted in fawning habitat during that period must be included in the annual monitoring report on all actions that are likely to adversely affect a listed species (see section 2.2.5).

By considering the above scheduling limits during the development and implementation of the VMP and power line maintenance activities, the level of harm to Columbian white-tailed deer should be minimized. Because this measure has been developed in consultation with PacifiCorp, agreed to by PacifiCorp, and would be prudent in protecting and preserving this species, we recommend that any license issued for the project require that while operating within deer fawning habitat, PacifiCorp shall perform vegetation management and powerline maintenance activities outside the fawning period

(May through July) whenever it is feasible. Activities which must be conducted in deer fawning habitat during the fawning period would be included in an annual monitoring report filed with the FWS and the Commission.

Kincaid's Lupine and Rough Popcorn Flower

Although Kincaid's lupine is found in the Umpqua National Forest, it was not observed on or near project facilities by PacifiCorp during field surveys (PacifiCorp 1995a). The rough popcorn flower is found in the Umpqua River Valley and was documented during relicensing studies in the secondary study area, but not near any project facilities. Ongoing maintenance of transmission line and road ROWs (e.g., mowing, herbicide application, vehicle use) could potentially affect these two species by destroying individual plants, if they were to occur in or near the ROWs. According to PacifiCorp (2002a), this potential effect would be considered by the RCC during the establishment of procedures for conducting transmission line and road maintenance activities such that these adverse effects would be avoided. Implementation of the VMP and TMP, noxious weed control measures, and increased use of native plant species would benefit the species by minimizing the loss of potential habitat from invasive plants and ensuring that populations of these two species are identified so that impacts to the species could be minimized.

We, therefore conclude, as discussed in the BA, that implementing the Settlement Agreement would not be likely to adversely affect Kincaid's lupine or rough popcorn flower populations (PacifiCorp 2002a). There would be no impacts on critical habitat because no critical habitat has been designated.

FWS concurred with the Commission's determination that the proposed action would not be likely to adversely affect these species (FWS 2002b). It also noted that the action area lies, at least in part, within the historic range of these species and contains potential habitat for them. Thus, the FWS stated that if the presence of Kincaid's lupine or the rough popcorn flower is documented in the action area during the license period, the potential impacts to the species from implementation of the proposed action would need to be evaluated and formal consultation with the FWS might need to be reinitiated.

NGO Alternative

As with the Settlement Agreement, numerous measures associated with the NGO Alternative are expected to minimize and mitigate project effects on coho salmon, steelhead, and sea-run cutthroat trout. These measures (e.g., increasing instream flows in bypassed reaches, limiting water level fluctuations with ramping restrictions, restoring

fluvial geomorphic processes, enhancing LWD transport, creating and improving wetlands) would create or improve habitat for listed fish species. In addition, the removal of Soda Springs dam would make historical spawning habitat available to coho salmon, steelhead, and sea-run cutthroat trout, as well as reducing predation on juvenile salmon by fish in the Soda Springs reservoir. Removal of Soda Springs dam would be likely to have some short-term adverse impacts on salmonids downstream of the dam because of increases in turbidity and sedimentation from the release of sediments behind the dam. However, the overall effects of the NGO Alternative on Oregon Coast coho salmon, steelhead, and sea-run cutthroat trout would be expected to be primarily beneficial.

Under the NGO Alternative project waterways would be covered to improve terrestrial habitat connectivity. This measure would reduce potential entrapment and entrainment of any listed species and the species on which they prey in project waterways and would prevent either direct death or reduced viability. However, because there have been no reports of entrapment of any listed species in project waterways, benefits to protected species from this measure may be limited. Creation and restoration of wetlands would improve habitats for some species of concern (e.g., stillwater amphibians).

Staff Alternative

Based on the analysis above and the BA (PacifiCorp 2002a), we conclude that project operation and maintenance under the terms of the Settlement Agreement would not affect the Oregon chub, would not be likely to adversely affect the Canada lynx, Columbian white-tailed deer, bald eagle, northern spotted owl, Kincaid's lupine, and rough popcorn flower, but may adversely affect the Oregon Coast coho salmon. Overall, implementation of the Settlement Agreement would benefit these and other candidate species that are known or may occur in the project area and would help promote their recovery.

The NMFS's BO found that implementation of the Settlement Agreement would not jeopardize the continued existence of the Oregon Coast coho salmon and included within the terms and conditions of its incidental take statement the measures specified in Section 9.4 of the Settlement Agreement. Because the staff alternative would include the measures described above for the Settlement Agreement, without significant modification, NMFS's findings would apply to the staff alternative.

The FWS concurred with staff's finding that implementation of the Settlement Agreement would not be likely to adversely affect the rough popcorn flower, Kincaid's lupine, and Canada lynx. Because the staff alternative would include the measures

described above for the Settlement Agreement, without significant modification, FWS's findings would apply to the staff alternative.

The FWS also concurred with staff's findings that implementation of most measures identified in the Settlement Agreement would not be likely to adversely affect the spotted owl, bald eagle, or Columbian white-tailed deer or spotted owl critical habitat. FWS's BO found that the issuance of a new license under the terms of the Settlement Agreement would not be likely to jeopardize the continued existence of the spotted owl, bald eagle, or the Columbian white-tailed deer and would not be likely to adversely modify designated spotted owl critical habitat. However, certain transmission line and road maintenance activities (e.g., mowing, brush removal, tree felling, herbicide application) could result in habitat loss and degradation, disturbance during nesting and fawning season, and the electrocution of raptors. The FWS's incidental take statement included reasonable and prudent measures to minimize the level of take of these species and four terms and conditions to implement the reasonable and prudent measures (see section 2.2.5). We recommend that any license issued include these measures. Because the staff alternative would include the measures described above for the Settlement Agreement, without significant modification, and the terms and conditions of FWS's incidental take statement, FWS's findings would apply to the staff alternative.

3.6.2.2 State-listed Species

This section provides an assessment of potential impacts for four state-listed species that are not federally listed: the wolverine, peregrine falcon, Umpqua mariposa lily, and wayside aster. All are known to occur in the area except the aster.

No-Action Alternative

Under the No-Action Alternative, existing project waterways would not be modified. However, it is likely that wolverines can use the existing crossings since they generally allow movement by large and medium-sized animals. Well-used game trails lead to most of the wildlife bridges, parallel many sections of the waterways, and are evident under the elevated flume trestles. However, those crossings may alter movement patterns or corridors, making individual wolverines more susceptible to predation or hunting mortality (PacifiCorp 1995a). Additionally, while it is possible that individual wolverines could be lost to entrapment, there are no records of any such deaths in project waterways. Under this alternative there would be no additional crossing opportunities for wolverines, and the potential for entrapment would continue. Maintenance activities

could disturb individual wolverine present in the project area, although such disturbance would be temporary, localized, and unlikely to affect wolverine populations as a whole.

Under the No-Action Alternative, no wetlands would be enhanced or created to improve habitat for waterfowl and other birds that are prey for peregrine falcons. However, PacifiCorp would continue to comply with the conditions outlined in the Rattlesnake Rock peregrine falcon nest site plan and the *Agreement for Management of Birds on Powerlines*.

Under the No-Action Alternative there would be no improvement to habitat conditions for the two state-listed plants or to habitat conditions in the Rock Creek and Canton Creek Basins. Ongoing maintenance of transmission line ROWs (e.g., mowing, herbicide application, vehicle use) could affect the Umpqua mariposa lily by destroying individual plants that occur in the transmission line ROW south of Glide.

Settlement Agreement

The Settlement Agreement would include a number of measures to preserve plant and animal species. Impacts on the four state-listed species are discussed below.

Peregrine Falcon

We evaluate the effects of the Settlement Agreement on birds, in general, in section 3.5.2. That assessment would include the peregrine falcon. No actions proposed in the Settlement Agreement would remove or adversely alter nesting, roosting, or foraging habitat for this species. Implementation of the Settlement Agreement would benefit populations of peregrine falcons by protecting and enhancing their nesting and foraging habitat and by minimizing potential disturbances to nesting birds. Proposed PM&E measures under the Settlement Agreement that would benefit peregrine falcons include:

- enhancing and creating wetland habitats (e.g., at Stinkhole Pond) to increase and improve habitat for waterfowl and other birds that are prey for peregrines;
- complying with conditions outlined in the Rattlesnake Rock peregrine falcon nest site plan;
- scheduling operations and maintenance activities and helicopter surveys of transmission lines near active raptor nests outside the nesting season unless the site is not occupied or nesting efforts have failed and there is no possibility of continued nesting; and
- continuing the *Agreement for Management of Birds on Powerlines*.

Thus, we conclude that the Settlement Agreement would not be likely to adversely affect peregrine falcons.

California Wolverine

Wolverines normally occupy habitats that are remote from humans and human developments, but human presence alone is not a deterrent to their presence (Banci 1994). A combination of unknown factors (e.g., food, denning habitat, solitude) likely underlies the presence or absence of self-sustaining wolverine populations. Wolverines seem to be most affected by activities that fragment and supplant their habitat, but information is insufficient to define what wilderness components they require or to determine when the impacts of a land-use activity have been excessive.

Wolverines are wide-ranging animals, and the dispersal and travel corridors that connect refugia, at least for males, likely need not have the habitat attributes necessary to support self-sustaining populations (Banci 1994). Because of their mobility, it is likely that they can use the existing waterway crossings and would use the new crossings that would be built under the Settlement Agreement.

The FS (FS 2001d) has stated that at the landscape level the wolverine is not at risk of being affected by the loss of connectivity to the extent that population viability would be a concern. At the local level proposed PM&E measures would improve wildlife connectivity (see section 3.5.2)—for example, enhancing and monitoring wildlife crossings of project waterways and acquiring riparian conservation easements in Rock Creek Basin. Thus, these measures could be beneficial to any wolverines that might be present in the area.

Maintenance activities could disturb individual wolverine present in the project area. However, disturbance would be temporary, localized, and unlikely to affect wolverine populations as a whole.

Implementation of the RRMP would not alter ongoing recreation activities, and they would likely continue to increase in the future. Increased recreation in the project area, especially activities such as snowmobiling and skiing during winter months, could disturb individual animals that are present.

Several aspects of the Settlement Agreement could be beneficial to any wolverines that might be present in the area. Thus, we conclude that the Settlement Agreement would not be likely to adversely affect the species.

Umpqua Mariposa Lily and Wayside Aster

A population of more than 600 Umpqua mariposa lily plants was found by PacifiCorp during field surveys under or adjacent to a 2-mile segment of transmission line ROW south of Glide (PacifiCorp 1995a). Ongoing maintenance of transmission line ROWs (e.g., mowing, herbicide application, vehicle use) could affect this species by destroying individual plants that occur in the ROW. This potential effect would be considered by the RCC during the establishment of procedures for conducting transmission line maintenance activities such that these adverse effects would be avoided. Implementation of the VMP, including noxious weed control measures and increased use of native plant species, would benefit the species by minimizing the loss of potential habitat from invasive plants and ensuring that populations of this species are identified so that impacts to the species can be minimized.

The wayside aster, a state-listed threatened species, was not observed in the project area. We conclude that implementing the Settlement Agreement would not affect the aster and would not be likely to adversely affect the lily species.

NGO Alternative

As with the Settlement Agreement, numerous measures associated with the NGO Alternative are expected to minimize and mitigate project effects on state-listed species. Under the NGO Alternative project waterways would be covered to improve terrestrial habitat connectivity. This measure would reduce potential entrapment and entrainment of wolverines in project waterways. However, because there have been no reports of wolverine entrapment in project waterways, benefits to the species from this measure may be limited. Benefits from enhancing and creating wetland habitats to increase and improve habitat for waterfowl and other birds that are prey for peregrine falcons would be similar to those under the Settlement Agreement.

The NGO alternative would require the development of a VMP that would be similar to that included under the Settlement Agreement (see section 3.5.2.1). The NGO's VMP would require vegetation management in the transmission line corridor to be reviewed and agreed upon annually by the FS. That review would include an analysis of potential habitats of and effects to special status species that occur within or adjacent to the treatment area. Since the vegetation management requirements would be very similar under the NGO and Settlement Agreement alternatives, the impacts of the NGO alternative on the Umpqua mariposa lily that occurs in and near some of the transmission lines would be generally the same as described above for the Settlement Agreement. As

the wayside aster was not observed in the project area, there would be no effects from the NGO alternative on that species.

Staff Alternative

Based on the analysis above, we conclude that, overall, implementation of the Settlement Agreement provisions would benefit the state-listed species that are known or may occur in the project area and would help promote their recovery. We have not identified any additional measures to address state-listed species. Therefore, we conclude that the impacts described above for the Settlement Agreement would be the same as those under the Staff Alternative.

3.6.2.3 Other rare species

A number of other rare species (e.g., FS sensitive species, BLM sensitive and assessment species, survey and manage species) are known to occur in the project area. The impacts of the project on these are discussed in section 3.5.2.5 and Appendix C.

3.7 CULTURAL RESOURCES

3.7.1 Affected Environment

Three types of cultural resources potentially exist in the North Umpqua Project area—prehistoric archaeological resources, historic cultural resources, and traditional cultural properties (TCP). For each type, PacifiCorp has identified an area of potential effect (APE), which is defined as “the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties if any such properties exist” (36 CFR 800). For prehistoric archaeological resources, the APE includes the existing project, proposed new facilities, access routes, and sediment disposal sites. For historical cultural resources and TCPs, the APE includes these same areas, plus a 0.25-mile corridor along the transmission line ROW to include potential visual impacts to historic resources (PacifiCorp 1995a).

PacifiCorp conducted archaeological field studies and records research to identify prehistoric archaeological resources in the project vicinity. The results of these studies are described below in terms of isolated finds and archaeological sites. To protect the resources of these sites, locations are not identified in this EIS.

Isolated finds are localities in which fewer than 10 artifacts are recovered from the surface. PacifiCorp located a total of 40 isolated finds in the APE. Of the 40 finds, 12 were examined beneath the surface—seven were found to have sufficient artifacts to be classified as archaeological sites, two were found to be portions of previously recorded archaeological sites, and three remain as isolated finds. Based on archaeological examinations of these locations, 31 isolated finds remain in the APE (PacifiCorp 1995a).

The FS and BLM had previously recorded 23 archaeological sites within the primary study area prior to the initiation of the study by PacifiCorp. PacifiCorp's inventories discovered an additional 19 archaeological sites within the primary study area. Through FS inventories, an additional 15 archaeological sites have been recorded since PacifiCorp's inventories. Boundary determinations conducted by project archaeologists at sites located in the APE found that the vast majority of sites contain cultural deposits of a type and in sufficient density to be considered significant. PacifiCorp believes that a formal evaluation of these sites would likely find them eligible for *National Register of Historic Places* (NRHP) listing (PacifiCorp 1995a).

Historic cultural resources include built resources related to Euro-American settlement and development. Through literature reviews and subsequent field surveys, PacifiCorp located a total of 22 historic cultural resources within the APE and documented them using Oregon's standardized State Inventory of Historic Places form. Of the 22 historic cultural resources, 12 are "hydro resources" (i.e., North Umpqua Project facilities, building groups, and transmission lines) and 10 are "non-hydro resources" (i.e., buildings and structures related to Euro-American settlement of the region) (PacifiCorp 1995a).

PacifiCorp assigned the historic cultural resources in the APE high, medium, or low ratings based on their significance and integrity using the State of Oregon's criteria for evaluating historic resources. Approximately half of the non-hydro resources and most of the hydro resources were determined to have a high level of significance and would likely be eligible for NRHP listing (PacifiCorp 1995a).

TCPs are sites, areas, or resources that have historic and continuing cultural significance for one or more contemporary peoples. Research into the presence of TCPs is usually based on contacts with groups who have traditionally occupied an area to determine if features or sites remain that are important to their cultures. PacifiCorp has contacted three Native American tribes that have traditional interests in the project vicinity—the Confederated Tribes of Grand Ronde, the Confederated Tribes of Siletz Indians, and the Cow Creek Band of Umpqua Tribe of Indians—to discuss potential tribal concerns about the project. During the course of these contacts, which are described in

detail in PacifiCorp's license application, no TCPs were identified within the project boundary (PacifiCorp 1995a).

3.7.2 Environmental Impacts and Recommendations

3.7.2.1 Archaeological and Historic Resources

One issue identified during scoping is the potential effect of project relicensing on prehistoric archaeological resources and historic cultural resources that are listed or are eligible for listing in the NRHP. PacifiCorp has identified three types of potential effects on archaeological and historic resources (PacifiCorp 1995a):

1. effects of ground-disturbing activities on archaeological resources;
2. effects of accidental water releases on archaeological resources; and
3. effects of modifications to project facilities on historic resources.

No-Action Alternative

Under the No-Action Alternative, there would be no new effects on archaeological or historic resources because the project would continue to operate under the terms and conditions of the existing license. PacifiCorp and the FS would continue to manage cultural resources in the project area as they do now, and the measures included in the Settlement Agreement to provide for data recovery, public outreach, monitoring, and cultural resource training would continue to be implemented outside of the Commission license.

Settlement Agreement

Under the Settlement Agreement, PacifiCorp would implement seven sets of activities for cultural resources:

1. By 2003, PacifiCorp would finalize the draft CRMP it developed as part of its license application and submit it for FS approval. The final CRMP, which would include PacifiCorp's *Historic Buildings Plan*, would define and describe the manner in which archaeological and historic resources would be protected and how impacts to those resources would be mitigated over the term of the new license. The final CRMP would also define the consultation process among the FS, BLM, the Oregon SHPO, the ACHP, and the affected tribes. PacifiCorp would implement the final CRMP upon the issuance of the new license.

2. PacifiCorp would implement the final CRMP through the execution of a Programmatic Agreement in consultation with the Commission, SHPO, ACHP, FS, and BLM. The PA would be consistent with the terms and conditions of the CRMP.⁸⁷
3. PacifiCorp would conduct archaeological site discovery surveys prior to any ground-disturbing activities in accordance with the FS *Umpqua National Forest Heritage Inventory Survey* of April 2000, as amended.
4. PacifiCorp would protect, restore, or recover data from archaeological sites as provided in site-specific plans approved by the SHPO, FS, and BLM. The schedule of recovery from known sites would be established in the final CRMP.
5. PacifiCorp would provide public outreach, interpretive displays, and cultural resource sensitivity training to company personnel as identified in the CRMP.
6. Upon implementation of the CRMP, PacifiCorp would conduct a monitoring program of known cultural sites pursuant to the final CRMP. This would include annual monitoring of known sites and project activities that are identified in PacifiCorp's *Cultural Resource Survey*, maintained as confidential records under the National Historic Preservation Act (NHPA) (held by the FS, SHPO, and PacifiCorp), and located in high probability zones (identified in the FS *Umpqua National Forest Heritage Inventory Survey* of April 2000, as amended). Looted sites, as identified in the CRMP, may require monitoring on intervals that would be determined among PacifiCorp, the BLM, and the FS on a site-specific basis.
7. PacifiCorp would continue to coordinate all operations and maintenance actions through the FS and BLM prior to issuance of a new license. A program for coordinating operations and maintenance would be established in the final CRMP.

Implementing the final CRMP and the final PA as part of the larger Settlement Agreement would help PacifiCorp achieve the cultural resource protection goals outlined in the draft CRMP (PacifiCorp 1995a):

1. minimize the potential for effects of the existing project and proposed operations changes on cultural resources, and coordinate cultural management programs with ongoing maintenance and operations activities within PacifiCorp;
2. avoid or mitigate impacts on cultural resources from proposed modifications to the project, including construction staging areas and construction activities;

⁸⁷ The PA, which was filed with the Commission on February 27, 2003, was signed by Oregon SHPO, PacifiCorp, FS, BLM, and the Cow Creek Band of the Umpqua Tribe of Indians. Due to the lack of disagreement among the consulting parties, the Advisory Council on Historic Preservation decided not to participate in the PA.

3. address agency issues and coordinate cultural management programs with the responsible land management and historic preservation agencies under the requirements of Section 106 of the NHPA;
4. demonstrate good stewardship of cultural resources by providing programs to identify undiscovered cultural resources, reduce vandalism, support enhancement opportunities, and encourage public awareness and stewardship of cultural resources;
5. provide cost-effective measures for cultural resources that balance with other resources and meet or exceed existing environmental regulations; and
6. maintain compatibility with the goals of water use and quality, aquatic resources, terrestrial resources, recreation, aesthetics, land management, socioeconomics, and project facilities and operations.

Also, by implementing the final CRMP and the final PA, PacifiCorp would help ensure compliance with the following plans, laws, and policies intended to protect cultural resources:

- *Umpqua National Forest Land and Resource Management Plan* (FS 1990);
- American Antiquities Act of 1906 (34 Stat. 225);
- Historic Sites Act of 1935 (P.L. 74-292. 49 Stat. 6660);
- Reservoir Salvage Act of 1960 (64 Stat. 220, 221) as amended by the Archaeological and Historic Preservation Act of 1974 (P.L. 93-291) (P.L. 86-253; 74 Stat. 220, 221; 16 U.S.C. 469; P.L. 93-291; 88 Stat. 174; 16 U.S.C. 469);
- National Historic Preservation Act of 1966 (36 CFR Part 800) as amended in 1992;
- National Environmental Policy Act of 1969 (P.L. 91-190);
- Executive Order 11593 "Protection and Enhancement of the Cultural Environment," Federal Register 8921, May 13, 1971;
- Federal Land Policy and Management Act of 1976 (90 Stat. 2743);
- American Indian Religious Freedom Act of 1978 (P.L. 95-341, 42 U.S.C. 1996);
- Archaeological Resources Protection Act of 1979 (ARPA) (P.L. 96-95); and
- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (P.L. 101-601; 104 Stat. 3048; 25 U.S.C. 3001).

Specifically, PacifiCorp would conduct archaeological surveys before any ground-disturbing activities in accordance with the *Umpqua National Forest Heritage Inventory Strategy*, April 2000, as amended. This strategy fulfills requirements set forth in the *Programmatic Agreement Among the U.S. Department of Agriculture (USDA) Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic*

Preservation Officer Regarding Cultural Resources Management on National Forests in the State of Oregon (NFS No. 94-06-59-16).

PacifiCorp would protect, restore, and recover data from archaeological sites as provided in site-specific plans approved by the SHPO, FS, and BLM. By fulfilling this requirement, FS and BLM would be fulfilling their obligations under the NHPA to take into account the effects of their undertakings on properties included in or eligible for the NRHP.

PacifiCorp would provide for public outreach, interpretive displays, and cultural resource sensitivity training to company personnel as identified in the CRMP. These measures would fulfill FS and BLM obligations under Section 110 of the NHPA and ARPA.

The proposed monitoring program for known sites, looted sites, and project activities would satisfy requirements of ARPA, the *Umpqua National Forest Land and Resource Management Plan* (FS 1990), and the *Programmatic Agreement Among the USDA Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Officer Regarding Cultural Resources Management on National Forests in the State of Oregon* (NFS No. 94-06-59-16).

We have reviewed PacifiCorp's draft CRMP, the agency comments on the draft CRMP, and the Settlement Agreement and conclude that the measures proposed by PacifiCorp and the agencies would prevent significant impacts to cultural resources and mitigate for any minor impacts. The final CRMP would outline PacifiCorp's and the agencies' goals, standards, and guidelines for managing cultural resources. These goals, standards, and guidelines would be met through the management procedures PacifiCorp and the agencies have identified, including procedures for: (1) staffing and training; (2) reviewing operational and construction activities; (3) reviewing alterations to or removal of project facilities; (4) providing interpretation and education; (5) controlling looting and vandalism; (6) conducting annual surveys; (7) planning and implementing mitigation measures; and (8) maintaining records. By implementing these procedures (as detailed preliminarily in the draft CRMP and to be finalized in the completed CRMP), PacifiCorp would prevent significant impacts to cultural resources.

Some of the more important CRMP procedures to be implemented by PacifiCorp are discussed in the Settlement Agreement. By conducting archaeological site discovery surveys prior to any ground-disturbing activities, PacifiCorp would prevent impacts to undiscovered resources. If new sites are discovered during these surveys, PacifiCorp would avoid or minimize impacts by consulting with the SHPO, FS, and BLM to

determine whether to protect, restore, or recover data from the sites. PacifiCorp would protect known cultural resources by annual monitoring of known sites and project activities, with more frequent monitoring of looted sites.

We conclude that the measures proposed by PacifiCorp and the agencies in the CRMP and the Settlement Agreement and the final CRMP would prevent significant impacts to cultural resources and mitigate for minor impacts.

NGO Alternative

The Conservation Groups have not commented on cultural resources. However, the NGO Alternative includes removing Soda Springs dam, an action that would significantly affect cultural resources because the dam contributes to a historic property that is eligible for listing in the NRHP. If Soda Springs dam is removed, appropriate mitigation (probably Historic American Buildings Survey documentation by photography and scaled drawings) would be necessary.

Staff Alternative

The Staff Alternative includes all of the elements in the Settlement Agreement, and therefore, the benefits of the Staff Alternative would be the same as those under the Settlement Agreement.

3.7.2.2 Traditional Cultural Properties

A second cultural resources issue that was identified during scoping is the potential effect of project relicensing on TCPs of the Confederated Tribes of Grande Ronde, the Confederated Tribes of the Siletz Indians, and the Cow Creek Band of Umpqua Tribe of Indians.

No-Action Alternative

Under the No-Action Alternative, there would be no effects on TCPs because none have been identified within the project boundary and the project would continue to operate under the terms and conditions of the existing license. PacifiCorp and the FS would continue to manage cultural resources in the project area as they do now, and the measures included in the Settlement Agreement to protect cultural resources would not be implemented under a Commission license.

Settlement Agreement

PacifiCorp has contacted each of the potentially affected tribes during the relicensing process, and no TCPs have been identified within the project boundary (PacifiCorp 1995a). Therefore, the CRMP and the Settlement Agreement do not specifically address TCPs.

In its preliminary Section 4(e) conditions, the BLM emphasized the need to fulfill its "responsibilities to the sovereign tribes which have heritage and religious interests in the resources" on BLM lands within the project boundary, pursuant to such laws as NAGPRA, ARPA, and the Federal Land Policy and Management Act (BLM 2001). BLM has identified six archeological sites on their lands that would be of potential tribal interest, and acknowledge that through the development and implementation of the final CRMP, existing adverse effects to these six sites could be reduced. This reduction in impacts would, in turn, fulfil BLM's responsibilities in regards to addressing issues associated with cultural resources that have Native American heritage and religious value.

We do not expect that relicensing the North Umpqua Project would result in significant impacts to TCPs because none have been identified within the project boundary. Further, impacts are not likely because the land on which existing project facilities are located is already disturbed and relicensing would involve only minor additional land disturbance.

Although we have no additional recommendations for avoiding or mitigating impacts to TCPs, we do agree with the BLM Section 4(e) condition, in reference to section 18 of the Settlement Agreement, that the final CRMP include provisions to protect or minimize project-related adverse effects to cultural resources that might have Native American heritage and religious value, and that the BLM retain its responsibility for tribal consultation on issues involving BLM lands within the APE.⁸⁸ The FS retains responsibility for Tribal consultation on all issues involving FS lands within the APE. Under ARPA and the NHPA, the FS would consult with the Tribes prior to data recovery and before permit issuance to PacifiCorp for any of the data recovery projects, surveys, or other undertakings requiring an ARPA permit.

⁸⁸ Our standard PA for filing and implementation of the final CRMP would also acknowledge both the BLM and FS responsibilities as land management agencies for compliance with various laws, such as ARPA and NAGPRA, and NHPA on their lands.

Along these lines, we recommend that PacifiCorp add measures to the final CRMP for their consultation with the Confederated Tribes of Grande Ronde, the Confederated Tribes of the Siletz Indians, and the Cow Creek Band of Umpqua Tribe of Indians, if and when cultural resources having Native American heritage and religious value are identified within the APE.

NGO Alternative

The Conservation Groups have not commented on TCPs or other cultural resources. Therefore, the benefits to TCPs would be the same under the NGO Alternative as under the Settlement Agreement.

Staff Alternative

Because the Staff Alternative includes all of the elements in the Settlement Agreement, the benefits of the Staff Alternative would be the same as those under the Settlement Agreement.

3.8 RECREATION

3.8.1 Affected Environment

The North Umpqua Project provides some of the most popular recreational sites and facilities in the region. PacifiCorp groups the project's recreational resources into three subareas: Lemolo, Toketee, and River.

The Lemolo subarea includes the recreational facilities associated with Lemolo Reservoir, Stump Lake, and the Clearwater No. 1 forebay (see figure 6.1-2 in PacifiCorp 1995a). These project impoundments are available for uses such as boating, angling, hiking, camping, swimming, and nature observation. Public access to the shorelines of these impoundments is virtually unlimited, except in a few areas where public safety is a concern (PacifiCorp 1995a).

The Toketee subarea includes the recreational facilities associated with Toketee Lake, Soda Springs Reservoir, the Lemolo No. 2 forebay, and the Clearwater No. 2 forebay (see figure 6.1-3 in PacifiCorp 1995a). These project impoundments are available for recreation, and public access is limited only where public safety is a concern and where certain angling restrictions apply.

The River subarea is located along the 33.8-mile stretch of the North Umpqua River from Soda Springs powerhouse downstream to Rock Creek. This federally designated Wild and Scenic River corridor⁸⁹ contains FS and BLM campgrounds and day-use areas, whitewater boater put-in/take-out sites, and the North Umpqua Trail. Recreational facilities in this area are shown in figure 6.1-4 in PacifiCorp 1995a. PacifiCorp facilities are located upstream of the designated Wild and Scenic River.

PacifiCorp conducted studies in 1992 and 1993 to identify demand for recreation in the project region, assess levels of recreational use and visitor attitudes, and determine the carrying capacity of existing recreational facilities. PacifiCorp reports that in 1990, an estimated 645,400 recreation users [351,200 total recreation visitor days (RVD)] visited in the vicinity of the Lemolo and Toketee subareas. For purposes of comparison, these RVDs combined represented only 25 percent of RVDs in the Diamond Lake Recreation Area, which is located about 8.5 miles south of Lemolo Reservoir. In the River subarea, 1990 recreational use levels were estimated at approximately 213,100 RVDs (PacifiCorp 1995a).

Throughout the project area, camping (83 percent of activity participation) and lake fishing (58 percent) are the most popular recreational activities. Most recreational use occurs in the summer months; the distribution of use by month is presented in figures 6.1-5 through 6.1-7 of the license application (PacifiCorp 1995a). These figures indicate that lake angling in the Lemolo and Toketee subareas peaks in May, and that river angling peaks in August. Boating on the lakes in the Lemolo and Toketee subareas peaks in May and July, but on the river boating peaks in August (PacifiCorp 1995a).

Because recreational use is highest during the summer months, the following paragraphs provide more information about three of the most popular summer activities: camping, river angling, and whitewater boating.

Camping: Of the campsites PacifiCorp surveyed, five FS campgrounds and one BLM campground had the highest monthly average occupancy rates during the summer season:

⁸⁹ This section of the North Umpqua River was designated as a Recreational River for its Outstandingly Remarkable Values (ORV): fisheries, water quality and quantity, recreation, scenic, and cultural [FS, BLM, and Oregon State Parks & Recreation Department (OSPRD) 1992)].

Poole Creek (FS)	27-62 percent occupied
East Lemolo (FS)	50-90 percent occupied
Toketee Lake (FS)	20-39 percent occupied
Horseshoe Bend (FS)	20-60 percent occupied
Susan Creek (BLM)	33-73 percent occupied
Island (FS)	43-71 percent occupied

A 40 percent average summer season occupancy rate indicates an overall optimal use level (FS 1990).

River Angling: River angling occurs year-round on the North Umpqua River, but is concentrated during the mid- to late-summer months when low water levels allow for wading and the summer steelhead run occurs. Only fly fishing is permitted along the 33.8-mile Recreational River from Soda Springs powerhouse to Rock Creek (bait fishing is allowed in the river segment beginning a few hundred feet above the Rock Creek confluence and extending to the west) (PacifiCorp 1995a).

PacifiCorp has conducted surveys of fly anglers to determine optimum angling conditions for the North Umpqua River. These surveys indicate that:

1. Flows above 1,500 cfs and below 600 cfs provide lower quality fly-angling opportunities and are characterized as "marginal" to "unacceptable."
2. Flows above 2,000 cfs are of particularly low quality, and flows above 3,000 cfs may even be characterized as "unfishable" for steelhead.
3. The only flow assessed that was clearly in the optimal range is 1,100 cfs. Discussions with anglers suggest that flows between 800 and 1,200 cfs are of similar high quality (PacifiCorp 1995a).

Whitewater Boating: During the summer of 1993, the BLM, FS, and PacifiCorp cooperatively monitored whitewater boating (non-motorized) on the North Umpqua River from Soda Springs powerhouse downstream to Rock Creek. The total number of whitewater boaters observed was 5,422. This number was comprised of approximately 2,368 (44 percent) boaters from commercial outfitters (plus an estimated 471 guides) and 3,054 (56 percent) private users (PacifiCorp 1995a).

Most boating activity (79 percent) occurred between Soda Springs powerhouse and Gravel Bin (RM 53.6). Of the boaters, 46 percent put in at Boulder Flat campground (RM 67.9), 13 percent put in at the Horseshoe Bend boater access area (RM 60.9), and 4 percent (excluding study participants) put in at Soda Springs powerhouse. The remainder put in at various points along the river where access from SR 138 is available.

Gravel Bin was the primary take-out location, receiving 58 percent of the use. Boaters were also likely to take out at the Horseshoe Bend boater access point or at the campground (PacifiCorp 1995a).

PacifiCorp conducted an on-the-water whitewater boater study for eight flow levels between 590 cfs and 3,000 cfs during 1992 and 1993. Subsequently, PacifiCorp conducted a written follow-up survey of the on-the-water study participants to review flows from 500 cfs to 5,000 cfs. Based on these studies, an overall acceptability curve was plotted for all boaters participating in the assessment. Flows below 900 cfs were considered “marginal” to “unacceptable.” Flows ranging from 1,000 to 2,300 cfs were increasingly “acceptable.” Flows from 2,300 to 3,000 cfs were rated “totally acceptable” by most participants. Above 3,000 cfs, the flow is too large and acceptability declines (PacifiCorp 1995a; Shelby, Whittaker, and Roppe 1998).

3.8.2 Environmental Impacts and Recommendations

3.8.2.1 Recreation Resource Management Plan

The effect of PacifiCorp’s proposed enhancements in meeting both current and future recreational facility needs at the project developments was raised as an issue during scoping.

No-Action Alternative

Under the No-Action Alternative, there would be no new effects on existing recreational resources because the project would continue to operate under the terms and conditions of the existing license. PacifiCorp and the FS would continue to manage recreation in the project area as they do now, and the measures included in the Settlement Agreement (see discussion below) would not be implemented.

Settlement Agreement

The goal of the parties to the Settlement Agreement for recreation resources is to develop and implement a RRMP that addresses planning, design, construction, renovation, operation, maintenance, and monitoring of existing and future public outdoor recreation activities and programs in the project vicinity. The recreation management objectives of the Settlement Agreement include:

- establishing a recreation operation and maintenance program that defines the responsibilities of PacifiCorp and the FS;

- mitigating adverse effects of the project on existing recreational activities and facilities and reducing adverse environmental effects of public recreation facilities;
- providing safe public access to and use of project water bodies and shorelines;
- providing for accomplishment of deferred maintenance, enhancement, and future expansion (as needed and appropriate) of recreation facilities;
- establishing a recreation monitoring program; and
- establishing standards for the operation and maintenance of recreation facilities.

Under the Settlement Agreement, PacifiCorp would develop and implement a final RRMP. PacifiCorp would complete the final RRMP in consultation with the FS, ODFW, and the Oregon State Marine Board within 15 months after the effective date of the new license. PacifiCorp would submit the final RRMP for FS approval, then implement the specific measures detailed in the RRMP. PacifiCorp would fund recreation-associated costs as identified in the plan in accordance with schedule 17.5 of the Settlement Agreement.

Section 17.8 of the Settlement Agreement describes the funding mechanisms for capital improvements at existing recreation facilities and future expansion. In accordance with the terms and schedule of the RRMP and subject to the cost limitations in schedule 17.1 of the Settlement Agreement, PacifiCorp would provide the capital improvements listed on schedule 17.5 of the Settlement Agreement. PacifiCorp would cost-share in recreation enhancements as listed on schedule 17.1, according to the terms and schedule of the RRMP. All operations, maintenance, and capital projects would be coordinated with the FS before, during, and after implementation. For deferred backlog of capital improvements as listed in schedule 17.1, PacifiCorp would provide 50 percent of funding in three equal payments to the FS made on or before January 15 of each year from 2002 through 2004 and the remainder by the third anniversary of the new license or 2007, whichever is earlier. The scope of the improvements would be based on the outcome of any required NEPA analysis (section 21.7 of the Settlement Agreement) and subject to final approval from the FS.

Commencing in 2004, PacifiCorp would provide reimbursement funding to the FS for operations, maintenance, and replacement of facilities at recreation sites identified in the RRMP. The funding would cover direct and indirect costs for summer dispersed recreation management⁹⁰ and year-round developed recreation management for the project-induced recreation identified in the RRMP. The funding level would be sufficient

⁹⁰ Dispersed, undeveloped recreation areas adjacent to project impoundments, as identified in Schedule 17.5 of the Settlement Agreement, would be included in the operations and maintenance funding.

for the FS to maintain recreation facilities to standards set forth in the FS's *Meaningful Measures Recreation Business Management System of the Forest Service, 2000 User Guide*. At a minimum, the critical *Meaningful Measures* standards would be met including health and cleanliness, safety and security, setting responsiveness, and condition of facilities.

If the FS collects fees at PacifiCorp-funded facilities and has the Congressional approval to retain said fees, then the collected fees would be directly spent on either maintenance or capital improvements at that facility or as directed by Congress. Funds collected, less overhead retained and expended at the site by the FS as provided by statute, would commensurately reduce PacifiCorp's annual obligation at that site. These fees would contribute to meeting the *Meaningful Measures* standards described above.

Under the Settlement Agreement, public access would be permitted to project reservoirs, stream channels, and adjacent lands for wildlife viewing, angling, hunting, and other recreational purposes (subject to PacifiCorp's Transportation Management Plan and restrictions for public safety, as determined by PacifiCorp and the FS in consultation with ODFW, and consistent with Commission requirements). In addition, commencing in 2004, PacifiCorp would provide annual funds in amounts identified in schedule 17.1 of the Settlement Agreement to the FS for public information programs and visitor center operations and maintenance.

The Settlement Agreement also contains provisions for law enforcement, annual monitoring, and forest plan compliance. Commencing in 2004, PacifiCorp would pay the FS for law enforcement related to land- and water-based recreation activities within project boundaries. The need for law enforcement coverage would be evaluated by PacifiCorp and the FS, in consultation with appropriate law enforcement agencies, upon the new license becoming final and every 3 years thereafter, and adjustments would be made as agreed by PacifiCorp and the FS. Providing for a land-based law enforcement officer and a water-based law enforcement officer on weekends and major holidays between the third weekend in April through the end of October would be the upper limit of the funding provision.

PacifiCorp would also fund recreation monitoring by the FS in accordance with the terms of the RRMP as provided in schedule 17.1 of the Settlement Agreement. Beginning with the effective date of any new license, PacifiCorp would provide funds (\$300,000) for meeting the compliance requirements of the Umpqua National Forest Plan within the project boundaries. PacifiCorp would provide 50 percent of the funds by the date the new license becomes final or 2004, whichever is earlier, and the remainder by the third anniversary of the new license or 2007, whichever is earlier.

The draft RRMP developed by PacifiCorp and submitted with its license application was the product of a 2-year study of recreation demand, supply, preferences, and conditions and a consensus-based process of evaluating several recreation alternatives and identifying a preferred alternative. Participants in the evaluation process included the National Park Service, Oregon State Parks, the FS, Douglas County, and PacifiCorp. The draft RRMP included programs for recreation facility enhancement, operations and maintenance, and monitoring. Under the Settlement Agreement, the terms of the Settlement Agreement would be incorporated into a final RRMP. The final RRMP would further clarify roles and responsibilities among PacifiCorp and the FS, and analyze and implement direction contained in the Forest Plan. Details on specific facility enhancements are outlined in schedule 17.5 of the Settlement Agreement and the draft RRMP.

Specifically, implementing a final RRMP in accordance with the Settlement Agreement provisions would address the potential need to provide more campground capacity within the project boundaries. As discussed in section 3.8.1, camping is the most popular recreational activity in the project area, with 83 percent of total activity participation. The FS indicates that a 40 percent average summer season occupancy rate indicates an overall optimal use level for campgrounds (FS 1990), and the Poole Creek and East Lemolo campgrounds sometimes exceed this occupancy rate (see section 3.8.1). PacifiCorp's potential campground capacity expansions at Toketee Lake, Poole Creek, and Lemolo Reservoir would address the likely need for additional capacity during the next 30 years.⁹¹

Implementing a final RRMP would also address the potential need to accommodate more lake fishing within the project boundaries. As discussed in section 3.8.1, lake fishing is the second most popular recreational activity in the project area, with 58 percent of total activity participation. PacifiCorp's proposed improvements at Lemolo Reservoir, Toketee Lake, and the Lemolo No. 2 forebay (e.g., construct and fund boat ramp and/or floating dock improvements at all three sites, construct and fund a new Toketee Lake ADA angler access pier) would help meet expected increases in demand during the next 30 years.

⁹¹ The Settlement Agreement (schedule 17.5) indicates the use threshold at which the proposed campground improvements would be implemented at Toketee Lake and Lemolo Reservoir (i.e., annual seasonal capacity of 60 percent in developed sites for 3 consecutive years).

As discussed in detail in section 3.8.2.3, PacifiCorp's proposal to fund a portion of the Boulder Flat boat launch site improvements would address the effects of relicensing on whitewater boating downstream of Soda Springs powerhouse.

Several provisions to ensure compliance with the ADA would be included in the final RRMP. These include ADA toilets at numerous locations, and ADA access and site improvements at the Toketee Lake, Inlet, Bunker Hill, East Lemolo, and Poole Creek campgrounds.

In addition to facility enhancements, the RRMP as modified by the Settlement Agreement would provide for continued public access to project resources, and funding for operation and maintenance, monitoring, public information and education, forest plan compliance, and law enforcement. The recreation monitoring program would allow PacifiCorp and the FS to adopt an "adaptive management" approach to identifying and addressing issues and needs as they become evident in the future. This would allow for the most effective and efficient use of future recreational funding. Funding for annual recreation facility operation and maintenance (O&M) and litter/trash control within the project boundary for the license term would help address the impacts of project-induced recreation on FS recreational facilities located within the project boundaries.

The Settlement Agreement helps ensure continued public access to the project water bodies and adjacent lands for a variety of recreational activities subject to public safety constraints. To help ensure recreational safety, PacifiCorp would provide the project reservoir level, lake, and forebay water level fluctuation information and user safety warnings described in the RRMP.

In summary, the RRMP as modified by the Settlement Agreement would prevent adverse effects to existing recreational resources and enhance recreational opportunities in the project vicinity.

NGO Alternative

The Conservation Groups have not commented on the effect of project relicensing on existing or future recreational facilities. AWA has provided comments and recommendations on the project's effects on whitewater boating (AWA 2001), and we discuss them in section 3.8.2.3 below. Therefore, the benefits to existing or proposed recreation facilities under the NGO Alternative would be the same as the benefits under the Settlement Agreement.

Staff Alternative

The benefits under the Staff Alternative would be the same as the benefits described under the Settlement Agreement.

3.8.2.2 Maintenance of Lemolo Reservoir Levels

Water levels at Lemolo Reservoir can affect public use such as boat ramp accessibility during the recreation season.

No-Action Alternative

Under the No-Action Alternative, there would be no new effects on existing water levels at Lemolo Reservoir because the project would continue to operate under the terms and conditions of the existing license. PacifiCorp would continue to maintain the reservoir at current levels, and the measures included in the Settlement Agreement (see discussion below) would not be implemented.

Settlement Agreement

Under the Settlement Agreement, commencing upon the issuance of any new license, and thereafter for the term of the new license, PacifiCorp would limit annual drawdown of Lemolo Reservoir to 25 feet below an approximate elevation of 4,148.5 feet amsl (to a maximum drawdown elevation of 4,123.5 feet amsl). Commencing by the first anniversary of any new license, PacifiCorp would restrict water level fluctuations of Lemolo Reservoir due to drawdowns to not more than 0.5 feet per day as measured at the staff gage on the outlet structure of Lemolo dam. Except as provided in section 9.3 of the Settlement Agreement, PacifiCorp would maintain Lemolo Reservoir at or near full pool (elevation 4,148.5 feet amsl) throughout the peak recreation season of Memorial Day through Labor Day. Also, PacifiCorp would ensure that the Lemolo Reservoir boat ramp is accessible by the opening day of fishing season (the fourth Saturday in April), barring any unusual natural hydrological events.

These measures would address concerns about the effects of reservoir level maintenance changes on public use of Lemolo Reservoir. Restricting water level fluctuations to not more than 0.5 feet per day would help minimize the adverse effects of rapid drawdowns on fish in the reservoir, thereby helping maintain the existing recreational fishery. Ensuring that the Lemolo Reservoir boat ramp is accessible by the opening day of fishing season and maintaining the reservoir at or near full pool throughout the peak recreation season would provide consistent and safe public access to the reservoir for the term of the new license.

NGO Alternative

The Conservation Groups have not commented on the effect of proposed reservoir level maintenance changes at Lemolo Reservoir.

Staff Alternative

The benefits under the Staff Alternative would be the same as the benefits described under the Settlement Agreement.

3.8.2.3 Effects on Whitewater Boating

During scoping, participants expressed concern about the potential effects of various alternatives for project operation on whitewater boating downstream of Soda Springs powerhouse. AWA states that the Settlement Agreement fails to make provisions for whitewater boating flows, flow information, or access to reaches directly affected by the project both downstream and upstream of the Soda Springs Development.

AWA contends that PacifiCorp does not currently provide any public information about releases from Soda Springs powerhouse and that boaters must rely on information from a gage more than 16 miles downstream (i.e., the Glide gage). AWA recommends that PacifiCorp be required to provide accurate, timely, and accessible flow information regarding releases from Soda Springs powerhouse (available both by telephone and internet on a real-time basis).

AWA states that the only reason for reduced boating use in the reach between Soda Springs powerhouse and Boulder Flat is the very poor existing boating access at Soda Springs powerhouse, and recommends that PacifiCorp be required to substantially improve whitewater boating access at or immediately below Soda Springs powerhouse.

AWA contends that without Soda Springs dam and reservoir, the reach between Slide Creek powerhouse and Soda Springs dam would support high levels of whitewater boating. AWA recommends that alternate mitigation be put in place for the lost opportunity.

AWA states that the reach between the Slide Creek diversion dam and Slide Creek powerhouse would support high levels of whitewater boating if it were not dewatered by the Slide Creek diversion dam. AWA recommends that PacifiCorp provide an annual schedule of optimal boating flows in this reach, improve access to the put-in adjacent to the Slide Creek diversion and the take-out near the powerhouse, and provide public access to flow information via the internet.

AWA states that the reach between Toketee Falls and the Slide Creek diversion dam has the potential to support whitewater boating, and that it be considered for restoration or mitigation.

AWA contends that whitewater boating is “theoretically possible” on many miles of the mainstem of the North Umpqua above Toketee Falls, as well as on major tributaries including the Clearwater River and Fish Creek. AWA recommends that these sections of the North Umpqua and major tributaries be considered for restoration or mitigation (including establishment of an annual schedule of releases, improved access, and publicly accessible flow information via the internet and phone). Specifically, AWA recommends that PacifiCorp provide an annual schedule of optimal boating flows mimicking the natural hydrograph in the Fish Creek bypassed reach as well as public access to flow information via the internet and phone.

Under the Settlement Agreement Alternative, PacifiCorp and the FS would jointly fund improvements to the FS Boulder Flat launch site downstream of Soda Springs to address the project’s impacts on whitewater boating (see discussion below). Although not specifically mentioned in the FS or BLM Section 4(e) conditions, these improvements would be included as Section 4(e) conditions because the agency conditions stipulate that the Settlement Agreement be implemented in its entirety.

The Conservation Groups have not commented on the effect of the project on whitewater boating, but their recommendations for removing Soda Springs dam and increasing instream flows throughout the project would affect boating. The NGO Alternative is discussed further below.

No-Action Alternative

Under the No-Action Alternative, there would be no new effects on whitewater boating because the project would continue to operate under the terms and conditions of the existing license. As discussed in section 3.8.1, most whitewater boating in the project area occurs between Boulder Flat Campground and Rock Creek. The provision included in the Settlement Agreement for PacifiCorp to help fund improvements at the FS Boulder Flat launch site would not be implemented under the No-Action Alternative.

Settlement Agreement

The goal of the Settlement Agreement parties for whitewater boating is to improve existing put-in and take-out facilities where demand for whitewater boating is greatest, in the reach between Boulder Flat Campground and Rock Creek. PacifiCorp states that:

“Recreational boating issues were not a source of major disagreement between the Parties during the Settlement process and as a result, the Settlement does not specifically discuss such issues. Further, available data indicate that whitewater boating opportunities above Soda Springs are limited, and that areas below Soda Springs dam provide outstanding opportunities” (PacifiCorp 2001a).

Under the Settlement Agreement, the RRMP would include a provision for PacifiCorp to help fund improvements at the FS Boulder Flat launch site downstream of Soda Springs powerhouse. PacifiCorp and the FS propose funding improvements at Boulder Flat (rather than at Soda Springs powerhouse as recommended by AWA) because:

1. more boaters put in at Boulder Flat (46 percent) than at Soda Springs powerhouse (4 percent) (see section 3.8.1); and
2. personal conversations with outfitters during PacifiCorp’s 1992–1994 boating surveys (PacifiCorp 1995a) reflected a desire for improvements at Boulder Flat rather than Soda Springs. According to PacifiCorp, this desire was based on the fact that the reach between Soda Springs powerhouse and Boulder Flat does not provide an alternative whitewater experience from other portions of the river and therefore does not warrant the additional 6-mile drive (i.e., from Boulder Flat to Soda Springs powerhouse).

Based on these surveys and conversations conducted in support of its 1995 license application, PacifiCorp determined (and the parties to the Settlement Agreement concurred) that cost-sharing with the FS for improvements at Boulder Flat best addressed the public need.

Further, PacifiCorp and the FS state that improving boater access at the Soda Springs powerhouse (as recommended by AWA) is not a good idea because:

1. the season of putting in at Soda Springs is short due to natural flow decreases that render the reach between Soda Springs powerhouse and Boulder Flat unboatable for nearly half the summer; and
2. access at Soda Springs powerhouse presents a safety risk because of the location of the project tailrace and the lack of an adequate staging area (which is limited by topography).

We agree that it is not appropriate to make access improvements at Soda Springs powerhouse. We conducted a site visit at the powerhouse, and conclude that attracting more boaters to the site by making access improvements would create additional safety concerns related to topography and the location of project facilities. Further, we agree that access improvements at Soda Springs powerhouse would not be worthwhile given the

short boating season and the limited additional length of river and quality of boating flows available between the powerhouse and Boulder Flat compared to areas downstream of Boulder Flat. Further, improvements at Boulder Flat as proposed in the Settlement Agreement would serve the needs of whitewater boaters in the area.

The Settlement Agreement does not include specific provisions for whitewater boating flows either downstream or upstream of Soda Springs dam. AWA states that because releases from Soda Springs powerhouse closely match the natural flow pattern of the North Umpqua River, the project's impacts on flows for boating would be negligible. We agree because flows under the Settlement Agreement would mimic natural flows in terms of when they would be "acceptable" (1,000 to 2,300 cfs) or "totally acceptable" (2,300 to 3,000 cfs) for boating (as identified by participants in PacifiCorp's 1992 to 1994 boating surveys; see section 3.8.1). In fact, implementing the Settlement Agreement could improve boating in this section of the river because project-induced flow fluctuations would be reduced (see section 3.3.2.2), meaning that daily flows would be less variable.

The FS states that providing information on releases from Soda Springs powerhouse (as recommended by AWA) is not necessary because real-time flow data from the gage located at Copeland Creek (downstream of Soda Springs dam) are available on the internet through the Oregon USGS website. We agree that the Copeland Creek gage provides useful flow information for boaters, but it does not provide precise information about releases from Soda Springs because it also measures inflow from Boulder Creek, which is located between Soda Springs and Copeland Creek. To provide boaters with accurate information about releases from Soda Springs, and to minimize the cost of providing such information, PacifiCorp could resume operation of the existing gage at Boulder Creek (USGS #14316495) and post real-time data for Boulder Creek on the internet. By doing so, PacifiCorp could provide the requested information about releases from Soda Springs (i.e., flow at Copeland Creek less inflow from Boulder Creek) without the cost of establishing a new flow gage below Soda Springs powerhouse.

For several reaches upstream of Soda Springs dam that are affected by the project, AWA recommends that alternate mitigation be put in place for lost whitewater opportunities. AWA recommends that PacifiCorp provide an annual schedule of optimal boating flows in some reaches, improve access to put-in and take-out locations in other reaches, and provide public access to flow information via the internet in all reaches affected by the project. However, available evidence does not support the need for additional measures related to recreational boating in these reaches (beyond the provision of flow information) given the opportunities that exist below Soda Springs powerhouse and the lack of opportunities above Soda Springs dam. Also, PacifiCorp and the FS contend that increased instream flows and the potential for reduced ramping under the Settlement Agreement could enhance boating opportunities above Soda Springs dam, and

that the provision of any additional measures is not warranted. We do, however, recommend that PacifiCorp post real-time flow data on the internet from all the project gages described in the Settlement Agreement. By doing so, PacifiCorp could provide the requested information about flows for whitewater boating with only minimal additional cost.

Also, we recommend that PacifiCorp provide notice and specific flow information when scheduled maintenance releases at the project developments could provide additional whitewater boating opportunities. These measures would better enable whitewater boaters to use resources above Soda Springs dam. In comments on the DEIS, PacifiCorp expressed concern that providing this information “may create significant public safety issues” by encouraging recreational boating “during periods of time and in project reaches (e.g., bypassed reaches) that are unsafe for such activities.” PacifiCorp provided no specific information, however, to support the contention that boating in project reaches during periods of scheduled maintenance would be unsafe. To better characterize the potential for recreational boating during maintenance periods, as well as the potential for safety concerns related to such boating, PacifiCorp could monitor boating during maintenance releases and document actual use levels and safety-related concerns. If the results of this monitoring indicate that recreational boating during maintenance releases is not occurring or is very limited, or that such boating is occurring but is unsafe, PacifiCorp could request that the Commission modify the license to remove the requirement for providing information about maintenance releases.

AWA also has expressed concern about the potential impacts to whitewater boating from PacifiCorp’s proposal to place new boulders or reposition existing boulders in the reach from Slide Creek powerhouse upstream to Fish Creek for the purpose of creating/improving spawning habitat (Settlement Agreement section 8.2). AWA states that such boulder placement would create safety hazards for boaters, and recommends that no channel alterations be made in the North Umpqua River. PacifiCorp and the FS state that such habitat improvement projects would be implemented in consultation with federal and state agencies, and would include boater safety considerations. Given the existing limited potential for whitewater boating in this reach (i.e., with the Slide Creek diversion dam in place), we do not believe that the proposed habitat improvement projects should be abandoned. Rather, AWA should be consulted on boater safety issues during such projects.

NGO Alternative

For whitewater boating, the NGO Alternative would include the AWA recommendations discussed above. Although the conservation groups have not commented on the effect of proposed project operations on whitewater boating, their

recommendations to remove Soda Springs dam and increase instream flows throughout the project could affect boating.

Removing Soda Springs dam would make the river reach between the dam and Slide Creek powerhouse more suitable for whitewater boating because the dam would no longer be in place as an obstacle to boaters. AWA has stated that this stretch of river would support high levels of boating all summer long. Without Soda Springs dam, natural flows in the reach downstream of Slide Creek powerhouse would average about 1,000 cfs from late May through September (Stillwater Sciences, Inc. 2000a).

The Conservation Groups' recommendation to increase instream flows throughout the project would also increase whitewater boating opportunities. The NGO Alternative includes higher instream flows than any of the other alternatives in the prime boating months (May through September; see table 2-1), and these higher flows would create more suitable conditions for whitewater boating throughout the project.

Staff Alternative

To provide boaters accurate flow information downstream of the project, we recommend that in addition to the measures proposed in the Settlement Agreement PacifiCorp resume operation of the existing gage at Boulder Creek (USGS #14316495) and post real-time data for Boulder Creek on the internet. We discuss the cost of this additional staff-recommended measure in the Comprehensive Development section (section 5.1).

Also, in addition to the Settlement Agreement measures, we recommend that PacifiCorp post real-time flow data on the internet from all the project gages described in the Settlement Agreement. By doing so, PacifiCorp could provide the requested information about flows for whitewater boating with only minimal additional cost.

In addition, we recommend that PacifiCorp provide notice and specific flow information when scheduled maintenance releases at the project developments could provide additional whitewater boating opportunities. For reasons discussed above for the Settlement Agreement Alternative, PacifiCorp could monitor recreational boating during maintenance releases and document actual use levels and safety-related concerns. If the results of this monitoring indicate that boating during maintenance releases is not occurring or is very limited, or that such boating is occurring but is unsafe, PacifiCorp could request that the Commission modify the license to remove the requirement for providing information about maintenance releases.

3.8.2.4 Effects on the Wild and Scenic River

During scoping, participants expressed concern about the potential effects of various alternatives for project operation on the North Umpqua Wild and Scenic River immediately downstream of Soda Springs powerhouse to Rock Creek. This reach was designated as a Recreational River under the Wild and Scenic Rivers Act in 1988. Section 7(a) of the Wild and Scenic Rivers Act requires administering agencies, "...to determine whether any proposed water resources project will have a direct and adverse effect on the values for which the river was established." Water resources projects have been defined to include any dam, water conduit, reservoir, powerhouse, or other project authorized under the FPA (36 CFR 297).

The parties to the Settlement Agreement have developed a number of measures to protect the resources for which the North Umpqua Wild and Scenic River was designated. These measures are discussed by resource in various sections of this EIS: water quantity and quality (section 3.3); fisheries (section 3.4); cultural resources (section 3.7); recreation (section 3.8); and aesthetics (section 3.9). These measures are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS and Section 4(e) conditions from the FS and BLM.

The Conservation Groups point out that the FS completed a *North Umpqua River Wild and Scenic Corridor Analysis* in April 2001, in which the FS recommended removing Soda Springs dam. As discussed below, the Conservation Groups state that there is no scientific reason for entering into a Settlement Agreement which does not include dam removal.

No-Action Alternative

Under the No-Action Alternative, there would be no new effects on the Wild and Scenic River because the project would continue to operate under the terms and conditions of the existing license.

Settlement Agreement

The parties to the Settlement Agreement acknowledge that the FS and BLM will make a final determination under Section 7(a) of the Wild and Scenic Rivers Act as to whether the operation of the project under a new license would "invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values" present in the river corridor at the date of its designation (see section 1.1.10). In June 2002, the FS submitted to the Commission a preliminary Section 7(a) determination that none of the action alternatives considered in the Commission's April 2002 DEIS would "invade or

unreasonably diminish the scenic, recreational, fish or wildlife values present at the date of the North Umpqua WSR's designation."

The FS determined that all action alternatives in the DEIS include provisions that enhance scenic quality and include additional provisions beyond those included in PacifiCorp's final license application. Examples of such enhancements that affect the designated river include provisions for landscaping, screening of transmission lines, and other visual management actions. The FS also determined that increased flows from the DEIS alternatives would benefit scenery by adding to the designated river's visual and aesthetic appeal. The FS concluded that there would be short-term visual impacts from dam removal at Soda Springs and from exposure of the reservoir bed that would be visible from the designated river. In the long-term, a more natural and diverse landscape would develop, consistent with the river management goal of retaining and perpetuating natural appearances (FS 2002).

The FS determination points out that all action alternatives in the DEIS would increase flows in the designated river above flows proposed in PacifiCorp's license application. The FS determined that this increase in flow would benefit recreation in the designated river, particularly on-river recreation such as whitewater boating. Other provisions of the DEIS alternatives that the FS determined would benefit recreation in the designated river area include providing flow information to the public and improving public put-in and take-out access in locations where demand for whitewater boating is greatest. The FS noted that the provisions in the action alternatives that improve water quality, scenery, and that provide benefits for fish and wildlife also would enhance the recreation opportunities of the designated river and its recreation setting. The FS states that the DEIS "recognized the potential for removal of Soda Springs dam to have significant effects to water quality and other values" and that these "potential effects could impact recreation in the designated river." Although the DEIS states that specific potential effects are uncertain, it concludes that, with proper dam removal, impacts from dam removal appear to be negligible in the long-term (FS 2002).

The FS determined that all DEIS action alternatives include provisions that enhance the fishery values of the designated river over those included in PacifiCorp's final license application, including: monitoring to ensure that water quality standards are met and predicted fish habitat improvements are achieved; flow releases substantially over existing and provisions to minimize impacts from ramping; measures to restore a more natural large wood regime and to restore more natural fluvial geomorphic processes; and provisions to improve fish passage and fish and habitat connectivity. The FS states that the impacts of river erosion and downstream transport of sediments released by the removal of Soda Springs dam are uncertain, but could include an increase in substrate embeddedness in the downstream reach (and a resultant decrease in salmonid spawning habitat). While the DEIS states that specific potential effects are uncertain, it concludes

that, with proper dam removal, impacts from dam removal appear to be negligible in the long-term (FS 2002).

The FS determination states that all action alternatives in the DEIS include provisions that enhance wildlife within the watershed, providing benefits to the designated river over those included in PacifiCorp's final license application. These provisions include: protection and restoration of riparian and wetland habitats; provisions to improve wildlife habitat connectivity; monitoring to ensure that predicted wildlife habitat improvements are achieved; provisions that reduce adverse interactions between power lines and birds; and provisions for federally listed species and for FS sensitive and survey and manage species (FS 2002).

The FS and BLM will submit draft and final Section 7(a) determinations in response to this FEIS.

NGO Alternative

The Conservation Groups (American Rivers 2001) point out that the FS completed a *Watershed Analysis: North Umpqua River Wild and Scenic Corridor, Rock Creek to Soda Springs Dam* (FS 2001c) in April 2001, in which the FS recommends removal of Soda Springs dam to (1) restore sediment and woody transport processes, (2) reduce unnatural sources of juvenile mortality (from stranding), and (3) aid in restoring water quality and nutrient cycling. The NGOs state there is no scientific reason for entering into the Settlement Agreement which is inconsistent with that analysis and that any agreement must fully comply with the Wild and Scenic River Act.

The FS acknowledges that implementing the Settlement Agreement may be inconsistent with the recommendation to remove Soda Springs dam contained in the draft watershed analysis, but contends that the measures included in the Settlement Agreement would substantially improve the aquatic functions desired in the Wild and Scenic River reach. The FS further points out that the purpose of the watershed analysis is to characterize the ecosystem elements within a watershed and to guide appropriate management activities in the watershed.

The Conservation Groups (Umpqua Valley Audubon Society 2002) also maintain that PacifiCorp's proposal in the November 2002 amendment to the Settlement Agreement to create spawning habitat at unspecified locations in the mainstem North Umpqua River and its tributaries below Soda Springs Dam would "adversely affect one or (most likely) several of the Outstandingly Remarkable Values for which the North Umpqua was designated as a Wild and Scenic River."

The FS believes, as do we, that the measures in the Settlement Agreement would substantially improve the aquatic functions desired in the Wild and Scenic River reach of the North Umpqua River. This would be accomplished through significant reductions in ramping (section 3.4.2.2), measures to improve sediment and large wood transport below Soda Springs dam to the Wild and Scenic River reach (section 3.4.2.4), and increased instream flows that would improve water quality (section 3.4.2.1). Further, we conclude that PacifiCorp's proposal to create spawning habitat at unspecified locations in the mainstem North Umpqua River and its tributaries below Soda Springs Dam would not adversely affect any of the ORVs for which the river was designated as a Wild and Scenic River (section 3.2.2.2). Therefore, we agree with the FS preliminary determination of consistency.

Staff Alternative

Because the Staff Alternative would not add any additional measures that would affect the Wild and Scenic River, we conclude that relicensing the project under the terms of the Settlement Agreement would not "invade the area or unreasonably diminish" the river's ORVs for the reasons discussed for the Settlement Agreement. Most importantly, flows downstream of Soda Springs powerhouse under the Settlement Agreement would be closer to natural flows than those that were released in 1988 when the river was designated.

3.9 AESTHETICS

3.9.1 Affected Environment

The North Umpqua River Basin is one of the most scenic river environments in western Oregon. The basin's visual resources include the river itself, numerous lakes and reservoirs, waterfalls, basalt cliffs and pumice deposits, and the forested landscape of the river canyon.

The State Highway (SH) 138 corridor east from Roseburg through the basin to SR 230 near Diamond Lake is a designated Oregon State Scenic Byway as well as a designated National Forest Scenic Byway named the Rogue-Umpqua Scenic Byway. It has been nominated as an All-American Road through the Federal Highway Administration's National Scenic Byway Program. SH 138 parallels the North Umpqua River from near the town of Glide eastward approximately 40 miles to near Toketee Lake.

The 33.8-mile reach of the North Umpqua River between Soda Springs powerhouse and Rock Creek is designated as a Recreational River in the federal Wild and Scenic River system and as an Oregon Scenic Waterway by the state. Scenery is

identified as one of the river's ORVs in the North Umpqua River Management Plan (FS, BLM, and OSPRD 1992). The visual condition of the Wild and Scenic River corridor is described as Variety Class A (unique) under the FS Visual Management System (PacifiCorp 1995a). The desired future condition of the corridor is one in which "the existing natural appearing landscape condition is maintained" and remains "basically unchanged from the present condition" (FS, BLM, and OSPRD 1992).

The FS and BLM are responsible for managing scenic resources on the lands they administer in the North Umpqua River Basin. The FS Visual Management System is based on goals known as Visual Quality Objectives (VQO). The BLM Visual Resource Management (VRM) System is similar to the FS system. BLM lands within the North Umpqua Wild and Scenic River corridor are managed to achieve the same visual quality goals as in the FS system (i.e., Retention VQO).

Locations in the Umpqua National Forest where visitors are likely to have a high degree of concern for scenic quality are identified as sensitive viewpoints. Sensitivity levels are designated as high (level 1), average (level 2), and low (level 3). Most of the sensitive viewpoints that provide views of North Umpqua Project facilities are located along SH 138 and within the North Umpqua and Clearwater river canyons.

One goal of the Umpqua National Forest Land and Resource Management Plan is "to retain and perpetuate the existing natural appearance and diverse landscape as viewed from the North Umpqua River and SR 138" (FS 1990). Lands outside the immediate view of the river and SH 138 are typically managed under less restrictive visual resource management goals. The Retention VQO applies to the immediate viewshed of SH 138 within the Umpqua National Forest boundary and includes the areas visible from the North Umpqua Wild and Scenic River and the Clearwater River adjacent to the highway. Lands viewed from the North Umpqua River and SH 138 in the BLM-managed portion of the project are designated VRM Class II, which is consistent with the Retention VQO used by the FS. Under the Retention VQO and VRM Class II designations, management activities should not be evident to the average forest visitor.

3.9.2 Environmental Impacts and Recommendations

3.9.2.1 Aesthetic Impacts of Project Facilities

Many North Umpqua Project facilities are located in areas that are not accessible to the public and therefore are not seen, or are located in accessible areas but are screened from view. Others, such as Stump Lake, the Clearwater No. 1 waterway, and the Fish Creek penstock, are within view from sensitive viewpoints but are visually compatible with the surrounding landscape character. However, some project facilities (i.e., Lemolo No. 2 and Toketee penstocks and surge tanks, Clearwater No. 2 penstock, Clearwater

switching station and Clearwater Village maintenance yard, and some transmission lines) are visible from sensitive viewpoints and contrast with the surrounding landscape.

Under the Settlement Agreement, PacifiCorp would implement a VRMP that includes measures (primarily painting and landscaping) to improve, where practicable, the appearance of facilities that are incompatible with the surrounding landscape and to conform to visual resource direction of the FS and BLM. Although not specifically mentioned in the FS or BLM Section 4(e) conditions, these measures would be included as Section 4(e) conditions because the agency conditions stipulate that the Settlement Agreement be implemented in its entirety.

The Conservation Groups have not commented on the aesthetic impacts of existing project facilities, but their recommendation to remove Soda Springs dam and its associated facilities would alter the aesthetic character of the landscape. The NGO Alternative is discussed further below.

No-Action Alternative

Under the No-Action Alternative, there would be no new visual impacts from project facilities because no new facilities would be constructed and existing facilities would continue to appear as they do now.

Settlement Agreement

In 1995, PacifiCorp proposed a number of measures to address visual/aesthetic resource issues (summarized in table 7.3-1 of its license application), including landscaping at the Clearwater switching station and maintenance area, penstock and surge tank painting, and screening of transmission lines. Since 1995, in consultation with the FS and BLM, PacifiCorp further refined its proposed aesthetic measures to address consultation and timing requirements of the measures (section 16 of the Settlement Agreement).⁹²

⁹² In the license application PacifiCorp also proposed to develop and implement a landscape plan for the Soda Springs sediment placement site, including tree planting along SH 138 in 1995. The plan was to be developed to mitigate the visual effects associated with the the creation of a 5.2-acre sediment pile created from removing sediments from Soda Springs Reservoir and Toketee Lake. No sediment would be removed if fish passage was provided. Because fish passage is being provided under the terms of the Settlement Agreement, this measure would not be needed.

Under the Settlement Agreement, PacifiCorp would prepare a VRMP by 2002 and would implement the VRMP upon the new license becoming final. The VRMP is intended to provide guidelines that address the design, maintenance, and construction of project facilities in order to preserve or enhance the visual resources of the project area. The guidelines would be developed and implemented in accordance with the most current visual resource standards applicable to the FS and BLM as appropriate. The VRMP incorporates the proposed visual enhancement measures contained in table 7.3-1 of PacifiCorp's license application, including landscaping at the Clearwater switching station and maintenance area, penstock and surge tank painting, and screening of selected transmission lines.

Landscaping at Clearwater: PacifiCorp would develop and implement a landscape plan for the Clearwater switching station and maintenance area, as described in the 1995 license application and consistent with the VRMP. Development and implementation would occur by the second anniversary of the new license or 2006, whichever is earlier.

The 0.75-acre Clearwater switching station is visible from FS Road 4776 and from nearby buildings in the FS complex. Existing vegetation provides some screening of more distant views from the road as motorists approach, but the switching station is otherwise unscreened, highly visible (especially from close-in locations), and exhibits a scale and industrial character that differs substantially from surrounding developments in the FS complex. The buildings, equipment, and yard that comprise the maintenance yard at Clearwater Village are also visible from FS roads 4776 and 34. As viewed by the public, the yard is in a predominately natural setting; the visual character of the facility and the variety of equipment and materials visible in the yard detract from the natural character of the area. Some landscaping is present but it is low, and there are large sections of no vegetation. The switching station and maintenance area appear incompatible with the surrounding setting and result in a degree of visual contrast that is inconsistent with the Retention VQO that applies to the area (PacifiCorp 1995a).

Development of the measures to reduce the contrast of these project facilities would soften the visual character of these industrial facilities in an otherwise natural setting. PacifiCorp and the FS recognize that development of such measures would still need to be compatible with continued operations and maintenance requirements and public safety and visibility along the road.

Penstock and Surge Tank Painting: By the first anniversary of the new license or 2005, whichever is earlier, PacifiCorp would conduct photographic simulations of the Lemolo No. 2 penstock and surge tank, Toketee penstock and surge tank, and Clearwater No. 2 penstock showing alternative colors. The FS would make a final color selection. PacifiCorp would paint these facilities at the next painting interval (expected to be within 25 years of any new license). PacifiCorp, in consultation with the FS, would evaluate the

status of the existing paint on these facilities not later than the twenty-fifth year of the new license.

Portions of the silver-colored Lemolo No. 2 penstock and surge tank are visible from a variety of locations in the Toketee Lake area, including the lake, boat launch, and the parking area and head of the North Umpqua trail. Visible portions of the penstock and surge tank are at or near the top of a ridge. The portions of the penstock and surge tank that are visible (at viewing distances of 1 mile) exhibit a degree of visual contrast that is inconsistent with the Retention VQO that applies to the area.

The Toketee penstock is generally screened from views on SH 138 by vegetation. Brief views (two to three intermittent glimpses lasting about 5 seconds or less) of the 128-foot high Toketee surge tank are possible from the highway. The large size and strong, geometric form of the surge tank result in a degree of visual contrast that is inconsistent with the Retention VQO that applies to the area. The light green color of the surge tank and penstock contrast with the dark green background of the forest.

The light brown-colored Clearwater No. 2 penstock is visible from several locations in the Toketee Lake area, some as close as 0.25 mile away. The facility's large scale and visual prominence are incompatible with the surrounding setting and result in a degree of visual contrast that is inconsistent with the area's Retention VQO. According to PacifiCorp no opportunity exists to establish a vegetative screen.

Painting the above facilities with a color more appropriate to the background conditions so that they better blend with surrounding landscape offers the best opportunity to make them less conspicuous. Particular attention should be given to color conditions that exist during the recreation season, April through October.

Transmission Line System: By the first anniversary of the new license or 2005, whichever is earlier, PacifiCorp would conduct an evaluation of the 13 locations on the transmission line ROW described in the 1995 license application and shown on figure 7.3-1 of the application.⁹³ The evaluation would examine existing plant species, mix, age, and size along the ROW and its effectiveness for mitigating the visual impact of the transmission lines. PacifiCorp would consider modifications to such vegetation or

⁹³ The Settlement Agreement refers to 11 locations where the transmission lines would be evaluated and a vegetation plan developed to reduce the visual contrast of the transmission lines. Staff assumed that this was a typographical error because the parties to the Settlement Agreement directly referred to the proposed measures described in table 7.3.1, figure 7-1, and the text of the 1995 application, in which PacifiCorp proposes to evaluate 13 locations. No explanation for the reduced number of sites was provided.

other methods, including replacement of conductors with nonreflective material (at such time as the conductors would otherwise be replaced), taking into consideration site conditions and ongoing operation and maintenance requirements. PacifiCorp would develop an implementation schedule for completing any such visual improvements as part of the VRMP. All proposed improvements would be implemented by the tenth anniversary of the new license and would be coordinated with the VRMP.

The North Umpqua Project transmission system consists of seven transmission lines (39, 42, 46, 51, 53, 55, and 57). Transmission lines 39, 42, 46, and 51 are visible from SH 138 at approximately 40 different locations between the Toketee Lake area and the Dixonville substation. Clearings associated with project lines 39 and 46 are intermittently visible on the north slope of the canyon from the road and from the Wild and Scenic reach of the North Umpqua River. Transmission lines 53, 55, and 57 are generally not visible from sensitive viewpoints, except where they are concentrated in the Toketee Lake area leading to the Clearwater switching station (PacifiCorp 1995a). Views vary from very brief glimpses of short segments to views that last up to 20 seconds and include several spans of transmission line, support structures, and the ROW itself. At about 13 locations, visibility of the transmission line is due to the cleared ROW. Where they are visible, the transmission lines detract from the natural-appearing landscape character, especially within the highly scenic corridor along the Wild and Scenic reach of the North Umpqua River. The lines also exhibit a degree of visual contrast that is inconsistent with the area's Retention VQO.

In many cases high visibility and visual contrast of the transmission lines are caused primarily by the visibility of steel-reinforced aluminum conductors as they reflect sunlight in the presence of a dark backdrop. The wood H-frame support structures, in most cases, are not highly noticeable. Replacing the conductors with non-specular material during normal maintenance or repair as proposed would reduce their visibility and lessen their obtrusiveness. Vegetation screening within the ROW, where it does not conflict with necessary safety and operations of the transmission lines, may also reduce visual contrasts associated with the project transmission lines. No opportunities exist to relocate the transmission lines to areas where they would be substantially less visible than they are now.

Other Project Facilities: Other project facilities [Lemolo No. 1 dam, waterway intake, and waterway (the portion visible from FS Road 2610), and Lemolo No. 2 powerhouse; Clearwater No. 1 dam, waterway intake and waterway at Stump Lake; Clearwater No. 2 powerhouse; Toketee dam, waterway intake, and waterway; and Soda Springs dam, waterway intake, waterway, penstock, and powerhouse] are also visible from sensitive viewpoints, and due to their large size and visual prominence are incompatible with the surrounding setting and result in a degree of visual contrast that is inconsistent with the area's Retention VQO. PacifiCorp acknowledges that these facilities

are inconsistent with a Retention VQO, but states that there are no feasible mitigation measures available due to the size and location of the facilities (PacifiCorp 1995a). Additionally, because the Soda Springs pipeline waterway/penstock and surge tank are located immediately next to the road, no opportunity exists to significantly reduce their visibility by repainting or through vegetative screening. No one has recommended any measures to reduce the contrast of these facilities with the surrounding natural landscape. Staff was not able to identify any measures to further reduce these effects. We believe the measures proposed in the Settlement Agreement represent the only feasible measures to help make the project facilities more compatible with a Retention VQO of the national forest. Implementing the measures in the Settlement Agreement would ensure that future modifications to project facilities would conform to the visual management objectives in place at the time the measures are implemented and over the new license term.

NGO Alternative

The Conservation Groups have not commented on the aesthetic impacts of project facilities. However, the NGO Alternative does include removing Soda Springs dam and its associated facilities, which would alter the aesthetic character of the landscape.

The Soda Springs dam, waterway intake, waterway, penstock, and powerhouse are all visible from sensitivity level 1 (high) or 2 (average) viewpoints. With the exception of a portion of the enclosed pipe waterway, these facilities are not visible from SH 138, but they are visible from the North Umpqua River from upstream of Soda Springs dam to downstream of Soda Springs powerhouse. All facilities in the Soda Springs Development are located in areas managed by the FS to achieve a Retention VQO (PacifiCorp 1995a).

Removing the project facilities at Soda Springs would have both short-term and long-term visual effects. Because of the visibility of the project facilities, construction and demolition activities would be prominent and would reduce the aesthetic quality of the area during the construction period. Adverse visual impacts would continue until the Soda Springs Reservoir bed and the ROW associated with the penstock and waterways are completely revegetated. Over time, a more natural and diverse landscape would develop, which would be consistent with the management goal of "retain and perpetuate the existing natural appearance and diverse landscape" (FS 1990) of this section of river. This is particularly important because the facilities are at the upstream end of the North Umpqua Wild and Scenic River.

Staff Alternative

We recommend that any new license issued include all the measures in the Settlement Agreement, without modification. Therefore, the benefits described above would be the same under the Staff Alternative.

3.9.2.2 Aesthetic Impacts of Project Operations

Project operations (flows and reservoir fluctuations) also influence the scenic quality of the National Forest and the Wild and Scenic River. During scoping, participants expressed concern about the visual effects of proposed project operations on visual quality at (1) Lemolo Reservoir, Toketee Lake, and Soda Springs Reservoir, and (2) Lemolo Falls and Toketee Falls on the North Umpqua River and Whitehorse Falls on the Clearwater River. PacifiCorp proposes flows to maintain the scenic quality of area water falls and within the Wild and Scenic reach of the North Umpqua River. Although not specifically mentioned as flows for aesthetics in the FS or BLM Section 4(e) conditions, these flows would be included as Section 4(e) conditions because the agency conditions stipulate that the Settlement Agreement be implemented in its entirety.

The Conservation Groups have not commented on the aesthetic impacts of project operations.

No-Action Alternative

Under the No-Action Alternative, there would be no new visual impacts from project operations because the project would continue to operate under the terms and conditions of the existing license. The measures included in the Settlement Agreement to minimize the visual impacts of project operations (see section 3.9.3.2 below) would not be implemented.

Settlement Agreement

Under the Settlement Agreement, PacifiCorp's VRMP would incorporate the following measures (proposed in the 1995 application and summarized in table 7.3.1 of Exhibit E) to minimize the visual impacts of project operations:

1. maintain instream flows at Lemolo Falls, Toketee Falls, and Whitehorse Falls at or above the minimum flow studied for each waterfall;
2. in the Wild and Scenic River reach downstream of Soda Springs powerhouse, when natural flows are at or below 1,600 cfs⁹⁴ eliminate flow fluctuations due to power operations;

⁹⁴ In the license application, PacifiCorp proposed to eliminate flow fluctuations due to power operations in the Wild and Scenic River when natural flows are at or below 1,200 cfs. In the Settlement Agreement, PacifiCorp changed this proposal to at or below 1,600 cfs.

3. in the Wild and Scenic River reach downstream of Soda Springs powerhouse, limit ramping rates to 1 inch per hour and 6 inches per day when flows at Copeland are between 1,200 and 1,700 cfs; and
4. maintain Lemolo Reservoir at or near full pool during the summer recreation season.

Implementing these measures would ensure that project operations would conform to the visual management objectives.

Lemolo Falls, Toketee Falls, and Whitehorse Falls are all popular scenic viewpoints that receive a moderate number of visitors. Lemolo Falls, which is located approximately 1 mile downstream of Lemolo Reservoir, has a year-round instream flow of about 25 cfs under existing project operations. Toketee Falls is located less than 1 mile downstream of Toketee Lake and is a popular scenic attraction accessed by a 0.5-mile trail. Under existing project operations, the instream flow for Toketee Falls is 25 cfs year round. Whitehorse Falls, which is located adjacent to the Whitehorse Falls Campground just off SH 138, is designated a sensitivity level 1 viewpoint. Under existing project operations, the instream flow for Whitehorse Falls is 5 cfs year round (PacifiCorp 1995a).

PacifiCorp conducted a visual assessment of various flows at these three waterfalls to evaluate the visual characteristics of different flows and viewer sensitivity to changes in the appearance of each waterfall (the assessment is described in detail in Appendix 7-1 of PacifiCorp's license application). Each of the waterfalls was evaluated for three different flows: Lemolo at 25, 68, and 150 cfs; Toketee at 25, 60, and 150 cfs; and Whitehorse at 6.5, 15, and 25 cfs (PacifiCorp 1995a).

Each of the three waterfalls responded differently to changes in flow. At Lemolo Falls, substantial changes in the width of the water column and extent of the plunge pool were observed across the complete range of flows examined. Noticeable but not substantial changes were observed across the range of flows studied at Toketee Falls, especially in relation to the width of the water column and the size of the plunge pool. At Whitehorse Falls, changes were hardly perceptible across the range of flows examined (PacifiCorp 1995a).

To prevent impacts to the existing visual quality of Lemolo Falls, Toketee Falls, and Whitehorse Falls, PacifiCorp would maintain instream flows at or above the minimum flow studied for each waterfall. Maintaining such flows would be beneficial because observers who participated in the assessment considered even the minimum flow studied at each waterfall as good—an average of 8.24 on a 10-point scale—in terms of “scenic beauty” (PacifiCorp 1995a).

PacifiCorp also conducted a visual assessment of various flows in the North Umpqua Wild and Scenic River downstream of the Soda Springs Development (the assessment is described in detail in Appendix 7-1 of PacifiCorp's license application). The river's appearance at flows of 800, 1,500, 2,250, and 3,000 cfs were observed and recorded. Scenes depicting the river's appearance at flows between 800 and 1,500 cfs were judged by observers to be higher in scenic beauty than flows in the range of 2,250 to 3,000 cfs (PacifiCorp 1995a).

To prevent impacts to the existing visual quality of the Wild and Scenic River reach, PacifiCorp would eliminate flow fluctuations due to power operations when natural flows are at or below 1,600 cfs. Also, PacifiCorp would limit ramping rates in the Wild and Scenic River reach to 1 inch per hour and 6 inches per day when flows at Copeland Creek are between 1,200 and 1,700 cfs. These flow restrictions would be beneficial because they would help protect the river's natural appearance when natural flows are at or below 1,600 cfs.

Lemolo Reservoir has a relatively large surface area of 419 acres. The reservoir's shoreline area features developed campgrounds and a concessionaire-operated campground and cabin development. Dense stands of conifers extending to the shore generally screen views of the lake from the surrounding campgrounds and roads. Likewise, the forested setting effectively screens views from the reservoir and its shore of the hydroelectric facilities that exist at the west end of the reservoir. When at or near full-pool, the reservoir appears essentially natural (PacifiCorp 1995a).

PacifiCorp typically maintains water levels at Lemolo Reservoir at or near full-pool elevation throughout the summer recreation season to prevent the adverse visual effects of an exposed, barren shoreline (i.e., the "bathtub ring" effect). At or near full-pool conditions, there is no or very little evidence of an exposed ring at the shoreline. When the reservoir is drawn down, large areas of barren reservoir bottom are exposed (PacifiCorp 1995a).

To prevent impacts to the existing visual quality of Lemolo Reservoir when it is viewed most frequently, PacifiCorp would maintain the reservoir at or near full pool during the summer recreation season (from Memorial Day through Labor Day). This would benefit visual quality during the period when Lemolo Reservoir receives the most use by preventing the bathtub ring effect.

Proposed operations at Soda Springs dam (i.e., re-regulating higher flows from peaking operations upstream) would result in increased daily water level fluctuations at Soda Springs Reservoir. Larger daily fluctuations would create an adverse visual effect by exposing more of the barren reservoir bottom between the high water mark and the water surface.

PacifiCorp has stated that no feasible mitigation measures are available at Soda Springs Reservoir because of the magnitude of the proposed fluctuations (PacifiCorp 1995a). No one has recommended any measures to address these visual effects and we have not been able to identify any measures. The effects of the increased reservoir fluctuations are not expected to be significant, however, because they would occur on a reservoir that has had similar (albeit smaller) fluctuations in the past and visitors are likely to be somewhat accustomed to these reservoir level changes. This means the visual impact would not be totally new, just more noticeable.

NGO Alternative

The Conservation Groups have not commented on the aesthetic impacts of proposed project operations. However, the NGO Alternative includes removing Soda Springs dam and its associated facilities. Removing the dam and returning flows in this reach to run-of-river would allow PacifiCorp to revegetate shoreline areas that are exposed by reservoir fluctuations and eliminate the “bathtub ring” effect. We discuss the aesthetic effects of this alternative in the previous subsection.

Staff Alternative

We recommend that any new license issued include all the measures in the Settlement Agreement. Overall, the benefits described above would be the same under the Staff Alternative.

3.10 LAND USE

3.10.1 Affected Environment

The North Umpqua Project, including the area within the existing project boundary and areas that would be affected under the Settlement Agreement, covers approximately 18,600 acres. With the exception of project transmission lines east of Fox Creek, the project is located within the Umpqua National Forest.

Most of the 18,600-acre project area (85 percent) is undeveloped, consisting largely of forested areas. Developed land uses comprise less than 9 percent of total land area, and consist primarily of lands associated with the project (transmission ROW, utility, and residential land uses). Other smaller areas of developed lands are used for FS facilities, commercial recreation, and other public recreation facilities. Open water represents about 6 percent of total land use in the project area (PacifiCorp 1995a).

Land in the western portion of the project area, associated with the transmission lines east of Fox Creek, is predominantly in private ownership. From the town of Glide east to the Umpqua National Forest boundary, land ownership is a patchwork of private and public lands administered by the BLM. In this area, project transmission lines are located partially on private lands and partially on BLM lands managed according to the *Roseburg District Record of Decision and Resource Management Plan* (BLM 1995b).

Proceeding eastward into the Umpqua National Forest, the administration of public lands changes from BLM to FS. The eastern portion of the project transmission lines and all other project facilities are located on FS lands managed according to the *Land and Resource Management Plan for the Umpqua National Forest* (FS 1990). We address the project's overall consistency with the FS and BLM management plans in section 5.4.

The project requires road access to operate and maintain project facilities [an inventory of these roads is provided in PacifiCorp's draft Transportation Management Plan (PacifiCorp 1995b)]. PacifiCorp has constructed, operates, and maintains certain roads and bridges located within the project boundary. These "PacifiCorp-Maintained Hydro Roads" are within the current license boundary and are exempt from FS Special Use Authorization (SUA) and BLM Grant of ROW under Federal Power Commission Withdrawal No. 1927. There are 47.12 miles of these roads. Under the existing license, PacifiCorp has been responsible for all maintenance of these roads. However, there has not been an agreed-upon or established set of standards for this maintenance work (FS 2001d).

The FS has constructed, operates, and maintains certain roads and bridges located outside and within the project boundary that are needed by PacifiCorp to access project facilities and recreation sites. PacifiCorp's use of these "Joint-Use Hydro Roads" is subject to FS SUA and BLM Grant of ROW. There are 66.17 miles of these roads. Under the existing project license, PacifiCorp has not funded or provided for any of the maintenance work on these roads, except for winter snowplowing required for PacifiCorp's winter access needs (FS 2001d).

The FS has also constructed, operates, and maintains certain other roads located within project-related developed recreation sites. Under the existing project license, PacifiCorp has not funded or provided for the maintenance of these "PacifiCorp-Maintained Recreation Roads." There are 4.36 miles of these roads (FS 2001d).

Also, PacifiCorp has constructed certain roads on FS and BLM lands to provide access for transmission line maintenance. These "PacifiCorp-Maintained Transmission Roads" are used solely for project management and are not needed for management of FS or BLM lands. There are 43.91 miles of these roads. There are other FS and BLM roads that provide access from county and state roads to the transmission lines or the

PacifiCorp-Maintained Transmission Roads. These “Joint-Access Transmission Roads” are needed for purposes other than project management, including management of FS and BLM lands. There are 39.09 miles of these roads (FS 2001d).

There are presently 51 bridges located on roads on FS land that access the project. The FS constructed and presently maintains 13 bridges that access the project (nine on Joint-Use Hydro Roads, three on Joint-Access Transmission Roads, and one on a PacifiCorp-Maintained Hydro Road). The average age of these FS bridges is 26 years. PacifiCorp constructed and presently maintains 38 bridges that access the project (26 on PacifiCorp-Maintained Hydro Roads and 12 on Joint-Use Hydro Roads). The average age of these PacifiCorp bridges is 39 years, with most of them being constructed in the 1950s and early 1960s. There are also six road bridges located within the project boundary for which the current use or maintenance responsibility is uncertain (FS 2001d).

There are seven road culverts on Joint-Use Hydro Roads that are stream crossings where fish passage may be possible. The current status of these culverts with respect to ODFW fish passage criteria is unknown but would be determined via surveys conducted jointly by PacifiCorp and the FS. However, it is known that most of these culverts would not meet current FS fish passage criteria for critical native fish during some life stages (FS 2001d).

There are an estimated 300 stream crossing culverts and 600 ditch relief culverts located on project access roads. In 1995, PacifiCorp contracted for a survey of approximately 500 of these culverts to determine their condition and ability to pass a 100-year flood flow (PacifiCorp 1995a). However, this assessment has since been determined to be incomplete and not consistent with current standards. This survey would be completed jointly by PacifiCorp and the FS (FS 2001d).

In 1991, PacifiCorp and the FS began discussion on the development of a road maintenance plan for all roads needed for project management. PacifiCorp developed, with input from the FS, and filed a draft TMP with its 1995 license application (PacifiCorp 1995b).

3.10.2 Environmental Impacts and Recommendations

3.10.2.1 Changes in Land Use

New construction of project-related facilities or changes in project operations under a new license could lead to changes in land use within the project boundary. This is particularly true for the dam removal option under the NGO Alternative, which, as discussed below, would result in more significant land use changes than the other alternatives.

No-Action Alternative

Under the No-Action Alternative, there would be no changes in current land use because there would be no new facility construction or changes in project operations.

Settlement Agreement

Under the Settlement Agreement, there would be only minor changes in current land use resulting from new facility construction or changes in project operations. However, PacifiCorp would affect land use in the project vicinity by purchasing riparian conservation easements on private timberlands in the Rock Creek and Canton Creek basins. These measures would change the current planned use of these lands from timber harvest to habitat conservation and would protect these lands in perpetuity.

Riparian conservation easements in the Rock Creek Basin would be designed to increase stream channel shading and reduce water temperatures in mainstem Rock Creek, while easements in the Canton Creek Basin would be designed to complete the protection of resident fish-bearing streams upstream of the anadromous fish barriers in the Pass Creek subbasin. The ecological benefits of providing riparian conservation easements in both basins are discussed more fully in sections 3.4.2 and 3.6.2. Easement purchases would be based on compensation to private landowners for habitat protection measures that would not already be required under state and federal regulations. PacifiCorp would develop a Conservation Easement Plan (CEP) to be reviewed and approved by ODFW. The CEP would show locations of potential easement acquisitions and describe the potential habitat benefit associated with each potential acquisition. PacifiCorp would monitor the easements to ensure that landowners are managing the land in strict accordance with the terms of the easement, and would take swift action to correct any activities that are not in accordance with the terms of the easement. PacifiCorp would provide \$500,000 in the first year of any new license to purchase easements for riparian buffers along Rock Creek. PacifiCorp would provide \$102,000 in the first year of any new license to purchase easements for riparian buffers along upper Canton and East Fork Pass creeks. However, PacifiCorp would make no expenditures until the CEP is

approved by ODFW. In the event that PacifiCorp and ODFW determine that the CEP would not achieve an appropriate benefit for habitat, PacifiCorp and ODFW would pursue other alternatives for maximizing the benefit of the available funds, subject to Commission approval (Oregon Fish and Wildlife Commission and PacifiCorp 2001).

By purchasing these riparian conservation easements, PacifiCorp would change the current planned use of these private timberlands and would protect the lands in perpetuity. This is important because both the Rock Creek and Canton Creek Basins were identified as areas that are appropriate for the "application of habitat conservation strategies" in the 1998 Cooperative Watershed Analysis (Stillwater Sciences, Inc. 1998a). However, we have no information with which to assess the extent of these land use changes because the location and total acreage of lands to be placed under conservation easements have not been determined.

NGO Alternative

Under the NGO Alternative, PacifiCorp would be required to remove Soda Springs dam within 5 years of license issuance. Removal of the dam and reservoir would result in more significant land use changes than the other alternatives because it would change most of the 31.5 acres that are currently inundated by the reservoir from open water land use to undeveloped land use (with the exception of the pre-dam river, which would remain as open water land use). Dam removal would also reduce developed land use by several acres if the Soda Springs flowline, surge tank, penstock, powerhouse, and switching station were all removed. Most of the land that would become available along the natural river corridor after removing the Soda Springs facilities probably would remain undeveloped for the immediate future, but PacifiCorp and the FS could choose to develop it for recreational use in the future.

Staff Alternative

The Staff Alternative includes all the elements of the Settlement Agreement, so effects on land use would be the same as those described for the Settlement Agreement.

3.10.2.2 Transportation Management

Under the existing project license, maintenance responsibilities and standards for the extensive network of roads and bridges that provides access to project facilities, transmission lines, and project-related recreation areas are not well defined or understood, and are often shared among PacifiCorp, FS, and BLM. For those roads constructed, operated, and maintained by PacifiCorp, there has not been an agreed-upon or established set of standards for maintenance work (FS 2001d). Also, recent bridge inspections indicate that several of the bridges on roads accessing the project have deferred or

backlog maintenance needs (FS 2001d). Additionally, existing road culverts may not meet ODFW fish passage criteria and some project roads may no longer be needed to access transmission lines for maintenance (FS 2001d).

Under the Settlement Agreement Alternative, PacifiCorp would develop and implement a final TMP to address existing and potential transportation issues associated with the project. The measures that would be implemented under the final TMP are reflected in the FS and BLM Section 4(e) conditions.

The Conservation Groups have not commented on the effects of road maintenance and decommissioning on land use.

No-Action Alternative

Under the No-Action Alternative, it is likely that PacifiCorp and the FS would finalize and implement the 1995 draft TMP (FS 2002). Thus, impacts would be similar to those discussed below under the Settlement Agreement.

Settlement Agreement

The goal established by the parties to the Settlement Agreement for transportation management is to develop and implement a final TMP that addresses the access needs, resource protection and public safety requirements, and maintenance responsibilities for roads and bridges associated with the project, consistent with FS and BLM land management plans.

To achieve this goal, by April 2003 PacifiCorp would consult with the FS and BLM, and complete a final TMP that would contain the same principles as the draft TMP submitted in 1995 and the specific provisions listed in the Settlement Agreement detailing road and bridge maintenance and cost-sharing responsibilities, road decommissioning, and upgrading of culverts. The final TMP, which PacifiCorp would implement for the term of the new license, would detail which PacifiCorp-Maintained Hydro Roads and PacifiCorp-Maintained Transmission Roads would be open to public access and under what conditions. The TMP would also include a plan for monitoring roads and bridges for review of maintenance activities and for damage.

Beginning on June 13, 2001, PacifiCorp assumed 100 percent maintenance and capital improvement responsibility for roads listed as PacifiCorp-Maintained Hydro Roads and PacifiCorp-Maintained Transmission Roads on Settlement Agreement schedule 15.2. Commencing in 2005, PacifiCorp and the FS would cost-share maintenance and capital improvements on roads listed as Joint-Use Hydro Maintenance on Settlement Agreement schedule 15.2. Road maintenance and capital improvement

activities would be completed consistent with applicable FS requirements found in the FS Manual and FS Handbook for Road Maintenance and the BLM Manual and Roseburg District Resource Management Plan. Settlement Agreement schedule 15.2 identifies maintenance levels required for each road. Implementation of these measures would ensure that public and project access needs are met and that costs are partitioned commensurate with use. The estimates of the shares of annual and deferred road maintenance costs for the FS and PacifiCorp are based on the 1995 draft TMP and FS engineering judgments of the use of various road types or classes associated with the project. We have no basis for disagreeing with these estimates.

PacifiCorp and the FS have collaboratively identified 8.6 miles⁹⁵ of PacifiCorp-Maintained Hydro Roads and PacifiCorp-Maintained Transmission Roads that are apparently no longer needed to access project facilities and thus would be decommissioned by the fourth anniversary of the new license (see Settlement Agreement schedule 15.4). The listed road segments would be decommissioned by PacifiCorp according to FS provisions. If PacifiCorp, the FS, and BLM agree, alternate road segments with approximately the same decommissioning cost as those listed could be substituted for decommissioning. Any additional PacifiCorp-Maintained Hydro Road or PacifiCorp-Maintained Transmission Road that PacifiCorp determines is no longer needed for project operation would be decommissioned as soon as practicable according to the FS standards. The benefits to terrestrial resources of decommissioning these roads are discussed in section 3.5.2. For any project road or facility that is determined to no longer be needed for project purposes, PacifiCorp would need to request the Commission to amend its license to remove such roads and facilities and to submit revised Exhibit G drawings detailing the modified project boundaries. Parties to the Settlement Agreement have contemplated such needs (see section 22.5.4).

PacifiCorp would complete, in consultation with the FS, an inventory of bridges and a process for inspecting bridges as part of the TMP according to the standards of the Highway Safety Act of September 9, 1966 (23 U.S.C. 401-411). Starting on June 13, 2001 and continuing through the term of any new license, PacifiCorp would assume 100 percent maintenance responsibility for bridges identified on Settlement Agreement schedule 15.5 as being on PacifiCorp-Maintained Hydro Roads and PacifiCorp-Maintained Transmission Roads. PacifiCorp and the FS would cost-share bridge maintenance and bridges on roads classified as Joint-Use Hydro Maintenance in accordance with the cost-share ratios set forth on Settlement Agreement schedule 15.2, provided that the owner of each bridge, as shown in schedule 15.5, would bear the full

⁹⁵ Schedule 15.4 of the Settlement Agreement identifies 4.46 miles of road agreed upon for decommissioning and 4.14 miles of roads that are candidates for decommissioning.

cost of deferred maintenance on such bridge. PacifiCorp would perform critical deferred maintenance (safety related) on PacifiCorp-owned bridges identified during bridge inspections by the first anniversary of the new license, or 2005, whichever came earlier; and would perform non-critical deferred maintenance on PacifiCorp-owned bridges by the tenth anniversary of any new license. PacifiCorp and the FS would jointly share the cost of bridge inspections at the same ratio as set forth for the road containing the bridge. Implementation of these measures would ensure that public and project access needs and safety are met and that costs are partitioned commensurate with use. PacifiCorp did not specify the basis for the cost-sharing estimates for bridge maintenance; however, we assume that it is based on the 1995 draft TMP and FS engineering judgments (as was done for the road maintenance provisions discussed above). We have no basis for disagreeing with these estimates.

PacifiCorp would complete, in consultation with the FS, BLM, and ODFW, an inventory of culverts on project lands as part of the TMP. The inventory would indicate which culverts require modifications to pass a 100-year flood and which require modifications to allow fish passage. For culverts requiring modifications to allow fish passage, PacifiCorp would upgrade such culverts commencing after the new license becomes final at a rate of approximately 20 percent of such culverts a year, to be completed by the fifth anniversary of the new license. Culverts requiring upgrading to accommodate a 100-year flood would be upgraded by the eleventh anniversary of the new license at an average rate of approximately 7.5 percent of such culverts per year. Culvert replacement or upgrades associated with other protection, mitigation and enhancement measures would be completed at the time of scheduled implementation of the said measure. Culvert improvements to address fish passage would meet ODFW criteria for stream road crossings set forth in Schedule 15.6 of the Settlement Agreement. PacifiCorp would consult with ODFW to consider any subsequent changes in these design criteria, and would incorporate any such changes provided the costs are not more than 125 percent of existing designs as of June 13, 2001, as adjusted for inflation. The FS and PacifiCorp also reached agreement on the cost-sharing basis of the culvert improvements: costs would be allocated on the same basis as costs for road maintenance set forth in sections 15.2 and 15.3 of the Settlement Agreement described above. If the FS cannot fund its share of the costs on culverts in any year, the schedule for work on such culverts would be adjusted to accommodate the funds available. Benefits to aquatic resources due to culvert improvements are discussed in section 3.4.2.7.

We find that completing and implementing a final TMP in accordance with the principles in the draft TMP and the stipulations within the Settlement Agreement discussed above would provide substantial public benefits by:

- providing for the long-term transportation-related needs of the project through the term of a new license;

- providing an equitable basis for sharing and satisfying maintenance obligations between the FS, BLM, and PacifiCorp;
- providing annual coordination of transportation-related activities between the FS, BLM, and PacifiCorp;
- maintaining transportation-related facilities to agreed-upon standards that meet the needs of the public and the national forest;
- providing for safe public access on jointly-maintained roads;
- providing for necessary project-related transportation access; and
- reducing adverse environmental effects of the transportation system, including impediments to fish passage.

NGO Alternative

The Conservation Groups have not commented on the effects of road maintenance and decommissioning on land use.

Staff Alternative

We recommend that any new license include the preparation of the final TMP as proposed in the Settlement Agreement, without modification. Therefore, the benefits described above would be the same under the Staff Alternative.

3.11 UNAVOIDABLE ADVERSE IMPACTS

Under all of the alternatives, project facilities and operations would continue to contribute to elevated rates of soil erosion in the watershed. Project-related roads and waterways would continue to be sources of soil erosion, although proposed PM&E measures under each of the action alternatives would reduce erosion impacts relative to the No-Action Alternative. Water level fluctuations from the peaking mode of operation would continue to cause shoreline erosion under all of the alternatives. These fluctuations would be reduced under the Settlement Agreement and the Staff Alternative and would be least under the NGO Alternative, which recommends run-of-river operations for the entire project. Sediment would continue to accumulate in project reservoirs under all the alternatives.

Operation and maintenance of the project would continue to affect water quality by causing temporary increases in turbidity. Dissolved gas concentrations would continue to be elevated by the project. Project operations would continue to increase water temperatures in some reaches and decrease them in others. These water quality changes would be smaller under any of the action alternatives than they are under existing

conditions. Water quality downstream from the Soda Springs powerhouse is not expected to be significantly degraded under any of the alternatives.

Although aquatic connectivity would be improved under the action alternatives by implementation of a variety of measures, ranging from providing fish passage at Soda Springs dam to reconnecting tributaries presently cut off from the mainstem North Umpqua River, some of the dams in the upper part of the project would continue to be barriers to the upstream movement of fish. Under the Settlement Agreement and the Staff Alternative, 1.4 miles of historical anadromous fish habitat above Slide Creek dam would remain inaccessible.

Project structures such as penstocks and flumes would continue to present barriers to movement for some wildlife species. Under the action alternatives, however, terrestrial connectivity would be improved from existing conditions by installing bridges and underpasses or, in the case of the NGO Alternative, by covering major portions of open waterways.

Project facilities would remain and would have unavoidable impacts on aesthetic resources under each of the alternatives.

3.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Operation of the North Umpqua Project under all the alternatives would result in a continued commitment of land and water that have been developed for energy production. Under the NGO Alternative, the amount of land and water dedicated for energy production would be reduced by the removal of Soda Springs dam and its associated facilities. Removing all eight project dams and other project facilities and restoring disturbed areas could result in the area eventually being returned to near pre-project conditions. Thus, the commitment of land and water to energy production is not considered to be irreversible or irretrievable. However, the substantial costs of removal and restoration and the loss of energy and recreational benefits make it unlikely that project removal and restoration would be done in the foreseeable future.

The loss of at least 136,500 MWh of energy annually under the action alternatives from increases in instream flow releases and other PM&E measures would be irretrievable in the context of hydropower generation from this project. The replacement of this lost energy production by fossil-fueled generation or other alternative energy resources would represent an irreversible and irretrievable loss of fossil fuel or other energy resources.

3.13 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Under the four alternatives considered in this EIS, the project would continue to produce from about 602,400 MWh (NGO Alternative) to 957,400 MWh (No-Action Alternative) annually and would provide recreational benefits for the duration of the license. All three action alternatives would provide long-term protection and enhancement of ecological, cultural, and recreational resources. The PM&E measures for the Settlement Agreement and the Staff Alternative would meet the environmental management goals of the resource management agencies and would enhance long-term productivity of the ecological resources. The PM&E measures of the NGO Alternative would provide somewhat greater long-term protection of environmental resources than the Settlement Agreement by removing some project features (e.g., Soda Springs dam), covering most project waterways, releasing greater instream flows, and operating the project in more of a run-of river mode than would be done under the Settlement Agreement or Staff Alternative. The NGO Alternative, however, would significantly reduce the short-term uses of the project for production of electricity and would result in greater flow fluctuations downstream of Slide Creek dam because of the project's reduced re-regulation capability. The No-Action Alternative would provide less long-term protection and enhancement of ecological, cultural, and recreational resources than would the action alternatives. Section 5.1 of this FEIS provides staff's analysis of balancing the developmental and nondevelopmental values of these alternatives.

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4. DEVELOPMENTAL ANALYSIS

4.1 INTRODUCTION

Under the Settlement Agreement, PacifiCorp would change how the North Umpqua Project is operated with regard to instream flows and ramping rates, and would also implement numerous environmental PM&E measures. The proposed changes in project operations would affect power benefits, and implementation of the proposed PM&E measures would affect project operating costs. In this section, the project's net annual benefits are estimated for the Settlement Agreement and are compared to the net benefits estimated for the No-Action, NGO, and Staff Alternatives. The net power benefit of a project is the difference between the power production cost and the power value (benefit), where the power value is based on the cost of obtaining the same amount of power from a likely alternative source.

We estimate the benefits and costs for the various EIS alternatives using data from the license application (PacifiCorp 1995a) and subsequent information filed during the relicensing process (PacifiCorp 2000a, 2002b). Table 4-1 summarizes the economic assumptions, energy and capacity values, and current capital and O&M costs used in our analysis.

4.2 PROJECT POWER BENEFITS

Historically, the project has generated on average about 957,400 MWh. Since the project is operated to provide peak power production, over 70 percent of the generation (693,100 MWh) is produced on-peak (PacifiCorp et al. 2001). The peak period is defined as 16 hours per day (6:00 a.m.–10:00 p.m.) Monday through Saturday. The off-peak period is 8 hours per day and all-day Sunday.

To compare the generation impacts of the Settlement Agreement and other alternatives with the current situation (i.e., the No-Action Alternative), staff used PacifiCorp's spreadsheet operations model of the North Umpqua Project to estimate peak and off-peak generation (PacifiCorp 1995a). This operations model was developed to evaluate the impacts of proposed operational modifications and constraints on hydropower generation and to make relative comparisons among alternatives (Raytheon

Table 4-1. Key economic assumptions for the economic analysis of the North Umpqua Project.

Parameter	Value
Period of analysis	30 years
Term of financing	20 years
Interest/discount rate	8.5%
Power Value:	
Peak energy value ¹	34.4 mills/kWh
Off-peak energy value	27.4 mills/kWh
Capacity value	\$73.8/kW
Production Costs: ²	
Net investment	\$47,800,000
Relicensing	\$43,000,000
Operations & maintenance	\$3,800,000/year
Future capital ³	\$48,800,000
FERC fees	\$500,000/year

¹ Values are average of November 2001 California-Oregon Border "Prompt Month Prices" (PacifiCorp 2001f).

² Costs are from PacifiCorp (2000a) and reflect escalation to current year. Additional explanation of justification of production costs is contained in PacifiCorp (2002c).

³ Future capital refers to anticipated replacement costs to maintain project operations during the license period.

1994). The operations model attempts to maximize peak power production subject to constraints on reservoir and forebay fluctuations, ramping rates, and minimum in-stream flow requirements. Although the model can use either of three alternative hydrologic years—median conditions (1969), wet conditions (1972), and dry conditions (1977)—we base our analysis on median water conditions.

Staff estimates that implementation of the Settlement Agreement would result in a total loss of 136,500 MWh—distributed as 49,500 MWh peak and 87,000 MWh off-peak. In comparison with the No-Action Alternative, this is a loss in power benefits of about \$4 million annually. The NGO Alternative would result in a total loss of 355,000 MWh relative to the No-Action Alternative, most of which would occur during on-peak

periods.⁹⁶ The relatively large change in the amount of peak generation is caused by the higher minimum flows, the removal of Soda Springs dam and associated capacity, and operating the project in a run-of-river mode. Staff estimates that implementation of the NGO Alternative would reduce power benefits by nearly \$13 million annually. Staff's Alternative is identical to the Settlement Agreement in terms of how the project is operated and the reduction in power benefits.

4.3 COST OF ENVIRONMENTAL MEASURES

The Settlement Agreement and the NGO and Staff Alternatives all would require substantial environmental PM&E measures. Each of these measures affects the economics of the North Umpqua Project by adding to the costs of operating the project and thus reducing net project benefits. The Settlement Agreement prescribes numerous PM&E measures, the economic costs of which would be accompanied by benefits to fish, wildlife, and recreation resources. The estimated costs for implementing these PM&E measures are summarized in table 4-2 by major resource area. Costs associated with implementation of the Clean Water Act § 401 Water Quality Certificate are also included. All costs in table 4-2 have been annualized based on the assumptions in table 4-1. We estimate the cost of the project under the Settlement Agreement would increase by about \$7.4 million annually.

Key provisions of the NGO Alternative are to: (1) increase minimum flows in bypassed reaches, (2) operate the project in a run-of-river mode, (3) remove Soda Springs dam within 5 years after issuance of a license, (4) replace selected segments of canals with buried steel pipelines, and (5) contribute additional funds to habitat restoration. Implementation of these measures would, however, preclude costs for measures identified under the Settlement Agreement for fish passage and off-site mitigation. Staff assumes that the costs of all other PM&E measures required under the Settlement Agreement also would apply to the NGO Alternative. The key differences in PM&E costs are shown in

⁹⁶ Staff's analysis is based on the Conservation Group's earlier submission (Umpqua Watersheds 2001a) and information provided by PacifiCorp (PacifiCorp 2002d). The NGO's most recent economic analysis submission (Umpqua Watersheds 2002) would not change the relative ranking of alternatives and staff's recommendation to the Commission. The Conservation Group's most recent economic analysis was filed with the Commission on November 18, 2002. PacifiCorp responded to this filing with further clarification on March 7, 2003 (PacifiCorp 2003).

Table 4-2. Annualized costs of Settlement Agreement PM&E measures.
(Source: Staff)

Settlement Agreement—PM&E measures ¹	Capital costs	O&M costs	Annualized costs ²
	—————(\$1,000)—————		
Water use and quality ³	\$8,801	\$225	\$1,418
Aquatics ⁴	\$6,385	\$297	\$1,162
Terrestrial ⁵	\$747	\$45	\$146
Cultural ⁶	\$158	\$202	\$224
Recreation ⁷	\$2,137	\$221	\$511
Visual ⁸	\$94	\$23	\$36
Fish passage ⁹	\$9,002	\$259	\$1,479
Geology and soils - erosion ¹⁰	\$6,793	\$92	\$1,013
Off-site mitigation ¹¹	\$1,012	\$802	\$939
Resource Coordination Committee ¹²	\$0	\$108	\$108
NEPA/ESA process ¹²	\$0	\$253	\$253
Transportation management plan ¹²	\$0	\$131	\$131
Total	\$35,128	\$2,660	\$7,421

¹ Current dollar estimates of capital, O&M, and time allocation provided by PacifiCorp 2002b.

² Annualized costs based on assumptions in table 4-1.

³ Capital allocated in FY2002 to FY2005. O&M allocated in FY2002 to FY2041. Costs associated with Clean Water Act § 401 Water Quality Certificate are included.

⁴ Capital allocated in FY2002 to FY2015 (89 percent in FY2003 to FY2010). O&M allocated in FY2002 to FY2041.

⁵ Capital allocated in FY2004 to FY2010. O&M allocated in FY2002 to FY 2041.

⁶ Capital allocated in FY2008 to FY2012. O&M allocated in FY2003 to FY2015 (75 percent), FY2016 to FY2041 (25 percent).

⁷ Capital allocated in FY2006 to FY2014, FY2023 to FY2024 (48 percent in FY2023 to FY2024). O&M allocated in FY2002 to FY2041.

⁸ Capital allocated in FY2006 to FY2012 (86 percent in FY2006 to FY2008). O&M allocated in FY2004 to FY2010 (64 percent), FY2011 to FY2041 (36 percent).

⁹ Capital allocated in FY2004 to FY2013 (84 percent in FY2009 to FY2012). O&M allocated in FY2007 to FY2041.

¹⁰ Capital allocated in FY2002 to FY2011 (76 percent in FY2007 to FY2009). O&M allocated in FY2003 to FY2041.

¹¹ Capital allocated in FY2003 to FY2005. O&M allocated in FY2004 to FY2026 (84 percent), FY2027 to FY2041 (16 percent).

¹² O&M allocated in FY2003 to FY2041.

table 4-3. The total annual increase in project costs under the NGO Alternative would be about \$8.2 million for the PM&E measures, less future capital, O&M and relicensing cost savings associated with the removal of Soda Springs dam. We estimated these latter cost savings at about \$0.35 million.

The Staff Alternative recommends the same minimum instream flows in the bypassed reaches and changes in ramping rates as specified in the Settlement Agreement. The Staff Alternative thus has the same impact on project generation as the Settlement Agreement. The Staff Alternative generally accepts the Settlement Agreement's PM&E measures as proposed with the exception of additional measures required for planning, compliance monitoring, and recreation. These recommended additional measures impose additional costs (table 4-4), but they are small relative to the overall costs of the Settlement Agreement's PM&E measures.

Table 4-3. Annualized costs of key PM&E measures required for implementation of the NGO Alternative. (Source: Staff)

NGO Alternative PM&E measures	Capital costs	O&M costs	Annualized costs ¹
	————— (\$1,000) —————		
Soda Springs dam removal ²	\$17,995	—	\$1,540
Geology and soils, and terrestrial (pipeline burial and canal covering) ²	\$17,268	—	\$2,341
Settlement Agreement measures excluding fish passage and off-site mitigation	\$18,360	\$1,599	\$4,367
Total	\$53,623	\$1,599	\$8,248

¹ Annualized costs based on assumptions in table 4-1.

² Capital allocated to FY2007 and FY2008. Costs shown for geology and soils are for 13.3 miles of pipeline and canal burying plus wildlife bridges.

Table 4-4. Annualized costs of Staff's Alternative including additional PM&E measures. (Source: Staff)

Staff's Alternative PM&E measures	Capital costs	O&M costs	Annualized costs ¹
	----- (\$1,000) -----		
Wetlands (habitat planning/monitoring) ²	\$10	\$10	\$12
Recreation ³	\$10	\$5	\$6
Settlement Agreement PM&E measures ⁴	\$35,128	\$2,660	\$7,421
Total	\$35,148	\$2,675	\$7,439

¹ Annualized costs based on assumptions in table 4-1. Capital costs incurred in initial license year.

² Development and implementation of wetland effectiveness monitoring plans (with annual monitoring). Capital costs are for the completion of a study plan; O&M costs are for annual reporting of data and evaluation of effectiveness.

³ Providing real-time data on flows on the internet for use by recreational boaters. Capital costs are for the Boulder Creek gage rehabilitation; O&M costs are for the monitoring and posting of data.

⁴ See table 4-2.

4.4 COMPARISON OF ALTERNATIVES

Project costs including PM&E measures, annual power benefits, and net project benefits are summarized in table 4-5. Staff's estimates of the annualized cost and benefits of the project under the No-Action Alternative are \$22.0 million and \$43.8 million,

Table 4-5. Summary of costs, power benefits and net benefits for the North Umpqua Project alternatives. (Source: Staff).

Alternative	Annualized cost	Annual power benefit	Annual net benefit
	\$millions (mills/kWh)		
No-Action	\$22.0 (22.9)	\$43.8 (45.7)	\$21.8 (22.8)
Settlement Agreement	\$29.4 (35.8)	\$39.7 (48.4)	\$10.3 (12.6)
NGO	\$29.9 (49.6)	\$31.0 51.4	\$1.1 (1.8)
Staff	\$29.4 (35.8)	\$39.7 (48.4)	\$10.3 (12.5)

respectively. Net project benefits under the No-Action Alternative are approximately \$21.8 million or 22.8 mills/kWh. The Settlement Agreement proposes numerous PM&E measures that have the effect of increasing the project's annual costs by about \$7.4 million and lowering annual power benefits by nearly \$4.1 million. These together result in a reduction in net project benefits of \$11.5 million annually relative to the No-Action Alternative.

Staff's recommendation for additional PM&E measures would increase project operating costs slightly and reduce net project benefits by about \$0.02 million per year. The Staff Alternative would not affect annual power benefits of the project relative to the Settlement Agreement. Implementation of the NGO Alternative would have much more impact to the project. Under the NGO Alternative, annual project costs would increase by about \$7.9 million (\$8.3 million in PM&E measures less \$0.35 million in cost savings associated with Soda Springs dam) over the No-Action Alternative. This amount is about the same as costs for the Settlement Agreement and the Staff Alternative. The removal of Soda Springs dam and its associated capacity, large increases in minimum flow releases, and run-of-river operation of the project reduces annual power benefits by about 30 percent from the No-Action Alternative and by 22 percent from the Settlement Agreement. The large loss in power benefits reduces the net project benefits to \$1.1 million annually, based on the current values of power.

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5. STAFF CONCLUSIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Section 4(e) of the FPA provides that, in issuing licenses for non-federal projects, the Commission “shall give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality.” Furthermore, Section 10(a)(1) of the FPA provides that licensed projects “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 adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat)], and recreation [and other purposes referred to in Section 4(e) of the FPA].”

This section presents our rationale in balancing developmental and nondevelopmental values and our recommendations for the plan best adapted to comprehensive development. Our balancing analysis considers the comparative environmental impacts of the alternatives (section 3), their economic viability (section 4), and their consistency with relevant agency recommendations, comprehensive plans, laws, and policies (sections 5.3, 5.4, and 5.5). Based on our independent review and analysis of current operations (section 2.1), the Settlement Agreement (section 2.2), and modifications to the Settlement Agreement recommended by the NGOs (section 2.3), we recommend relicensing the project as proposed under the Settlement Agreement, as amended, with our additional recommended modifications to PM&E measures in the Settlement Agreement as discussed below.

We chose the Staff Alternative as the preferred alternative because: (1) the project would provide a significant (820,900 MWh) and dependable source of electrical energy for the region; (2) the project would avoid the need for an equivalent amount of fossil-fuel-fired, electric generation and capacity, thereby continuing to help conserve these nonrenewable energy resources and reduce atmospheric pollution; and (3) the PM&E measures proposed under the Settlement Agreement, combined with the additional measures recommended by staff, would adequately protect and enhance environmental resources and mitigate impacts of the project. The overall benefits of this alternative

would be worth the cost of proposed environmental measures and would outweigh the consequences of the other alternatives or license denial.

The Staff Alternative would include all of the provisions of the Settlement Agreement along with staff's recommendations for PacifiCorp to: (1) submit plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement (see section 2.3.1 for a list of these plans) to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation; and (2) resume operation of the existing gage at Boulder Creek (USGS gage #14316495), post real-time flow data on the internet for this gage and all the project gages described in the Settlement Agreement to provide recreational boaters with accurate flow information, and provide notice to the public of scheduled maintenance releases at the project developments. Staff also recommends that, in developing the plans mentioned under item 1 above, PacifiCorp consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

We consider the cost of filing plans for monitoring and implementing certain enhancement measures with the Commission as described in our first recommendation to be nominal.

As discussed in section 3.8.2.3, the Copeland Creek gage provides some flow information for boaters downstream of Soda Springs, but it does not provide precise information about releases from the Soda Springs powerhouse because it also measures inflow from Boulder Creek, which is located between Soda Springs and Copeland Creek. Therefore, to provide boaters with accurate information about releases from the Soda Springs powerhouse and to minimize the cost of providing such information, we recommend that PacifiCorp resume operation of the existing gage at Boulder Creek (USGS #14316495) and post real-time data for this gage on the internet. By doing so, PacifiCorp would provide valuable information for boaters on releases from Soda Springs (i.e., flow at Copeland Creek less inflow from Boulder Creek) without the cost of establishing a new flow gage below the Soda Springs powerhouse. We estimate the cost of resuming operation of the Boulder Creek gage and posting real-time data on the internet to be \$10,000 in one-time costs and \$5,000 in annual costs.

Also, we recommend that PacifiCorp post on the internet the real-time flow information collected by all the gages that would be installed under the Settlement Agreement because this would provide additional valuable information for whitewater boaters (see section 3.8.2.3). We estimate the additional cost of this measure to be minimal.

In the draft EIS, staff recommended that PacifiCorp monitor shoreline erosion at project reservoirs with fluctuating water levels because such monitoring was not explicitly stated in the Settlement Agreement. In their comments on the draft EIS, the parties to the Settlement Agreement indicated that the scope and content of the erosion control plan and monitoring plan for erosion sites located within the project boundary would address shoreline erosion at the project's reservoirs (PacifiCorp 2002c). Thus, there would be no additional cost for monitoring shoreline erosion.

Several of our recommendations differ significantly from recommendations included in the NGO Alternative. We have considered the recommendations of the Conservation Groups and have taken into account tradeoffs between environmental resources and effects on project generation and economics in developing our recommendations. The principal differences between the additional measures we recommend and those of the NGO Alternative are: (1) removal of Soda Springs dam, (2) off-site mitigation in lieu of fish passage, (3) minimum instream flows, and (4) wildlife entrapment and barriers to wildlife movement. We discuss these differences and our balancing of environmental impacts versus benefits below.

Removal of Soda Springs Dam

A major difference among the alternatives considered in this EIS centers around the issue of providing access for anadromous fish to habitat above Soda Springs dam that was available to these species before the dam was built. Under the Settlement Agreement, PacifiCorp would construct and operate a vertical-slot fish ladder for upstream passage of adult salmonids and lamprey at Soda Springs dam by the seventh anniversary of the license. The fish ladder would include a fish-viewing window and video camera system to monitor fish passage. The Settlement Agreement also includes provisions for facilities at Soda Springs dam to improve downstream fish passage. These facilities would consist of fish screens, a trap for evaluating screen performance and for long-term monitoring of the downstream migrant population, and modifications to the spillway.

In contrast, under the NGO Alternative, the Conservation Groups recommend that PacifiCorp remove the dam and its associated facilities and construct a tailrace barrier at the Slide Creek powerhouse. Concurrent with removal of Soda Springs dam, they recommended that PacifiCorp study entrainment of Pacific lamprey and other anadromous fish and determine in consultation with a Technical Committee what, if any, additional measures are required to reduce entrainment. The Conservation Groups maintain that dam removal is the only alternative that would comply with the Forest Plan's ACS objectives. As a party to the Settlement Agreement, the FS has not required

this dam removal, but instead has agreed with a combination of new fish passage facilities and off-site habitat enhancement measures.

During the settlement discussions, PacifiCorp provided a draft technical feasibility study for removal of Soda Springs dam (Raytheon 1999). This study evaluated seven alternatives for completely or partially removing the dam and an alternative of constructing a tunnel diversion around the dam and leaving the dam in place. In addition, section 20 of the Settlement Agreement required PacifiCorp to prepare a report analyzing the physical, biological, and economic feasibility of (1) removing Soda Springs dam and replacing it with a new reregulating dam upstream of the present location, and (2) installing a new, enlarged spill gate at Soda Springs dam. On August 16, 2001, the parties to the Settlement Agreement filed PacifiCorp's report with the Commission along with their evaluation of its findings (PacifiCorp et al. 2001). The parties determined that removal of Soda Springs dam and replacement with a new reregulating dam upstream of the present location might provide greater local environmental benefits than construction of a fish ladder and fish screen at Soda Springs dam. However, the parties also determined that substantial uncertainties existed with permitting, delays in implementation, geotechnical delays, and negative generation impacts. The parties concluded that potential localized ecological benefits were outweighed by more certain environmental and power generation benefits throughout the North Umpqua River Basin as a whole from implementing the Settlement Agreement. As a result of this evaluation, the parties recommended against further evaluation or technical analysis of the dam removal alternatives.

We have reviewed the technical reports prepared for alternatives involving dam removal and the Conservation Groups' recommendation to remove Soda Spring dam, and considered them in comparison to installation and operation of the proposed fish passage facilities at Soda Springs dam. We estimate that the annualized costs of dam removal would be \$1.54 million (section 4.3), while the proposed fish passage measures that include a fish ladder and screens at Soda Springs dam, as well as additional measures elsewhere in the project, would be \$1.48 million. We understand that the design goal for installation and operation of the proposed upstream fish passage facilities at Soda Springs dam is to achieve 100 percent upstream passage for adult salmonids and lamprey and that these facilities would be designed to meet NMFS, ODFW, and FWS standards for fish passage (ODFW 2001). We agree with the parties to the Settlement Agreement (e.g., FWS 2001b, ODFW 2001) that ecosystem goals throughout the project area and the upper North Umpqua River Basin could be achieved by the proposed fish passage measures, while avoiding negative economic and power production impacts [e.g., peak generation capacity could be reduced by 46 percent (PacifiCorp 2001d)]. We estimate that the annual value of power lost from removing Soda Springs dam would be about

\$7.3 million when compared to the Settlement Agreement or Staff Alternative. Therefore, we conclude that the proposed installation and operation of fish passage facilities at Soda Springs dam would provide adequate access to historical spawning and rearing habitat upstream of the dam and would be worth the cost.

Off-Site Mitigation In Lieu of Fish Passage

Under the Settlement Agreement, off-site habitat mitigation measures to benefit anadromous fish would be implemented in the Rock Creek Basin in lieu of providing fish passage at Slide Creek dam. Providing fish passage at Slide Creek dam would allow anadromous fish, primarily chinook salmon and steelhead, access to about 1.4 miles of the mainstem North Umpqua River between the dam and Toketee Falls, the natural barrier to upstream fish movement before the project was constructed. Rock Creek Basin was selected because: (1) it contains alluvial habitat that is relatively rare in the basin and could provide high quality spawning and rearing habitat for anadromous fish, and (2) it has been identified by ODFW as a high priority fisheries enhancement area. The Settlement Agreement also includes off-site habitat enhancement measures for resident trout in the upper Canton Creek and East Fork Pass Creek subbasins as part of proposed mitigation in lieu of providing fish passage at Toketee, Clearwater Nos. 1 and 2, and Lemolo No. 1 dams.

Under the Settlement Agreement, off-site mitigation would be funded through the Tributary Enhancement Program. Funds for this program would be provided by PacifiCorp with an initial \$2 million deposit followed by seven annual installments of \$430,000. The fund would be used for the mitigation defined in the ODFW MOU incorporated as part of the Settlement Agreement, but it would also be available for other enhancement and mitigation projects with the approval of ODFW.

The Conservation Groups take the position that the proposal for off-site habitat enhancement measures in lieu of fish passage at Slide Creek dam is inadequate and fails to ensure any on-site benefits to anadromous fish and other migratory fish populations. They state that priority should be given to on-site, in-kind mitigation to ensure that impacts of the project are addressed and recommend that PacifiCorp establish a \$3 million mitigation trust fund for on-site mitigation to address ongoing impacts that cannot be mitigated through other changes in project operation or structure. In addition, the Conservation Groups propose that a Technical Committee made up of representatives of PacifiCorp, the state and federal agencies, and NGOs determine within 5 years of license renewal whether effective upstream and downstream fish passage should be provided at Slide Creek dam, dependent on whether sufficient recovery of habitat in the Toketee bypassed reach has occurred to warrant such passage. If passage is determined to

be warranted, PacifiCorp would be required to install and operate fish passage facilities. If not, then PacifiCorp would be required to contribute an additional \$5 million to the Habitat Restoration Fund.

We have reviewed the ODFW MOU, the Settlement Agreement, and the Conservation Groups' recommendations. We concur with the parties to the Settlement Agreement that providing access to the 1.4 miles of mainstem river above Slide Creek dam would provide very limited benefit to anadromous fish habitat in the basin and that from a watershed perspective, habitat enhancement measures in the Rock Creek and Canton Creek Basins have a greater potential to benefit anadromous fish spawning and rearing habitat. In addition, off-site habitat enhancements would benefit wetlands (section 3.5.2.3). The Conservation Groups provide no cost estimate for fish passage at Slide Creek dam. However, we believe that it would cost at least the \$5 million that PacifiCorp would incur with the off-site enhancement fund and would provide less benefit to anadromous and resident fish populations because of the limited amount of habitat above Slide Creek dam (section 3.5.2.3). In addition, the Settlement Agreement makes clear provision for on-site habitat enhancement measures. Therefore, we recommend the proposed measures in the Settlement Agreement to fund off-site habitat enhancement in the Rock Creek and Canton Creek Basins.

Minimum Instream Flows and Project Operations

Under the Settlement Agreement, as amended, the goal for developing the instream flow regime was to maintain and/or restore instream flows that sustain well-connected and functional riparian and aquatic habitats to which the native aquatic and riparian communities are adapted. The Settlement Agreement includes a number of measures to improve instream flows for aquatic habitats: (1) increasing instream flow releases in all bypassed reaches; (2) rerouting the discharge from Lemolo No. 2 powerhouse to Toketee Lake; (3) providing flows for the operation of fish passage facilities and ODFW fish holding ponds; and (4) supplementing instream flows in the Toketee bypassed reach with flows from the new Clearwater River reconnection. These instream flow enhancements are reflected in the FPA Section 10(j) recommendations from the ODFW, FWS, and NMFS and Section 4(e) conditions from the FS and BLM. The proposed flow regime was based on the need to establish: (1) a range of flows to provide habitat for anadromous and resident fish, amphibian populations, aquatic invertebrate production, and other aquatic attributes; (2) winter and summer flows to reflect seasonal shifts in habitat use; (3) priorities for native species over nonnative species; (4) seasonal flow patterns to meet the ACS objective that includes "the timing, magnitude, duration, and

spatial distribution of peak, high and low flows;" (5) flows that address the ODFW trout management plan; and (6) a flow regime that considers the impacts to project economics and power generation.

The Conservation Groups maintain that the proposed instream flows in the Settlement Agreement for reaches outside the anadromous fish zone do not provide the minimum necessary flows for functioning ecosystems. They also object to the possibility of open-ended modifications to the proposed flows and the lack of ecological criteria to be used to support any such modifications. The NGO Alternative recommends higher instream flow releases than provided by the Settlement Agreement, including natural streamflows (i.e., no diversions) in the Soda Springs and Fish Creek bypassed reaches during all or parts of the year. The Conservation Groups state that PacifiCorp must implement a flow regime that provides functioning aquatic ecosystems and must consider the needs of anadromous fish, if present, resident native fish, amphibians and other riparian dependent species, and macro invertebrates; flows to address water quality problems; and the timing and magnitude of reference flows. The Conservation Groups suggest that their proposed flow regimes: (1) would better mimic the natural hydrograph, (2) are within the natural range of variability, (3) would maintain aquatic processes, (4) provide properly functioning aquatic habitat for fish and macroinvertebrates, (5) improve water quality, and (6) further the goals of overall ecosystem integrity.

Increased minimum flows and changes in project operations under all the action alternatives would result in decreased power generation. Under the Settlement Agreement, the increased instream flows and modified project operations would result in a loss of 49,500 MWh peak and 87,000 MWh off-peak generation, estimated to be a loss in power benefits of about \$4 million annually (section 4.2). In contrast, implementation of the NGO recommendations for increased instream flows and run-of-river operation would result in a total loss of 355,000 MWh relative to the No-Action Alternative, most of which would occur during on-peak periods, and an estimated loss in power benefits of nearly \$13 million annually (section 4.2). The Staff Alternative is identical to the Settlement Agreement in terms of how the project is operated and the reduction in power benefits.

We have reviewed the changes in minimum instream flow and project operations recommended under the Settlement Agreement and those proposed by the Conservation Groups (section 3.4.2.1). We conclude that the flow regime and modifications to project operations proposed by the Conservation Groups would result in an unacceptable loss of power benefits relative to the concomitant benefit to aquatic ecological resources. We conclude that the Settlement Agreement measures provide an adequate flow regime for improving aquatic habitat for anadromous and resident species in the mainstem of the

North Umpqua River and the bypassed reaches and represent the best balance between flows for protection and enhancement of environmental resources and power generation, and we recommend they be implemented.

Wildlife Entrapment and Barriers to Wildlife Movement

Under the Settlement Agreement, the management goal for terrestrial wildlife species includes modifying the waterway system so that effects on wildlife populations in the project vicinity are insignificant and wildlife entrapment-related injury and mortality of individuals are minimized. Proposed measures include increasing the width of the 29 existing big-game bridges across project waterways to 36 feet and providing suitable habitat components on crossing surfaces to facilitate use by all classes of terrestrial species, installing 34 new wildlife crossings that are 36 feet wide, developing and implementing a monitoring plan to evaluate the efficacy of the wildlife crossings, based on the monitoring results installing up to a total of 5 additional wildlife crossings if required by FS and ODFW, and excavating at least 9 wildlife underpasses below project penstocks at locations determined in consultation with the FS and ODFW.

In contrast, the NGO Alternative would require, among other things, (1) covering, burying, or elevating canals, pipelines, and flumes along the waterway system in priority Riparian Reserves to allow continuous unencumbered wildlife movement and other ecological processes and (2) adding 36-foot-wide wildlife bridges over gunite canals between other riparian areas so there would be a wildlife crossing every 400 feet. These measures would eliminate wildlife entrapment along 13.35 miles of waterway and significantly increase wildlife crossing opportunities and exchange between populations.

The annual cost of Settlement Agreement measures for enhancing wildlife movement has been estimated to be about \$100,000 (i.e., a significant portion of the \$146,000 annual cost for terrestrial measures shown in table 4-2). The Conservation Groups have not provided a cost estimate for their proposed measures for covering, burying, or elevating significant portions of canals, pipelines, and flumes, but staff estimates that these measures would cost about \$2.3 million annually (table 4-3). This cost is primarily for pipeline and canal burying, which staff estimate at about \$290 per foot.

Overall, the NGO Alternative would appear to provide greater benefits for terrestrial species habitat connectivity and reduced wildlife mortality than the proposed Settlement Agreement measures, but at a significantly higher cost. However, the staff agrees with the FS (FS 2001d) that there is little evidence to indicate that any particular species has been affected to a significant degree (i.e., population persistence or viability)

by project-induced loss of connectivity or entrapment for either terrestrial or riparian/aquatic species, particularly at the landscape level. Therefore, we conclude that on balance, the benefits provided by the Settlement Agreement are adequate to enhance wildlife connectivity and are worth the cost.

5.2 CUMULATIVE EFFECTS SUMMARY

5.2.1 Geology and Soils

Erosion, landsliding, and sediment deposition are strongly influenced by timber harvesting and other management practices in the watershed. Rates of erosion, landsliding, and sediment delivery to streams have exceeded natural rates under all project alternatives and can be expected to continue to exceed natural rates due to timber harvesting and the presence of roads. Excess sediment deposition, particularly by landslides and large-magnitude erosion episodes, adversely affects the maintenance of natural fluvial geomorphic processes. The erosion control provisions in the Settlement Agreement would not directly affect the incidence of non-project-related erosion and landsliding, except where these processes directly affect project waterways. Over time the incidence of non-project-related erosion and landsliding affecting watershed streams should decrease somewhat due to changes in non-project-related land management practices. Improved road construction and maintenance practices adopted in the 1980s have resulted in less road-related landsliding in western Oregon (Landslides and Public Safety Project Team 2001). On FS lands, the designation of riparian reserves adjacent to streams should reduce the future incidence of erosion and landsliding that directly affect streams, resulting in less deposition of fine sediment in stream channels. Designation of LSR on a large fraction of the Western Cascades portion of the watershed (under FS forest plans) should reduce the incidence of shallow landsliding in the watershed. Planned and ongoing watershed restoration measures in the Steamboat Creek watershed (FS 2000a and 2000b) should reduce landsliding rates and, thus, sediment delivery from this North Umpqua River tributary. However, the watersheds of Steamboat Creek and other Western Cascades tributaries contain large quantities of stored sediment and would continue to deliver larger than natural quantities of sediment to the river.

Increased timber harvesting planned in the upper portions of the watershed (see section 5.2.4), primarily in the High Cascades (including the Fish Creek watershed and Lemolo Reservoir unit) is likely to increase rates of sediment delivery into project canals, Lemolo Reservoir, and other project impoundments and streams with watersheds in the High Cascades.

Conservation and restoration measures independently planned for the Rock Creek and Canton Creek watersheds should reduce the delivery of sediment to these streams and, thus, aid in restoration of fluvial geomorphic processes. Conservation easements that limit timber harvest on slopes susceptible to landsliding could reduce the future incidence of landsliding in these watersheds. Removal of roads near streams would reduce road-related erosion that deposits sediments into the streams. Removal or improved construction of roads traversing landslide-prone slopes could reduce landslide incidence. Replacement of selected culverts could reduce culvert-related erosion.

Cumulatively, improvements in road construction and timber harvesting practices and watershed restoration projects should reduce the incidence of land instability and excessive sediment deposition in North Umpqua watershed streams and reservoirs under all alternatives, including the No-Action Alternative. Reductions in adverse erosion and sedimentation impacts and restoration of natural fluvial geomorphic processes would be greater under any of the action alternatives than under the No-Action Alternative. On a watershed scale, the Settlement Agreement and the Staff Alternatives would contribute to greater cumulative reductions in adverse sedimentation-related impacts than the NGO Alternative, because required mitigation measures in the Rock Creek and Canton Creek watersheds would enhance the effectiveness of other planned measures there. The NGO Alternative would, however, have more positive impacts along part of the mainstem of the river due to the elimination of erosion from water-level fluctuations in the area currently inundated by Soda Springs Reservoir. Similarly, cumulative effects on availability of gravel deposits suitable for anadromous fish habitat would be positive under all action alternatives, but the Settlement Agreement and the Staff Alternatives would be more favorable with respect to availability of gravels and associated habitats in tributaries (due to the mitigation measures in the Rock Creek and Canton Creek watersheds), and the NGO Alternative would be more favorable with respect to availability of gravels and associated habitats in the mainstem of the river (due to the restoration of a natural sediment and debris transport regime to the reaches affected by Soda Springs dam).

5.2.2 Water Quality

The Settlement Agreement is expected to improve overall water quality in the North Umpqua River Basin by reducing the contribution of the North Umpqua Project to changes in water temperature, suspended sediments (i.e., turbidity), and dissolved gases. For example, water temperature increases can occur not only from North Umpqua Project operations, but also from forest canopy removal associated with logging. Increased water temperatures degrade fish habitats, especially in lower elevation streams. By diverting water from stream channels and passing it through project waterways, the North Umpqua

Project often increases water temperatures. Modeling conducted for the Watershed Analysis (Stillwater Sciences, Inc. 1998a) concluded that although the project has important localized water temperature effects, the cumulative effect below the Soda Springs powerhouse is small. Warm summer water temperatures in the lower mainstem North Umpqua River below the project are minimally affected by operation of the North Umpqua Project, and result primarily from natural warming of the river and inflows of warmer water from tributaries below the project. Increased instream flow releases and restoration of riparian vegetation under the Settlement Agreement should reduce any effects North Umpqua Project operations have on water temperature. In addition, recovery of clear-cut areas on the National Forest would increase vegetation cover and help moderate water temperature fluctuations.

Most of the larger watersheds in the Umpqua National Forest have high sediment loads, from historical and current logging and many miles of roads. Total sediment delivery in the Umpqua National Forest was estimated to be 125,000 tons/year in 1990. The North Umpqua River Basin experiences episodes of high turbidity caused by storm events and runoff, facilities maintenance releases and unplanned emergency shutdowns, accidental canal overflows and failures, and landslides unrelated to the project (Stillwater Sciences, Inc. 1998a). Project maintenance-caused turbidity pulses may not be larger than natural turbidity levels (due to storm runoff, for example), but maintenance activities may be conducted outside of the seasons when turbidity pulses would naturally occur. Under the Settlement Agreement, some of these project-related impacts would be addressed. For example, planned releases from facilities maintenance would be timed to avoid impacts from high turbidity (e.g., high-turbidity releases should be avoided during low streamflows in summer and winter). PacifiCorp would implement a waterway shutoff and drainage system that promptly redirects water from erodible areas. Site plans would be developed to reduce soil erosion at existing, high- and medium-priority erosion sites. These remedial measures would be site-specific, but may include removing sidecasted soil, installing drainage pipes at stream crossings, and installing large-diameter culverts beneath access road embankments.

The North Umpqua River Basin is undergoing progressive eutrophication, resulting in elevated levels of phytoplankton in the reservoirs and periphyton in the stream channels and project canals (Stillwater Sciences, Inc. 1998a). Soil in the basin is naturally rich in phosphorus, and concentrations of the other commonly limiting plant nutrient, nitrogen, are increased by recreational use and timber harvest. For example, Diamond Lake, in the upper basin, is a source of nutrients from lake sediments, recreational fishing, and sewage effluents from homes and campgrounds. The North Umpqua Project does not contribute nutrients to the river, but it does influence the movements and conversion of nutrients. For example, project reservoirs trap organic

materials, whose subsequent mineralization releases dissolved nitrogen and phosphorus. Nutrient-rich waters are discharged from the reservoirs and routed through unshaded project waterways, where exposure to sunlight can support periphyton and phytoplankton. Changes in the rule curve for Lemolo Reservoir are not expected to change the timing, duration, or magnitude of nuisance algal blooms (ODEQ 2002). Diversion of water into the expanded wetland complex around Stinkhole Pond to mitigate ramping impacts (section 3.5.3) would help remove dissolved nutrients that would otherwise be transported downstream into the North Umpqua River below the project. Restoration of riparian vegetation and riparian reserves, both as part of the Settlement Agreement and by other organizations to correct the impacts of past timber harvest practices, would help eliminate runoff and loss of nutrients from adjacent terrestrial systems. This reduction of nutrient inputs into the aquatic environment would help reduce the potential for eutrophication and its resultant adverse effects on pH and DO in the North Umpqua River.

5.2.3 Fisheries and Other Aquatic Biota

Restoring anadromous fish stocks in the North Umpqua River would depend on modifying or eliminating land use activities that contribute to fish habitat degradation in stream and riparian systems. The Watershed Analysis (Stillwater Sciences, Inc. 1998a) considered the most important of these to be hydroelectric power production and forest management activities (e.g., timber harvesting, road construction). Adverse impacts to these fish populations can also come from introduced species, fisheries management, and climatic and ocean conditions. Other possible sources of cumulative impacts were considered to be less important to the North Umpqua Basin anadromous fish stocks: livestock grazing, urbanization, agriculture, mining, declines in marine nutrient influx to tributaries, and mammal and bird predation.

Barriers to upstream movement of fish include the North Umpqua Project dams and diversions, Winchester dam (downstream of the project), and natural barriers such as Toketee Falls and the series of cascades, chutes, and waterfalls on lower Fish Creek. Winchester dam has had a fish ladder since 1946, and the Settlement Agreement requires the installation of a fish ladder for anadromous fish passage at Soda Springs dam. Increased instream flow releases in Fish Creek may improve upstream passage conditions at the natural barriers. Consequently, compared to existing conditions, the Settlement Agreement would improve upstream fish passage in the North Umpqua River Basin.

The quantity and distribution of spawning gravels are important to the success of both resident and anadromous salmonids. Activities in the North Umpqua River Basin can either reduce or increase the amounts of gravels and other sediments. For example,

dams associated with the North Umpqua Project have trapped bedload sediments and reduced the amounts of spawning gravels in the river down to the confluence with Steamboat Creek (Stillwater Sciences, Inc. 1998a). On the other hand, erosive land use practices (e.g., clear cutting, road building) have increased the amount of bedload in the North Umpqua River below Steamboat Creek, compared to pre-project conditions. In order to counter the trapping of sediments by Soda Springs dam, under the Settlement Agreement PacifiCorp would continue to augment salmonid spawning gravels and would implement measures to help increase the retention of gravels in reaches where supplies are depleted.

Aquatic macroinvertebrates depend upon appropriately sized sediments and LWD for habitat. As noted, North Umpqua Project reservoirs trap sediments and reduce the amounts of habitat, at least until these materials are replenished by tributary streams below Soda Springs dam. Also, previous land use (e.g., forest management) practices have limited the amounts of LWD in the stream channels. Gravel augmentation, increased instream flows, and placement of LWD planned under the Settlement Agreement should all enhance the habitat for aquatic macroinvertebrates.

Whereas aquatic habitats may be limited by insufficient quantities of large sediments and LWD, increased inputs of fine sediments (i.e., silts and clays) would also diminish habitat quality for anadromous and resident fish, as well as aquatic macroinvertebrates. Adverse effects can range from filling in the interstices between gravels to filling pools and clogging the gills of fish and invertebrates. In the North Umpqua Basin, increased inputs of fine sediments mainly result from erosion associated with timber harvesting and road building (Stillwater Sciences, Inc. 1998a). Soil erosion control measures under the Settlement Agreement (section 3.2.2.1) would help correct the impacts of past forest management activities on aquatic habitats by eliminating some potential sources of fine sediment.

Exotic fish species that have been introduced into the North Umpqua River include smallmouth bass, brown trout, and brook trout. Bass and brown trout are predators of juvenile salmonids, and brook trout that inhabit project reaches may compete for limited resources with both juvenile anadromous fish and native rainbow trout. In addition, stocks of anadromous fish are also reduced because of competition for food by American shad in the lower river and estuary, degraded water quality and habitats in the estuary, commercial and sport harvest, and suboptimal conditions in the ocean (Stillwater Sciences, Inc. 1998a). For example, recreational fishermen in the North Umpqua River harvest an average of 23 percent of returning adult spring chinook salmon. The ocean

and estuarine conditions and harvests are beyond the control of the North Umpqua Project. However, the Settlement Agreement contains several measures to enhance anadromous fish production in the North Umpqua River Basin.

5.2.4 Terrestrial Resources

Terrestrial wildlife populations are subject to cumulative impacts from the project and other actions in the North Umpqua watershed. Habitat loss is the most significant effect on wildlife populations in the watershed. Many areas of the Umpqua National Forest have been clearcut, and stands in various successional stages occur throughout the watershed (Stillwater Sciences, Inc. 1998a). Recent clearcuts likely hinder the movement of some wildlife and reduce the amount of mature forest habitat. Such habitat fragmentation probably has the greatest effect on terrestrial amphibians and small mammals that have limited dispersal abilities and patchy distributions and are susceptible to microclimate changes.

The first step in a habitat restoration or enhancement program in the watershed should be to reduce or eliminate those land use activities that are contributing to ongoing degradation of stream and riparian systems (Stillwater Sciences, Inc. 1998a). An ecosystem function-based approach to restoration could include elimination or reduction of commercial timber harvest, LWD placement, road decommissioning, road storm-proofing, and riparian habitat planting. The Umpqua National Forest LRMP (FS 1990), as amended (FS/BLM 1994a, 1994b), provides a coordinated ecosystem management approach to the national forest lands surrounding the project. Thus, as discussed below, most of the types of measures identified here have and would continue to be implemented (FS 2002).

Since 1995, the Umpqua National Forest has sold or made plans to sell 9,306 acres of public forests in 22 timber sales. Timber harvests (e.g., Lemolo watershed, Little River DEMO, Felix, Upper North, Fish Creek) scheduled within watershed areas designated as Matrix Lands by the Forest Plan are expected to further decrease habitat connectivity from current conditions (Stillwater Sciences, Inc. 1998a). About 1,200 acres per year would be harvested within the study area from Umpqua National Forest and BLM lands; none of this area would be clear-cut, and at least 15 percent of the timber volume would be retained in each harvest unit (Stillwater Sciences, Inc. 1998a). These measures and others implemented by the FS to meet the standards and guidelines in the Forest Plan (FS/BLM 1994a, 1994b) (e.g., road closure and restoration, smaller timber harvest units that leave green trees and coarse woody debris, maintenance and restoration of Riparian Reserves) would help to minimize the negative effects of timber harvest.

Improvement in riparian protection prescriptions required by the Oregon Forest Practices Act could limit future removal of late-successional riparian vegetation on non-federal lands in areas such as the Canton Creek and Rock Creek Basins (Stillwater Sciences, Inc. 1998a). Silvicultural techniques may also be used to speed the recovery of late-seral characteristics in riparian areas through re-establishing and/or increasing growth of conifers where they are currently lacking or where their growth has been suppressed by faster-growing hardwoods (e.g., alders) that are characteristic of disturbed riparian habitats. In the North Umpqua Basin, these methods may be most applicable to riparian areas in third-and fourth-order tributary drainages where coniferous vegetation has decreased compared to pre-project conditions. In smaller channels, deciduous vegetation can provide shade and, thus, may be a benefit.

Hunting and trapping reduce populations of game species, but these activities are not expected to increase in the near future (FS 1990, Stillwater Sciences, Inc. 1998a). Furthermore, decommissioning of roads in the project area should reduce hunting to some extent by making it more difficult for hunters to reach areas where game species live.

There are about 3,028 miles of road within the boundaries of the North Umpqua watershed. About 200 miles (6 percent) of these roads are associated with the project, half of which are used exclusively for the project, the other half being used jointly by the FS and PacifiCorp (Stillwater Sciences, Inc. 1998a). The majority of FS roads, like those associated with the hydroelectric project, are unpaved and do not prevent movement by most species. However, it is possible that these roads hinder movement by small mammals and by amphibians under dry conditions. In addition, some wildlife (e.g., big game) avoid habitats adjacent to roads. Based on traffic volume and width, State Route 138 is probably the most significant road barrier to wildlife movement in the watershed (Stillwater Sciences, Inc. 1998a). Traffic, particularly on State Route 138, is likely to increase and will probably result in higher rates of wildlife-vehicle collisions and greater mortality during the period of the new license (Stillwater Sciences, Inc. 1998a).

Recreation-related impacts could result in habitat loss and decreased carrying capacity for some species (Stillwater Sciences, Inc. 1998a; see also section 3.9.2 on recreation). However, improvements described under the Staff Alternative should minimize those impacts.

Many of the impacts from timber harvesting and other activities as described above would continue under any of the alternatives. However, any of the alternatives except the No-Action Alternative would include measures (e.g., road decommissioning, additional wildlife bridges) that would improve habitat within the project area and contribute to the reduction of cumulative impacts on terrestrial resources.

5.2.5 Cultural Resources

Archaeological resources may be affected by ground-disturbing activities that include new building or road construction or ongoing maintenance projects that disturb previously undisturbed ground. Historic resources may also be affected by new building construction when the construction alters the setting or building additions alter the integrity of design. Historic resources may also be affected by maintenance activities that alter the historic fabric. Ground-disturbing activities, building maintenance, or construction in the APE during the license term would comply with the FS Programmatic Agreement with the SHPO and the ACHP, and significant impacts would be mitigated or avoided. Therefore, we conclude that relicensing the project would not make a significant contribution to cumulative impacts on cultural resources in the North Umpqua Basin.

5.3 FISH AND WILDLIFE RECOMMENDATIONS

Under provisions of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

By signing the Settlement Agreement, the federal and state fish and wildlife agencies have indicated that they support the applicant's proposed alternative as reflected in the Settlement Agreement. In letters pursuant to FPA Section 10(j) dated December 3, 2001, December 10, 2001, and December 21, 2001, respectively, ODFW, NMFS, and FWS recommended the measures in the Settlement Agreement.⁹⁷ Subsequent

⁹⁷ In response to the Commission's Notice of Application Ready for Environmental Analysis of November 15, 2000, the NMFS (February 28, 2001), ODFW (March 1, 2001), and Interior (in a joint filing for BLM and FWS, March 1, 2001) filed their initial Section 10 (j) recommendations. Subsequent to the signing of the Settlement Agreement, in response to the Commission's notice dated October 11, 2001, these agencies filed revised recommendations that were consistent with the Settlement Agreement.

to the issuance of FERC's notice requesting comments on Amendment No. 1 to the Settlement Agreement, ODFW filed a letter on March 6, 2003, stating that its Section 10(j) recommendations included all measures in the Settlement Agreement, including those in Amendment No. 1. In addition, the FS (November 13, 2001), and BLM (December 11, 2001) recommended the measures in the Settlement Agreement under FPA Section 4(e), and the FS filed its revised draft terms and conditions on March 7, 2003. On March 7, 2003, the FWS filed revised Section 10(j) terms and conditions as revised and modified by Amendment No. 1.

ODFW states that its recommendations are based on and consistent with the terms and measures set forth in the Settlement Agreement, including Amendment No. 1. ODFW and the State reserve the right to modify their recommendations in accordance with 18 CFR 4.34(b)(4).

ODFW incorporates the PM&E measures set forth in sections 4 through 14, 15.6, 19, and 21.5 of the Settlement Agreement as its Section 10(j) recommended terms and conditions. In addition, ODFW recommends that the licensee completely and fully comply with all the provisions of the Settlement Agreement, including: (1) all PM&E measures identified in the Settlement Agreement, appendices, and schedules, and (2) all commitments identified in each plan referenced in the Settlement Agreement, appendices, and schedules.

NMFS incorporates the PM&E measures in the Settlement Agreement into its Section 10(j) recommendations, stating that the licensee shall completely and fully comply with the measures and associated schedules discussed in sections 4 through 19, and Appendices A through D of the Settlement Agreement. NMFS reserves the right to make necessary additions or modifications in the event of materially changed factual circumstances. In its revised recommended terms and conditions filed on March 7, 2003, NMFS adopts and incorporates the terms of Amendment No. 1 and deletes reference to conflicting and outdated sections of the Settlement Agreement that were changed by the Amendment.

FWS states that its recommendations are intended to be consistent with the Settlement Agreement. FWS also states that its highest priority for the next licensing period is to reestablish successful, self-sustaining runs of anadromous fish in the upper North Umpqua River above Soda Springs dam. FWS reserved the right to amend its Section 10(j) recommendations and recommended the Commission include in the new license a specific condition reserving its right to amend the license as necessary to comply with the Endangered Species Act. On August 23, 2002, FWS filed amended Section 10(j) recommendations to (1) include in its recommendation no. 5 specific recommendations

for the development of the Soda Springs Bypass Reach Alluvial Restoration Project, consistent with section 8.3 of the Settlement Agreement, as amended,⁹⁸ and (2) include in its recommendation no. 12 the implementation of measures to minimize potential electrocution risks for nesting bald eagles.⁹⁹ In its revised Section 10(j) recommendations filed on March 7, 2003, the FWS states that to the extent that any portion of its recommendations are in conflict with the Amendment to the Settlement Agreement, the provisions of the Amendment are applicable and all references to the Settlement Agreement refer to the Settlement Agreement as modified by the Amendment.

Table 5-1 lists the NMFS, FWS, and ODFW Section 10(j) recommendations for the North Umpqua Project. In addition the table displays our conclusions as to whether each recommendation is within the scope of Section 10(j), our estimates of the annual cost of each category of recommendations, and our decision about whether each recommendation should be adopted. We recommend adopting each of the ODFW, NMFS, and FWS fish and wildlife recommendations that we found to be within the scope of Section 10(j) of the FPA.

⁹⁸ Under Amendment No. 1 to the Settlement Agreement, the parties to the Settlement have agreed to expand the area considered for habitat projects to include the Soda Springs bypassed reach and additional locations on the mainstem North Umpqua River and its tributaries below Soda Springs dam.

⁹⁹ PacifiCorp and FWS developed these measures in consultation with the FS, and PacifiCorp has agreed to implement them. Both FWS and PacifiCorp believe that the measures do not differ significantly from those in the Settlement Agreement.

Table 5-1. Fish and wildlife agency recommendations. (Source: Staff)

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
<i>Fish Passage Measures—estimated annual cost is \$1,479,000¹</i>					
1.	Provide upstream and downstream fish passage at Soda Springs dam	FWS, ² NMFS, ² ODFW	4.1.1, 4.1.2	Yes	Yes
2.	Provide tailrace barriers at Soda Springs and Slide Creek powerhouses	FWS, ² NMFS, ² ODFW	4.1.1	Yes	Yes
3.	In lieu of constructing passage at Slide Creek dam, provide mitigation measures and funding to benefit wild anadromous and other migratory fish populations on-site or in proximity to the project in accordance with section 19.1 of the Settlement Agreement	NMFS, ² ODFW	4.2	Yes	Yes
4.	Modify Lemolo No. 2 fishway; and maintain existing fishways at Fish Creek and Lemolo No. 2 dam	FWS, ² NMFS, ² ODFW	4.3.1	Yes	Yes
5.	In lieu of installing fish ladders at Toketee, Clearwater Nos. 1 and 2, and Lemolo No. 1 dams, provide benefits to fish and wildlife in the upper North Umpqua Basin in accordance with section 19.1 of the Settlement Agreement and the ODFW MOU	NMFS, ODFW	4.3.1	Yes	Yes
6.	Install a fish screen at the Fish Creek intake	FWS, ² NMFS, ² ODFW	4.3.2	Yes	Yes
7.	Modify trashrack at Toketee dam to maintain the fishery in Toketee Lake and reduce predation of anadromous fish downstream of the dam	NMFS, ² ODFW	4.3.3	Yes	Yes
<i>Instream Flows for Fish and Other Aquatic Species—estimated annual cost is \$384,000</i>					
8.	Implement, reevaluate, and modify minimum instream flow requirements before and after anadromous fish reestablishment efforts	FWS, NMFS, ODFW	5.1 ³ –5.3	Yes	Yes

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
9.	Reroute discharge from Lemolo 2 powerhouse to Toketee Lake	FWS, NMFS, ODFW	5.4	Yes	Yes
10.	Install and maintain gages to monitor in-stream flow	NMFS, ODFW	5.5	Yes	Yes
11.	Continue to divert 8 cfs from Soda Springs penstock to ODFW holding ponds	NMFS, ODFW	5.6	Yes	Yes
12.	Provide required instream flows for Soda Springs, Fish Creek, and Lemolo No. 2 needed for fish passage facilities	FWS, NMFS, ODFW	5.7	Yes	Yes
13.	Design fish passage facilities so discharge flows from Soda Springs dam enter the bypassed reach upstream of restored alluvial reach	FWS, NMFS, ODFW	5.8	Yes	Yes
14.	Supplement instream flows for the Toketee bypassed reach with flows from the new Clearwater River reconnection	FWS, NMFS, ODFW	5.9	Yes	Yes
<i>Ramping—estimated annual cost is \$361,000</i>					
15.	Reroute peaking flows from Lemolo 2 powerhouse to Stinkhole area	NMFS, ODFW	6.1	Yes	Yes
16.	Conduct studies to determine if there should be project-induced ramping in the Slide Creek full-flow reach	NMFS, ODFW	6.2	Yes	Yes
17.	Operate project to prevent or limit ramping in the Wild and Scenic River reach	FWS, NMFS, ODFW	6.4	Yes	Yes
18.	Limit ramping in the project bypassed reaches; minimize impacts of ramping in bypassed reaches during planned project maintenance; and adhere, to the extent possible, to ramping restrictions for planned maintenance during emergency shutdowns	NMFS, ODFW	6.5–6.7	Yes	Yes
19.	Install a new bypass valve or improve the existing one at Soda Springs powerhouse to ensure ramping criteria in Wild and Scenic River reach are maintained during emergency shutdowns	FWS, NMFS, ODFW	6.8	Yes	Yes

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
20.	Determine if current bypass valve at Slide Creek powerhouse is sufficient to avoid adverse impacts, and replace if necessary	FWS, NMFS, ODFW	6.9	Yes	Yes
<i>Main-stem North Umpqua Anadromous Fish Spawning Habitat Enhancement—estimated annual cost is \$233,000</i>					
21.	Provide gravel augmentation in the Soda Springs bypassed reach and below Soda Springs dam to address geomorphic effects of reduced sediment load below the dam	FWS, NMFS, ODFW	7.1–7.2 ¹	Yes	Yes
22.	Enhance anadromous fish spawning habitat in Slide Creek by placing new boulders or repositioning existing boulders to trap bedload mobilized by Fish Creek	FWS, NMFS, ODFW	8.2	Yes	Yes
23.	Restore or create salmonid habitat in the Soda Springs bypassed reach and the mainstem North Umpqua River and its tributaries below Soda Springs dam	FWS, NMFS, ODFW	8.3 ¹	Yes	Yes
<i>Reservoir and Forebay Management and Mitigation—estimated annual cost is \$89,000</i>					
24.	Fund production of hatchery rainbow trout to stock reservoirs and forebays, and fund development of rainbow trout brood stock	NMFS, ODFW	9.1, 9.2	Yes	Yes
25.	Manage Lemolo Reservoir to limit total annual drawdown, allow ODFW and FS to jointly manage drawdowns from 10 to 25 feet, ensure the Lemolo boat ramp is accessible by opening day of fishing season, and restrict water level fluctuations of Lemolo Reservoir due to drawdowns to not more than 0.5 feet per day	FWS, NMFS, ODFW	9.3.1–9.3.3	Yes	Yes
26.	Determine feasibility of revegetating and controlling erosion in areas subject to reservoir fluctuations during development of the Erosion Control Plan and the Vegetation Management Plan.	FWS, NMFS, ODFW	9.4	Yes	Yes
27.	Salvage fish in project waterways during maintenance shutdowns	FWS, NMFS, ODFW	9.5	Yes	Yes

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
28.	Implement measures to benefit rainbow trout in the upper North Umpqua watershed in accordance with section 19.1 of the Settlement Agreement	FWS, NMFS, ODFW	9.6	Yes	Yes
<i>Aquatic Connectivity—estimated annual cost is \$323,000</i>					
29.	Design and construct passage for aquatic amphibians and macroinvertebrates across the dam at Stump Lake	FWS, NMFS, ODFW	10.2	Yes	Yes
30.	Reconnect Clearwater River to North Umpqua River	FWS, NMFS, ODFW	10.3	Yes	Yes
31.	Breach, modify, and remove diversions on tributary streams	FWS, NMFS, ODFW	10.4	Yes	Yes
32.	Restore riparian habitats, reconnect intercepted tributaries, and replace inadequately sized culverts	FWS, NMFS, ODFW	10.5–10.7	Yes	Yes
<i>Terrestrial Resources—estimated annual cost is \$224,000</i>					
33.	Increase width of existing big-game bridges, install new wildlife crossings, excavate wildlife underpasses, and monitor the efficacy of wildlife crossings	FWS, NMFS, ODFW	11.1–11.4	Yes	Yes
34.	Enhance wetland species diversity and still-water amphibian habitats	FWS, NMFS, ODFW	11.5	Yes	Yes
<i>Vegetation Management—estimated annual cost is \$15,000</i>					
35.	Develop a Vegetation Management Plan and undertake measures to control noxious weeds	FWS, NMFS, ODFW	12.1, 12.2	Yes	Yes

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
<i>Erosion and Sediment Control—estimated annual cost is \$1,013,000</i>					
36.	Finalize the Erosion Control Plan and obtain approval	FWS, NMFS, ODFW	14.1	Yes	Yes
37.	Develop a waterway drainage system with the goal of draining the affected waterway segment within 30 minutes in the event of a flume failure	FWS, NMFS, ODFW	14.2	Yes	Yes
38.	In the event of an accidental spill or discharge from the waterway system, immediately notify and consult with the FS; notify the state within 24 hours; immediately notify and consult with ODFW if harm to fish or wildlife habitat is observed or suspected; coordinate emergency response to waterway failure or other erosive event; and develop site-specific remediation plans in consultation with the FS, ODFW, and ODEQ	FWS, NMFS, ODFW	14.3.1–14.3.3	Yes	Yes
39.	Develop and implement site-specific plans for prevention and remediation of erosion at 31 high priority and 27 medium priority erosion sites	FWS, NMFS, ODFW	14.4.1–14.4.4	Yes	Yes
40.	Implement a monitoring program to evaluate currently ranked erosion sites and identify new erosion sites; develop a site-specific remediation plan for new sites discovered through monitoring	NMFS, ODFW	14.5	Yes	Yes
41.	Post a performance bond if the FS in consultation with ODEQ determines that site-specific performance criteria for remediation of erosion sites are not being met	NMFS, ODFW	14.6	Yes	Yes, this would be a mandatory license condition
42.	Conduct high-level analyses of potential seismic and geologic hazards facing the project.	NMFS, ODFW	14.7	No, not a specific measure to protect fish and wildlife	Yes, this would be a mandatory license condition

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
43.	Continue to consult with OWRD's Dam Safety Section in conjunction with the Commission's engineering and safety inspection activities, and comply with relevant statutes and rules when modifying dams or other project hydraulic structures	NMFS, ODFW	14.8	No, not a specific measure to protect fish and wildlife	Yes, this would be a mandatory license condition
<i>Avian Protection—no estimated annual cost is available</i>					
44.	Modify power poles to minimize adverse impacts on birds, schedule activities to avoid impacts on raptor nesting, evaluate the raptor electrocution risk of all power distribution facilities within 1 mile of Toketee bald eagle nest and upgrade all structures which represent a risk, ⁴ and comply with plans for helicopter surveys and with existing agreements for management of birds on powerlines	FWS, NMFS, ODFW	13.1–13.4	Yes	Yes
<i>Restoration of Fluvial Geomorphic Processes—estimated annual cost is covered by other PM&E measures</i>					
45.	Continue the ongoing gravel augmentation program below Soda Springs dam until December 31, 2004, as required by section 7.1 of the Settlement Agreement, as amended	FWS, NMFS, ODFW	7.1 ³	Yes	Yes
46.	Plan, implement, and monitor a Gravel Augmentation Program to provide gravel augmentation below Soda Springs dam as required by section 7.2 of the Settlement Agreement, as amended	FWS, NMFS, ODFW	7.2 ³	Yes	Yes
47.	Continue current practice of providing passage of woody debris past Soda Springs and Slide Creek dams; develop an operations plan in consultation with FS, ODEQ, NMFS, FWS, and ODFW for passing woody debris past these two dams without modifying existing facilities	FWS, NMFS, ODFW	7.3	Yes	Yes
48.	Provide passage of sediment past Slide Creek dam using existing facilities; coordinate sediment passage with downstream restoration projects to ensure such projects realize anticipated benefits	FWS, NMFS, ODFW	7.4	Yes	Yes

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
49.	Design reconnection of the Clearwater River to the Toketee bypassed reach and other tributary reconnections, as well as modification of Clearwater dam at Stump Lake, to allow passage of sediment and woody debris during high flow events	FWS, NMFS, ODFW	7.5	Yes	Yes
<i>Transportation Management Plan—estimated annual cost is \$131,000</i>					
50.	Prepare a Transportation Management Plan that identifies maintenance and capital improvement responsibilities for roads, cost sharing for joint-use roads, decommissioning of PacifiCorp-maintained roads, inventorying and inspecting bridges, maintaining bridges, and cost sharing of bridges	NMFS	15.1–15.5	No, not a specific measure to protect fish and wildlife	Yes
51.	Inventory and upgrade culverts as needed to allow fish passage and pass a 100-year flood	FWS, NMFS, ODFW	15.6	Yes	Yes
<i>Cultural Resources—estimated annual cost is \$224,000</i>					
52.	Develop and implement a Cultural Resources Management Plan that would include a Programmatic Agreement; archaeological site discovery surveys; protection, restoration, and recovery of data from archaeological sites; public outreach, interpretive displays, and cultural resource sensitivity training; monitoring; and timing of implementation	NMFS	18.1–18.7	No, not a specific measure to protect fish and wildlife	Yes
<i>Aesthetics—estimated annual cost is \$36,000</i>					
53.	Prepare a Visual Resources Management Plan that would address landscaping of certain project facilities; penstock and surge tank painting; evaluating the effectiveness of current vegetation in mitigating visual impacts at 11 locations along project transmission lines; considering modifications for reducing visual impacts of the transmission lines; and completing an implementation plan for visual improvements	NMFS	16.1–16.4	No, not a specific measure to protect fish and wildlife	Yes

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
<i>Recreation—estimated annual cost is \$511,000</i>					
54.	Complete and implement a Recreation Resources Management Plan (RRMP) that addresses funding for operations, maintenance, and replacement of recreation facilities; critical Meaningful Measures standards; application of user fees collected at PacifiCorp-funded facilities; funding for dispersed undeveloped recreation areas; allowance of public access; funding for law enforcement, capital improvements and future expansion, public information, annual monitoring, and Forest Plan compliance operations and maintenance; and maintenance of Lemolo Reservoir at or near full pool from Memorial Day through Labor Day	NMFS	17.1–17.11	No, not a specific measure to protect fish and wildlife	Yes
<i>Mitigation—estimated annual cost is \$939,000</i>					
55.	Fund and implement a Tributary Enhancement Program to offset project impacts to fish and wildlife that would not otherwise be mitigated	FWS, NMFS, ODFW	19.1	Yes	Yes
56.	Establish a fund to formulate and implement Long-Term Monitoring and Predator Control Plans to monitor and evaluate the success of reintroducing anadromous fish upstream of Soda Springs dam	FWS, NMFS, ODFW	19.2	Yes	Yes
57.	Establish a Mitigation Fund to be administered by the FS to offset adverse impacts of the project to aquatic, terrestrial, and other natural resources not offset by other provisions of the Settlement Agreement	FWS, NMFS, ODFW	19.3	Yes	Yes

Table 5-1. Continued.

No.	Recommendation	Agency	Settlement Agreement section	Within the scope of 10(j)?	Recommend adopting?
58.	Pay ODFW's annual costs for oversight of monitoring tasks under the Tributary Enhancement Program and oversight of on-site mitigation performed by PacifiCorp and other entities	NMFS, ODFW	19.4	No, not a specific measure to protect fish and wildlife	No, but it would be part of the staff alternative because it would be required under the FS's mandatory 4(e) conditions
59.	Establish an Early Implementation Fund to be used to implement highly visible PM&E measures before the license becomes final	NMFS, ODFW	19.5	Yes	Yes
60.	Develop site-specific plans for construction activities that would result in ground-or habitat disturbance in consultation with the resource agencies; conduct Sensitive Species and Survey and Manage Species protocol surveys for rare, endemic species within 400 feet of any ground- or habitat-disturbing activity; include measures to prevent erosion in all site-specific plans	FWS, ODFW	21.5	Yes	Yes

¹ Staff estimates based on information provided by PacifiCorp (2002b); see table 4-2 above.

² Included as a Section 18 prescription by FWS and NMFS.

³ Includes provisions stipulated in Amendment No. 1 of the Settlement Agreement (PacifiCorp 2002f).

⁴ To the extent that such measures would include power distribution facilities outside the Commission's jurisdiction, the recommendation would not be within the scope of Section 10(j) and would not be included in any license issued (see footnote 44, section 3.5.2.4)

5.4 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. Accordingly, federal and state agencies have filed comprehensive plans that address various resources in Oregon. Of these, we identified and reviewed the following plans that are relevant to the North Umpqua Project and conclude that, with the inclusion of our recommended environmental measures, relicensing the project would not conflict with any of these plans:

- Bureau of Land Management. 1985. A five-year comprehensive anadromous fish habitat enhancement plan for Oregon coastal rivers. Department of the Interior, Portland, Oregon. May 1985. 20 pp.
- Bureau of Land Management. 1994. Roseburg District proposed resource management plan/environmental impact statement. Department of the Interior, Roseburg, Oregon. October 1994. Three volumes and maps.
- Bureau of Land Management. 1995. Roseburg District resource management plan, including Record of Decision. Department of the Interior, Roseburg, Oregon. June 1995. 216 pp. and maps.
- Bureau of Land Management, Roseburg District. Forest Service, Umpqua National Forest. Oregon State Parks & Recreation Department. 1992. North Umpqua river management plan. July 1992. 110 pp.
- Forest Service. 1990. Umpqua National Forest land and resource management plan. Department of Agriculture, Roseburg, Oregon. September 1990. 301 pp. and appendices.
- Forest Service. Bureau of Land Management. 1994. Standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Department of Agriculture, Washington, D.C. April 13, 1994. 144 pp.
- Governor's Hydroelectric Planning Group. 1985. Preliminary site resource inventory: report to the 63rd Legislative Assembly. Salem, Oregon. March 1985. 146 pp.
- Hydro Task Force. Strategic Water Management Group. 1988. Oregon comprehensive waterway management plan. Salem, Oregon. 112 pp. and appendices.
- National Marine Fisheries Service, Seattle, Washington. Pacific Fishery Management Council, Portland, Oregon. 1978. Final environmental impact statement and fishery management plan for commercial and recreational salmon fisheries off the coasts of Washington, Oregon, and California commencing in 1978. Department of Commerce. March 1978. 157 pp.
- Northwest Power Planning Council. 1988. Protected areas amendments and response to comments. Document 88-22. Portland, Oregon. September 14, 1988.

Oregon Department of Energy. 1987. Oregon final summary report for the Pacific Northwest rivers study. Salem, Oregon. November 1987. 89 pp.

Oregon Department of Environmental Quality. 1978. Statewide water quality management plan. November 1978. Seven volumes.

Oregon Department of Fish and Wildlife. 1980. Lemolo Reservoir fish management plan. Portland, Oregon. November 1980. 3 pp.

Oregon Department of Fish and Wildlife. 1982. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Part I. General considerations. Portland, Oregon. June 1, 1982. 33 pp.

Oregon Department of Fish and Wildlife. 1982. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Part II. Coho salmon plan. Portland, Oregon. June 1, 1982. 118 pp. and appendices.

Oregon Department of Fish and Wildlife. 1984. Proposed Toketee Reservoir management plan. Portland, Oregon. 1 p.

Oregon Department of Fish and Wildlife. 1986. North Umpqua River fish management plan. Portland, Oregon. May 1986. 56 pp.

Oregon Department of Fish and Wildlife. 1987. The statewide trout management plan. Portland, Oregon. November 1987. 77 pp.

Oregon Department of Fish and Wildlife. 1987. Warmwater game fish management plan. Portland, Oregon. August 1987. 60 pp.

Oregon Department of Fish and Wildlife. 1987. Trout mini-management plans. Portland, Oregon. December 1987. 58 pp.

Oregon Department of Fish and Wildlife. 1991. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Coastal chinook salmon plan. Portland, Oregon. December 18, 1991. 62 pp.

Oregon Department of Fish and Wildlife. 1993. Oregon wildlife diversity plan. Portland, Oregon. November 1993. 512 pp.

- Oregon Department of Fish and Wildlife. 1993. Oregon wildlife and commercial fishing codes. Portland, Oregon. 146 pp. and index.
- Oregon Department of Fish and Wildlife. 1995. Biennial report on the status of wild fish in Oregon. Portland, Oregon. December 1995. 217 pp. and appendix.
- Oregon Department of Fish and Wildlife. 1995. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Part III. Steelhead plan. Portland, Oregon. April 26, 1995. 118 pp. and appendices.
- Oregon Department of Fish and Wildlife. 1996. Species at risk: sensitive, threatened, and endangered vertebrates of Oregon. Portland, Oregon. June 1996.
- Oregon Department of Fish and Wildlife. 1997. Oregon coastal salmon restoration initiative (Oregon Plan). Roseburg, Oregon. March 1997. Five volumes.
- Oregon Department of Fish and Wildlife. 1997. Oregon plan for salmon and watersheds: supplement 1 Steelhead. Roseburg, Oregon. December 1977. Four volumes.
- Oregon Department of Transportation. State Parks and Recreation Division. 1987. Recreational values on Oregon rivers. Salem, Oregon. April 1987. 71 pp.
- Oregon Land Conservation and Development Commission. 1984. Oregon coastal management program. Salem, Oregon. 63 pp.
- Oregon State Board of Forestry. 1982. Forestry program for Oregon: an action program for the eighties. Salem, Oregon. May 1982. 57 pp.
- Oregon State Game Commission. 1963-1975. Fish and wildlife resources—18 basins. Portland, Oregon. 21 reports.
- Oregon State Parks and Recreation Division. 1983. Statewide Comprehensive Outdoor Recreation Plan. Salem, Oregon. August 1983. 91 pp. and appendices.
- Oregon State Parks and Recreation Division. Undated. The Oregon scenic waterways program. Salem, Oregon. 75 pp.
- Oregon State Water Resources Board. 1973. Surface area of lakes and reservoirs. Salem, Oregon. 43 pp.

Oregon Water Resources Commission. 1985. State of Oregon water use programs. Salem, Oregon. June 20, 1985.

Oregon Water Resources Commission. 1987. State of Oregon water use programs. Salem, Oregon. 295 pp.

Oregon Water Resources Department. 1985. Biennial report, 1985-1987. Salem, Oregon. January 1985. 58 pp.

Oregon Water Resources Department. 1988. Oregon Water Laws. Salem, Oregon. 240 pp.

Pacific Fishery Management Council. 1988. Eighth amendment to the fishery management plan for commercial and recreational salmon fisheries off the coasts of Washington, Oregon, and California commencing in 1978. Portland, Oregon. January 1988.

Pacific Fishery Management Council. 1999. Appendix A - Identification and description of essential fish habitat, adverse impacts, and recommended conservation measures for salmon: Amendment 14 to the Pacific coast salmon plan. Portland, Oregon. August 1999. 146 pages.

Pacific Fishery Management Council. 1999. Appendix B - Description of the ocean salmon fishery and its social and economic characteristics: Amendment 14 to the Pacific coast salmon plan. Portland, Oregon. August 1999. 109 pages.

Pacific Fishery Management Council. 2000. Amendment 14 to the Pacific coast salmon plan (1997). Portland, Oregon. May 2000.

5.5 RELATIONSHIP TO LAWS AND POLICIES

5.5.1 Water Quality Certification

Pursuant to § 401(a)(1) of the Federal Water Pollution Control Act (Clean Water Act) and Commission regulations, PacifiCorp is required to file as part of its license application a copy of the water quality certificate provided by the state of Oregon or proof that such a certificate has been applied for or the requirements waived. On September 15, 1999, PacifiCorp filed its application for § 401 Water Quality

Certification with the ODEQ. Subsequently, this application was withdrawn because of the ongoing settlement discussions.

On July 2, 2001, PacifiCorp resubmitted its application for water quality certification to ODEQ. On March 8, 2002, ODEQ provided public notice and a 60-day opportunity for public comment on its proposed § 401 Water Quality Certification decision. ODEQ issued a § 401 Certificate for the project on June 28, 2002 (see section 2.2.3 for a summary of these conditions).

5.5.2 Endangered Species Act

On August 20, 2001, PacifiCorp was designated as the Commission's non-federal representative for purposes of conducting informal Section 7 consultation with the FWS and the NMFS under the ESA. PacifiCorp filed a *Draft Biological Assessment (BA) and Essential Fish Habitat Assessment* with FERC on February 15, 2002, and also sent it to NMFS and FWS. The BA contained detailed information on the species identified by FWS and NMFS and an assessment of the impacts of implementing the proposed Settlement Agreement on them. Two species listed by the FWS (2001), the Oregon chub and the Oregon spotted frog, were not included in the BA because neither is believed to occur in the project area.

On May 7, 2002, the Commission adopted PacifiCorp's BA as its own and submitted it to NMFS, requesting the initiation of formal Section 7 consultation for adverse effects on coho salmon. In a June 12, 2002, letter to the Commission, NMFS indicated that it had sufficient information to initiate formal consultation on the listed anadromous fish species affected by the project. On December 17, 2002, NMFS filed its BO on the effects of the proposed action on listed species. NMFS anticipates that the proposed action would cause more than a negligible amount of incidental take of Oregon Coast coho salmon, but that the extent of anticipated take is not likely to jeopardize the continued existence of this species. As discussed in section 2.2.5, the BO identified reasonable and prudent measures to minimize take and specified terms and conditions to implement these measures. Those terms and conditions included the measures identified in the Settlement Agreement.

On May 8, 2002, staff forwarded to the FWS a copy of the draft EIS which concluded that relicensing of the North Umpqua Hydroelectric Project under the Settlement Agreement with staff's recommended measures would not affect the endangered Oregon chub and would not be likely to adversely affect the endangered Columbian white-tailed deer and rough popcorn flower and the threatened Canada lynx, bald eagle, northern spotted owl, and Kincaid's lupine. In its letter accompanying the

draft EIS, staff stated that it was adopting the draft BA with the exception that the determination of “no effect” made for the Canada lynx in the draft BA was modified to “not likely to adversely affect.” Based on the information and analysis in the BA and the draft EIS, staff stated that it did not believe formal Section 7 consultation was needed for these species and requested FWS concurrence with its determinations of “not likely to adversely affect.” In a September 19, 2002, letter to FWS, staff requested completion of formal Section 7 consultation since the requested concurrence had not been received.

On December 23, 2002, the FWS filed its BO on the effects of the proposed Settlement Agreement on the northern spotted owl, the bald eagle, and the Columbian white-tailed deer. The FWS concluded in its BO that the proposed relicensing of the project would result in incidental take of these three species, but the level of anticipated take would not be likely to jeopardize their continued existence. The FWS also concluded in its BO that the proposed relicensing would not be likely to adversely modify designated spotted owl critical habitat. As discussed in section 2.2.5, the BO identified reasonable and prudent measures to minimize incidental take and specified terms and conditions for implementing these measures. In its BO, the FWS states that because some actions (e.g., herbicide application) were not fully developed and effects could not be addressed in the BO, additional Section 7 consultation may be needed once specific details for these activities are available if it is determined that these activities might affect the spotted owl, the bald eagle, or designated spotted owl critical habitat.

The FWS included with its BO a letter concurring with staff’s determination that the proposed relicensing would not be likely to adversely affect the rough popcorn flower, Kincaid’s lupine, and the Canada lynx. In this letter, the FWS also stated that the action area lies, at least in part, within the historic ranges of all three species and potential habitat for all three species exists within this area. Thus, if any of these species were to be documented as being present in the area during the license period, formal consultation with the FWS would need to be reinitiated.

No further consultation pursuant to Section 7 of the ESA is required at this time.

5.5.3 Essential Fish Habitat Assessment

The Magnuson-Stevens Fishery Conservation and Management Act (MSA)¹⁰⁰ requires federal agencies to consult with NMFS on all actions that may adversely affect EFH. In the case of the North Umpqua Project, EFH consultation is required for chinook and coho salmon. On February 15, 2002, PacifiCorp filed a draft EFH Assessment with

¹⁰⁰ 16 U.S.C. § 1855(b)(2).

the Commission and submitted it to the NMFS and the FWS along with the BA discussed in the previous section (PacifiCorp 2002a). The purpose of the EFH assessment was to determine whether the proposed Settlement Agreement would adversely affect designated EFH habitat for chinook and coho salmon. On May 7, 2002, staff informed NMFS that it had adopted the draft BA, including the EFH assessment, and initiated EFH consultation with NMFS by submitting the staff's draft EIS and the draft BA and EFH assessment. Staff requested that NMFS provide any EFH recommendations along with its BO (section 5.5.2).

We concluded in the draft EIS and EFH assessment that the proposed Settlement Agreement would have only minor, short-term impacts on chinook salmon habitat and on migrating adult or juvenile salmonids. We also concluded that the Settlement Agreement would improve habitat conditions overall and would provide a net benefit to chinook salmon in the basin. As discussed in section 5.5.2, we found that the proposed action may adversely affect coho salmon and concluded that overall implementation of the Settlement Agreement provisions would benefit this species and could help promote its recovery.

As discussed in sections 2.2.5 and 5.5.2, NMFS filed its EFH consultation with the Commission, along with its BO, on December 17, 2002. NMFS found that the proposed relicensing would adversely affect EFH for coho and chinook salmon and recommended that the terms and conditions of section 9 of the BO be adopted as EFH conservation measures. These measures are described in section 2.2.5 of this EIS. Sections 3.5 and 3.6 consider these measures in the evaluation of impacts to listed species and EFH.

5.5.4 National Historic Preservation Act

Relicensing is considered an undertaking within Section 106 of the National Historic Preservation Act of 1966, as amended (P.L. 89-665; 16 U.S.C. 470). Section 106 requires that every federal agency "take into account" how each of its undertakings could affect historic properties and provide the ACHP with an opportunity to comment. Historic properties include districts, sites, buildings, structures, traditional cultural properties, and objects (significant in American history, architecture, archaeology, engineering, and culture) that are eligible for inclusion on the NRHP. As the lead federal agency for issuing a license, the Commission is responsible for insuring that the licensee will take all necessary steps to "evaluate alternatives or modifications" that "could avoid, minimize, or mitigate any adverse effects on historic properties" for the term of the new license involving the project. The lead agency must also consult with the SHPO, as well as with other land management agencies where the undertaking may have an effect, and with Indian tribes who may have attached religious or cultural significance to properties that may be affected by the undertaking. The ACHP, an independent federal agency, is

responsible for promulgating regulations to implement Section 106 (36 CFR Part 800). A principal purpose of these regulations is to provide a framework for resolving any conflict that might exist between historic preservation objectives and a proposed development project.

PacifiCorp, under the jurisdiction of the Commission and as part of the Commission's requirements under the FPA, conducted Section 106 consultation through the FS and BLM with the SHPO, the Confederated Tribes of Grand Ronde Community, the Confederated Tribes of Siletz Indians, and the Cow Creek Band of Umpqua Tribe of Indians since 1995. Commission staff will continue Section 106 consultation with the SHPO, ACHP, FS, and BLM involving the review of PacifiCorp's final CRMP and PacifiCorp's determinations of NRHP eligibility for properties identified in the Area of Potential Effect (see section 3.8).

To meet the requirements of Section 106, and as part of the Settlement Agreement, Commission staff would develop a Programmatic Agreement (PA) on cultural resources in consultation with and for execution by the Commission, SHPO, ACHP, FS, BLM, and PacifiCorp (see section 3.8). The Commission staff would incorporate the PA by reference in any license issued for the project. The PA would provide for executing the final CRMP that would be carried out for the term of the new license. The terms of the PA would ensure that PacifiCorp would appropriately address and treat all historic properties identified within the project area through the CRMP.

5.5.5 Americans with Disabilities Act

Public recreation facilities must comply with the Americans with Disabilities Act (ADA) of 1990 (P.L. 101-336) to the extent possible. Under the terms of the Settlement Agreement, PacifiCorp would provide: (1) ADA toilet replacements at the Toketee, Inlet, Bunker Hill, and East Lemolo campgrounds and at the Poole Creek campsite; (2) ADA walkway and path reconstruction within the project boundary at the Inlet, Toketee, Bunker Hill, and East Lemolo campgrounds; (3) new ADA toilets at Clearwater No. 2 forebay and Lemolo No. 2 forebay Forest Camp; (4) a new ADA toilet at the Soda Springs powerhouse picnic site; (5) a new ADA angler access pier at Toketee Lake; and (6) if future monitoring demonstrates a need, new ADA toilets at the Clearwater No. 1 and Fish Creek forebays. We conclude that these measures would ensure PacifiCorp's compliance with the ADA at the North Umpqua Project.

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**Federal Energy
Regulatory
Commission**

**Office of
Energy Projects**

March 2003

FERC/FEIS - 0147F

Final Environmental Impact Statement



**North Umpqua Hydroelectric
Project, Oregon
(FERC 1927)**

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

6. REFERENCES

- American Rivers. 2001. North Umpqua Hydroelectric Project No. 1927, Offer of Settlement, Comments Submitted on Behalf of American Rivers, Pacific Rivers Council, Oregon Trout, and WaterWatch of Oregon. July 26.
- American Whitewater. 2001. *Recommended Terms and Conditions, North Umpqua River Hydroelectric Project*, FERC No. 1927-008. December 10.
- Anderson, C.W., and K.D. Carpenter. 1998. *Water-Quality and Algal Conditions in the North Umpqua River Basin, Oregon, 1992-95, and Implications for Resource Management*. U.S. Geological Survey Water Resources Investigations Report 98-4125, 78pp.
- APLIC (Avian Power Line Interaction Committee). 1996. *Suggested Practices for Raptor Safety on Power Lines: The State of the Art in 1996*. Edison Electric Institute/Raptor Research Foundation. Washington, D.C.
- Bacon, C.R., L. G. Mastin, K. M. Scott, and M. Nathenson. 1997. Volcano and Earthquake Hazards in the Crater Lake Region, Oregon. Open-File Report 97-487, U.S. Geological Survey, Vancouver, Washington.
- Banci, Vivian. 1994. Wolverine. Pages 99-127 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, eds. *The Scientific Basis for Conserving Forest Carnivores, American Marten, Fisher, Lynx and Wolverine in the Western United States*. USDA For. Serv. Rocky Mt. For. and Range Exp. Stn., Gen. Tech. Rep. RM-254, Fort Collins, Colorado.
- BCI (Beak Consultants, Incorporated). 1991. *A Study to Determine the Influence of the Snoqualmie Falls Project (FERC No. 2493) on the Injury or Mortality of Adult Salmonids*. Progress Report prepared for Puget Sound Power & Light Company. October, 18 pp.
- Bednarek, Angela T. 2001. "Undamming rivers: A review of the ecological impacts of dam removal." *Environmental Management* Vol. 27, No. 6, pp. 803-814.

BLM (Bureau of Land Management). 1994. *Roseburg District Proposed Resource Management Plan/Environmental Impact Statement*. U.S. Department of the Interior. Roseburg, Oregon. October.

_____. 1995a. *Watershed Analysis, Canton Creek*. Roseburg District BLM, Roseburg, Oregon. Updated as of June 12, 1995.

_____. 1995b. *Roseburg District Record of Decision and Resource Management Plan*. U.S. Department of the Interior. Roseburg, Oregon. June.

_____. 1996. *Watershed Analysis, Rock Creek*. Roseburg District BLM, Roseburg, Oregon. Updated as of February 1996.

_____. 1999. Memo from Charles E. Wassinger, Associate State Director. Oregon/Washington Bureau of Land Management, *Status of Species De-listed under the Endangered Species Act*. December 28.
<http://www.blm.gov:80/nhp/efoia/or/fy2000/TMs/m2000-022.htm>

_____. 2000. *Oregon and Washington Bureau of Land Management Special Status Species List*. Information Bulletin No. OR-2000-092. January 25.

_____. 2001. *Revised Recommendations, Terms and Conditions, and Prescriptions, for the North Umpqua Hydroelectric Project FERC No. 1927-008*. (filed December 12).

BLM and FS (Bureau of Land Management and the U.S. Forest Service). 1995. *Conservation Strategy for Calochortus umpquaensis, Umpqua Mariposa Lily*. BLM Roseburg and Medford Districts and Umpqua National Forest.

Chapman, J.A., and G.A. Feldhammer (eds.). 1982. *Wild Mammals of North America*. Johns Hopkins University Press, Baltimore and London (as cited in PacifiCorp 1995a).

Dietrich, W. E., and D. R. Montgomery. 1998. *SHALSTAB: A Digital Terrain Model for Mapping Shallow Landslide Potential*.
<http://socrates.berkeley.edu/~geomorph/shalstab/index.htm>

Dimick, J. B. 1954. "The Diamond Lake Story." *Oregon Game Commission Bulletin*, December 1954.
<http://www.dfw.state.or.us/ODFWhtml/InfoCntrFish/Diamondlake/1954GCB.html>

- DOE (U.S. Department of Energy). 1995. *Allowable Gas Supersaturation for Fish Passing Hydroelectric Dams*. Report prepared by Montgomery Watson for Bonneville Power Administration, U.S. DOE, Portland, Oregon.
- Dunne, T., and L.B. Leopold. 1978. *Water in Environmental Planning*. W.H. Freeman, San Francisco.
- _____. 2002. *Monthly Utility Power Plant Database - Form 906*, Washington, January, <http://www.eia.doe.gov/cneaf/electricity/page/eia906u.html> Form 906.
- EPA (U.S. Environmental Protection Agency). 1986. *Quality Criteria for Water*. EPA-440/5-86-001. Office of Water Regulations and Standards, Washington, D.C.
- Franklin, J. F., and C. T. Dyrness. 1973. *Natural Vegetation of Oregon and Washington*. Technical Report PNW-8. USDA Forest Service, Portland, Oregon.
- FS (U.S. Department of Agriculture/Forest Service). 1990. *Land and Resource Management Plan for the Umpqua National Forest*.
- _____. 1992. *Peregrine Falcon Eyrie Management Plan, Rattlesnake Rock Nest Site*. Umpqua National Forest, North Umpqua Ranger District, February, 17 pp.
- _____. 1995. *Forest Service Manual (FSM)*. Title 2600 - Wildlife, Fish, and Sensitive Plant Habitat Management.
<http://www.fs.fed.us/im/directives/fsm/2600/2670-2671.txt> (accessed April 3, 2002).
- _____. 1999. *Sensitive Species Plant List*. U. S. Forest Service, Region 6, Portland, Oregon.
http://roadless.fs.fed.us/documents/feis/data/sheets/summspd/tes_supp/r6ssspecies_plant.pdf (accessed December 19, 2001).
- _____. 2000a. *Watershed Restoration Business Plan*. Umpqua National Forest, August 21.
- _____. 2000b. *Roads Analysis: Lower Steamboat Watershed*, North Umpqua Ranger District, Umpqua National Forest, October.

- _____. 2000e. *Toketee Bald Eagle Nest Plan*. Umpqua National Forest, Diamond Lake District. 7 pp.
- _____. 2001a. *Reply Comments in Support of the Settlement Agreement for the North Umpqua Hydroelectric Project No. 1927-008*. (filed August 13).
- _____. 2001c. *Watershed Analysis: North Umpqua River Wild and Scenic River Corridor, Rock Creek to Soda Springs Dam*. Umpqua National Forest, North Umpqua Ranger District. April.
- _____. 2001d. *Justification Statement for USDA Forest Service Revised Terms and Conditions*. Pacific Northwest Region, Portland, Oregon, dated December 13, 2001 (filed January 15, 2002).
- _____. 2002. *North Umpqua Hydroelectric Project No. 1927-008, Terms and Conditions, Schedule for Submittal of Final Terms and Conditions, Comments, Section 7(a) Determination*. Pacific Northwest Region, Portland, Oregon, (June 21).
- FS/BLM. 1994a. *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*. Two volumes (February).
- _____. 1994b. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl on Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (April).
- _____. 2001a. *Middle North Umpqua Watershed Analysis*. Version 1.0, North Umpqua Ranger District, Umpqua National Forest, January.
- _____. 2001b. *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (January).
- _____. 2001c. *Preliminary Section 7(a) Determination, Wild and Scenic Rivers Act, North Umpqua Hydroelectric Project, North Umpqua Wild and Scenic River*. (Enclosure 3 of Forsgren to Boergers letter dated February 26).

- _____. 2001e. *Watershed Analysis: North Umpqua River Wild and Scenic River Corridor, Rock Creek to Soda Springs Dam*. Umpqua National Forest, North Umpqua Ranger District (April).
- FS, BLM, and OSPRD (U.S. Forest Service, Bureau of Land Management, and Oregon State Parks & Recreation Department). 1992. *North Umpqua River Management Plan* (July).
- FWS (U.S. Fish and Wildlife Service). 2001a. Letter from Kemper M. McMaster, Oregon Fish and Wildlife Office, U.S. Fish and Wildlife Service, to John Smith, FERC, concerning updated list of threatened and endangered species (filed August 29).
- _____. 2001b. *U.S. Fish and Wildlife Service Comments to Conservation Groups on the Settlement Agreement, North Umpqua Hydro Project, FERC No. 1927, Concerning Updated List of Threatened and Endangered Species*. Oregon Fish and Wildlife Office (filed August 13).
- _____. 2002a. *Amended Preliminary Comments, Recommendations, Terms and Conditions, and Prescriptions for the License Application – North Umpqua Hydroelectric Project, FERC Project No. 1927-008, North Umpqua River, Douglas County, Oregon*. Portland, Oregon (August 23).
- _____. 2002b. *Final Biological Opinion for the Proposed Relicensing of the North Umpqua Project, Project No. 1927*. Roseburg Field Office, Roseburg, Oregon, December 18, 2002 (filed December 23, 2002).
- _____. 2002c. *Reinitiation of Section 7 Consultation for Batch Two of the Umpqua National Forest Fiscal Year 2000 Program Activities*. Roseburg Field Office, Roseburg, Oregon (July 25).
- Gregory, Stan, Hiram Li, and Judy Li. 2002. "The conceptual basis for ecological responses to dam removal." *BioScience* 52:713-723.
- Groshong, Noel. 2001. Phone conversation between Noel Groshong, General Manager, Umpqua Basin Water Association, 4972 Garden Valley Road, Roseburg, Oregon, and Ellen Smith, Oak Ridge National Laboratory, December 17, 2001.

- Hart, David D., Thomas E. Johnson, Karen L. Bushaw-Newton, Richard J. Horwitz, Angela T. Bednarek, Donald F. Charles, Daniel A. Kreeger, and David J. Velinsky. 2002. "Dam removal: Challenges and opportunities for ecological research and river restoration." *BioScience* 52:669-681.
- Hayes, M.P. 1997. *Status of the Oregon spotted frog (Rana pretiosa) in the Klamath and Deschutes basins with a summary of its distribution across its historic range*. Final Report, Prepared for U.S. Fish and Wildlife Service, Oregon State Office, Portland, Oregon.
- Hilgert, P. 1992. *Excluding Fish from Hydropower Project Tailraces*. Oral presentation at the 11th Annual Conference of the Northwest Hydroelectric Association, Bellevue, Washington (January 29, 1992).
- Hunter, M.A. 1992. *Hydropower Flow Fluctuations and Salmonids: A Review of the Biological Effects, Mechanical Causes, and Options for Mitigation*. Technical Report No. 119, Washington Department of Fisheries, Olympia, Washington.
- Interior (U.S. Department of the Interior). 2002. *Comments--Notice of Availability of Draft Environmental Impact Statement for the North Umpqua Hydroelectric Project, FERC Project No. 1927, North Umpqua River, Douglas County, Oregon*. Office of Environmental Policy and Compliance, Portland, Oregon, June 17.
- Ludwin, R.S., C.S. Weaver, and R.S. Crosson. 1991. "Seismicity of Washington and Oregon." In: Slemons, D.B., E.R. Engdahl, M.D. Zoback, and D.D. Blackwell (eds.). *Neotectonics of North America: Geological Society of America Decade Map Volume*.
- Montgomery, D. R., and W. E. Dietrich. 1994. "A physically based model for the topographic control on shallow landsliding." *Water Resources Research* 30: 1153-1171 (April).
- NMFS (National Marine Fisheries Service). 2001a. Letter regarding Species List for the North Umpqua Project from Bryan Nordlund, National Marine Fisheries Service to David P. Boergers, FERC (filed July 30).
- _____. 2001b. *National Marine Fisheries Service's Reply to Conservation Groups' Comments on the Settlement Agreement* (filed August 13).

- _____. 2002. *Endangered Species Act Section 7 Consultation, Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Consultation, North Umpqua Hydroelectric Project, FERC Project Number 1927-008*. Northwest Region Hydro Program, Portland, Oregon, December 13 (filed December 17).
- ODEQ (Oregon Department of Environmental Quality). 2001. *Comments of the Oregon Department of Environmental Quality Prepared for the North Umpqua Hydroelectric Application Relicensing Team Regarding the North Umpqua Hydroelectric Project, FERC No. 1927* (February 23).
- _____. 2002. *Clean Water Act § 401 Certification Conditions for the PacifiCorp North Umpqua Hydroelectric Project (FERC No. 1927) North Umpqua Subbasin, Douglas County, Oregon*. Portland, Oregon (June 28).
- ODFW (Oregon Department of Fish and Wildlife). 1980. *Lemolo Reservoir Fish Management Plan (Below Soda Springs Dam)*. Roseburg, Oregon (November).
- _____. 1988. *Oregon's Trout Plan, A Plan for the Management of Oregon's Trout*. Portland, Oregon.
- _____. 1999. URL: <http://www.dfw.state.or.us/ODFWhtml/Wildlife/t%26e.html>.
- _____. 2001. *State of Oregon Reply Comments to Conservation Groups Comments on Settlement Agreement* (filed August 1).
- ODT (Oregon Department of Transportation). 2002. *Threatened and Endangered Species of Oregon. Aster vialis*. <http://www.odot.state.or.us/eshtm/asvi.htm> (accessed March 12, 2002).
- O'Neill, B.L. 1991. *Evaluation of Six Archaeological Sites along the North Umpqua Highway, Douglas County: Steamboat Creek to Boulder Flat Section*. Oregon State Museum of Anthropology Report No. 91-1. University of Oregon, Eugene.
- _____. 1992. *Pre-Mazama Occupation of the Dry Creek Site (35DO401), Southwest Oregon*. Paper presented at the 45th Annual Northwest Anthropological Conference. Burnaby, British Columbia.

Oregon Department of Forestry. 2001. *Forestry, Landslides, and Public Safety*. An Issue Paper Prepared for the Oregon Board of Forestry by the Landslides and Public Safety Project Team. Oregon Department of Forestry, June 2001.

Oregon Fish and Wildlife Commission and PacifiCorp. 2001. *Memorandum of Understanding (MOU) Waiver of Fish Passage*. March (submitted to FERC in June 2001 as Appendix E to the Settlement Agreement for the North Umpqua Hydroelectric Project).

OWRD (Oregon Water Resources Department). 2003. *State of Oregon's Comments, Recommendations, Terms and Conditions, and Prescriptions*. Salem, Oregon (filed March 6).

PacifiCorp. 1995a. *Application for New License for Major Modified Project: North Umpqua Hydroelectric Project, FERC Project No. 1927, Douglas County, Oregon*. Portland, Oregon (January).

_____. 1995b. *Draft Transportation Management Plan for the North Umpqua Hydroelectric Project, FERC Project No. 1927, Douglas County, Oregon*. Portland, Oregon (December).

_____. 2000a. *Responses to Schedule A, Requested item No.9*. Portland, Oregon (February).

_____. 2000b. *Summary of Proposed Modifications, Operations and Resource Enhancements, Addendum to the 1995 Application for a New License*. Portland, Oregon (February).

_____. 2001a. *Settlement Agreement among PacifiCorp, USDA Forest Service, National Marine Fisheries Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, Oregon Water Resources Department Concerning the Relicensing of the North Umpqua Hydroelectric Project, FERC project No. 1927-8, Douglas County, Oregon*. PacifiCorp, Portland Oregon, June 13 (filed June 21).

_____. 2001 c. *Resource and Market Planning Program (RAMPP-6)*, Portland, Oregon (July).

- _____. 2001d. *Reply Comments of PacifiCorp in Support of Settlement Agreement*. (filed August 13).
- _____. 2001e. *Evaluation of Alternatives for Providing River flow Reregulation* (August).
- _____. 2001f. *Economic Report for Protection, Mitigation, and Enhancement Measures* (December).
- _____. 2001g. *Explanatory Statement for the Settlement Agreement among PacifiCorp, USDA Forest Service, National Marine Fisheries Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, Oregon Water Resources Department Concerning the Relicensing of the North Umpqua Hydroelectric Project, FERC project No. 1927-8, Douglas County, Oregon. PacifiCorp, Portland Oregon* (filed June 21).
- _____. 2002a. *North Umpqua Hydroelectric Project, Draft Biological Assessment and Essential Fish Habitat Assessment*, Prepared by Stillwater Sciences, Inc., for PacifiCorp, Portland, Oregon (February).
- _____. 2002b. *Revised Table 2.0-1, Capital and O&M Cost Estimates for PM&E Measures*, February.
- _____. 2002c. *Comments of PacifiCorp on Draft Environmental Impact Statement; North Umpqua Hydroelectric Project (FERC Project No. 1927-008)*. Portland, Oregon, June 21 (filed June 24).
- _____. 2002d. *Response to Comments on Draft Environmental Impact Statement; North Umpqua Hydroelectric Project (FERC Project No. 1927-008)*. Portland, Oregon, August 28 (filed August 30).
- _____. 2002e. *North Umpqua Hydroelectric Project, P-1927-008; Resource Coordination Committee, Settlement Agreement Protection, Mitigation, and Enhancement Measures, 2001–2002 Annual Report*. Portland, Oregon, June 17 (filed June 19).
- _____. 2002f. *Amendment No. 1 to the Settlement Agreement Concerning the Relicensing of the North Umpqua Hydroelectric Project, FERC Project No. 1927-08, Douglas County, Oregon*. Portland, Oregon, November 1 (filed November 4).

- _____. 2002b. *Annual Report (Form 10-K)*. Filed with the Securities and Exchange Commission for the Fiscal Year Ending March 31, 2002, Portland, Oregon.
 - _____. 2003a. *North Umpqua Hydroelectric Project (P-1927-08); Explanatory Statement Supporting Amendment to the North Umpqua Hydroelectric Project Settlement Agreement*. Portland, Oregon, January 31 (filed February 3).
 - _____. 2003b. *Integrated Resource Plan, 2003*. Portland, Oregon.
- PacifiCorp, Oregon Department of Fish and Wildlife, and U.S. Fish and Wildlife Service. 1988. *Agreement for Management of Birds on Power Lines*. Portland, Oregon (February 18).
- PacifiCorp, U.S. Forest Service, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Bureau of Land Management, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, Oregon Water Resources Department. 2001. *Evaluation of Alternatives for Providing River Flow Reregulation* (filed August 16).
- _____. 2002. *North Umpqua Hydroelectric Project (P-1927-008); Response to Staff Recommended Alternative for Project Relicensing*. Portland, Oregon, June 21 (filed June 24).
- Pizzuto, James. 2002. "Effects of Dam Removal on River Form and Process." In *BioScience* 52:684–692 (August).
- Powell, Roger A., and William J. Zielinski. 1994. "Fisher." Pages 38–73. in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, eds. *The Scientific Basis for Conserving Forest Carnivores, American Marten, Fisher, Lynx and Wolverine in the Western United States*. USDA For. Serv. Rocky Mt. For. and Range Exp. Stn., Gen. Tech. Rep. RM-254, Fort Collins, Colo.
- Raytheon Engineers and Constructors. 1999. *Revised Draft Report, Soda Springs Dam Removal Technical Feasibility Study*. Prepared for PacifiCorp, Portland, Oregon, (June).
- Raytheon Infrastructure Services Inc. 1994. *Spreadsheet Model Documentation for the North Umpqua Hydroelectric Project*, prepared for PacifiCorp in support of the Resource Utilization Study (November).

- Scheerer, P. undated. *Oregon Chub Research in the Willamette Valley 1991–1999*. Oregon Department of Fish and Wildlife, Corvallis Research Laboratory, Corvallis, Oregon. <http://oregonstate.edu/Dept/ODFW/freshwater/chub/>.
- Scott, W.E., R. M. Iverson, S.P. Schilling, and B. J. Fisher. 2001. *Volcano Hazards in the Three Sisters Region, Oregon*. Open-File Report 99-437, U.S. Geological Survey, Vancouver, Washington.
- Seevers, J. and F. Lang. 1998. *Management recommendations for Clustered Lady Slipper Orchid* (*Cypripedium fasciculatum Kellogg ex. S. Watson*). <http://www.or.blm.gov/surveyandmanage/MR/VascularPlants/section9.htm> (accessed March 27, 2002).
- Shafroth, Patrick B., Jonathan M. Friedman, Gregor T. Auble, Michael L. Scott, and Jeffrey H. Braatne. 2002. "Potential Responses of Riparian Vegetation to Dam Removal." *BioScience* 52:703–712.
- Shelby, B., D. Whittaker, and J. Roppe. 1998. "Controlled Flow Studies for Recreation: A Case Study on Oregon's North Umpqua River." *Rivers*, Vol. 6, No. 4, pp. 259–268.
- Sherrod, D. R. 1991. "Geologic map of a part of the Cascade Range between latitudes 43°– 44°, central Oregon." *Miscellaneous Investigation Series Map I-1891*; Map scale 1:125,000. U. S. Geological Survey.
- Stillwater Sciences, Inc. 1998a. *North Umpqua Cooperative Watershed Analysis*. Prepared for PacifiCorp, Portland, Oregon, 3 volumes.
- _____. 1998b. *Potential Downstream Effects of Releasing Sediment from Soda Springs Reservoir if Soda Springs Dam Were Removed*. Prepared for the North Umpqua Cooperative Watershed Analysis Resource Team. Berkeley, California.
- _____. 1999. *Dam-in-Place Alternative: Further Responses to Questions from the Soda Springs Connectivity Subgroup*. Resource Team Information Request Report. Prepared for the North Umpqua Cooperative Watershed Analysis Resource Team. Berkeley, California.

- _____. 2000a. *North Umpqua Cooperative Watershed Analysis, Technical Appendix to the Synthesis Report. Appendix 4-1: Hydrologic Analyses Conducted for the North Umpqua Cooperative Watershed Analysis, Volume 1.* Prepared for PacifiCorp by Stillwater Sciences and McBain & Trush (February).
 - _____. 2000b. *North Umpqua Cooperative Watershed Analysis. Technical Appendix 7-3 to the Synthesis Report.* Prepared for PacifiCorp, Portland, OR.
 - _____. 2000c. *North Umpqua Cooperative Watershed Analysis, Technical Appendix to the Synthesis Report, Appendix 2-1: Sediment Budget for the North Umpqua River Basin* (April 2000).
- Structural Engineering Committee of the State of Oregon Building Codes Structures Board. 1997. *Seismic Zonation for the Oregon Coast.*
- Umpqua Valley Audubon Society. 2002. *Proposed Amendment to the North Umpqua Hydroelectric Project Settlement (11/1/02), North Umpqua Hydroelectric Project (P-1927-008).* Roseburg, Oregon, December 9, 2002 (filed December 16, 2002).
- Umpqua Watersheds. 2000c. *North Umpqua Hydroelectric Project Relicensing: Existing Information Analysis, Module 8, Instream Flows.* Umpqua National Forest, April 28; attachment to filing of Umpqua Watersheds (April 16, 2001).
- Umpqua Watersheds. 2000d. *North Umpqua Hydroelectric Project Relicensing: Existing Information Analysis, Module 7, Mainstem Aquatic Connectivity and Anadromous Fish Habitat Quality/Quantity.* Umpqua National Forest, January 22; attachment to filing of Umpqua Watersheds (April 16, 2001).
- Umpqua Watersheds. 2000f. *North Umpqua Hydroelectric Project Relicensing: Umpqua National Forest Module 5, Existing Information Analysis, Vegetation Management.* Umpqua National Forest; attachment to filing of Umpqua Watersheds (filed July 26, 2001).
- Umpqua Watersheds. 2001a. *North Umpqua Hydroelectric Project No. 1927, Offer of Settlement, Affidavit and Comments Submitted on Behalf of Umpqua Watersheds, Umpqua Valley Audubon Society, Steamboaters, the North Umpqua Foundation, and Oregon Natural Resources Council (collectively Conservation Groups).* Roseburg, Oregon (July 26).

- Umpqua Watersheds. 2001b. *North Umpqua Hydroelectric Project Relicensing: Existing Information Analysis, Module 2, Continued Inundation by Lemolo, Toketee, Stump Lake Reservoirs and Lemolo 2 Forebay of Wetland and Riverine Habitats*. Umpqua National Forest, January 26; attachment to filing of Umpqua Watersheds (filed March 1, 2001).
- Umpqua Watersheds. 2002. *Response to PacifiCorp's August 28, 2002 letter, North Umpqua Hydroelectric Project—FERC Project No. 1927-008*. Roseburg, Oregon.
- USCB (U.S. Census Bureau). 1999a. <http://www.census.gov/population/estimates/metro-city>.
- _____. 1999b. <http://venus.census.gov/cdrom/lookup/943039576>.
- _____. 2001. <http://quickfacts.census.gov>.
- USGS (U.S. Geological Survey). 2001. *Three Sisters, Oregon, Information Statement*. USGS Cascades Volcano Observatory, Vancouver, Washington; Volcano Hazards Team, Menlo Park, California; and Earthquake Hazards Team, Menlo Park, California; and University of Washington, Geophysics Program, Seattle, Washington (May 8) .
http://vulcan.wr.usgs.gov/Volcanoes/Sisters/WesternUplift/information_statement_08may2001.html (accessed October 22, 2001).
- Wisseman, R.W. 1996. *Benthic Invertebrate Biomonitoring and Bioassessment in Western Montane Streams*. Aquatic Biology Associates, Corvallis, Oregon (Draft).
- Wolke, R.E., G.R. Bouck, and R.K. Stroud. 1975. "Gas-Bubble Disease: A Review in Relation to Modern Energy Production." In *Fisheries and Energy Production: A Symposium*. Edited by S.B. Saila. Lexington Books, D.C. Heath and Company, Lexington, Massachusetts.

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APPENDIX A

RESPONSES TO COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The Environmental Protection Agency's (EPA) Notice of Availability of the North Umpqua Project draft environmental impact statement (EIS) was issued on May 10, 2002.¹ Comments on the draft EIS were due June 24, 2002. The following entities filed comments on the draft EIS:

Entity	Code	Date filed	Pages in Appendix
<i>Federal Government Agencies</i>			
U.S. Department of Agriculture, Forest Service	FS	June 25, 2002	A-3 to A-39
U.S. Department of the Interior	DOI	June 17, 2002	A-40 to A-43
U.S. Environmental Protection Agency	EPA	June 19, 2002	A-44 to A-47
<i>State Government Agencies</i>			
Oregon Department of Environmental Quality	ODEQ	June 24, 2002	A-48
Oregon Department of Fish and Wildlife	ODFW	June 24, 2002	A-49 to A-63
Oregon Department of Geology and Mineral Industries	ODGM	May 13, 2002	A-64
<i>Non-Governmental Organizations</i>			
American Rivers, Oregon Natural Resources Council, Umpqua Watersheds, Umpqua Valley Audubon Society, Steamboaters, The North Umpqua Foundation, Oregon Trout, Pacific Rivers Council, and Waterwatch of Oregon (American Rivers et al.)	AR	June 21, 2002	A-65 to A-97

¹ *Federal Register* 67, 31801.

Entity	Code	Date filed	Pages in Appendix
Friends of Living Oregon Waters	FLOW	June 27, 2002	A-98 to A-101
Native Fish Society	NFS	June 21, 2002	A-102 to A-106
Pacific Rivers Council	PRC	June 24, 2002	A-107 to A-108

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Robert F. Allen	RFA	June 25, 2002	A-109
Rodney T. Antilla	RTA	June 19, 2002	A-110
Craig A. Burns	CB	June 17, 2002	A-111 to A-118
Norman M. Christensen	NC	June 25, 2002	A-119
Jeremy Hall	JH	June 19, 2002	A-120
Susan Morlang	SM	June 25, 2002	A-121
Peter Mortenson, Carlotta J. Mortenson, and Jill C. Mortenson	PCM	June 25, 2002	A-122
Robert and Jean Pollock	Poll	June 27, 2002	A-123
Mary Ann Wilcox	MAW	July 3, 2002	A-124

Licensee and Settlement Parties

PacifiCorp	PC	June 24, 2002	A-125 to A-151
PacifiCorp filing for Settlement Parties Joint Filing	SP	June 24, 2002	A-152 to A-157

On the following pages, we present the comments received, provide responses to those comments, and indicate where we modified the text of the final EIS, as appropriate, to address the comments. Parties wishing to review the comments made on the draft EIS in their entirety can do so on the Commission's web site at: www.ferc.gov.²

² After logging onto the web page, select FERRIS (Federal Energy Regulatory Records Information System). Then select "General Search." Type in P-1927 in the docket space, and then enter a date range to search. For assistance, call 1-866-208-3676 (toll free), TTY (202) 502-8659, or e-mail Ferconlinesupport@ferc.gov.

USDA Forest Service
North Umpqua Hydroelectric Project 1927
June 24, 2002

File Code: 2770

Date: June 21,
2002

Ms. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
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RE: PacifiCorp
North Umpqua Hydroelectric Project No. 1927-008
TERMS AND CONDITIONS, SCHEDULE FOR SUBMITTAL OF FINAL TERMS
AND CONDITIONS, COMMENTS, SECTION 7(a) DETERMINATION

Dear Ms. Salas:

The following draft terms and conditions, comments, revised Section 7(a) determination and summary of evidence comprise the preliminary reports of USDA Forest Service pursuant to Section 4(e) of the Federal Power Act and Section 7(a) of the Wild and Scenic Rivers Act responsive to the Draft Environmental Impact Statement prepared by the Commission.

Enclosure I contains the draft terms and conditions I find necessary for the protection and utilization of the Umpqua National Forest as required by the management direction established in the *Umpqua National Forest Land and Resource Management Plan* (1990) as amended (Forest Plan). Significant amendments to the Forest Plan include the *North Umpqua River Management Plan* as amended (1992 and 1994) and the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents with the Range of the Northern Spotted Owl* (1994). These documents have previously been filed with the Commission pursuant to Section 10(a)2(A)(i) of the Federal Power Act. The draft terms and conditions submitted herein are predicated on a new license term of 35 years. I reserve the authority to submit revised terms and conditions in the event the Commission issues a license with a term exceeding 35 years.

Enclosure II contains USDA Forest Service schedule for submitting final terms and conditions.

Enclosure III contains the USDA Forest Service comments on the FERC Draft Environmental Impact Statement (FERC/DEIS - 0147D, April 2002).

Enclosure IV contains the USDA Forest Service Revised Section 7(a) Determination, Wild

USDA Forest Service
North Umpqua Hydroelectric Project 1927
June 24, 2002

Ms. Magalie R. Salas
2

Please contact Walter A. Dortch, Region 6 Hydropower Program Coordinator, at 360-436-1155 if you have questions concerning this submittal.

Sincerely,

/s/ Lisa Freedman (for)
HARV FORSGREN
Regional Forester

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UMP - Forest Supervisor
WO, Lands
OGC - Jocelyn Somers

**ENCLOSURE III
COMMENTS ON THE DEIS**

For

**North Umpqua Hydroelectric Project
Oregon
FERC Project No. 1927
June 2002**

By

**Pacific Northwest Region
USDA Forest Service**

RELATIONSHIP OF THE DEIS TO USDA FOREST SERVICE NEPA REQUIREMENTS

The National Forest Management Act (NFMA) requires the USDA Forest Service to develop and implement Land and Resource Management Plans (LRMP) for each National Forest. Section 6 also directs that: "Resource plans and permits, contracts, and other instruments for the use and occupancy of National Forest System lands shall be consistent with the land management plans. Those resource plans and permits, contracts, and other such instruments currently in existence shall be revised as soon as practicable to be made consistent with such plans. When land management plans are revised, resource plans and permits, contracts, and other instruments, when necessary, shall be revised as soon as practicable. Any revision in present or future permits, contracts, and other instruments made pursuant to this section shall be subject to valid existing rights." Thus, the intent of NFMA is that uses of National Forest System lands, including hydropower projects be consistent with the LRMP. The objective therefore, of the USDA Forest Service participation in licensing and relicensing is to provide terms and conditions to FERC that will, when included in the FERC license, make the Project consistent with the LRMP.

Final USDA Forest Service terms and conditions for the North Umpqua Hydroelectric Project will be issued via a Record of Decision within 90 days of issuance of the FERC FEIS in a USDA Forest Service Record of Decision. The Record of Decision will document the rationale supporting the finding that the terms and conditions issued are necessary for the protection and utilization of National Forest System lands and that implementation of the measures in the new license will ensure that continued operations of the North Umpqua Hydroelectric Project are consistent with the requirements of the Umpqua National Forest Land and Resource Management Plan as amended. As issuance of final terms and conditions by the USDA Forest Service will cause implementation of LRMP requirements in a license issued by the FERC, the decision to issue the terms and conditions is subject to administrative review (36 CFR Part 215.1).

The USDA Forest Service Record of Decision will tier to or adopt the FERC FEIS consistent with 40 CFR Part 1500.4, provided the FEIS contains the information necessary to support the USDA Forest Service determination regarding consistency of the proposed action with the requirements of the forest plan. The comments which follow are provided so that the Commission can prepare a FEIS that will meet USDA Forest Service requirements for implementing NEPA and which will also provide the information necessary to support the USDA Forest Service Record of Decision.

GENERAL COMMENTS:

The DEIS understates the scope, value and adaptive management capabilities provided by the Section 19 of the Settlement Agreement (SA). Attention is drawn to Section 5.16 of the Explanatory Statement (PacifiCorp, 2001g) and to Section 19 of the USDA Forest Service Justification Statement (FS/BLM, 2001d).

FS 1

FS 1 Although the FS is no longer a cooperating agency in the preparation of the EIS, we have attempted to provide the information requested to the extent it meets the Commission's needs for complying with NEPA.

FS 2

FS 2 The mitigative and enhancement measures and monitoring outlined in Section 19 of the Settlement Agreement are discussed in numerous places in the draft EIS. Discussion has been added to the EIS on measures that the FS would be able to implement with money provided by the funds set up by section 19 of the Settlement Agreement. These measures would include replacing or providing substitute resources and environments for anadromous fish, wetlands, and riparian habitats and restoring early seral condition terrestrial habitats to later successional conditions. These measures would be in addition to those established explicitly in sections 4-18 of the Settlement Agreement.

FS 2

The DEIS understates the commitment of PacifiCorp to further adapt Project operations or configuration of facilities to meet water quality requirements. Attention is drawn to paragraph 2 of Section 22.2.1 of the SA. Further, it is likely that ODEQ will issue a certification for the Project in July 2002. The FEIS should reflect the outcome of the certification.

FS 3

The DEIS understates the monitoring measures and performance based outcomes established in the SA. Attention is drawn to the specific comments below and to the letter filed with the Commission by the parties on June 21, 2002, "Response to Staff Recommended Alternative for Project Relicensing".

FS 4

The Purpose and Need for Action is not clearly stated. The need for action described does not present a strong argument for going forward with the Project. The DEIS, page 1-5, lines 15-19, states that very little (1.3%) of the power that PacifiCorp sells is generated by this Project. Further, lines 25-29 on page 1-6 use words like the power would be "useful in meeting PacifiCorp's needs". This does not present a strong argument for the need for the Project. Need statements show the difference between the existing and desired condition; hence the need for action to close that gap. For example, currently no anadromous fish passage exists at Soda Springs; therefore, there is a need to create anadromous fish passage at Soda Springs to reintroduce anadromous fish to historic spawning grounds. Ramping rates are currently stranding young salmonids; therefore, there is a need to reduce ramping rates to increase young salmonid survival. The canals and flumes are barriers to terrestrial wildlife movement. Therefore, there is a need to increase terrestrial connectivity along canals and flumes. This section of the document needs to be strengthened to articulate the importance of the Project.

FS 5

Fire Management in the DEIS. There is no discussion of the risk of fire starts from downed power lines throughout the Project area. This discussion should tie into PacifiCorp's need to maintain roads to powerlines.

FS 6

SPECIFIC COMMENTS:

EXECUTIVE SUMMARY.

Page xix: Add the definition for ACSR to the Acronyms list.

FS 7

Page xxiv, line 15: The date should read 2000.

FS 8

FS 3 Section 3.3.2.2 of the draft EIS lists numerous measures that would be carried out by PacifiCorp under the Settlement Agreement to remediate soil erosion and to address other water quality issues. The final EIS has been revised to reflect the mandatory conditions of the §401 Water Quality Certificate issued by ODEQ on June 28, 2002.

FS 4 We recognize that considerable monitoring would be conducted under the terms of the Settlement Agreement. Many measures in the Settlement Agreement did not explicitly detail what monitoring they would include. EIS section 2.3.1 has been revised based on the specific comments provided by the FS and others to more accurately reflect the performance based outcomes established in the Settlement Agreement.

FS 5 Text has been added to section 1 of the final EIS in response to this comment to clearly state the management goals of the Settlement Agreement, which reflect the need for the protection, mitigation, and enhancement measures defined in the Settlement Agreement and staff's recommendation for a new license. Section 1.2 focuses on the need for power.

FS 6 Fire management is discussed in section 3.5.2.1.

FS 7 Acronym has been eliminated from the text and replaced with the phrase steel-reinforced aluminum conductors.

FS 8 Date has been corrected.

2. PROPOSED ACTIONS AND ALTERNATIVES.

2.1 NO-ACTION ALTERNATIVE

2.1.2 Lemolo No. 1 Development

Page 2-10, line 26: Remove "White Mule Creek" for water is no longer diverted. FS 9

2.1.9 Soda Springs Development

Page 2-22: To be consistent with the other reach descriptions add in the capacity of Soda Spring penstock. FS 10

2.2 PROPOSED ACTION - SETTLEMENT AGREEMENT ALTERNATIVE

2.2.2 Proposed Environmental Measures

Page 2-27, Table 2-2. Fluctuations in reservoir and forebay levels: The maximum daily level fluctuations for Soda Springs Reservoir appear to be in error. Presently, the utility fluctuates this reservoir greater than the figures shown for existing and historic. In addition, following installation of ladders and screens as agreed to in the SA, fluctuation will be maintained within a range suitable for attainment of fish passage requirements in the SA. FS 11

Page 2-27, line 10: Revise the date from 2001 FS 12

Page 2-28, line 5-8: These lines paraphrase the sections 14.3 and 14.4 on page 37 of the SA incorrectly. FS 13

Page 2-42, lines 30-32: "national forest" should be changed to "reservations" or "public lands administered by BLM" should be added. FS 14

Page 2-49, line 16-17: Clarify this sentence. Bear Creek is connected to the Clearwater at Stump Lake. FS 15

Page 2-50, lines 3-4: It is unclear from the Conservation Groups submission whether PacifiCorp would be required to actually rehabilitate the wetlands or just prepare a plan for the measures. FS 16

FS 9 Text has been modified in response to this comment.

FS 10 The capacity of the penstock is not provided in the license application.

FS 11 In it's February 21, 2000, filing, PacifiCorp indicated that the reference to table 2.2-2 should be replaced with a reference to Exhibit A of the license application (PacifiCorp 2000a). Inspection of Exhibit A shows that for Soda Springs Reservoir (see page 3-96 of Exhibit A), for example, the difference between normal maximum and normal minimum water surface elevation for existing conditions is 12 feet, which is significantly different than the 4.3-foot maximum daily level fluctuation shown in table 2.2-2. The 12-foot figure is generally consistent with other information in the license application indicating that sediment buildup in the reservoir has limited fluctuations in water level to about 10 feet. Table 2-2 in the draft EIS, which was based on table 2.2-2 in the license application, has been removed from the final EIS. PacifiCorp has committed to operate Soda Springs Reservoir in a range suitable for attainment of fish passage requirements specified in the Settlement Agreement.

FS 12 We have revised the date to April 2003 based on Table 3.4-1 in PacifiCorp 2002(e).

FS 13 Text concerning notification of the FS and the state has been revised to incorporate the language of the Settlement Agreement.

FS 14 Text has been changed as suggested in this comment.

FS 15 Sentence has been modified to reflect the NGO wording more clearly.

FS 16 The statement in the draft EIS is correct. The NGO Alternative would require PacifiCorp to rehabilitate or create wetlands within the time indicated rather than just prepare a plan for the measures. See clarification in section 3.5.2.3.

3. ENVIRONMENTAL CONSEQUENCES.

3.1 INTRODUCTION

3.1.1 General Environmental Setting

3.1.2 Cumulatively Affected Resources

Page 3-1, line 26: "Range" should be "Province".

FS 17

FS 17 The text has been corrected.

Page 3-4. Line 5. This paragraph should explain the reasons why Riparian Reserves were established in the NFP similar to the way it explained the need for LSR's connectivity in the watershed. *Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Under the Aquatic Conservation Strategy, Riparian Reserves are used to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity in the watershed.*

FS 18

FS 18 This explanatory information has been added to the EIS.

Page 3-4, lines 9-14: This description is unclear. It is accurate to say that Project facilities cross-riparian reserves or are located within them, but the use of the term "occupied" implies that the entire riparian reserve is consumed by Project facilities. Similarly, the existence of a reservoir results in the riparian reserve land allocation being expanded to extend up from the shorelines of the reservoir. It is inaccurate to say the reservoir "occupies" the mainstem riparian reserve.

FS 19

FS 19 The EIS has been modified to clarify that the entire riparian reserve is not consumed by project facilities.

Page 3-6: Based on the way the DEIS has defined the assessment area for cumulative effects, the fisheries resource should be included in the cumulative effects discussion. Fish populations in the North Umpqua are dependent on the distribution, quantity, and quality of habitat in the basin and the Project has the potential to affect all of these parameters.

FS 20

FS 20 Fisheries and Other Aquatic Biota were considered as a cumulatively affected resource in section 5.2.3. Text has been revised to add this resource to section 3.1.2 as well.

Page 3-6, lines 32-35: The cumulative impacts from new and expanded recreation areas and trails have a higher potential for affecting archaeological and historic sites than the cumulative impacts from timber harvest.

FS 21

FS 21 In section 3.1.2 we identify other actions that may interact with the measures considered in this relicensing action to cumulatively affect cultural resources. Development and expansion of recreation areas and trails are specific measures being addressed and considered by the commission staff. Timber harvest is one activity that has and will continue to have effects on cultural resources and values in the environmental setting in the project area.

Lines 31-35 should read as follows:

Archaeological and historic sites and traditional cultural properties (TCPs) of Native American tribes within the basin and with historic or traditional ties to cultural and historical developments in other parts of the basin could be affected by continued Project operation, proposed modifications, and other activities such as *the development and expansion of recreation areas and trails.*

3.2 GEOLOGY AND SOILS

3.2.1 Affected Environment

3.2.1.1 Geological Setting

Page 3-8, lines 1-3: It is the underlying High Cascades bedrock lithologies (lava flow units) and not the surficial deposits that are responsible for sustained stream base flow conditions. Line 1-3 should be rewritten to read as follows: *Outwash and pyroclastic deposits have high permeability, promoting rapid infiltration of rainfall and snowmelt into the underlying bedrock units of the High Cascades. A lattice of open, interconnecting fractures and joints within the High Cascade lava flows function as a bedrock aquifer that stores and uniformly discharges cold ground water into the Clearwater and North Umpqua Rivers throughout the entire year. The High Cascade lava flows thus are responsible for maintaining the relatively sustained stream base flow conditions throughout the year.*

FS 22

FS 22 The text has been revised in response to this comment.

Page 3-8, line 35: The text should note that due to the difference in stability and erosion rates between the High and Western Cascades Geologic Regions, most of the sediment available for transport and deposition in the upper North Umpqua system is derived from the Western Cascades.

FS 23

FS 23 The text has been revised to provide more information about the differences in sediment availability between the High Cascades and the Western Cascades.

3.2.1.2 Erosion and Landsliding

Page 3-9, lines 22-33: The first paragraph should be completely revised to incorporate data provided in the revised document prepared by Stillwater Sciences, Inc., dated March 2000, titled "North Umpqua Cooperative Watershed Analysis (NUCWA), Technical Appendix to the Synthesis Report Appendix 2-1, Sediment Budget for the North Umpqua River Basin". The March 2000 technical report provides a significant revision to sediment yields from that disclosed in the 1998 Sediment Budget Analysis. There are also some caveats (footnotes) regarding uncertainty of the sediment yields that should also be addressed.

FS 24

FS 24 The text has been updated as recommended.

3.2.1.4 Fluvial Geomorphology and Sediment Transport

Page 3-13, line 36: The statement "... but sediment supplies... have been significantly reduced as a result of the project" is misleading. Sediment transport to downstream reaches has been reduced. Sediment contribution and capture in Project reservoirs has been increased as a result of erosion associated with the Project.

FS 25

Page 3-17, lines 17-24: The reference to sediment character and size downstream of Soda Springs Dam is not quite accurate. There are numerous references in the NUCWA describing the effect of Soda Springs Dam on bed coarsening of the North Umpqua River channel. NUCWA 2-3, 2-4, 2-45. This effect is primarily evidenced in the two miles immediately below the dam (to Boulder Cr. Confluence) and diminishes with distance downstream. Add citations for the reference to gravel bars upstream and downstream of the Steamboat confluence - NUCWA 2-46. Add the citations for the reference to the influence of the 1964 flood in Steamboat Creek and the North Umpqua River-NUCWA 2-21 and 2-46.

FS 26

3.2.2.1 Erosion and Sediment

Page 3-19, line 23: Drop "several" insert "numerous".

FS 27

Page 3-20, line 24: Add "*as amended*" following reference to ULRMP (1990).

FS 28

Page 3-21, lines 30-34: These two sentences are not accurate, as the SA also provides for the Mitigation Fund (Section 19.3), which can be used to mitigate or compensate for Project impacts, including erosion. This fund can be used off-site as well as on-site to address erosion, landsliding and associated sediment delivery in the North Umpqua basin on National Forest System lands and BLM-administered lands."

FS 29

Page 3-23, line 6: It is unclear and inappropriate for staff to speculate about the effects of actions not included in the NGO alternative. On Page 3-22, lines 20-23 state that the NGO alternative would not address these sites and does not include monitoring. This part of the paragraph should be deleted.

FS 30

FS 25 The text has been clarified.

FS 26 The text has been corrected to indicate that the reach with no observed systematic downstream variation in sediment size is the reach below Soda Springs powerhouse, not the entire reach below Soda Springs dam. The referenced section of the EIS reports that the dam has resulted in a 95 to 100 percent reduction in the supply of bedload sediment (including gravel) to the reaches between Soda Springs dam and Boulder Creek, and it has been revised to include additional discussion of the implications of sediment depletion below Soda Springs dam. The Watershed Analysis and the April 2000 Sediment Budget Technical Report were the sources of all information in the referenced paragraph.

FS 27 The text has been revised to avoid use of subjective terms such as "several" and "numerous."

FS 28 The text has been revised to include "as amended."

FS 29 The text has been revised to note that the Mitigation Fund could be used to implement additional measures to address erosion, landsliding, and associated sediment delivery.

FS 30 Because the Conservation Groups' recommendations were not developed in as much detail as the Settlement Agreement, for purposes of analysis it was necessary for the staff to make reasonable inferences about some specific details of the NGO Alternative. Consistent with the requirements of the CEQ regulations regarding incomplete or unavailable information (40 CFR 1502.22), the EIS identifies those details of the alternative about which assumptions were made and discusses the uncertainties associated with these assumptions. The Conservation Groups did not disagree with either the remediation of those high- and medium-priority erosion sites not associated with canals or the implementation of an erosion monitoring program. Rather, they did not comment on these topics. It is inaccurate to quote the draft EIS as stating that the NGO Alternative would not address the high- and medium-priority erosion sites not associated with canals. The cited section of the draft EIS stated that one particular element of the NGO Alternative, namely the proposed installation of buried pipelines, would not address these sites. In view of the Conservation Groups' expressed concern with soil erosion, we think it is reasonable to infer that the NGO Alternative would include the subject measures.

Page 3-23, line 26: Section 9.4 of the SA describes how this will be covered during the development of the Vegetation Management Plan and the Erosion and Sediment Control Plan in Sections 12 and 14 of the SA.

FS 31

3.2.2.2 Restoration of Fluvial Geomorphic Processes

Page 3-24, line 31: Add citation to NUCWA 2-3, 2-4, 2-45 (SW, 1998a) regarding bed coarsening immediately below Soda Springs Dam. Under the no action alternative, sediment flow from the Clearwater around Toketee Dam would not occur and hence coarsening in that reach would continue as well.

FS 32

Page 3-25, line 17-22: This paragraph is confusing because most of the discussion in the preceding paragraph is on the Slide bypass reach Project and then it references the Clearwater River. This paragraph should be restated to say: *The proposed modification of the Clearwater #1 Diversion Dam to pass sediment and the proposed Slide bypass reach restoration Project will result in increased gravel deposition and retention in these respective river reaches.*

FS 33

Page 3-25, line 21-33: After further analysis of this reach as a potential enhancement site, it was determined that stream gradients were too high to allow optimization of spawning habitat to fully mitigate for the alluvial habitat that continues to be inundated by Soda Springs Dam. (Stillwater Technical Memo, February 2002) The SA parties are currently working to develop alternatives that would achieve the mitigation goals both at this site and in other parts of the upper North Umpqua River.

FS 34

Page 3-26, line 5: Reference Federal mitigation fund.

FS 35

Page 3-27, line 33: The North Umpqua is dominated by transport capacity. The "excess sediment accumulation" referenced is described in the NUCWA (page 2-46) as a major bedload deposit moving out of Steamboat Creek caused by the 1964 flood. This deposit has made the channel bed more alluvial than it was historically but it does not necessarily represent "excess sediment".

FS 36

FS 31 The final EIS has been revised to acknowledge that the parties to the Settlement Agreement consider that the scope and content of the erosion control plan and monitoring plan for erosion sites located within the project boundary would address shoreline erosion at the project's reservoirs. The text referred to in this comment has been deleted.

FS 32 The technical background information in this EIS is based on Stillwater Sciences, 1998a, except where indicated. The text has been revised to include the additional information requested.

FS 33 The text has been revised consistent with the commenter's recommendation.

FS 34 Section 3.2.2.2 has been revised to include a discussion of Amendment No. 1 to the Settlement Agreement (PacifiCorp 2002f). The amendment modifies the gravel augmentation program in the original Settlement Agreement, and it replaces the Soda Springs Bypass Reach Alluvial Restoration Project proposed in the original Settlement Agreement with a North Umpqua River Habitat Restoration/Creation Project.

FS 35 We see no need at this location for a reference to the Federal mitigation fund to be established under the Settlement Agreement.

FS 36 The text has been revised to correct the characterization of this deposit.

USDA Forest Service
North Umpqua Hydroelectric Project 1927
June 24, 2002

3.3.1 Affected Environment

3.3.1.1 Water Quantity

Page 3-46. Figure 3.3-13. North Umpqua River at Toketee Falls, pre-dam and post-dam flow duration curves. The labels on this figure appear to be reversed. What is called the pre-dam curve (dashed line) certainly appears to be a post-dam curve.

FS 37

FS 37 Figure 3-15 has been corrected in response to this comment.

3.3.1.2 Water Quality

Page 3-58, line 9: There needs to be a reference for residences adjacent to Toketee and Lemolo Reservoirs being a possible source of nitrogen in the system. The influence of residences to nitrogen production in the system is not clearly identified in the NUCWA. NUCWA 6-3 relates eutrophication to: increased nitrogen loading from recreation, use and timber harvest, and nutrients trapped, decomposed and released from reservoirs. NUCWA 6-31 identifies potential nutrient sources from: 1.) USDA Forest Service helicopter fertilization Projects (pre 1993), 2.) Diamond Lake development - campgrounds, summer homes and cheese baits, internal sediment nutrient cycling and food web changes. NUCWA 6-32 does mention the PacifiCorp/USDA Forest Service housing near Toketee Lake as a "possible" source but says additional sampling is needed to see if these houses are still contributing nutrients to the system. NUCWA 6-52-53 Eutrophication control mentions septic tank leach fields at Toketee and pit toilets at Stump and Lemolo Lakes as one of a suite of 8 potential actions which might help reduce eutrophication in the system. Studies submitted in support of PacifiCorp's 401 application to ODEQ indicate that nutrients in the North Umpqua River do not increase or decrease monotonically down stream from the Project.

FS 38

FS 38 This subsection has been revised to reflect information provided in this comment.

3.3.2 Environmental Impacts and Recommendations

3.3.2.1 Water Quantity

Page 3-60, line 28: Include amphibians and macroinvertebrates on the list of resources benefiting from increased instream flows. Benefits to these guilds were some of the primary reasons the SNA flows were developed and incorporated into the SA.

FS 39

FS 39 The text has been revised to reflect this information.

3.3.2.2 Water Quality

Page 3-67, lines 8-11: Cite NUCWA pages 4-56,57,60. Tables 4-11, 4-12, and 4-15 show that temperatures decline with increased flow releases.

FS 40

FS 40 The text has been revised to include this citation.

Page 3-68, lines 6-16: Include the following points to more fully describe what is in the SA. 1.) Increased instream flows in Project bypass reaches will decrease water temperatures in most bypass reaches and reduce the potential for growth of nuisance algae, 2.) Treating all high and medium erosion sites will reduce the rate of sedimentation to Project waterways and help control nutrient input, 3.) Revegetation of riparian areas and increased wetlands development (including expansion of Stinkhole) will help tie up nutrients, 4.) A TMDL is planned for the Umpqua Basin in 2003 that will address water quality issues including nuisance algae and pH in the North Umpqua watershed. Within the Project affected waters, the measures associated with the CWA section 401 certification will address Project reservoirs, waterways, and the North Umpqua River.

FS 41

FS 41 This text has been revised extensively to incorporate discussion of the § 401 Water Quality Certificate requirements.

Page 3-69, lines 38-39: This sentence should be deleted, as this is not the appropriate place for staff to judge what is "better."

FS-42

FS 42 The sentence has been deleted.

3.4 AQUATIC RESOURCES

3.4.1 Affected Environment

The following series of comments relate to Table 3.4-1. Major River Segments affected by the North Umpqua Project.

Page 3-71, Table 3.4.1: The following change should be made to the table: Fish Creek between the North Umpqua River and Fish Creek Diversion - should note that the lower part of Fish Creek will be managed to restore anadromous fish production.

FS-43

FS 43 Table 3-7 has been corrected.

Page 3-71, Table 3.4-1: "Issues/major obstacles to enhancement". "River Segment" - In general, the "issues" list is simplified and incomplete for all river reaches. Issues such as sediment transport interruption and water quality/303d listing for specific WQ parameters should be included where appropriate. Issues to be included by reach are:

FS-44

FS 44 Table 3-7 has been revised to include this information.

Reach	Issue	FS-44 (Cont)
Soda Dam – Powerhouse	Restriction of sediment transport	
Soda Reservoir – Fish Creek.	Restriction of sediment transport	
Fish Creek – Slide Diversion.	Restriction of sediment transport	
	303d listed for Temperature	
Slide Div – Toketee Lake	Restriction of sediment transport	
Toketee Lake – Lemolo 2 PH	303d listed for habitat modification, Temp, pH, upper 1 mile 303d listed for TDG	
Lemolo 2 PH – Lemolo2 Div	303d listed for habitat modification	
Lemolo 2 Dv – Lemol Res.	Part of reach 303d listed for Temp 303d listed for habitat modification part of reach below Lemolo 1 PH listed for TDG	
Lemolo Reservoir	303d listed for nuisance algae and pH	
Fish Creek to diversion	303d listed for Temperature	
CW R. from Tok Res – CW2 Div	Restriction of sediment transport	
CW R. CW2 div – CW1 div.	303d listed for TDG 303d listed for TDG	

Page 3-71, Table 3.4-1: "Existing aquatic resources". "...shiners; dace; sculpins; smallmouth bass" The text should note that smallmouth bass are a very small, perhaps non-existent population in the mainstem North Umpqua River between Soda Springs powerhouse and Rock Creek. USDA Forest Service staff is aware of only one instance that a smallmouth bass has been found in this reach below Steamboat Creek.

FS 45

FS 45 Table 3-7 has been revised to delete smallmouth bass.

Page 3-71, Table 3.4-1: "Issues/major obstacles to enhancement". "River Segment" – North Umpqua River between Soda Springs dam and Soda Springs powerhouse (Soda Springs bypassed reach)". "...Bypassed reach, but still Wild and Scenic;...". This area is not within the Wild and Scenic River designation. The Wild and Scenic River designation starts ~100 yards downstream from the Soda Springs powerplant.

FS 46

FS 46 Table 3-7 has been corrected.

Page 3-72, Table 3.4-1: "Desired future aquatic resources". "River segment" – "North Umpqua River, Lemolo No. 2 powerhouse to Lemolo No. 2 diversion." "Enhance and restore habitat connectivity." Should include the goal of reduction of fine sediment. FS 47

Page 3-72, Table 3.4-1: "Desired future aquatic resources". "River segment" – "North Umpqua River, Lemolo No. 2 diversion up to Lemolo reservoir." "Enhance and restore habitat connectivity." Should include the goal of reduction of fine sediment. FS 48

Page 3-72, Table 3.4-1: "Issues/major obstacles to enhancement". "River segment" – "Fish Creek between North Umpqua River and Fish Creek diversion." Bypassed reach; fishery of endemic rainbow trout; possible natural barrier at R.M. 3.5 (disputed); extensive fish passage facility at Fish Creek diversion. Not accessible to anadromous fish." Fish Creek is 303(d) listed by ODEQ for the criteria of "Temperature". This should be an "issue". FS 49

Under "Desired future aquatic resources", it should note as a goal to provide access by, and habitat for, anadromous fish, at least to the ("disputed") barrier at R.M. 3.5 of Fish Creek. FS 50

Page 3-73, Table 3.4-1: "Existing aquatic resources". "River segment" – "Lake Creek". "tui chub, rainbow trout" Should include brown trout. FS 51

Page 3-73, Table 3.4-1: "River segment" – "Slide Creek", "Issues/major obstacles to enhancement" and "Desired future aquatic resources" to "Provide access by and habitat for anadromous fish, especially Chinook salmon and steelhead". The reach is 303(d) listed by ODEQ for the criteria of "Temperature". This should be considered an "issue". FS 52

It is unclear as to what specific portion of Slide Creek this refers to. It appears that the Slide Creek bypass reach is covered under other river segments. Slide Creek itself would provide poor anadromous habitat as a result of moderate-high channel gradient, domination by cobble-small boulder substrate, very narrow wetted width during the spawning period and very short length (~400 feet) to an impassable fish barrier. It is not understood why "Insufficient instream flow releases" is an "issue/major obstacle" as there is no diversion. The addition of increased flow would not mitigate the high channel gradient or short length as far as anadromy is concerned. If identification of this "River segment" as a desirable anadromous stream was not in error, then a perched culvert at the mouth of the stream with a jump height of ~2 feet should be listed as an issue/concern. FS 53

FS 47 Table 3-7 has been revised to reflect this information.

FS 48 Table 3-7 has been revised to reflect this information.

FS 49 Table 3-7 has been revised to reflect this information.

FS 50 Table 3-7 has been revised to reflect this information.

FS 51 Table 3-7 has been revised to reflect this information.

FS 52 The Slide Creek river segment has been deleted from table 3-7.

FS 53 The Slide Creek river segment has been deleted from table 3-7.

Page 3-74, line 18: "(3.4 miles in the North Umpqua River and 3.2 miles in Fish Creek)." In Table 3.4.-1 under "River segment" "Fish Creek between North Umpqua River and Fish Creek diversion" under "Issues/major obstacles to enhancement" it is stated "possible natural barrier at R.M. 3.5 (disputed);...". If this is one and the same barrier there should not be a mileage discrepancy.

FS 54

FS 54 The natural barrier is located at Fish Creek mile 3.2; table 3-7 has been corrected.

Page 3-75, line 21: This is somewhat misleading.- 4 of 14 sites (29%) had "poor" or "very poor" taxa richness in the 1995 ABA assessment (Wisseman, 1996) and many showed substantial impairment, with 6 of 14 sites (43%) having "lower" or "much lower" than expected scores (Wisseman, 1996).

FS 55

FS 55 The text has been revised.

3.4.2 Environmental Consequences and Recommendations 3.4.2.1 Instream Flows for Fish and Other Aquatics Species

Page 3-78, Table 3.4.2: Table 3.4-2 does not reflect the Spatial Niche Analysis (SNA) process used by the USDA Forest Service and other agencies to develop flow regimes in bypass reaches that would meet the intent of the NFP/ACS for species other than salmonids. Hence, it does not accurately describe the full benefits of the SA IFR's for reaches above the Slide Diversion Dam. Refer to USDA Forest Service Instream Flows Justification Statement (FS 2001d) and supporting data files. Benefits of the IFR's contained in the NGO alternative are from a preliminary draft USDA Forest Service internal document and do not describe the effect of these flows on species other than salmonids since no SNA was completed for these flow levels.

FS 56

FS 56 Although table 3-8 only presents the effects of different flow releases in terms of Weighted Usable Areas, the supporting text describes application of the Spatial Niche Analysis (SNA) by the FS to ensure that adequate flows are provided to meet the intent of the ACS for all aquatic species.

Page 3-79, lines 4-13: Due to the limited storage capacity of the Project, the magnitude of common floods (<5 year events) has been decreased in Project bypass reaches but the magnitude of larger floods (>5 year events) has not been altered (NUCWA 4-3 and Table 4-3 page 4-14). This pattern will be continued with implementation of the SA. NUCWA 2-4. In bypass reaches where low-magnitude peak flows have been reduced, sediment transport capacity generally exceeds supply and morphologic effects of reduced peak flows are not observable, in part due to the retention of larger flood events. NUCWA 4-62. The main management issue related to high flows is the timing of annual facilities maintenance and the effect of increased flows during these events on the aquatic ecosystem. These concerns are addressed in section 6.6 of the SA.

FS 57

FS 57 This comment appears to refer to lines 4-13 on page 3-80. The effect of instream flows on sediment transport processes is discussed in sections 3.2.1.4 and 3.2.2.2.

Page 3-80, line 36: The reason the USDA Forest Service employed the Spatial Niche Analysis should be described. Under the ACS/NFP, the USDA Forest Service is required to provide for flows that meet the needs of all native aquatic species, not just fish. Existing PHABSIM analysis for the Project only addressed flow needs for salmonids. While the USDA Forest Service believes that the prescribed flows in anadromous reaches meet ACS objectives, there was a need to employ the SNA to develop flow recommendations that would address the needs of multiple species in non-anadromous reaches as required by the ACS.

FS 58

FS 58 The text has been revised to include the FS rationale for using the SNA.

Page 3-81, line 26: Table reference is incorrect, should be Table 3.4.2.

FS 59

FS 59 The table reference has been corrected.

Page 3-82, line 14: The reason for the re-direction of Lemolo 2 powerhouse discharge should be explained. This action is intended to reduce the daily ramping in this rare low gradient reach of the river and provide stable habitat for aquatic dependent species.

FS 60

FS 60 The text has been revised to reflect this information.

Page 3-83, line 22: Table reference incorrect, should be Table 3.4.2

FS 61

FS 61 The table reference has been corrected.

Page 3-84, line 1-3: The SA does allow for modification of IFR's. This modification may result in either increases or decreases depending on the results of the analysis. To this point, no ecological criteria has been developed to guide this modification, though it would certainly involve some of the same analysis that resulted in the SA IFR's as well as some additional analysis, such as a RNV. With the current SA flows considerably below the average unregulated baseflows shown in Table 4-2 of the NUCWA, it is difficult to conceive of a situation where a further reduction in baseflow would be acceptable under the NFP.

FS 62

FS 62 The provision for modification of instream flow releases (under Settlement Agreement section 5.3) is listed in the EIS.

3.4.2.2 Ramping Rates

Page 3-87, line 22: Stranding of fish is not the primary concern in some of these reaches. Macroinvertebrate analysis clearly shows that full-flow reaches are among the most impaired stream reaches on the Project (Wissemann, 1998). This is probably due to the daily ramping that takes place below the Project powerhouses.

FS 63

FS 63 We generally agree, although the impacts on macroinvertebrates in relatively confined reaches, such as Toketee and Slide Creek, would be less than those in a low-gradient reach such as Lemolo No. 2.

Page 3-87, line 29: "By the sixth anniversary of the new license, flows would be directed to the Stinkhole area, using a pipe that may be partially buried." Flow allocation alternatives also allow for the possibility of an "open canal" rather than a pipe.

FS 64

FS 64 The text has been revised to reflect this information.

Page 3-91, lines 36-40: Full flow reaches are described in NUCWA 4.5.2 on page 4-27. There are four affected by the Project. Under the terms of the SA there will be no ramping in the Soda Springs full flow reach at flows below 1600 cfs- there will be no ramping at all in the Lemolo full flow reach and if anadromous fish use the Slide full flow reach (0.2 miles long), ramping will be somewhat restricted by operational measures. The only full flow reach not addressed at all in the SA is the Toketee full flow reach. This reach is described as a deep, steep sided bedrock pool upstream of Slide Dam. Ramping generally has little adverse affect to this type of habitat.

FS 65

FS 65 The text has been revised to clarify the number of full flow reaches affected by the North Umpqua Project.

3.4.2.3 Fish Passage

Page 3-95, line 26: Tailrace barriers are a mitigation that will reduce (not eliminate) delay, injury, and/or mortality to adult anadromous fish.

FS 66

FS 66 The text has been corrected.

Page 3-95, lines 33-37: Add the citation in NUCWA pg. 2-42.

FS 67

FS 67 The text has been revised to reflect this information.

Page 3-96, line 19: - This line states: "Maintenance of the functioning fish ladder at the Fish Creek dam is unlikely to enhance anadromous fish populations because a natural barrier in Fish Creek (at about R.M. 3.5, downstream from the dam) would probably block their migrations...." The "barrier" is earlier referred to as an "obstacle". The term obstacle or "possible barrier" should be used. There is also another waterfall (~14 in height) at about R.M. 4.3 that provides another significant obstacle/barrier to anadromous fish passage.

FS 68

FS 68 The text has been revised.

Page 3-98: Following line 34, reference the general comment regarding the Federal Mitigation Fund.

FS 69

FS 69 The text has been revised to include a statement regarding the Mitigation Fund, as stipulated in section 5.1.6 of the Explanatory Statement of the Settlement Agreement.

3.4.2.4 Restoration of Fluvial Geomorphic Processes

Page 3-102, line 26: Drop "attempts" replace with *implements measures that will*

FS 70

FS 70 The text has been revised.

Page 3-102, line 26-32: "Consistent with that goal, the SA will restore fluvial geomorphic processes in the project area by a number of measures...." Include the boulder placement project (SA, section 8.2) in the Slide Creek Bypass reach. This project is designed to create up to 6,000 square feet of spawning habitat by trapping bedload from Fish Creek.

FS 71

FS 71 The text has been revised to reflect this information. The impacts on fluvial geomorphic processes of the Slide Creek Bypass Habitat Enhancement Project are discussed in section 3.2.2.2.

Page 3-102, line 34-39: The paragraph, as written, is confusing. Recommended text: *Under the SA, PacifiCorp would continue its ongoing gravel augmentation program below Soda Springs dam, placing up to 400 cubic yards of gravel in this reach annually, until the Soda Springs Bypass Reach Alluvial Restoration Project (Section 8.3 of the SA) is completed. PacifiCorp will then provide gravel augmentation in the Soda Springs Bypass Reach Alluvial Restoration Project area (Section 7.2 of the SA). The quantity, quality, and timing would be adjusted in consultation with the agencies upon commencement of the Soda Springs Bypass Reach Alluvial Restoration Project.*

FS-72

FS 72 The text has been revised, as recommended.

Page 3-103, lines 15-19: In addition, SA sections 10.3, 10.4, 10.6 and 10.7 describe other actions related to restoration of flows and geomorphic process including; reconnection of sediment and flow from the Clearwater River to the North Umpqua, breaching of diversions at Helen, Spotted Owl, Karen, Thorn, Mill, White Mule, Potter and Deer Creeks, culvert replacement to accommodate 100 year flow events and reconnection of aquatic sites throughout the Project area.

FS-73

FS 73 The text has been revised to reflect this information.

Page 3-104, lines 11-15: Objectives of these projects are stated in the SA. Agencies including the USDA Forest Service will review and comment on monitoring plans for these project prepared by PacifiCorp. This review will include an evaluation of plan goals and objectives.

FS 74

FS 74 The text has been revised to reflect this information.

3.4.2.5 Mainstem North Umpqua Anadromous Fish Spawning Habitat Enhancement

Page 3-105, lines 38-39: No monitoring plans for these projects have been prepared so it is premature to assess the adequacy of these plans.

FS 75

FS 75 The statement in the draft EIS only describes the provisions of the Settlement Agreement and does not assess the adequacy of the monitoring plan.

Page 3-106, lines 27-29: Use of spawning habitat in these enhancement reaches will be dependent on the quality and quantity of habitat available as well as on the number of spawners with access to the project sites. The intent is to augment existing spawning habitat in the upper basin. If spawner escapement is sufficient, fish should use this additional habitat. However, there is no guarantee that they will. Currently the USDA Forest Service monitors Chinook spawning downstream of the Project within the Wild and Scenic River reach. These surveys could be expanded to include evaluation of Project reaches downstream of Soda Springs Dam. The intent of the project in the Slide bypass reach is to collect gravels and provide spawning substrates prior to re-introduction of anadromous fish. For this reason, the monitoring described in the SA focused on physical characteristics of the habitat desired. Following re-introduction it will be possible to assess use of this habitat by spawning fish.

FS 76

FS 76 The text has been revised to reflect this information.

3.4.2.6 Reservoir and Forebay Management and Mitigation

Page 3-108, lines 18-19: The measure of predator control (e.g. brown trout) in Soda Springs Reservoir should be added to this list.

FS 77

FS 77 The text has been revised to reflect this information.

Page 3-109, lines 32-34: Suggest striking the reference to the ACS. This is primarily a recreational fisheries issue.

FS 78

FS 78 The text has been corrected.

3.4.2.7 Aquatic Connectivity

Page 3-111, lines 15-23: The USDA Forest Service completed a survey of road stream crossing culverts for streams with potential or existing fish habitat on roads used by the Project. Seven (7) of these culverts were found to be barriers to fish passage and will be upgraded to provide fish passage as part of the SA. Additionally, the estimated 300 other stream crossing culverts and 600 ditch relief culverts on Project access roads will be surveyed and evaluated during 2002 as part of the SA to determine their ability to pass a 100-year flood flow (reference section 3.10 of Project DEIS). Generally, Project roads are much less a movement barrier compared to other Project features with the exception of sites with undersized and/or shotgun stream culverts. Undersized and shotgun culverts prevent species dependent upon stream bottom, stream riparian margin, or aquatic habitat from moving up and down the stream corridor. Sediment and debris movement important for habitat maintenance is also impaired. Redesign and replacement of road stream crossing culverts having these conditions identified in the inventories will improve aquatic connectivity, so that animals and materials can move up and down the water and stream margins. The upgrade of culvert type structures of a size sufficient to accommodate at least the 100-year flood at stream crossings, as required by the NFP, will also improve aquatic connectivity.

FS 79

FS 79 The text has been revised to include this information.

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Numerous perennial and intermittent stream channels are intercepted into Project flumes and canals, eliminating habitat and species connectivity and preventing hydrologic functions and physical processes associated with functioning riparian and aquatic ecosystems at those locations. The Project canals directly "intercept" 60 streams and associated riparian corridors into the canals or concrete flumes. This existing condition prevents movement of many riparian/aquatic and terrestrial species up and down the immediate drainage channel, and in fact, likely entrains species into the canals and flumes that are moving downstream and results in high levels of mortality. Physical processes, such as the movement of sediment and woody debris, are interrupted as well. These stream channel interceptions have been prioritized for reconnection as part of the SA process. Under the SA, Priority 1 and 2 intercepted streams will be reconnected to restore riparian connectivity.

FS791
(cont)

Page 3-112, line 21: "In addition, the SA includes provisions for the removal of diversion dams on eight tributary streams along the Lemolo waterways..." Under the SA (Section 10.4), removal of seven diversions would occur, while the remaining diversion (Deer Creek), would be "modified", not removed.

FS 80

FS 80 The text has been corrected.

Page 3-112, line 23: "67 small tributaries" refer to Schedule 10.6 of the SA for priority 1 and 2 aquatic sites. This number does not include the other 8 named streams discussed that have been reconnected.

FS 81

FS 81 The text has been revised to clarify this distinction.

Page 3-115, line 7: Reference page 18 of the USDA Forest Service reply comments (FS, 2001a).

FS 82

FS 83 The species identified by PacifiCorp (1995a) as the Douglas County variety of *Kalmiopsis leachiana* has since been named *K. fragrans*, Umpqua kalmiopsis. This species is a FS and BLM sensitive species and is so listed in Appendix B. It is discussed with other sensitive plant species in Appendix C. Because the sentence referred to in the comment would be incorrect if the name were changed from *K. leachiana* to *K. fragrans*, it has been deleted.

3.5 TERRESTRIAL RESOURCES

3.5.1 Affected Environment

3.5.1.1 Vegetation

Page 3-117, lines 1-3: The correct plant name is Umpqua *Kalmiopsis*, *Kalmiopsis fragrans*. *K. leachiana* is a morphologically separate species from the Siskiyou Mountains.

FS 83

FS 84 The text has been revised to clarify that *Cypripedium fasciculatum* is both a Regional Forester's Sensitive Species and a Survey and Manage category "C" species. Two sentences have been added to the final EIS to clarify FS sensitive species requirements. The following sentence has been added to footnote 37: "It is FS policy to prepare a biological evaluation as part of its NEPA process to determine the potential effect of its programs and activities on sensitive species." In addition, the following sentence has been added to the last paragraph of section 3.5.1.1: "Since the species is a FS sensitive species, FS policy requires preparation of a biological evaluation to determine the potential effect of FS programs and activities on it as part of the FS NEPA process."

Pages 3-117 and 3-118: -The FEIS should clarify that *Cypripedium fasciculatum* is both a Regional Forester's Sensitive Species and a Survey and Manage category "C" species. As such, there are requirements to disclose the potential effects for the species as well as the need to survey for the species and implement management recommendations.

FS 84

Page 3-119, Footnote 41: Second sentence - "surface" should be "survey"

FS 85

FS 85 The second sentence of the footnote has been deleted as the information is already presented in the text. Thus, this correction is not needed.

Page 3-119, line 1: "management" should be "manage".

FS 86

FS 86 This comment apparently refers to line 1 on page 3-120. See response below to comment FS 87.

3.5.1.2 Wildlife.

Page 3-120, line 1: Add USDA Forest Service Management Indicator Species to line 1 - "... (i.e., survey and manage species and management indicator species).

FS 87

FS 87 The indicated information has been inserted. Also, a definition of management indicator species has been added as a footnote to the insert with an explanation of their current regulatory status.

Page 3-121, line 5: Current Regional and interagency habitat mapping criteria resulted in no suitable lynx habitat being identified on the Forest. This could likely result in a "no affect" determination from the Project.

FS 88

FS 88 Information about lynx habitat has been added to sections 3.5.1.2 and 3.6.1.1.

Page 3-121, line 8: Add: Management indicator species (MIS), as identified in the Forest Plan, known or suspected to occur in the Project area include pine marten, pileated wood pecker and other cavity nesters. Other MIS species discussed above include spotted owl, bald eagle, peregrine falcon, Roosevelt elk and blacktail deer.

FS 89

FS 89 Information about management indicator species has been added to the text.

3.5.1.3 Wetlands and Riparian Habitats

Pages 3-121-122: Recommend that the FEIS include the value of wetland and riparian ecosystems to rare plant species and other organisms (such as mollusks, bryophytes, lichens and algae) as well as amphibians. Adders tongue, *Ophioglossum pusillum*, is a rare plant dependent on these ecosystems.

FS 90

FS 90 Additional information on species dependent on wetland areas has been added to the first paragraph of this section.

Page 3-120, line 1: Add USDA Forest Service Management Indicator Species to line 1 - "... (i.e., survey and manage species and management indicator species).

FS 91

FS 91 This comment is a duplicate of comment FS 87.

3.5.2 Environmental Impacts and Recommendations

3.5.2.1 Vegetation Impacts and Management

Page 3-122, lines 37-38: The "USDA Forest Service August 2000 preliminary recommendations" document submitted by the Conservation Groups was an earlier iteration of USDA Forest Service documentation and has been replaced by the justification statement for Section 12 of the SA (FS, 2001d) and is also addressed in PacificCorp (PC, 2001g). These documents include the components envisioned to be in the vegetation management plan.

FS 92

FS 92 A statement indicating that the FS preliminary recommendations have been superseded has been added to the final EIS

Page 124, lines 37-40: The purpose of the provision in 12.2 of the SA is for PacifiCorp to begin early implementation of control and prevention activities for noxious weeds prior to license issuance. There are several known populations of noxious weeds that should receive control activities as soon as possible. FERC staff assumes that the provision is intended to focus PacifiCorp's efforts related to noxious weed control to proposed enhancement measures is partially correct; but the provision is also intended to integrate noxious weed control into ongoing maintenance and monitoring activities that will be coordinated through the RCC each year. USDA Forest Service document (FS 2001d, page 75) should be referenced.

FS 93

Page 3-127, lines 6-10: USDA Forest Service agrees that the concepts and components of the vegetation management plan recommended by the Conservation Groups are inherently incorporated in the VMP provisions of the SA.

FS 94

Page 3-127, lines 11-13: While the overall long term benefits of the vegetation management plan may be similar between the NGO Alternative and the provisions of the SA, the fact that the plan provided for in the SA would be completed and implementation of some components initiated prior to license issuance increases the likelihood that some populations of noxious weeds will be controlled earlier and at less cost.

FS 95

3.5.2.2 Wildlife Entrapment and Barriers to Wildlife Movement

Page 3-130, lines 17-20: The FEIS should state that *the reconnection of Priority 1 and 2 intercepted tributaries and drainages and the enlargement of culverts to accommodate 100-year flood events will also contribute to improved movement for most land-based terrestrial species, with the possible exception of big game.*

FS 96

Page 3-130, line 30: Recommend that "Section 10(j)" be related to the FPA.

FS 97

Page 3-131, lines 1-2: Nowhere in the record is there documentation supporting that wildlife movement is "completely" impeded for any species, let alone "many" species. This statement also conflicts with following sentences identifying where access across the waterways does occur.

FS 98

Page 3-131, lines 11-12: This statement indicates a much greater impact of the Project waterways on restricting wildlife movement than is found in the record. See following comment.

FS 99

FS 93 In section 3.5.2.1 of the final EIS the meaning of provision 12.2 of the Settlement Agreement has been clarified. The FS justification statement (FS 2001d) was referenced at the beginning of the paragraph in the draft EIS.

FS 94 The final EIS has been revised to indicate FS concurrence with staff's assessment.

FS 95 A paragraph has been added to the final EIS to reflect the differences in short term benefits between the Settlement Agreement and NGO Alternatives.

FS 96 This information has been added to section 3.5.2.2.

FS 97 This information has been added to section 3.5.2.2.

FS 98 The NUCWA, Volume 2, section 8.3.4 (Stillwater Sciences, Inc. 1998a), states, "Under current conditions ... (f)or some species, the project waterways may only hinder movement... For other wildlife, the waterway may represent a complete barrier to movement..." The statement in the EIS has been clarified to more accurately reflect this documentation on impacts on wildlife movement.

FS 99 The NGO recommendation is described in an attachment (EIA module 1A) to their comments on the Settlement Agreement (Umpqua Watersheds 2001a). In terrestrial habitat priority 1 areas (areas 1-4 of figure 3.5-2 of the EIS) their proposal would involve covering, burying, or elevating canals and flumes along the waterway systems (12.35 miles of canal and flume). This would include both Riparian Reserve (RR) and non-Riparian Reserve terrestrial habitats in those four areas. In terrestrial areas 5-10 their proposal would involve covering, burying, or elevating canals and flumes in 18 priority 1 RRs. This would be done for the total RR width of 300 feet (class 3/4 streams) or 600 feet (class 1/2 streams) for a total additional 1.0 mile of canal or flume treatment. The EIS has been modified to clarify the NGO Alternative.

The table comes from the NGO's offer of settlement (Umpqua Watersheds 2001), as noted in the source listed at its end. The title of the table has been modified to clarify that the information and value judgements in it are those of the NGOs.

The statement in the final EIS has been clarified to more accurately reflect the statement of the current condition in the NUCWA (Stillwater Sciences, Inc. 1998a).

Page 3-131, Figure 3.5-2 and Pages 3-132-133, Table 3.5-1. It is unclear whether the Conservation Groups recommendation to cover, bury, or elevate all canals and flumes described on Page 3-130 includes both Priority 1 Terrestrial Connectivity Areas and Priority 2 Terrestrial Connectivity Areas. Also, while the descriptions of the areas may be helpful, the table incorporates both factual information and conclusory statements or value judgments that are not defined or supported elsewhere in the record. Page 3-131, lines 11-12: This statement indicates a much greater impact of the Project waterways on restricting wildlife movement than is found in the record. It would be more accurate to use the current condition statement from the NUCWA 1998 that states "Habitat fragmentation resulting from the hydroelectric project waterways prevents the unrestricted movement of nearly all terrestrial amphibians, reptile and mammal species in the vicinity" (emphasis added).

FS 99
(Cont)

Page 3-131, line 2: Additional or updated information on canal-caused mortality to big game may be available from PacifiCorp or from Oregon Department of Fish and Wildlife telemetry studies conducted over the past few years.

FS 100

Page 3-133, line 11: Should state that this management goal is from the NUCWA, (1998).

FS 101

Page 3-135, line 38-40: It should be identified that the reconnection of Priority 1 and 2 intercepted tributaries and drainages and the enlargement of culverts to accommodate 100-year flood events will also contribute to improved movement for most land-based terrestrial species, with the possible exception of big game. This would add a minimum of 67 additional crossing opportunities for terrestrial species.

FS 102

Page 3-136, line 6: Preliminary locations of many of the new crossings were included in PacifiCorp's Final License Application and were based on field reviews of the Science Team. Additional field review will be conducted prior to final placement of the crossings.(Figure 4.3.4, Exhibit E, page 4-90, Final License Application, PacifiCorp, 1995).

FS 103

Page 3-136, lines 7-8: The USDA Forest Service did not submit figure 3.5-2 to FERC and it should not be referred to as a USDA Forest Service document. This figure reflects an earlier analysis in the relicensing process that was not used to determine where terrestrial crossings were needed to fulfill the provisions of the SA. The "priority riparian reserves" depicted on the figure are addressed in Section 10.6 of the SA. The USDA Forest Service intends to use whatever factual information is available and applicable, including the Survey and Manage surveys, to identify the final locations of the new crossings.

FS 104

FS 100 Section 3.5.2.2 of the final EIS presents our analysis of impacts of entrapment of big game (e.g., elk, deer) in the canals under the No-Action Alternative. Data collected by PacifiCorp between 1983 and 1993 as part of project relicensing studies (PacifiCorp 1995a, Stillwater Sciences, Inc. 1998a) indicate that approximately 11 deer and 4 elk become trapped and die in project waterways each year. No more recent data have been filed with the Commission. As discussed in the final EIS, project waterways do not prevent movement through the area by big game species, but may alter their movement patterns or corridors (Stillwater Sciences, Inc. 1998a). Because there has been no change in project waterways or their management since the relicensing studies were done, we have no reason to expect that the level of entrapment of big game has changed significantly.

FS 101 This information has been added to the text.

FS 102 Reconnecting intercepted tributaries and enlarging culverts would contribute to improved movement for most riparian species, but would not provide additional crossing opportunities for terrestrial species. A statement about reconnecting tributaries and enlarging culverts has been added to sections 3.5.2.2 and 3.5.2.3, with a cross reference to further discussions of the issue in section 3.4.2.7.

FS 103 The EIS has been modified to reflect this information.

FS 104 This statement has been deleted from the final EIS.

Page 1-136, lines 19-28: The details of the monitoring plan will consider the final site plans developed for the crossings, and will be designed to fit the site-specific situation.

FS 105

FS 105 A sentence has been added to reflect this information.

Page 3-136, line 30: The term "tract plates" should be "track plates". While track plates will be considered an available method, they may not be the best tools to answer the monitoring question of the efficacy of the crossings. A single band of elk can make a big impact to tracking conditions-making any count difficult and obscuring any tracks of smaller animals.

FS 106

FS 106 The text in the final EIS has been simplified by removing the statements referred to in this comment.

Page 3-137, line 1: Reference Section 8.3.3 of the NUCWA, page 6.

FS 107

FS 107 A reference to that section in volume 2 of the watershed analysis has been added to the EIS.

Page 3-137, lines 8-10: The USDA Forest Service did not submit the interval or the dimensions that would be needed. The actual interval and dimensions will be based on on-the-ground site conditions, but it can be assumed that movement by deer and elk will be improved.

FS 108

FS 108 The information about the interval and dimensions that would be needed was taken from page 61 of the FS Revised Terms and Conditions (FS 2001d) stating: "Passage under the penstock for large animals needs to be provided at an interval no greater than .25 miles with passage openings a minimum of 8 feet high by 23 feet wide or greater (Reed et al. 1975)". The FS did not include a list of references, so the Reed et al. (1975) document could not be reviewed or itself referenced in the EIS. A statement has been added to the EIS indicating that the actual interval and dimensions would be based on site-specific conditions.

Page 3-138, lines 9-13: The measures proposed would significantly improve crossing opportunities for some classes of wildlife in the Project area. Avian species would not benefit to any degree from the measures. Habitat connectivity would be improved to some degree, but due to the facilities and access roads remaining on the landscape, it is doubtful that habitat for late-successional habitat-associated species could be developed on the site.

FS 109

FS 109 The statement has been modified to indicate that habitat connectivity would not improve for birds under this alternative. Also, a statement has been added about facilities and access roads still being present.

Page 3-138, lines 28: Recommend that the last sentence be changed to read - *"Complete unencumbered movement" of wildlife species is not identified as a standard and guideline in the Forest Plan, and would be an extremely difficult standard to achieve without removal or significant modification of all of the Project waterways and the restoration of habitat to pre-Project conditions. This objective would not be attained by any of the alternatives, including the NGO alternative.*

FS 110

FS 110 The end of this paragraph in the EIS has been modified to reflect additional information about the Forest Plan.

Page 3-138, lines 34-37: It is anticipated that final plans, locations, monitoring methods and evaluation criteria for requiring additional crossings will be filed with the Commission.

FS 111

FS 111 Staff's recommendation would ensure that these were filed with the Commission.

3.5.2.3 Impacts on Wetlands Habitats

Page 3-139-140: USDA Forest Service recommends that additional information be included in the Impacts on Wetland Habitat section providing effects and benefits to other plant and wildlife species besides amphibians.

FS 112

FS 112 Information on the impacts to other plant and wildlife species besides amphibians is found in other sections of the EIS, specifically, sections 3.4.2.3, 3.4.2.7, 3.5.2.1, and 3.5.2.2. Rather than repeat that information in this section, the other discussions are referred to at the beginning of the discussion of the Settlement Agreement in section 3.5.2.3.

Page 3-141, lines 16-19: In the development of site plans for creating/restoring wetlands, water level fluctuations in adjacent reservoirs or forebays will be considered. In most cases, and to the extent possible, the wetlands would be hydraulically disconnected from the adjacent water body. If reconnection were to occur, water level fluctuations may affect amphibian reproduction, but it is envisioned that the wetlands would provide additional and higher quality habitat than that which currently exists.

FS 113

Page 3-141, lines 30-35: Final site plans would include a monitoring plan component based on the actual site conditions and the proposed wetland creation or restoration action. An adaptive management strategy may be appropriate in some instances.

FS 114

Page 3-142-143: NGO Alternative. It is unclear whether PacifiCorp would just be required to complete a plan for the creation and improvement of at least eight wetlands under the NGO Alternative or whether they would also be expected to implement it. The SA requires PacifiCorp to implement the measures. It is unclear whether the plan would be held in reserve if the stable water level requirement addressed on page 3-143 did not measurably improve wetland habitat. More clarity is needed.

FS 115

Page 3-144, lines 12-14: Monitoring will be identified within the site plans for each created or restored wetland based on meeting site-specific objectives. The Explanatory Statement (PacifiCorp 2001g) identifies the overall goals for wetland and stillwater amphibian habitats (page 27), and identifies that monitoring will be a component of the site plans (page 75). Until the specific site plans are developed, it would be premature to identify monitoring and evaluation measures.

FS 116

3.5.2.5 Forest Service Sensitive Species and Survey and Manage Species

Page 3-148, line 8: For the sake of clarity, it would be more appropriate to separate the discussion of Sensitive Species from Survey and Manage Species. The requirements are different in each case. A biological evaluation needs to be completed for Sensitive Species that addresses the potential Project effects to those species, and should be included in the FEIS. The requirements for Survey and Manage Species include surveys for particular species prior to habitat disturbing activities and the implementation of appropriate management recommendations if they are found.

FS 117

FS 113 This information has been added to the EIS.

FS 114 The EIS has been modified to reflect this information.

FS 115 The EIS has been revised to clarify that the NGO Alternative would require creation and improvement of at least eight wetlands. The NGOs have not clarified the apparent contradiction in their alternative that was described, as follows, in the draft EIS: "The Conservation Groups state that stable water levels should be maintained in reservoirs and forebays instead of creating artificial wetland habitat." Thus, we have not modified this text in the EIS.

FS 116 The Explanatory Statement for the Settlement Agreement (PacifiCorp 2001g) identifies the goals for aquatic, riparian, and terrestrial species connectivity. The information that monitoring would be a component of site plans for each created or restored wetland is found in the Justification Statement for USDA Forest Service Revised Terms and Conditions (FS 2001d). We agree that until site specific plans are developed it would be premature to identify specific monitoring and evaluation measures. Our recommendations are general elements to be considered in the monitoring plans, as appropriate. The EIS has been clarified to indicate that monitoring should be developed with and included in the site specific plans.

FS 117 Because most of the survey and manage species are also FS sensitive species or BLM sensitive or assessment species, it would be duplicative to separate the discussion of the two types of species. However, the different FS requirements have been explained in the text. The final EIS analysis focuses on species known to occur in the project area. Also, FS 4(e) condition 15 requires PacifiCorp to develop a sensitive species plan within 1 year of license issuance. The plan would require PacifiCorp to complete biological evaluations of the potential effects of proposed actions on Sensitive Species. Thus, additional site-specific biological evaluations would be completed later in the process by PacifiCorp.

Page 3-151, lines 23-24: This is an incorrect statement. While some of the USDA Forest Service preliminary terms and conditions regarding Sensitive Species and Survey and Manage Species seemingly are not included in the SA, they are inherent to the provisions of Sections 21.5 and 21.7 of the SA. The conditions are intended to be more descriptive of the requirements for these species, and do not conflict with the provisions of the SA. The development of the particular plans will ensure that PacifiCorp is knowledgeable of and will meet USDA Forest Service management direction by performing the necessary surveys and managing for these species throughout the term of the license.

FS 118

FS 118 Based on this FS interpretation of their 4(e) conditions, the statement in the EIS has been clarified and supplemented with reference to the FS statement.

Page 3-151, lines 37-40 through Page 3-152, line 6: To meet USDA Forest Service biological evaluation requirements, the FEIS should contain additional effects analysis for each Sensitive Species (similar to the 3.6 Threatened and Endangered Species section that does include some of the Sensitive Species). While USDA Forest Service agrees that the majority of species would be benefited by the measures contained in the SA, there may be some short-term adverse impacts to some species from disturbance during project implementation. If so, they should be identified. Requirements of a biological evaluation include:

FS 119

FS 119 Information that short-term adverse impacts to some species from disturbance could occur during project implementation has been added to the EIS (see discussion in section 3.6.2 of the final EIS). Appendix C provides more information on sensitive species. See also response to comment FS 117.

1. An identification of all sensitive species and their habitat potentially affected by the proposed activity.
2. An analysis of the direct, indirect, and cumulative effects of the proposed action (including mitigation) and alternatives on species or habitat.
3. A determination of "no impact", "beneficial impact", "may impact individuals but not likely to cause a trend to federal listing or loss of viability", or "likely to result in a trend to federal listing or loss of viability." The determination should include the rationale for the determination, including documentation of the information used to make the determination.
4. Recommendations for reducing negative impacts and providing beneficial mitigation measures.

Page 3-152, lines 5 and 21: The statements that an alternative "could have potential benefits for sensitive and survey and manage species" is too vague and does not meet the requirements of a biological evaluation as identified above.

FS 120

FS 120 See responses to comments FS 117 and 119.

3.6 THREATENED AND ENDANGERED SPECIES

3.6.1 Affected Environment

3.6.1.1 Federal and State-Listed Species

Page 3-154, Table 3.6-1: The list of species should be updated to reflect the current Regional Forester's Sensitive Species list for animals (November, 2000). This list is included in the USDA Forest Service Justification Statement for Condition No. 15 – USDA Forest Service Sensitive Species (FS, 2001d).

FS 121

FS 121 The table has been updated to reflect the current sensitive species list for animals.

Page 3-156, line 27: Cutthroat has been de-listed, but is included on the Sensitive Species list.

FS 122

FS 122 The text has been revised.

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Page 3-158, line 8: Field surveys to verify lynx presence utilizing DNA technology have been done in the North Umpqua watershed. Surveys using the US FWS protocol were conducted in several locations in 1999. Surveys conducted according to USDA Forest Service protocol were conducted in 1999, 2000 and 2001. DNA results are only back for the 1999 and 2000 surveys, but no lynx were detected. Additionally the Lynx Biology Team (an interagency group that included US FWS) recommended in July of 2000 that the Lynx Conservation Strategy not be applied west of the Cascade Crest. This recommendation was formalized in Regional direction on September 19, 2000.

FS 123

FS 123 Information about the field surveys for lynx has been added to the EIS.

Page 3-159, lines 20-27: The Diamond Lake Ranger District has additional bald eagle nesting records which should be identified here. Nests have been monitored at Diamond Lake, Lemolo Reservoir and Toketee Reservoir and have verified nesting activity and reproductive success. Jeff Bohler, USDA Forest Service or Frank Issacs, Oregon Eagle Foundation may be contacted at 541-498-2531 and 541-737-1938 respectively for updated information on bald eagle nesting.

FS 124

FS 124 Recent information on bald eagle nesting at Toketee Lake and Lemolo Reservoir was obtained from Jeff Bohler of the FS and added to the text in the final EIS. Bald eagle nests have also been observed near Diamond Lake. Since this lake is above Lemolo Reservoir and does not have any PacifiCorp improvements, that information has not been included in the final EIS.

Page 3-159, line 32: Northern spotted owl is no longer a Forest Service Sensitive species as it is a listed species under ESA.

FS 125

FS 125 The correction has been made. Also, we have made the same change for other listed species (e.g., Oregon coast coho salmon, bald eagle, Kincaid's lupine) both in the text and in table 3-11.

3.6.2 Environmental Impacts and Recommendations

Page 3-163, lines 15-18: Identifies that surveys will be done for "protected" species, but this provision in the SA applies specifically to Survey and Manage Species, generally not Federally listed or Sensitive Species.

FS 126

FS 126 Section 21.5 of the Settlement Agreement states: "PacifiCorp shall conduct Sensitive Species and Survey and Manage species protocol surveys for rare, endemic species..." "Protected species" has been changed to "sensitive and survey and manage species" to more accurately reflect section 21.5 of the Settlement Agreement.

Page 3-163, line 26: Add Section 10(j) "of the FPA".

FS 127

FS 127 Insert has been made.

3.6.2.1 Federal- and State-Listed Species

Page 3-164, line 7: The mixing of state and federal listed species is confusing. Since the requirements for consultation for Federally listed species are so different than for other species, these two species categories should be separated.

FS 128

FS 128 To avoid confusion, this section has been divided into two subsections. The first includes all federally listed threatened and endangered species, some of which are also state listed as threatened or endangered. The second subsection covers the four species that are state listed as threatened or endangered but not federally listed as such.

Page 3-166, line 23: Refers to an assessment for bald eagle, spotted owl and peregrine falcon in section 3.5.2, but the assessments are actually in sections 3.6.1.1

FS 129

FS 129 The text has been revised to clarify that the general assessment in section 3.5.2.4 for birds would also apply to these three species. Sections 3.6.1.1 and 3.6.1.2 describe the affected environment for the three species, not the effects of the project on them.

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Page 3-166, lines 23-29: Again, the analysis mentions that there are mitigation measures prescribed that minimize adverse habitat impacts and then draws the conclusion that an alternative would then "benefit" eagles, owls and falcons. This conclusion is unjustified. Adopting any of the alternatives includes activities in and around occupied eagle, falcon and owl habitat that may effect either the amount of available habitat or result in the potential for significant disturbance of nesting sites if seasonal restriction are not incorporated into project design. The analysis for these species should summarize a more thorough analysis conducted as part of Section 7 consultation. Consultation guidelines call for any activity that has any impact to be classified as a "May Effect" for Section 7 consultation. All alternatives will have some activity that has the potential to adversely impact either habitat or result in disturbance. Based on the effects identified, there are both adverse effects and beneficial effects to these species, and both need to be disclosed.

FS 130

Page 3-168, line 3: The Diamond Lake Ranger District has sighting records of wolverine in the North Umpqua basin.

FS 131

Page 3-170, line 33: Text here should summarize the analysis done in the BA and also relate those results to the other alternatives.

FS 132

3.7 CULTURAL RESOURCES

3.7.1 Affected Environment

Page 3-171, line 32: Insert in place of the first sentence *The USDA Forest Service and BLM had previously recorded 23 archaeological sites within the primary study area prior to the initiation of the study by PacifiCorp. PacifiCorp's inventories discovered an additional 19 archaeological sites within the primary study area. Through USDA Forest Service inventories, an additional fifteen archaeological sites have been recorded since PacifiCorp's inventories.*

FS 133

Page 3-171, line 37: Insert *PacifiCorp has proposed twenty-two sites for data recovery excavations with in the Cultural Resource Management Plan (CRMP). Twenty of these sites are on lands administered by the Federal government. USDA Forest Service or BLM specialists have not reviewed data recovery plans.*

FS 134

FS 130 Sections 3.6.2.1 and 3.6.2.2 include summaries of proposed PM&E measures under the Settlement Agreement that would benefit or reduce effects on these species. We have clarified in those sections that the Settlement Agreement would include seasonal restrictions on activities in order to protect nesting bald eagles, falcons, and spotted owls. A more detailed review of effects on bald eagles and spotted owls is found in the BA (PacifiCorp 2002a).

The BA considered the potential effects of disturbance from recreation, maintenance activities, and helicopter surveys of transmission lines. It concluded that activities conducted under the Settlement Agreement alternative "may affect, but would not be likely to adversely affect" bald eagles or the northern spotted owl. Given the protection measures that would be in place, we concluded that such actions would not rise to a level of significance to determine that the Settlement Agreement would adversely affect these species. By letter dated May 8, 2002, Commission staff requested FWS's concurrence on our determination of effects of relicensing the project under the Settlement Agreement. On December 23, 2002, FWS filed a concurrence letter and its BO on the action alternative. In the BO, the FWS anticipates that incidental take of bald eagles, northern spotted owls, and Columbian white-tailed deer would occur and identifies reasonable and prudent measures to minimize take and terms and conditions to implement these measures. We have incorporated these findings and measures in the final EIS, as appropriate (see sections 2.2.5, 3.6.2, and 5.5.2).

FS 131 This information has been added to the EIS.

FS 132 The analysis in the BA has been summarized for each individual species in the discussions earlier in the section.

FS 133 Text in section 3.7.1 has been revised as suggested in this comment.

FS 134 Text in section 3.7.1 has been revised as suggested in this comment.

3.7.2 Environmental Impacts and Recommendations

3.7.2.1 Archaeological and Historic Resources

Page 3-173, line 4-8: "and the measures included in the SA to protect cultural resources (see section 3.7.2.2 below) would not be implemented under a FERC license." Archaeological and historic resources are protected under the Archaeological Resources Protection Act of 1979, as amended, the National Historic Preservation Act of 1966, as amended in 1992, and the National Environmental Policy Act of 1976. Any activity conducted by PacifiCorp would be subject to these laws thus, protecting heritage resources from impacts from authorized and unauthorized activities prior to issuance of the FERC license. The SA provides for data recovery from approved site-specific plans, public outreach, interpretive displays, and cultural resource sensitivity training, and monitoring of looted sites that would not be covered under law and regulation. The only measure provided in the SA that is not required under law and regulation that could be considered a protection measure would be the monitoring of looted sites. Therefore replace lines 4-7 with the following: *PacifiCorp and the USDA Forest Service would continue to manage cultural resources in the Project area as they do now, and the measures included in the SA to provide for data recovery, public outreach, monitoring, and cultural resource training would continue to be implemented outside of the FERC license.*

FS 135

FS 135 Text in section 3.7.2.1 has been revised as suggested in this comment.

3.7.2.2 Traditional Cultural Properties

Page 3-178, line 21-24: Delete lines 21 thru 25-- "Similarly....of the new license." Insert *The USDA Forest Service retains responsibility for Tribal consultation on all issues involving USDA Forest Service lands within the APE. The USDA Forest Service continues to consult with the Tribes on issues and is responsive to tribal concerns on lands administered by the USDA Forest Service. When cultural resources having cultural or religious value to American Indian tribes are identified on USDA Forest Service lands, the USDA Forest Service will consult with the Tribes. Under ARPA and the NHPA, the USDA Forest Service will consult with the Tribes prior to data recovery and before permit issuance to PacifiCorp for any of the data recovery projects, surveys, or other undertakings requiring an ARPA permit.*

FS 136

FS 136 Text in section 3.7.2.2 has been revised as suggested in this comment.

Page 3-178, Footnote 62: The CRMP should acknowledge that both the BLM and USDA Forest Service responsibilities as land management agencies for compliance with various laws, such as ARPA, NAGPRA, and NHPA on their lands.

FS 137

FS 137 Text in section 3.7.2.2 has been revised as suggested in this comment.

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3.8 RECREATION

3.8.1 Affected Environment

More discussion is needed of other recreational uses in the Lemolo and Toketee sub-areas as described in the License Application (PacifiCorp, 1995a). | FS 138

Page 3-180, line 2: add in sentence "*PacifiCorp facilities are above the designated Wild and Scenic River area.*" | FS 139

3.8.2 Environmental Impacts and Recommendation

3.8.2.1 Recreation Resource management Plan

Page 3-183, line 5-6: Change to: PacifiCorp would fund recreation-associated costs as identified in the plan in accordance with.... | FS 140

Page 3-183, Footnote 64: Expand discussion of Schedule 17.1 and move this discussion to the main body of text. | FS 141

Page 3-184, line 29: "(\$150,000)" should be \$300,000 (see Schedule 17.1, Forest Plan Compliance). | FS 142

Page 3-185, line 7: Agreement provisions would address the *potential* need to.... | FS 143

Page 3-185, line 13: *Potential* campground capacity expansions.... | FS 144

Page 3-185, line 16: Implementing a final RRMP would also address the *potential* need.... | FS 145

3.8.2.3 Effects on Whitewater Boating

Page 3-189, line 28: "...area occurs between *Boulder Flat Campground* and *Rock Creek*...." | FS 146

Page 3-189, line 36: "...the reach between *Boulder Flat Campground*...." | FS 147

3.8.2.4 Effects on Recreation in the Wild and Scenic River (*This title should be changed to "Effects on the Wild & Scenic River"*) | FS 148

FS 138 We believe that section 3.8.1 provides sufficient detail for our assessment of impacts to recreation. Additional information about the affected environment from PacifiCorp's 1995 license application is available in the public record.

FS 139 Text in section 3.8.1 has been revised as suggested in this comment.

FS 140 Text in section 3.8.2.1 has been revised as suggested in this comment.

FS 141 We have revised section 3.8.2.1 as suggested by moving the discussion from the footnote 64 to the main body of the text. We refer readers seeking additional detail about Schedule 17.1 to the Settlement Agreement.

FS 142 Text in section 3.8.2.1 has been revised as suggested in this comment.

FS 143 Text in section 3.8.2.1 has been revised as suggested in this comment.

FS 144 Text in section 3.8.2.1 has been revised as suggested in this comment.

FS 145 Text in section 3.8.2.1 has been revised as suggested in this comment.

FS 146 Text in section 3.8.2.3 has been revised as suggested in this comment.

FS 147 Text in section 3.8.2.3 has been revised as suggested in this comment.

FS 148 Text in section 3.8.2.4 has been revised as suggested in this comment.

Page 3-193 to 3-196: The North Umpqua Wild and Scenic River is located just below the lowermost Project facility at Soda Springs Dam. The USDA Forest Service employs direction in the North Umpqua WSR Management Plan, which amended the 1990 Umpqua National Forest Land and Resource Management Plan, to evaluate terms and conditions under Section 4(e) of the Federal Power Act for recreation and other identified values. The USDA Forest Service and BLM are also applying their independent authority under Section 7(a) of the WSR to determine whether the Project as proposed in the License Application and the action alternatives in FERC DEIS will invade the designated river area or unreasonably diminish its scenery, recreation, fish or wildlife values as present in October 1988 (the date of the North Umpqua's addition to the National System). This discussion incorrectly confuses the two authorities and should be corrected in the FEIS.

Under Section 7(a) of the WSR, the river-administrator evaluates whether a Project outside (below, above or on a tributary to) a designated river will invade the designated river or unreasonably diminish the scenic, recreational, fish or wildlife values present at the date of its designation. The BLM/USDA Forest Service made a WSR Section 7(a) determination in response to the License Application (FS/BLM, 2001c, Enclosure 3), and in response to the DEIS (Enclosure IV of this filing) evaluating the effects of proposed Project operations on each of the values stated in the statute. The discussion in the FEIS should present a separate section on WSR Section 7 which incorporates the finding of the FS/BLM June 21, 2002 determination.

Note that for projects outside a designated river corridor, the river-administrator is directed by Section 7 to consider the Project's effects on scenery, recreation, fish and wildlife values, which may or may not be the outstandingly remarkable values on a particular designated river. Each determination is made responsive to a particular Project proposal (License Application, and alternatives as described in the DEIS/FEIS). Importantly, a project in relicensing that predates a river's addition to the National System is not automatically "consistent with designation (DEIS, p. 3-196)." Rather, the river-administering agency is directed to evaluate whether any identified continuing adverse effects rise to a level of unreasonable diminishment based on existing condition and resource trend over the life of a new license.

FS 149

FS 149 The text in section 3.8.2.4 correctly states that the Wild and Scenic corridor begins "downstream of Soda Springs powerhouse" (not "below the lowermost Project facility at Soda Springs Dam"). We have, however, revised section 3.8.2.4 to discuss the preliminary Section 7(a) determination submitted by the FS on June 21, 2002. We also acknowledge that the FS and BLM will submit a final Section 7(a) determination after this final EIS is issued.

FS 150

FS 150 We have revised section 3.8.2.4 to discuss the preliminary Section 7(a) determination submitted by the FS on June 21, 2002. We also acknowledge that the FS and BLM will submit a final Section 7(a) determination after this final EIS is issued.

FS 151

FS 151 Text in section 3.8.2.4 has been revised to reflect this comment.

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Page 3-195, lines 14-36: Cite the comments made in FS 2001a. Recommend adding the following after the sentence ending on line 27 – *Recommendations from a watershed analysis are merely staff recommendations, which should not be followed unless justified by a thorough and independent analysis of a complete record for the decision to be made. Nor is such a staff recommendation, where provided, binding on a USDA Forest Service decision-maker.*

FS 152

FS 152 The final EIS reports the record on which Commission staff prepared its recommendations. While the statements in this comment may be correct and a factor in the FS decision-making process, they have no bearing on Commission staff's analysis of the record.

3.9 AESTHETICS

3.9.1 Affected Environment

Page 3-196, lines 22-25: Change the paragraph to "The State Highway (SH) 138 corridor east from Roseburg through the basin to SH 230 near Diamond Lake is a designated Oregon State Scenic Byway as well as a designated National Forest Scenic Byway named the Rogue-Umpqua Scenic Byway. It has been nominated as an All-American Road through the Federal Highway Administration's National Scenic Byway Program. SH 138 parallels the North Umpqua River from near the town of Glide eastward approximately 40 miles to near Toketee Lake.

FS 153

FS 153 Text in section 3.9.1 has been revised as suggested in this comment.

Page 3-197, lines 8,12,13,14,17" Change SR to SH.

FS 154

FS 154 Text in section 3.9.1 has been revised as suggested in this comment.

Page 3-197, line19: Replace "human" with *management*.

FS 155

FS 155 Text in section 3.9.1 has been revised as suggested in this comment.

3.9.2 Environmental Impacts and Recommendations

3.9.2.1 Aesthetic Impacts of Project Facilities

Page 3-198, line 4: Add "aesthetic impacts of existing Project facilities...."

FS 156

FS 156 Text in section 3.9.2.1 has been revised as suggested in this comment.

Page 3-198, line 13: Existing conditions relative to VQO's are summarized in FS 2001d.

FS 157

FS 157 In section 3.9.1 we describe existing conditions relative to VQOs in the project area.

Page 3-198, footnote 67" Changes SR to SH.

FS 158

FS 158 Text in section 3.9.2.1 has been revised as suggested in this comment.

Page 3-199, line 33: Change photograph to *photographic*. FS 159

Page 3-199, line 35: Change line 35 to read, "...showing alternative colors. The USDA Forest Service *would* make a final color selection. FS 160

Page 3-199, line 36: Change line 36 to read "*PacifiCorp would* paint these facilities at the next painting interval (expected to be within 25 years of the new license). FS 161

Page 3-200, line 8: Change SR to *SH*. FS 162

Page 3-200, line 23 - 24: Change line 23 - 24 to read, "...should be given to color conditions that exist during the recreation season, *April through October*. FS 163

Page 3-201, line 8: Change SR to *SH*. FS 164

Page 3-201, line 23: Clarify what is "ACSR". FS 165

Page 3-202, line 22: Change SR to *SH*. FS 166

3.9.2.2 Aesthetic Impacts of Project Operations

Page 3-203, line 10: Change "forest" to "*Forest*" FS 167

Page 3-204, line 20: Change SR to *SH*. FS 168

3.10 LAND USE

3.10.1 Affected Environment

Page 3-207, line 27: The correct date for the Forest Plan is 1990 not 1993. FS 169

Page 3-207, line 31: The inventory referred to is not a complete inventory of these roads (See Schedule 15.2 of the SA). FS 170

Page 3-207, line 33: Only roads within the current license boundary are exempt from a special-use authorization requirement. FS 171

Page 3-208, line 23: Numbers in this paragraph do not add up to the stated total of 51. FS 172

FS 159 Text in section 3.9.2.1 has been revised as suggested in this comment.

FS 160 Text in section 3.9.2.1 has been revised as suggested in this comment.

FS 161 Text in section 3.9.2.1 has been revised as suggested in this comment.

FS 162 Text in section 3.9.2.1 has been revised as suggested in this comment.

FS 163 Text in section 3.9.2.1 has been revised as suggested in this comment.

FS 164 Text in section 3.9.2.1 has been revised as suggested in this comment.

FS 165 We have removed "ACSR" from the text because it does not add important information to the description.

FS 166 Text in section 3.9.2.1 has been revised as suggested in this comment.

FS 167 Text in section 3.9.2.2 has been revised as suggested in this comment.

FS 168 Text in section 3.9.2.2 has been revised as suggested in this comment.

FS 169 Text in final EIS section 3.9.2.2 has been revised to reflect this comment.

FS 170 Text in section 3.10.1 has been revised to reflect this comment.

FS 171 Text in section 3.10.1 has been revised to reflect this comment.

FS 172 The number "51" refers to bridges on FS land, 13 of which were constructed and are maintained by the FS, and 38 of which were constructed and are maintained by PacifiCorp. The six bridges mentioned in the last sentence of the paragraph are not included in the "51" because the current use and maintenance responsibility for them is uncertain.

3.10.2 Environmental Impacts and Recommendations
3.10.2.2 Transportation Management.

Page 3-211, line 30: It is reasonable to assume that PacifiCorp and the USDA Forest Service would finalize the 1995 draft TMP under this alternative. FS 173

3.11 UNAVOIDABLE ADVERSE IMPACTS.

Page 3-215, lines 20-21: All alternatives may contribute to elevated rates of soil erosion but each to a different degree. Identify what are these degrees are. Need to elaborate. Identify the alternative that would have the least negative effect. FS 174

Page 3-216, line 9: Would be appropriate to add "from existing conditions" after "...terrestrial connectivity would be improved"... FS 175

3.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Page 3-216, line 25: Yes, considered not to be irreversible for the water and land but need to address organisms that rely on the land and water. Identify if the current use of the land and water have a negative "irreversible and irretreivable" effect on them. FS 176

Page 3-216, line 26: This sentence is an opinion only without any rationale and supporting documentation. FS 177

Page 3-216, line 32: This statement draws a conclusion and is not documented with any form of evidence. Less electric generation does not mean it has to be replaced by fossil fuel. There are other forms of power generation, and PacifiCorp is developing some of these alternatives at the present time. FS 178

3.13 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Page 3-217, line 8: All alternatives would provide long-term protection, but need to identify if are there greater benefits from one over the others. Cite the rationale and documentation to support this statement. FS 179

FS 173 Text in section 3.10.2.2 has been revised to reflect this comment.

FS 174 The relative impacts of the alternatives on soil erosion are discussed in section 3.2.2.1.

FS 175 Text in section 3.11 has been modified in response to this comment.

FS 176 Only if a species becomes extinct would the project be considered to have an irreversible and irretreivable effect on organisms. Based on the analysis in section 3.6.2, it is unlikely that any species in the area would become extinct because of the project.

FS 177 The rationale for this sentence is presented earlier (see section 2.4.3). Project retirement is not considered a reasonable alternative and was not evaluated in detail in the EIS.

FS 178 A reduction in power generation from the North Umpqua Project is an irretreivable loss of renewable energy produced by the project, which would have to be replaced from other energy resources to meet current and future demands. Text has been modified in this section to clarify this point.

FS 179 Text in section 3.13 has been modified in response to this comment. The rationale and documentation for balancing developmental and nondevelopmental values for the alternatives that considers the comparative environmental impacts of the alternatives and their economic viability is presented in section 5.1.

Page 3-217, line 12: Possibly negative annual benefits to PacifiCorp, but not necessarily negative annual benefits overall. | FS 180

5. STAFF CONCLUSIONS.
5.2 CUMMULATIVE EFFECTS SUMMARY
5.2.4 Terrestrial Resources

Page 5-14, lines 31-36: Recommend addition of the following text.. *The Umpqua NF LRMP, as amended, provides an ecosystem function-based approach for management of National Forest System lands surrounding the Project, and most of the types of measures identified here have and will continue to be implemented.* | FS 181

5.2.1 Geology and Soils

Page 5-10, lines 39-40: It is doubtful that the NGO alternative would "eliminate" erosion in the area inundated by Soda Springs Dam. Erosion from water-level fluctuations caused by reservoir operation would be eliminated. | FS 182

FS 180 Text in section 3.13 has been revised to clarify that the NGO Alternative would reduce the short-term uses of the project for production of electricity.

FS 181 This information is mentioned later in section 5.2.4, but for clarity it has been added to the EIS where suggested.

FS 182 The text in section 5.2.1 has been revised to make the distinctions indicated by the comment.

5.2.5 Cultural Resources

Page 5-16, line 14 - 22: Replace lines 14-22 with the following:

Archaeological resources may be impacted from ground-disturbing activities that include new building or road construction or ongoing maintenance projects that disturb previously undisturbed ground. Historic resources may also be impacted from new building construction when the construction alters the setting or building additions alter the integrity of design. Historic resources may also be affected by maintenance activities that alter the historic fabric. Ground-disturbing activities, building maintenance, or construction in the APE during the license term will comply with the USDA Forest Service Programmatic Agreement with SHPO and the ACHP and significant impacts will be mitigated or avoided. Refinancing of the Project would not make a significant contribution to the cumulative impacts to cultural resources in the North Umpqua Basin.

FS 183

FS 183 Section 5.2.5 has been revised to reflect the information in this comment.

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

All Federal comprehensive plans are missing from the list. They need to be added to the list including but not limited to:

- USDA Forest Service, 1990, Umpqua National Forest Land and Resource Management Plan
- USDA Forest Service, USDI BLM, and Oregon State Parks & Recreation Department, 1992, North Umpqua River Management Plan
- USDA Forest Service and USDI BLM, 1994, FEIS on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl

FS 184

FS 184 This section has been revised to reflect the Commission's October 2002 list of comprehensive plans.

5.5 RELATIONSHIP TO LAWS AND POLICIES

5.5.3 Essential Fish Habitat Assessment

Page 5-29, line 8: The sentence "Also found may adversely affect coho" is an incomplete sentence. State a conclusion for EFH.

FS 185

FS 185 Incomplete sentence has been corrected.

5.5.4 National Historic Preservation Act

Page 5-29, line 31 - 35: Change lines 31-35 to read "PacifiCorp, under the jurisdiction of the Commission and as part of the Commission's requirements under the FPA, conducted Section 106 consultation through the USDA Forest Service and BLM, with SHPO and the Confederated Tribes of Grand Ronde Community, Confederated Tribes of Siletz, and Cow Creek Band of Umpqua Tribe of Indians since 1995.

FS 186

FS 186 Text in section 5.5.4 has been revised as suggested in this comment.

6. REFERENCES.

Page 6-3, line 34: Forest Plan is 1990 not 1993.

FS 187

FS 187 Text has been modified in response to this comment.

Page 6-4, lines 19-21, 23-26, and lines 31-34: The documents listed may be on USDA Forest Service letterhead but are not USDA Forest Service approved documents. These were preliminary draft working documents that have been superceded by the Justification Statements filed with the Commission in January 2002.

FS 188

FS 188 These documents were provided by Umpqua Watersheds as attachments to their proposed alternative. The reference list has been revised to indicate that these documents were not filed by the FS.

Page 6-5, lines 1-5: The document listed may be on USDA Forest Service letterhead but is not an approved USDA Forest Service document. This was a preliminary working document that has been superceded by the Justification Statements filed with the Commission in January 2002.

FS 189

FS 189 See response to comment FS 188.

Page 6-5, lines 7-9. Identify if this document has been submitted to the administrative record. If it has, it should be identified as a draft document. If it hasn't, this citation should be removed. In the text (page 3-195), it is referred to by a different title and identifies only one paragraph submitted by the Conservation Groups from the recommendations section, which has no scientific context.

FS 190

FS 190 The document referred to in this comment is the *Watershed Analysis: North Umpqua Wild and Scenic River Corridor, Rock Creek to Soda Springs Dam* published by the FS in April 2001. This document, which was obtained by Commission staff from FS staff, appears to be publically available. We have submitted a copy of the document to the administrative record.

As stated on page 1 of the document, the watershed analysis "functions to provide information to support consultation under the Endangered Species Act (ESA) for various projects and activities that may be proposed and analyzed under the National Environmental Policy Act (NEPA) within riparian reserves and the river corridor of the North Umpqua."

APPENDIX A

Page A-4: Pacific shrew is documented within the North Umpqua watershed

FS 191

FS 191 No change has been made in the table as the designation "SD" means that the Pacific shrew is documented within the Umpqua National Forest.

Page A-5: If mountain shrew is properly on the list, then it should noted that the species is verified to occur in the area.

FS 192

FS 192 We assume the "mountain" shrew in this comment is *Sorex monticolus*, a species also called "montane" or dusky shrew (FEMAT 1993). This is a common species that is not listed by FS, BLM, or the state in any of the categories of rare species included in Appendix B. Therefore, it does not belong on the list in Appendix B.

United States Department of the Interior
Office of the Secretary
Office of Environmental Policy and Compliance
500 NE Multnomah, Suite 356
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June 17, 2002

ER 02/391

Honorable Magalie R. Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Subject: COMMENTS - Notice of Availability of Draft Environmental
Impact Statement for the North Umpqua Hydroelectric Project, FERC
Project No. 1927, North Umpqua River, Douglas County, Oregon

Dear Ms. Salas:

The Department of the Interior (Department) has reviewed the May 10, 2002, Notice of Availability of Draft Environmental Impact Statement for the North Umpqua Hydroelectric Project, FERC Project No. 1927, North Umpqua River, Douglas County, Oregon. The following comments reflect, and are consistent with, the many years of Departmental involvement through its component agencies, the U.S. Fish and Wildlife Service (Service) and the Bureau of Land Management (BLM), in the relicensing proceeding for the North Umpqua Project. Both the Service and the BLM are signatories to the June 21, 2001, Project Settlement Agreement. These comments have been coordinated with the applicant, the USDA Forest Service, and other parties to the Settlement Agreement.

GENERAL COMMENTS

The draft environmental statement adequately describes the existing project and reasonable alternatives for relicensing. The Department supports selection of the proposed action (Alternative #2); issuance of a new license implementing the June 21, 2001, Settlement Agreement. The Settlement Agreement is a carefully crafted regional solution addressing the future operation of the project that includes various measures to protect, mitigate, and enhance the fish and wildlife and other environmental resources of the upper North Umpqua River system.

DOI 1

DOI 1 The Staff Alternative incorporates all the provisions of the Settlement Agreement with some additional recommendations that are necessary for the comprehensive development of the basin.

We are concerned about the document's description of the Staff Alternative (Alternative #4) which proposes operation of the project under the terms of the Settlement Agreement, but with four additional measures recommended by staff. We strongly recommend that before Alternative #4 is considered further for inclusion in the final EIS and/or decision record, that the Federal Energy Regulatory Commission (Commission) hold a meeting with all parties signatory to the Settlement Agreement. The purpose of the meeting would be for the Commission to explain why the proposed modification to four PM&E measures is consistent with language in Section 1.1 and 22.2.1 of the Settlement Agreement.

SPECIFIC COMMENTS

Page v, Paragraph 2 of Abstract, Last Sentence. The non-governmental organizations withdrew from the Settlement Agreement discussions in September 2000, rather than 2001. This correction also needs to be made on page xxiv, first paragraph, last sentence.

Page 2-27, Table 2-2, Fluctuations in Reservoir and Forebay Levels. It is inaccurate to reference the 16 feet of fluctuation for Soda Springs Reservoir as the Proposed Action. The license applicant noted that comments received on the draft license application suggested this amount of fluctuation would not be compatible with anadromous fish passage. Accordingly, the license applicant proposed to significantly reduce the daily fluctuation and acknowledged the amount of reduction would depend on the type of fish passage facilities constructed.

The Settlement Agreement language represents the proposed action regarding possible fluctuation of Soda Springs Reservoir. The Settlement Agreement language (section 4.1.1.d) pertaining to upstream passage modifications seeks to "achieve optimum performance", and language pertaining to screen testing and modification to provide downstream passage (section 4.1.2) also suggests achieving optimum performance. In Settlement Agreement discussions, reservoir fluctuations of eight feet were considered to be more in the range of operation for accepted upstream and downstream passage facilities. The Department anticipates this range of reservoir fluctuation (eight feet) is necessary to provide for effective and appropriate fish passage facility conditions as intended in the Settlement Agreement.

Page 3-159, Bald Eagle, Second Paragraph. We suggest modifying the fourth sentence to read as follows: "Nesting attempts on the south shore of Toketee Lake were confirmed in 1999, 2000, 2001, and 2002; one young fledged from the Toketee nest in 2001." This information is based on surveys conducted by USDA Forest Service staff in 2001 and 2002.

In addition, the Service is currently in discussions with the license applicant and the Forest Service, pursuant to section 7 of the Endangered Species Act, to modify transmission lines within a mile of this bald eagle nest site to avoid or minimize electrocution risks to bald eagles and other raptors. The Service is conducting these discussions in accordance with the language of the Settlement Agreement. The applicant has been very cooperative during these discussions and a remedy to the existing situation is forthcoming.

- DOI 2 Submission of the Settlement Parties comments and subsequent discussions with Interior obviated the need for the proposed meetings. We believe the revised recommendations in the final EIS support the Settlement Agreement by clarifying the content of planning documents to be developed and the filing requirements for these documents. Our recommendation that PacifiCorp resume operation of the existing gage at Boulder Creek and post real-time data for this gage on the internet would provide valuable information for boaters on releases from Soda Springs at a nominal cost.
- DOI 3 Text has been modified in response to this comment.
- DOI 4 In the license application, PacifiCorp states that sedimentation in the reservoir limits water level fluctuation to the top 10 feet of storage, but proposes fluctuations of up to 16 feet (Volume 2, Exhibit B, pages 2-8 through 2-10). The Settlement Agreement does not specify a maximum water level fluctuation for the reservoir. As noted in this comment, however, effective operation of the fish passage facilities to be installed under the Settlement Agreement also could restrict water level fluctuations. Our evaluation of the effects of water level fluctuations in the EIS assumes no dredging would occur and that fluctuations would not exceed 10 feet. As discussed in section 3.2.4.6 of this final EIS, dredging or removal of sediments, which would be needed to increase water level fluctuations, would require additional review and approvals under condition 4.h of the § 401 Water Quality Certificate and conditions 6 and 18 of the FS's 4(e) conditions, and would be subject to coordination with and approval by the Oregon Division of State Lands and ODFW. Both of these mandatory requirements would become conditions of any license issued.
- DOI 5 See response to comment DOI 4.
- DOI 6 The sentence has been modified with updated information supplied by the FS.
- DOI 7 In 2002 FWS reinitiated formal Section 7 consultation with FS on its fiscal year 2000 program activities. These activities include a decade-long powerline and power distribution facilities maintenance program being implemented by PacifiCorp for the North Umpqua Project (FWS 2002c). During that consultation, the issue of potential electrocution risks for bald eagles was raised. PacifiCorp agreed to implement measures to minimize those risks around the bald eagle nest where and when eaglets were considered most at risk. FWS issued a modified final BO on July 25, 2002, that incorporated the agreed-to measures as reasonable and prudent measures to minimize and avoid the incidental take of bald eagles (FWS 2002c).

The measures in the BO are more specific than the measures described in Section 13 of the Settlement Agreement, but FWS and PacifiCorp do not view them as differing either materially or significantly from those agreed to in the Settlement Agreement (FWS 2002c). Accordingly, FWS revised their preliminary Section 10(j) fish and wildlife recommendation number 12 under the FPA to harmonize with the July 25, 2002, BO.

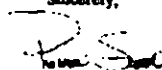
These recommendations include the review of project distribution facilities within 1 mile of the bald eagle nest site on the south shore of Toketee Lake to avoid or minimize electrocution risks to bald eagles and other raptors (DOI 2002).

FWS has issued its BO (FWS 2002c) on the proposed relicensing that incorporates the overview of distribution lines and the retrofitting of any problem distribution lines as part of the proposed action. While the Commission staff applauds PacifiCorp for agreeing to implement these measures and encourages them to do so, we caution the parties that the Commission does not have jurisdiction over distribution lines and, therefore, cannot require such actions.

Information about the reinitiated Section 7 consultation and the BOs has been added to the final EIS discussion of bald eagles in section 3.6.

The Department appreciates the opportunity to comment on the draft environmental statement for the North Umpqua Hydroelectric Project. If you have any questions regarding these comments, please contact Mr. Kemper McMaster, State Supervisor, U.S. Fish and Wildlife Service, 2600 S.E. 98th Avenue, Suite 100, Portland, Oregon, 97266 (503-231-6179). For BLM, questions or requests for additional information should be directed to Mr. Cary Osterhaus, District Manager, Bureau of Land Management, Roseburg District Office, 777 N.W. Garden Valley Blvd., Roseburg, Oregon, 97470 (541-464-3200).


Sincerely,



Preston A. Sleeper
Regional Environmental Officer

cc: Service List

A-44



REGION 10
1200 Ninth Avenue
Seattle, Washington 98101

June 19, 2002

Re: 94-47-FC

Ms. M. Salas
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Reference: Project No. 1927

Dear Ms. Salas:

The Environmental Protection Agency (EPA) has completed its review of the Draft Environmental Impact Statement (EIS) for the North Douglas Hydroelectric Project (NHDHC) (EIS No. 020172) in accordance with our authority and responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. The draft EIS has been prepared by the Federal Energy Regulatory Commission (FERC) in response to an application by PacificCorp to relocate their existing 181.5 megawatt hydroelectric project located on the North Douglas River in western Oregon. The EIS evaluates three action alternatives for relocating the project as well as a No Action alternative.

Based on our review and evaluation, we have assigned a rating of B-C-2 (Environmental Concerns - Insufficient Information) to the draft EIS. This rating, and a summary of our comments, will be published in the Federal Register. A copy of this rating system used in conducting our review is enclosed for your reference.

Our comments are related to the following topics:

- Affected Environment, Project-Related Impacts and Needed Mitigation Measures
- Monitoring and Evaluation Plan
- Government-to-Government Consultation with Tribes

These issues are discussed in greater detail in the enclosure to this letter.

Thank you for the opportunity to provide comments on the draft EIS. I urge you to contact Bill Ryan of my staff at (206) 553-4541 at your earliest opportunity to discuss our comments and how they might best be addressed for the project.

Sincerely,

/s/

Justin Lutzman, Law Manager

Geographic Information Unit

Enclosure

EPA Comments
on the
North Umpqua Hydroelectric Project
Draft Supplemental Environmental Impact Statement

Affected Environment, Project-Related Impacts and Needed Mitigation Measures

We are concerned that a number of plans, analyses and surveys identified in the EIS would generate information that appears to be necessary to define 1) the affected environment, 2) the environmental consequences of the proposed project and 3) mitigation measures needed to avoid, minimize or offset predicted effects. We believe that such information should be reflected in the EIS, per the direction of the implementing regulations for NEPA to "insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken" (40 CFR 1500.1(b)) and to "include appropriate mitigation measures not already included in the proposed action or alternatives" (40 CFR 1502.14(f)). For example, the draft EIS indicates or suggests that the following have not yet been developed, but would be after issuance of a license for the project:

- Erosion control plan - needed to define mitigation;
- Plans to prevent and remedy erosion at high- and medium-priority erosion sites - needed to define mitigation;
- Analyses of seismic and geologic hazards facing the project - needed to define affected environment, potential effects and mitigation;
- Plan for passing woody debris past Soda Springs and Slide Creek dams - need to define mitigation;
- Baseline habitat survey of current spawning habitat - needed to define affected environment, potential effects and mitigation;
- Vegetation management plan - needed to define mitigation;
- Cultural resource management plan - needed to define mitigation;
- Archeological site discovery surveys - needed to define affected environment, potential effects and mitigation;
- Recreational resources management plan - needed to define mitigation;
- Evaluation of existing plant species along transmission line right-of-way - needed to define affected environment, potential effects and mitigation;
- Develop landscape plan - needed to define mitigation;
- Transportation management plan - needed to define mitigation; and
- Feasibility report for providing flow regulation at the Soda Springs dam - needed to define mitigation.

The completion of these efforts seem to be necessary to define the affected environment and project-specific effects and identify measures needed to mitigate identified effects. Consequently, these studies and plans should be completed and their results included in the EIS. We recommend that the FERC ensure that all necessary analyses/studies are completed and included in the EIS so that effects and appropriate mitigation approaches are defined and disclosed to the public (in the EIS) before decisions are made, as directed by the NEPA regulations.

EPA 1

EPA 1 We believe that the EIS contains adequate information and analysis to meet the requirements of NEPA and provides a sufficient basis for supporting a licensing decision. The Settlement Agreement includes numerous measures that would protect, enhance, and mitigate impacts on the resources in the project area. The EIS is based on the best available information at this stage in project planning. The analysis in the EIS defines project effects on natural resources as we know them. Where there are uncertainties or where information is unavailable, the Settlement Agreement provides for, and staff recommends, further development of detailed plans and measures. EPA's suggestion would be tantamount to delaying the license decision until the Commission has perfect information, which the Commission is not required to have.

Monitoring and Evaluation Plan

We are pleased to see that monitoring will be an important part of project implementation and agree with FERC staff that a monitoring plan be developed. We believe that it is extremely important that monitoring be designed and conducted to determine whether mitigation measures are achieving their desired/expected resource protection outcomes. To ensure that such efforts would be undertaken for the proposed project and that they would be conducted in a systematic and predictable fashion, we recommend the development of a monitoring and evaluation plan and that it be included in the EIS. This plan would identify the objectives of the project to be evaluated, include the design of appropriate monitoring methods, establishment of evaluation and reporting mechanisms and schedules, and include a framework for making appropriate management changes based on the results of the monitoring. Such a plan would ensure the evaluation of whether conditions (i.e., mitigation measures) contained in the license for the project have actually been implemented (implementation monitoring) and the effectiveness of those measures in offsetting or reducing impacts (effectiveness monitoring).

Government-to-Government Consultation with Tribes

The EIS indicates that the applicant has consulted with potentially affected Tribes in the course of project development regarding the location of potential traditional cultural properties. There do not, however, appear to have been any consultations between the Federal government (FERC) and the governments of affected tribes, as directed by Executive Order (EO) 13175 (*Consultation and Coordination with Indian Tribal Governments*). While we believe that it is important that the project proponent work with affected Tribes, the Federal government has a unique trust relationship with tribes. We recommend that the FERC engage affected Tribal governments, pursuant to EO 13175, in the further development of the project/EIS to ensure that Federal government meets its obligation to consult with tribes on a government-to-government basis. Results of such consultations should be reported in the EIS.

EPA 2

EPA 2 Monitoring plans are included in the Settlement Agreement. The staff alternative includes additional considerations for those plans as they are being developed in consultation with the parties to the Settlement Agreement and other resources agencies as needed.

EPA 3

EPA 3 We have given the interested tribes the opportunity to participate in the EIS scoping process and provide comments on the draft EIS and the Programmatic Agreement (PA) for the project. As of the date of the final EIS, only one tribe had signed the PA.

**U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Notations and Follow-Up Review***

Environmental Impact of the Action

EO - - Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

ED - - Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EE - - Environmentally Questionable

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Summary of the Impact Statement

Category 1 - - Adequate

EPA believes the draft EIS adequately sets forth the environmental impacts of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussions should be included in the final EIS.

Category 3 - - Inadequate

EPA does not believe that the draft EIS adequately examines potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and/or Section 109 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1615 Policy and Procedures for the Review of Federal Actions Involving the Environment, February, 1987.

June 24, 2002

Margaret R. Salts, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: North Umpqua Project No. 1827
Comments on DEIS by the Oregon Department of Environmental Quality

Dear Secretary Salts:

Enclosed for electronic filing are the Oregon Department of Environmental Quality's comments on the April 2002 Draft Environmental Impact Statement - 014370 for the North Umpqua Hydroelectric Project (FERC Project No. 1827).

Comment No. 1 Page 3-56 Line 12 Average chlorophyll-a values measured did not exceed the action level of 0.015 mg/L in project impoundments

ODEQ 1

ODEQ 1 Table 3-6 has been corrected.

Comment No. 2 Page 3-67 Lines 30-39 Stream temperatures exceeded temperature criteria at least in Park Creek above and below the diversion during May - October during the period study.

ODEQ 2

ODEQ 2 The information has been added.

Comment No. 3 Page 3-68 Line 8 Reservoirs are on-site sewage systems. There is no viable indication of failure of the distribution lines and outfall lines from them. Information provided by PacificCorp in the §401 Application (July 2001) indicates the sewage treatment systems are not overextended, operating normally and are regularly maintained. The significant amount(s) of nitrogen in the North Umpqua River within the Project is not believed to result from effluents through treatment systems in residential housing and recreational areas.

ODEQ 3

ODEQ 3 The referenced statement has been deleted.

Comment No. 4 Page 3-69 Line 26 The in-stream dissolved oxygen standard is in effect and is not a proposed standard.

ODEQ 4

ODEQ 4 The statement has been corrected.

Comment No. 5 Page 3-62 Line 15 Based on water quality data from the §401 Application, ODEQ has determined that Project effluent matches best Dissolved Oxygen results.

ODEQ 5

ODEQ 5 The statement has been corrected.

Comment No. 6 Page 3-62 Line 16-18 Lamps Reservoir is within the action level for chlorophyll-a. The Clean Water Act Section 303(d) listing for nuisance algae will be dropped at the next update of the list. The nuisance algae regulation is an action level and not a criterion.

ODEQ 6

ODEQ 6 The statement has been corrected.

Comment No. 7 Page 3-64 paragraph beginning with Line 36. The Parties to the Settlement Agreement did not develop §401 conditions per se nor TMDLs addressing such water quality issues as stream temperature, or dissolved gas supersaturation. Clean Water Act section 401(b) conditions in part are based on the Settlement Agreement. PMT measures and the Settlement Agreement did not include §401 conditions. TMDLs will be developed by ODEQ in a separate administrative process.

ODEQ 7

ODEQ 7 The statement has been corrected.

Comment No. 8 Page 3-43 Section 2.2.1 The staff alternative as set out in the EIS could be affected by §401 certification and conditions. A decision on the pending §401 Application will be available after July 1, 2002 and will be posted on the ODEQ web page <http://www.deq.state.or.us/od/401certification.htm>.

ODEQ 8

ODEQ 8 Conditions of the §401 Water Quality Certification have been reflected in the final EIS.

Please contact me if you have any questions.

Respectfully submitted,

Dennis Beatty
Water Quality Engineer
Oregon Department of Environmental Quality
391 West Main Suite 3-D
Medford, OR 97501
541-776-6910



Oregon
John A. Davidson, M.D., Governor

ORIGINAL

Department of Fish and Wildlife
Southwest Regional Office
4192 N. Umpqua Hwy.
Roseburg, OR 97470
(541) 640-3385
FAX (541) 673-0572

June 21, 2002

Ms. Megale R. Sales
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Subject: Comments by the Oregon Department of Fish and Wildlife on the Draft
Environmental Impact Statement, North Umpqua Hydroelectric Project
(FERC 1927)

Dear Secretary Sales:

Enclosed for filing please find the original and eight copies of the Oregon Department
of Fish and Wildlife's comments on the Draft Environmental Impact Statement in the
above captioned proceeding, and certificate of service.

Sincerely,

Ken Hornolka

Ken Hornolka
Hydropower Coordinator
Southwest Region

Pam Sighting- Umpqua National Forest, Roseburg
Craig Tusa- U.S. Fish and Wildlife Service, Roseburg

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RECEIVED
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REGISTRATION
FEDERAL ENERGY
COMMISSION

United States of America
Federal Energy Regulatory Commission

PacificCorp } Project 1927
Application for Major New License } (North Uniqua Hydroelectric Project)

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REGULATORY COMMISSION

OREGON DEPARTMENT OF FISH AND WILDLIFE
COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Introduction

The Draft Environmental Impact Statement (DEIS) for the above-referenced project was issued by the Federal Energy Regulatory Commission (Commission) on or about April 30, 2002. The Oregon Department of Fish and Wildlife (ODFW) has reviewed the DEIS and is filing these comments as permitted by the requirements of the National Environmental Policy Act of 1969 and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR Part 380). ODFW is a signatory to the June, 2001 settlement agreement filed with the Commission, which is the proposed action evaluated in the DEIS. ODFW found that the DEIS provided a detailed description of the existing project, included reasonable alternatives for relicensing, and generally reflected the content of the Settlement Agreement. ODFW is filing these comments with the goal of ensuring the final Environmental Impact Statement is accurate and correct. ODFW recognizes that some sections of the DEIS are merely descriptive and the

1
Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact
Statement, North Uniqua Hydroelectric Project (FERC 1927)

comprehensive terms of the Settlement Agreement will control relicensing activities through incorporation by reference into the new Commission licenses.

Comments

Page 1- second paragraph of the Abstract: We recommend noting that some of the NGO's that initially participated in settlement discussions, i.e. Unique Fishermen's Association, were unable to continue their participation in ongoing settlement talks and withdrew prior to September 2000. The remaining NGO's, later referred to collectively as the Conservation Groups (page xiv) were the groups that withdrew in September 2000 and submitted alternative recommendations to the Settlement Agreement. Also note the abstract incorrectly reads that these groups withdrew in September 2001, this should be corrected to read September 2000.

ODFW 1

ODFW 1 Text in the abstract and section 1 has been modified in response to this comment.

Page 1-3 lines 7-12: See the above comment regarding NGO's and conservation groups. There seems to be inconsistency in the DEIS in identifying which organizations were NGO's and which were conservation groups.

ODFW 2

ODFW 2 Text in section 1.3 has been modified in response to this comment.

Page 1-7 lines 9 and 15-16: The DEIS is inaccurate regarding the intervention history. Substitute "State of Oregon" for "Oregon Department of

2

Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Unique Hydroelectric Project (FERC 1927)

Justice". The Commission's notice granting late intervention, issued May 5, 2000, correctly identified the State of Oregon as the intervenor.

ODFW 2
(cont)

Page 2-6: The figure incorrectly lists the Lenoir 2 powerhouse as having 133 MW capacity. It should be 33 MW (refer to page 1-1, line 20).

ODFW 3

Page 2-17, lines 28-30: Section 2.1 describes the No-Action Alternative, or existing conditions. Tolstee Falls is the historical (pre-project) natural barrier to upstream passage of anadromous fish, but under current conditions, anadromous fish cannot access this reach. The current barrier to upstream passage of anadromous fish is Soda Springs Dam.

ODFW 4

Page 2-22, lines 10-11: The DEIS reads that sedimentation in the reservoir (Soda Springs) limits fluctuations in water levels to the top 10 ft of storage; however, Table 2-2 (page 2-27) indicates that the proposed maximum daily level fluctuation will be 16 ft. ODFW is unaware of a proposal to dredge sediment from the reservoir to increase reservoir fluctuation from 10 to 16 ft. Also, ODFW expects reservoir level fluctuation to be limited within a range that achieves optimum performance of the upstream fish passage facility. In Settlement Agreement discussions, eight feet of fluctuation was considered to be the likely maximum operating range for providing optimum performance of the fish ladder. Previous to settlement discussions, the licensee noted that

ODFW 5

3

Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Umpqua Hydroelectric Project (FERC 1927)

ODFW 3 Figure 2-3 has been modified to correct this typographical error.

ODFW 4 Text in section 2.1.6 has been modified in response to this comment.

ODFW 5 See response to comment DOI 4.

comments received on the draft relicensing application suggested that 16 ft of fluctuation would not be compatible with anadromous fish passage.

ODFWs
(Cont)

Page 2-24, lines 13-18: The DEIS incorrectly reads that maintenance activities would be scheduled as much as possible during periods of low natural flow to mimic the natural hydrograph. Actually the preferred maintenance timing is during high natural flow seasons because water normally diverted by the project is returned to natural stream channels adding to what is typically an already high flow situation, mimicking the natural hydrograph. The DEIS reads correctly on page 3-80 (lines 11-16) where the timing of project maintenance is reiterated.

ODFW 6

ODFW 6 Text in section 2.2.1 has been modified in response to this comment.

Page 2-24, lines 26-27: Table 2-2 represents the existing, historic, and proposed daily fluctuations. The word proposed is missing from the text.

ODFW 7

ODFW 7 The title to table 2-2 has been modified in response to this comment.

Page 2-27, Table 2-2: See the comment made above under Page 2-22, lines 10-11 regarding the proposed maximum daily fluctuation for Soda Springs Reservoir.

ODFW 8

ODFW 8 See response to comment ODFW 5.

Page 2-28, lines 25-28: ODFW recommends deleting the word "this" in line 25 and adding "and the quantity, quality, and timing of gravel augmentation will be determined through consultation with USDA-FS, ODEQ, NMFS, USFWS, and ODFW" to the end of line 28.

ODFW 9

ODFW 9 Text has been modified here to reflect Amendment No. 1 to the Settlement Agreement.

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Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Umpqua Hydroelectric Project (FERC 1827)

Page 2-28, lines 29-31: ODFW recommends noting that no later than the first anniversary of the new license, a more restrictive ramping regime will apply during maintenance and emergency shutdowns.

ODFW 10

ODFW 10 Text has been revised to reflect this information.

Page 2-31, Footnote 18: In addition to the three measures from the MOU described in the footnote that are proposed for the first year of the license, large woody debris enhancements and conservation easements will also be initiated in upper Canton and East Fork Pass creeks.

ODFW 11

ODFW 11 The footnote has been modified in response to this comment.

Page 2-32, lines 5-6: The 5,000 to 15,000 square feet of spawning habitat was intended to be created in the Soda Springs bypass reach. The DEIS does not identify which reach this applies to.

ODFW 12

ODFW 12 Text has been revised to reflect new information on this reach that was provided in Amendment No. 1 to the Settlement Agreement.

Page 2-31, lines 18-19: The DEIS references Section 3.3.2.1 for a description of increases in the magnitude of daily drawdowns in Toketee Lake and Soda Springs Reservoir; however, this section doesn't describe increases in drawdowns in these reservoirs.

ODFW 13

ODFW 13 The erroneous cross-reference has been corrected. The text now refers to table 2-2.

Page 2-31, lines 34-36: The DEIS refers to a license condition that requires minimum flows in the North Umpqua River to exceed 25 cfs or the inflow, whichever is less. Article 22 of the Commission license reads that "The Licensee shall maintain in the interest of fishlife a minimum flow of not less than 25 cfs in the North Umpqua River between each diversion dam and its

ODFW 14

ODFW 14 The existing license allows for situations where the inflows to the North Umpqua River are less than the required 25 cfs. The existing flow duration curve for the North Umpqua River (figure 3-4) shows that post-regulation flows exceed 25 cfs 75 percent of the time. This is the same as saying flows are less than 25 cfs 25 percent of the time. Figure 3-5 shows the daily average hydrograph for a representative year—it does not represent drought conditions. During drought conditions, when inflows can be less than 25 cfs, PacifiCorp is not required to make up flows to exceed natural inflows.

5
Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Umpqua Hydroelectric Project (FERC 1827)

respective powerhouse.....". The natural hydrograph for the Lamolo 1 reach (DEIS Figures 3.3-2 and 3.3-3) suggests that inflows are always substantially above 25 cfs, and the presence of Lamolo Reservoir (with storage capacity) above this reach would make the "or the inflow" caveat moot in the North Umpqua.

ODFW 14
(Cont)

Page 3-48, Figure 3.3-12: The series appear to have been incorrectly labeled in the legend. The post-dam flow duration curves (in this case 1960-64) typically exhibit extremely reduced mean daily discharge due to project diversion. The graph shows the opposite, that is, mean daily discharge was greater after the project was constructed.

ODFW 15

ODFW 15 The figure has been corrected in response to this comment.

Page 3-63, line 26: Include amphibians and macroinvertebrates on the list of resources benefiting from increased instream flows. Benefits to these guilds were some of the primary reasons the SNA flows were developed and incorporated into the SA.

ODFW 16

ODFW 16 The text has been revised to reflect this information.

Page 3-64, lines 39-40 and Page 3-65, lines 1, 2: The paragraph is inaccurate to the extent it implies that the parties to the Settlement Agreement have developed 401 conditions and TMDL's. While true that 401(d) conditions based on the Settlement Agreement's protection mitigation and enhancement measures have been incorporated into the proposed 401, the Settlement Agreement did not include 401 conditions for compliance with water quality

ODFW 17

ODFW 17 The statement has been corrected.

standards per se. Further, TMDL's will be developed by a separate administrative process.

ODFW 17
(Cont)

Page 3-71, Table 3-4-1: In the river segment of the North Umpqua River between Soda Springs Dam and Soda Springs powerhouse, ODFW recommends adding resident cutthroat trout in the "Existing Aquatic Resources" column.

ODFW 18

The river segments of the North Umpqua River from (1) Soda Springs Reservoir to Fish Creek confluence, and, (2) Fish Creek upstream to Slide Creek Diversion includes a bypass reach from the diversion dam to the powerhouse and the full flow reach from the powerhouse to Soda Springs Reservoir. The table identifies (1) as the Slide Creek bypassed reach, but as described in the DEIS, this river segment also includes the full flow reach below the Slide Creek powerhouse. Therefore, this entire river segment is not appropriately characterized as a bypass reach.

ODFW 19

Page 3-72, Table 3-4-1: In the river segment of Fish Creek between the North Umpqua River and Fish Creek Diversion, ODFW recommends that the "Desired Future Aquatic Resources" include "restoring access for anadromous fish in the reach below the natural obstacle, and further if Pacific lamprey or other anadromous fish can voluntarily ascend the obstacle". Also, the possible natural barrier is located at RM 3.2, not RM 3.5.

ODFW 20

7
Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Umpqua Hydroelectric Project (FERC 1627)

ODFW 18 Table 3-7 has been revised to include resident cutthroat trout.

ODFW 19 Table 3-7 has been corrected.

ODFW 20 Table 3-7 has been revised to reflect this goal.

Page 3-73, Table 3-4-1. The table includes a river segment called "Slide Creek". Slide Creek is a small tributary that enters the North Umpqua immediately below the Slide Creek powerhouse. The project does not divert water from this tributary. ODFW suspects this actually was intended to describe the Slide Creek bypass and/or full flow reach of the North Umpqua River (Soda Reservoir to Slide Creek Diversion) described previously in the table.

ODFW 21

Table 3-7 has been corrected.

The table identifies "issues/major obstacles to enhancement" for the headwaters of the Clearwater River as "unregulated system inflows....." Unregulated inflow, or the natural hydrograph, is considered a desirable characteristic, not an obstacle to enhancement.

ODFW 22

Table 3-7 has been corrected.

Page 3-74, line 32. ODFW recommends adding "may have" to this line as follows:
....as 1910, and native rainbow trout ~~may have~~ interbred with hatchery rainbow trout until stocking....

ODFW 23

The text has been revised.

Page 3-78, Table 3-4-2. The table contains incorrect information regarding the minimum flow regime in the upper Slide Creek bypass. The table reads that in the river segment that includes the North Umpqua River from Fish Creek upstream to Slide Creek Diversion, the post anadromous fish passage flow will

ODFW 24

Table 3-8 has been corrected.

8
Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Umpqua Hydroelectric Project (FERC 1827)

be 110 cfs. The Settlement Agreement requires 240 cfs in the entire Slide Creek bypass reach for anadromous fish.

ODFW 24
(Cont)

Page 3-78, Table 3.4-2: See the above comment regarding "Slide Creek" (i.e. Page 3-73, Table 3.4-1.

ODFW 25

ODFW 25 Table 3-8 has been corrected.

Page 3-78, line 33 and footnote 32: ODFW's trout management plan is cited and explained in footnote 32. Rather than describing the trout plan, the footnote actually describes activities of the ODFW-MOU, which are consistent with the Trout Plan; however, ODFW's trout management is an unrelated document that is used statewide. Important guidelines of the Trout Plan include:

ODFW 26

ODFW 26 The footnote has been revised to reflect the Trout Plan guidelines.

- ODFW seeks to actively pursue and promote habitat protection and enhancement. Habitat must be protected or enhanced, using a subbasin wide approach, to maximize the productivity of the stock, conserve stock fitness and life history characteristics, and to maintain healthy populations with multiple age classes.
- Unique native populations may require additional recognition for protection.

Page 3-81, line 34: ODFW recommends replacing "Slide Creek" with "Slide Creek reach" or "the North Umpqua River below Slide Creek Dam". See

ODFW 27

ODFW 27 The text has been revised.

§
Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Umpqua Hydroelectric Project (FERC 1827)

above comments related to "Slide Creek" (i.e. Page 3-73, Table 3.4-1; and Page 3-78, Table 3.4-2)

ODFW 27
(Cont)

Page 3-85, line 2: Table 3.4-4 is referenced several times throughout this section, the correct reference is Table 3.4-3

ODFW 28

ODFW 28 The table reference has been revised.

Page 3-89, line 22-23: The DEIS reads that the voluntary ramping rate for the Soda Springs bypass reach is between 0.8 and 1.5 ft/yr, although these ramping rates are not corroborated in Table 3.4-3. ODFW believes this ramping rate was included in error because ramping in this bypass has been voluntarily restricted to 0.2 ft/yr since 1995 (Bilgewater 1998).

ODFW 29

ODFW 29 The text has been revised.

Page 3-106, line 7-8: The fourth guideline is "basic yield" not "base yield". Also, details of these management guidelines are contained in ODFW's Trout Plan (ODFW 1987). The activities associated with the ODFW MOU are consistent with the Trout Plan, but it is not the appropriate citation for details of the guidelines.

ODFW 30

ODFW 30 The text has been revised.

Page 3-126, line 34-37: Note that the Resource Coordination Committee has agreed to construct three wildlife crossings in 2002 as an early implementation measure (Section 19.5 of the Settlement Agreement- Early Implementation Fund).

ODFW 31

ODFW 31 One of the projects selected by the RCC for early implementation during 2002 is expansion of three existing wildlife bridges in the Lemolo No. 2 reach (PacifiCorp 2002e). The description of the Settlement Agreement in section 3.5.2.2 of the final EIS has been revised to include this information.

ODFW 32 As suggested, the discussion of federal- and state-listed species has been divided into separate sections. See response to Comment FS 128.

ODFW 33 The text in this paragraph has been corrected.

ODFW 34 The footnote has been corrected.

ODFW 35 The table has been corrected in response to this comment.

ODFW 31	<p>Figure 3-164, line 7: The state and federal categories should be separated for clarity.</p> <p>Figure 3-164, lines 9-7 and 10-11: Striped bass are not found in the North Umpqua River; they are only found in the lower 25 miles of the Umpqua River near the estuary. Striped bass were not introduced to the Umpqua; they became established voluntarily as a result of releases in the Sacramento River, Ca. Further, American shad do not prey on anadromous fish, but they may have a high dietary overlap with juvenile salmonids in the estuary, which has raised concerns regarding the likelihood of shad on salmonid declines.</p>	ODFW 31
ODFW 32	<p>Figure 3-17, footnote 8: Several agencies of the State of Oregon filed unified comments with the Commission on March 1, 2001; however, it was the Oregon Department of Fish and Wildlife that filed Section 100 recommendations and conditions pursuant to the Fish and Wildlife Coordination Act, 16 USC 661 et seq., and the Federal Power Act, 16 USC 803g. This correction should be made. This change will also provide consistency with the last sentence because "The State of Oregon" is not an agency.</p>	ODFW 32
ODFW 33	<p>Figure 3-23-23, Table 3-1, No. 40 and 41: These recommendations are attributed to ODFW. ODFW did not make these recommendations; however, we recognize the importance of these to the Estuarine Agreement and fully agree and support adoption of these measures.</p> <p>11</p> <p>Oregon Department of Fish and Wildlife Comments on Draft Environmental Impact Statement, North Umpqua Hydroelectric Project (FERC, 1977)</p>	ODFW 33

Page 5-23, Table 5-1, No. 36 Commission staff concluded that payment of ODFW oversight costs is not within the scope of Section 10(j). ODFW believes agency oversight is integral and necessary to fish and wildlife mitigation and monitoring activities, and funding is necessary to support agency oversight. This funding is consistent with the commission's staff alternative 3 requiring the licensee to explicitly incorporate effectiveness monitoring into the development of monitoring plans and programs. The role of these positions is to conduct long-term biological monitoring of fish passage at Rock Creek fishway; monitor anadromous and resident fish population responses to ODFW MOU mitigation in Rock Creek basin; prepare status reports; read video tapes from Soda Springs fishway; and assist in field studies, surveys, and on-site monitoring. Therefore, this recommended condition requiring payment of ODFW oversight costs is within the scope of Section 10(j).

ODFW 36

ODFW 36 Staff does not consider the payment of oversight costs to be a specific measure to protect fish and wildlife and therefore consider such costs to be outside the scope of Section 10(j). Although we consider the recommendation to be outside the scope, it is still included in the staff alternative because it would be a mandatory FS Section 4(e) condition.

Page 5-26, line 3 The DEIS lists plans selected by the Commission staff that were considered as the relevant comprehensive plans to the North Umpqua Project. One of the plans that has been accepted by the Commission pursuant to Section 10(a)(2) for the State of Oregon, but is not apparently considered relevant to the project, is the Oregon Plan for Salmon and Watersheds. ODFW filed the Oregon Plan for Salmon and Watersheds with Mr. Jim Helmer of the Commission on October 8, 1998. Because of the

ODFW 37

ODFW 37 The list of comprehensive plans in the EIS has been updated to reflect the Commission's October 2002 List of Comprehensive Plans.

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efforts of the state agencies and other stakeholders, the Settlement Agreement is consistent with the Oregon Plan for Salmon and Watersheds, therefore this very important state plan must be included in Section 5.4 of the DEIS. ODFW also believes there are other comprehensive plans accepted by the Commission that are relevant to the North Umpqua project that are not included in Section 5.4 of the DEIS. ODFW recommends that the Commission conduct another review of these plans and include additional appropriate plans (e.g. plans to manage wildlife species).

ODFW 37
(Cont)

References

Stillwater Sciences. 1988. The North Umpqua cooperative watershed analysis synthesis report. Prepared by Stillwater Sciences, Berkeley, California for PacifiCorp Portland, Oregon.

ODFW. 1987. Trout Plan. Oregon Department of Fish and Wildlife. Portland, Oregon.



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John A. Kautzer, M.D., Governor

May 3, 2002

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FEDERAL ENERGY
REGULATORY COMMISSION

These comments are relative to the Draft Environmental Impact Statement (DEIS) for the North Umpqua Hydroelectric Project (Project No. 1927) released on April 30, 2002. This Agency provides review on seismic and geologic hazard elements for re-issuance of data in the state system of oversight.

The section of the EIS dealing with seismicity (Section 3.2.1.3) presents historic data on earthquakes and concludes that the area is one of low seismicity.

In contrast publications by this agency (unknown), Seismic Zonation in Oregon (Zone 3), and seismic characterizations by the US Geological Survey note that the hazard is moderate.

This Agency presented this perspective to the applicants in 1999 (correspondence attached).

We ask that the EIS properly present the recent perspectives of earthquake risk in the EIS to conform to professional judgment, current regulation, comments presented to the applicant (attached) three years ago, and general public perception.

Thank you.

Sincerely,

John D. Kautzer
Dr. John D. Kautzer
State Geologist

0205160531-3

REC'D
MAY 13 2002

ODGM 1

ODGM 1 Section 3.2.1.3 has been revised in response to this comment.

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

PacificCorp)	Project No. 1927
Draft Environmental Impact Statement)	North Umpqua Hydroelectric Project

AMERICAN RIVERS, OREGON NATURAL RESOURCES COUNCIL,
UMPUQUA WATERSHEDS, UMPQUA VALLEY AUDUBON SOCIETY,
STEAMBOATERS, THE NORTH UMPQUA FOUNDATION,
OREGON TROUT, PACIFIC RIVERS COUNCIL, AND
WATERWATCH OF OREGON'S COMMENTS ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT

I. INTRODUCTION

In January 1995, PacificCorp filed an application for a new major license for the North Umpqua Hydroelectric Project, No. 1927. That application was examined by PacificCorp in February 2000. In April 2002, the Federal Energy Regulatory Commission (Commission) issued a Draft Environmental Impact Statement (DEIS) for the North Umpqua Project and invited parties to file comments. The Federal Register Notice established a comment deadline of June 24, 2002. (67 Fed. Reg. 31801 May 18, 2002).

American Rivers, Oregon Natural Resources Council, Umpqua Watersheds, Umpqua Valley Audubon Society, Steamboaters, The North Umpqua Foundation, Oregon Trout, Pacific Rivers Council, and WaterWatch of Oregon (collectively, the Conservation Groups) appreciate the opportunity to comment on the DEIS. We have reviewed the document and offer the following comments. In total, the Conservation Groups recommend that the Commission modify its Final Environmental Impact Statement (FEIS) in accordance with our comments and select the Non Governmental Group (NGO) alternative as the preferred alternative.

The 185-megawatt North Umpqua Hydroelectric Project was constructed between 1947 and 1956 near the headwaters of the North Umpqua River. The project is located almost entirely within the Umpqua National Forest on the North Umpqua River, Fish Creek, and the Clearwater River. Due to the extent of project features across the landscape, for more than 50 years, the North Umpqua Hydroelectric Project has adversely affected a variety of aquatic and terrestrial ecosystems. Alteration of ecosystem functions has been substantial. Impacts to the ecosystem include: 1) drastically reduced streamflows in bypassed reaches of streams; 2) fluctuating flows and reservoir elevations; 3) blockage of upstream passage for both anadromous and resident fish; 4) entrainment of fish, amphibians, and terrestrial animals at unscreened diversions; 5) interruption of downstream transport of gravel and large woody material; 6) increased erosion and sedimentation from construction, Project facilities, and roads; 7) stranding and killing of fish downstream of the Project due to rapid changes in the river levels during low summer flows; 8) disruption of terrestrial habitat connectivity; 9) disruption of aquatic and riparian habitat and connectivity in small tributaries and headwater streams; 10) inundation of antique stillwater,

AR 1 We have reviewed all the comments that were submitted on the draft EIS and have made changes in the final EIS as appropriate. We continue to recommend the Staff Alternative that incorporates the Settlement Agreement with minor modifications.

We have given serious consideration to the Conservation Groups' recommendations and have evaluated the NGO Alternative in the EIS. In section 5.1, we present our rationale in balancing developmental and nondevelopmental values and recommend the Staff Alternative as the preferred alternative because: (1) the project would provide a significant (820,900 MWh) and dependable source of electrical energy for the region; (2) the project would avoid the need for an equivalent amount of fossil-fuel-fired, electric generation and capacity, thereby continuing to help conserve these nonrenewable energy resources and reduce atmospheric pollution; and (3) the PM&E measures proposed under the Settlement Agreement, combined with the additional measures recommended by staff, would adequately protect and enhance environmental resources and mitigate impacts of the project.

wetland, and riverine riparian habitats by reservoirs and forebays; 11) reduction in water quality and progressive eutrophication of the North Umpqua River.

Any alternative for relicensing and continued operations of the project must provide adequate protection, mitigation, and enhancement of fish and wildlife resources and promote ecosystem health. Based upon the analysis set forth in the DEIS, the Conservation Groups believe it would be imprudent for FERC to move forward with either the settlement agreement or staff alternative. Both alternatives fail to adequately address the hydroelectric project impacts and would allow for the ongoing decline of our public resources in the North Umpqua Basin. Rather, we support the Non-Governmental Group alternative as the preferred alternative and that which best serves the public interest.

II. DEFICIENCIES IN DRAFT ENVIRONMENTAL IMPACT STATEMENT ANALYSIS

A. Economic Analysis Deficiencies

The DEIS evaluates the potential environmental benefits expected from a range of proposed protection, mitigation, and enhancement measures (PM&Es). In addition to environmental effects, the DEIS looks at the anticipated effects of those PM&Es on project operation costs and the underlying economics of the various alternatives. The Commission staff's analysis and several of the underlying key economic assumptions are based upon financial information provided by PacifiCorp. As outlined below, the economic analysis presented in the DEIS is deficient in several respects such that the economics associated with the various relicensing alternatives for the project are misrepresented. Several of the flaws include:

- Failure to credit the project with millions of dollars of deferred income tax credits that result from the 100-year depreciation schedule used by PacifiCorp.
- The wholesale acceptance of substantial relicensing costs with no breakdown of the costs to evaluate their merit.
- Projected operating and maintenance costs that are 3 times greater than historic operation and maintenance costs, as previously reported on FERC Form 1.

These issues are analyzed in the following paragraphs and their impact on the economic analysis will be illustrated.

1. Project Depreciation

The DEIS fails to adequately address the implications of the accounting method and accompanying project depreciation schedule utilized by PacifiCorp. According to PacifiCorp documents, the total capital spent on the project since the beginning of construction (excluding transmission) is approximately \$81.5 million.¹ Rather than depreciate this investment in a manner that is consistent with standard accounting practices, PacifiCorp chose to recover most of the project equipment and structures over a 100-year period.² This accounting practice is problematic for several reasons.

First, as noted, the methods are inconsistent with standard accounting practices. Standard utility accounting practices would require complete cost recovery of the capital investment through depreciation over a period of about 30 years, or in the case of federally licensed projects, such as

¹ PacifiCorp Depreciation Study, December 31, 1996, prepared by Management Resources International.
² Id.

AR 2

AR 2 We present our rationale for recommending the Staff Alternative in section 5.1 of the final EIS.

AR 3

AR 3 The purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and costs of a hydroelectric project. We use information provided by the applicant, which in this case is subject to oversight by the state public utility commissions in which PacifiCorp operates. We generally rely on the accuracy of information provided and appropriateness of accounting standards followed. We have no reason to believe the economic information filed by PacifiCorp is not accurate and is not in conformance with approved standards.

AR 4

Project economics is just one of the many public interest factors considered by the Commission in deciding whether to issue a license for a project or what environmental enhancement measures to require in any license issued. The Commission adopts the environmental enhancement measures needed to make the project consistent with the best comprehensive development of the watershed. In so doing, the Commission has often issued licenses for which staff's economic analysis shows negative net power benefits (i.e., the estimated cost of project power exceeds the current cost of the likely alternative source of power). The Commission understands that it is the licensee who must make the business decision whether or not to build or continue to operate the project. Staff's economic analysis does not stand in the way of the Commission providing the environmental enhancement measures required to support the current and future beneficial uses of the watershed.

AR 4 See response to comment AR 3.

AR 4
(Cont)

a FERC licensed hydroelectric project, over a period no longer than the license duration. Revenue from ratepayers would be used to cover all carrying charges and retire the capital investment in a time period consistent with the license. Although PacifiCorp received a 50-year operating license for the North Umpqua Hydroelectric Project from the Commission, it did not utilize a 50-year depreciation schedule, consistent with generally accepted accounting practices. Rather, the company opted for a 100-year depreciation schedule, with the result that in the event of relinquishing less than 50 percent of the current capital investment has been recovered. This burdens the future operation of the project with nearly \$48 million in unrecovered capital.¹ The capital recovered should have been borne by the ratepayers who benefited from the first 50 years of operation.

Moreover, the methods run counter to the principle that relinquishing is not a continuation of the status quo, but a reconsideration of the past consequences of the river resources based on present day values and existing laws and regulations. *Confederated Tribes and Bands of the Yakima Indian Nation v. FERC*, 746 F.2d 466. The court noted that just because the same resource had been considered in the past does not make the relinquishing a phase in a continuous activity. Utilization of a 100-year depreciation schedule, rather than one that mirrors the length of the original license inappropriately assumes continued operations and fails to recognize that relinquishing constitutes a new, irreversible, and irreversible commitment of a public resource. And, in doing so, it places the burden of undepreciated capital onto all of the public purposes other than hydropower. Accordingly, the FEIS should not consider or factor in the undepreciated amount in a manner that reduces the funding sources available for environmental measures to be implemented during the next licensing period. PacifiCorp's depreciation method should not dictate the project economics for the next licensing period.

More importantly, the DEIS does not identify and account for the deferred income tax that would have accrued to PacifiCorp with regard to this project. The Internal Revenue Service requires that tax depreciation be taken in accordance with limitations set forth in its rules, which normally would be less than the 50-year project license. Taking this tax depreciation, PacifiCorp has moved on its income taxes and this money should be in a Deferred Income Tax account.² With a \$48 million undepreciated capital account, the deferred income tax account should be about \$14 million plus accumulated interest. This money belongs to the project and should be identified as a project resource and should offset the carry-over deferred depreciation. The FEIS should clarify the status of the deferred income tax account and incorporate these monies into the economic analysis of the various relinquishing alternatives evaluated.

¹ Draft Environmental Impact Statement, Table 4-1, p. 4-2. "Net investment loss"

² The IRS only recognizes tax depreciation based on tax lives. Tax depreciation reduces the amount of income tax the PacifiCorp actually pays. For accounting purposes, the Oregon Public Utility Commission (PUC) defers book depreciation based on useful life. Income taxes are then calculated using this book depreciation. When book depreciation takes place over a longer time frame than tax depreciation (as the case with North Umpqua Project), the income taxes calculated for rate making would be higher. These higher taxes are the basis for the money paid by the customers. In reality, PacifiCorp pays lower taxes during the tax depreciation period. The difference between taxes actually paid and taxes used for rates are accumulated in an account called "deferred income taxes". When the facility is fully depreciated for tax purposes, then the money collected from the ratepayers under the heading book depreciation is viewed by the IRS as income (not depreciation) and PacifiCorp must pay income taxes on it. The money they use to fund the "deferred income tax account". So any time a facility has been fully depreciated for tax purposes, but not for book purposes, there should be a deferred income tax account. It is neither source of money to the project nor should it partially offset any apparent undepreciated capital.

AR 5

We do not agree that the difference between average annual cost and average annual power value, as estimated by staff's economic analysis, represents a "funding source available for environmental measures to be implemented during the next license period." We recommend the environmental measures our analysis shows would result in resource benefits that would be worth the additional cost of implementation. We do not find that the additional resource benefits associated with the NGO alternative would be worth the approximately \$9 million annual cost above that of the staff-recommended alternative.

AR 6

Staff's economic analysis is only an approximation of a project's power value and resulting net benefit. In our analysis, we use a maximum 30-year period for capital depreciation. Capital costs, including the remaining net investment, are handled the same in all alternatives. The incremental cost impact of individual measures is, therefore, not significantly affected by the magnitude of the net investment included in the analysis. We use staff's economic analysis for the sole purpose of estimating the cost of enhancing measures and the cost-effectiveness of alternative methods for mitigating project effects, and approximating the overall project economic value as compared to a likely alternative generating resource. The reduction in cost that would result from using a lower, or even zero net investment, would not change the staff recommendations, which we believe provide adequate protection for aquatic resources and a better balance of the developmental and non-developmental resources than would be provided by the NGO alternative.

2. Relicensing Costs

PacifiCorp has claimed relicensing costs of approximately \$43 million, an unusually high amount. The high amount calls into question whether all of the costs have been properly incurred and whether they should all be incorporated into the economic analysis of the various relicensing alternatives. Additionally, some of the costs may be the result of delays in the relicensing process, which have benefited PacifiCorp by allowing them to continue operating under the same terms as the original license, while allowing ongoing harm to other public values.

If the Oregon Public Utility District determined that some of the costs were disconnected from the relicensing, it would likely disallow PacifiCorp from recovering them. As such, the costs would have to be paid by ScottishPower stockholders instead of the PacifiCorp ratepayers. Under those circumstances the project should not have to recover the excessive relicensing costs.

In light of the unusually high costs, the Conservation Groups urge FERC to provide an accounting of the \$43 million costs prior to their wholesale acceptance to ensure that they are all associated with the relicensing process. Those that are determined to be distinct should not be included and the economic analysis modified accordingly. Until completion of such an accounting, the FEIS should incorporate a relicensing cost that is more typical for this type of facility in its analysis of the relicensing alternatives. With a more rational relicensing cost all of the alternatives would be less costly, and there would, in turn, be additional money to allocate to environmental enhancements, while still maintaining an economically viable project.

1. Key Economic Assumptions

a. Operation and Maintenance Costs

The DEIS incorporates an operations and maintenance cost figure of \$3.8 million per year for the current project (DEIS, Table 4-1, page 4-2). This figure represents the key economic assumption regarding expected operations and maintenance costs under status quo operations. However, it appears to be inconsistent with average operation and maintenance cost figures previously reported by PacifiCorp. The costs for 1997 and 1998 were \$1.17 million and \$1.26 million, respectively.¹ Hence, the expected costs identified in the DEIS and relied upon in the Commission's economic analysis is three times greater than the 1997 and 1998 values; however, there is no explanation of the significant disparity. The FEIS should clarify the discrepancy in the operations and maintenance costs and modify the analysis as appropriate. Based on previous filings, we urge FERC to consider a much lower operations and maintenance cost.

b. Future Capital

Another key economic assumption in the DEIS relates to future capital. The DEIS identifies a future capital figure of \$48.8 million (DEIS, Table 4-1, page 4-2). While this is a significant expenditure, the DEIS provides insufficient detail on which to evaluate and justify the future capital costs. The FEIS should include a breakdown and greater clarification of these costs, as well as a schedule describing when the monies will be allocated and to what projects. For example, is it a present value? Does it include items not addressed in the DEIS, such as dredging Soda Springs or other reservoirs? In reality, the future capital costs would NOT be recovered until after these investments are made, possibly decades in the future. They should not be included in the present costs for the project in the early years of the new license. Additionally,

¹ FERC Form 1 tables for FERC project 1937.

AR 7

AR 7

We did not call into question relicensing costs claimed by PacifiCorp in its license application and subsequent filings with the Commission. Explanation of relicensing costs is provided in PacifiCorp's response to comments in a letter dated August 28, 2002, and filed with the Commission August 30, 2002. In re-evaluating the economic analysis for the final EIS, we revised the relicensing costs to account for the removal of Soda Springs dam. The effect of this change is reflected in the annualized project costs for the NGO Alternative in the final EIS.

AR 8

AR 8

In response to comments (dated August 28, 2002, and filed with the Commission August 30, 2002), PacifiCorp addresses the apparent discrepancy between costs reported on FERC Form 1 and O&M costs reported in their license application and subsequent filings. We conclude that there is no basis to change O&M costs.

AR 9

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PacifiCorp reports planned capital investment of \$126.3 million for continuing operations over the next 30 years (PacifiCorp 2000a). No specific itemization and implementation schedule for these planned expenditures was submitted by PacifiCorp. We apportioned these costs equally over a 30-year period. The total present value of these costs is approximately \$48.8 million. Itemization of some capital projects is shown in the license application (PacifiCorp 1995a). In re-evaluating the economic analysis, we have amended estimates of future capital associated with the project by reducing future capital costs for the NGO Alternative by an amount proportionate to the capital cost items associated with Soda Springs in the license application.

the FEIS should identify how the value of the \$49.8 million contained in Table 4-1 was derived from these future investments.

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(Cont)

4. No-Action Alternative

In the analysis of the No-Action Alternative, the DEIS states that the existing project costs approximately \$23.2 million annually to operate (DEIS, p. xxi). This, however, is a gross overstatement of the actual costs incurred by PacifiCorp to operate the project currently. Rather, the estimated costs reflected in the No-Action Alternative include substantial costs associated with relicensing the project and therefore, represent the cost of operating a relicensed project. This distinction should be clarified to illustrate the low operation costs that PacifiCorp has enjoyed during the original license term.

AR 10

5. NGO Alternative

As a result of the deficiencies highlighted above – project depreciation, relicensing costs, operation and maintenance costs – the economic analysis of the alternative proposed by the Non-Governmental Organizations is seriously flawed. The inflated costs have prejudiced the total costs of all the alternatives, including the NGO alternative. As such, the analysis allows for significantly less in terms of environmental protection, mitigation, and enhancement measures.

AR 11

The FEIS should provide a revised analysis of the NGO alternative based upon modifications to the underlying costs associated with all the alternatives. According to our calculations, modifications to the economic analysis in accordance with our comments will result in an NGO alternative that provides a net benefit of approximately \$3.6 million per year, compared to the negative net benefit currently contained in the DEIS.

AR 10 We used consistent assumptions and cost data for all project alternatives. Requested changes in relicensing costs, O&M costs, and economic assumptions would apply to all alternatives. Such changes would not affect the relative ranking of alternatives. We did, however, make specific changes to project costs for the NGO Alternative to reflect the removal of Soda Springs dam. These changes to project costs resulted in an increase in net economic benefits for the NGO alternative. See also response to comments AR 5 and AR 6.

AR 11 See response to comment AR 10.

6. Unidentified Costs

Under several relicensing scenarios, reservoir fluctuations to maximize power generation are clearly contemplated. For example, the Settlement Agreement provides for increases in maximum daily level fluctuations from 4.3 feet to 16 feet in Soda Springs reservoir, 2.4 feet to 6 feet in Clearwater No. 1, 2.7 feet to 5 feet in Clearwater No. 2, and 3 feet to 6 feet in Fish Creek. (DEIS, Table 2-2, p. 2-27). While the DEIS clearly considers and incorporates the expected power generation benefits from such operations, it fails to identify any costs of associated actions, such as reservoir dredging, that will likely be necessary to realize the proposed fluctuations. Moreover, the DEIS fails to provide any analysis of the environmental impacts associated with dredging that may be necessary to facilitate the proposed fluctuations. Analyzing the expected power generation benefits of an action without also analyzing any economic and environmental costs associated with its implementation results in an inaccurate representation of the alternatives. The FEIS should carefully examine the economic and environmental costs associated with increased reservoir fluctuations and modify the economics of the various alternatives that contemplate such measures.

AR 12

AR 12 The economic costs associated with increased reservoir fluctuations are contained in the estimates for future capital costs. Discussion of these enhancements can be found in PacifiCorp's license application (PacifiCorp, 2000a). PacifiCorp has not proposed any dredging beyond normal maintenance activities that currently occur. Any future proposed dredging to allow greater water level fluctuations would be subject to additional reviews and approvals under § 401 Water Quality Certificate and FS Section 4(e) conditions which would become requirements of any license issued. See also responses to FS 11 and DOI 4.

B. Ecological Analysis Deficiencies

The analysis of the various relicensing alternatives and mitigation in the DEIS is deficient and misleading. It fails to adequately evaluate and explain the ability of various measures and alternatives to meet ecosystem objectives. Much of the evaluation in the DEIS consists of general assertions of expected benefits, but very little quantitative analysis. Moreover, it lacks objectivity and is biased in scope, content, and analysis towards the Settlement Agreement (SA) alternative.

AR 13

AR 13 Protection, mitigation, and enhancement measures included in the Settlement Agreement and the Staff Alternative go well beyond the "mere improvement" of the status quo. The parties to the Settlement Agreement represent most of the resource management agencies, and the management goals of these agencies have been appropriately addressed. The deficiencies listed in this comment are discussed further where they have been described in more detail in the specific comments that follow.

with added monitoring adjustments in the Staff Alternative that do not provide reasonable assurance that adverse impacts have been addressed and objectives will be met. Mere improvement in status quo conditions does not merit a finding that an alternative is sufficient. Deficiencies with aquatic connectivity and wildlife resource analysis and determinations include:

- Lack of meaningful or relevant rationale and valid information supporting the SA alternative.
- Lack of measurable criteria and comparisons of levels of risk/confidence between alternatives, in meeting aquatic connectivity and wildlife objectives and species population viability requirements.
- Inadequate information that purportedly supports the credibility of assumptions. The analysis includes ambiguous statements and overgeneralizations. It overlooks, ignores, excludes, or superficially describes important parts and excludes a large body of relevant credible scientific information from independent sources and publications. Little detail is given as to how SA mitigation will address the impacts and meet requirements.
- Conclusions regarding wildlife resource impacts and appropriate levels of mitigation necessary to address adverse effects are not based on substantial evidence. The FEIS must make full use of available science, theories, principles, and ecological inferences related to the issues at hand.
- Important design details and factors associated with alternative mitigations are overlooked and oversimplified, resulting in insufficient benefit-cost alternative comparison.
- The SA alternative leaves important details to resource management plans that will be completed separate from the NEPA process. The plans are not adequately defined such that the public and evaluate them to determine their adequacy. Because of the reliance on engineered, inexpensive "quick fixes" that are not effective, these management plans are critical.
- Mitigation in the SA alternative leaves out consideration of significant species population needs and habitat that is to be provided by Forest Plan allocations and standards and guidelines.
- Cumulative effects are inadequately analyzed in relation to alternatives for local populations of species of concern, connectivity levels, continued loss and degradation of habitats and disturbance impacts.
- References to sections of the North Umpqua Cooperative Watershed Analysis are taken out of context to support mitigation that was not evaluated during the watershed analysis process.

The DEIS fails to provide sufficient information and analysis to support the proposed SA. The deficiencies have mistakenly inflated the sufficiency of the measures contained in the SA, leading Commission staff to conclude that such an alternative, with some modifications, adequately protects, mitigates, and enhances fish and wildlife resources and is in the public interest.

In addition to our comments provided below regarding specific sections of the DEIS, we would like to highlight what we view as one of the most noteworthy deficiencies of the document. Whether or not there is going to be dredging of Soda Springs Reservoir is significant from both an ecological and economic perspective. Inexplicably, the DEIS contains no analysis of dredging that is required now and in the future in order to operate as contemplated in the SA and Staff alternatives. The economic projections for the SA and Staff Alternative appear to presume significant dredging (required to provide peak power generation). However, Oregon Department of Environmental Quality findings with regard to PacifiCorp's Clean Water Act section 401

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AR 14 The EIS is based on the detailed studies prepared by PacifiCorp, the North Umpqua Cooperative Watershed Analysis, and extensive filings associated with the Settlement Agreement, including those submitted by the Conservation Groups. We believe this is an adequate basis to support the EIS analysis.

AR 15 Section 3.2.2.1 has been revised to acknowledge the potential for increased turbidity due to water level fluctuations.

PacifiCorp's proposal does not mention dredging beyond what is routinely done for maintenance purposes. However, any dredging proposal would require ODEQ approval in accordance with Condition 4.h of the § 401 Water Quality Certification. Also, under FS Section 4(e), Condition No. 18, reservoir and forebay dredging on NFS lands is restricted to actions that are consistent with the Umpqua National Forest Land and Resource Management Plan, as amended, within and below the project. Accordingly, any dredging proposals would be subject to review and authorization by the FS as described in Condition 6 of the 4(e) conditions, and subject to coordination with and approval by the Oregon Division of State Lands and ODFW. Although the economic analysis presented in the EIS assumes up to 16 feet of fluctuation in Soda Springs Reservoir, this assumption does not affect the assessment of net economic benefits of the Settlement Agreement.

Also see responses to comments DOI 4 and ODFW 5.

certification application represent that there will be no dredging.⁶ This apparent contradiction between the 401 certification findings and the DEIS must be reconciled to ensure adequate analysis of both the economic and ecological costs and benefits of the SA and Staff alternatives.

1. Cumulatively Affected Resources – Section 3.1.2

The DEIS identifies a range of resources potentially subject to cumulative effects. The list, however, inexplicably fails to include aquatic and riparian connectivity. Connectivity in the upper North Umpqua River sub-basin has been altered or lost from several activities, including timber harvest, roads (generally), stream crossings, and hydropower related facilities, such as dams, reservoirs, and diversions (North Umpqua Cooperative Watershed Analysis Synthesis Report, Vol. 2 Chap. 3-5 (hereinafter Watershed Analysis)). While some mitigations proposed (e.g. ladders and screens at Soda Springs) in the SA will aid in fish passage, implementation of most other aspects of aquatic and riparian connectivity will remain. The NGO alternative, on the other hand, would provide greater restoration of ecosystem processes, functional connectivity of habitat for all native organisms (not just fish), and restoration of habitat quality and quantity within and downstream from the project (EIA, Module 7, pg 13).

The FEIS should be modified to include aquatic and riparian connectivity in the cumulative effects analysis. And, it should clarify the substantial differences in environmental benefits to be gained by the NGO alternative as compared with the other alternatives. The NGO alternative is the one that is truly restorative. (Watershed Analysis, Vol. 2, Chap. 3-30, Chap. 7-3, and Attach. 1.8; EIA Module 7, pg 19).

2. Fluvial Geomorphology and Sediment Transport – Section 3.2.1.4

a. North Umpqua River from Tolobee Lake to Soda Springs Dam

The DEIS discussion of the North Umpqua River from Tolobee Lake to Soda Springs Dam mentions the steep-walled headcut nature of a portion of the reach and provides great detail about sediment deposition. It does not, however, provide a description of what is an incredibly important and ecologically significant attribute of that reach – the relatively large, rare unconfined reach that contained several large alluvial features (totalling as much as 100,000 sq.ft.) and that exists under Soda Reservoir (see EIA, Module 7, pg 9-10). In order to ensure a comprehensive analysis of ongoing effects of the hydroelectric project, the FEIS should include a description of this feature and its ecological importance.

In addition, the FEIS should clarify that the SA alternative would do nothing to restore this rare and potentially very productive “hot-spot”. That alternative relies instead upon mitigation consisting of several small, un-proven projects in confined reaches that, according to some experts, have a low likelihood of success. The NGO alternative, on the other hand, would eventually result in full restoration of this unique and productive reach. There is no support for the assertion in the DEIS that restoring natural conditions to this alluvial feature is “not likely to be achieved” (DEIS, p. 3-28). On the contrary, alluvial features in unconstrained valley-forms are, by their very nature, transitory and changeable. Once sediment transport processes (including removing the barrier dam) and flow regimes are restored, the alluvial feature would most assuredly re-appear. The FEIS should include this likely benefit in its analysis of the NGO alternative.

⁶ Evaluation Report and Finding on Application for Water Quality Certification, prepared by Oregon Department of Environmental Quality (March 2002), Section 7.A.6.6.

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AR 16 Aquatic connectivity has been added to section 3.1.2 of the final EIS as a cumulatively affected resource. Section 3.4.2.7 of the EIS presents our analysis of impacts of the alternatives on aquatic connectivity.

AR 17 Section 3.2.1.4 has been revised to include discussion of the alluvial features that were inundated by Soda Springs Reservoir.

AR 18 The EIS has been revised to include more discussion of the potential benefits of dam removal for restoration of fluvial geomorphic processes and creation of fluvial aquatic habitat in the reach inundated by Soda Springs Reservoir. However, as discussed in sections 3.2.2.2, 3.4.2.3, and 3.5.2.1, there is substantial uncertainty involved in projecting the impacts of dam removal. The deposition of large quantities of sediment in Soda Springs Reservoir has substantially altered the topography and geology of the surface across which the river would flow if fluvial conditions were restored in the reach that was inundated by the reservoir. Following removal of the dam, a new stream channel would form and evolve over time. While it is likely that portions of the new stream channel would be alluvial in character, stream channel evolution following dam removal is unlikely to replicate the same features that existed before the dam was built.

The Settlement Agreement would not restore fluvial habitat conditions in reaches that would continue to be inundated by the reservoir, but it would enhance and create habitat in the bypassed and full-flow reaches of the North Umpqua River below Soda Springs dam. Subsequent to the publication of the draft EIS, the parties to the Settlement Agreement determined that the habitat restoration measure proposed for the Soda Springs bypassed reach would not achieve its objectives. Accordingly they have amended the Settlement Agreement to replace the Soda Springs Bypass Reach Alluvial Restoration Project that was proposed in the original Settlement Agreement with a North Umpqua River Habitat Restoration/Creation Project. The new project aims to create additional anadromous fish spawning habitat in full-flow reaches and tributaries of the North Umpqua River, in addition to the bypassed reach. The expansion of the habitat restoration effort to a larger area that includes more lower gradient stream segments, where gravel replenishment efforts are more likely to succeed than in high-gradient areas, eliminates the circumstances that led to the judgment that the habitat restoration measures in the Settlement Agreement had a “low likelihood of success.” Furthermore, the Settlement Agreement provides for monitoring of the effectiveness of the proposed habitat restoration measures, and provides for modifications or additional PM&E measures if needed to achieve the habitat restoration objectives.

b. North Umpqua River below Soda Springs Dam

The discussion of the North Umpqua River below Soda Springs Dam of geomorphic processes and studies included in the document suggest a high level of understanding and scientific certainty to infer that the effects of eliminating coarse sediment transport below the Soda Springs for the past fifty plus years has had no or minimal impact on the ecology of the river downstream of the project. This conclusion is not supported by the record, which includes several scientifically credible independent assessments and reviews that have pointed out considerable uncertainty and likely adverse effects (see EIA Module 7, pg 6-8). Yet, the DEIS has dismissed this information without providing any data, analysis or plausible explanation.

3. Erosion and Sediment Control - Section 3.2.2.1

a. Canton and Rock Creek Easements

The DEIS evaluates proposed off site mitigation measures intended to reduce near stream erosion and resulting deposition of sediment. The analysis, however, overstates the effectiveness of the proposed riparian easements in the Canton Creek and Rock Creek watersheds in reducing sediment deliveries. Although the riparian easements may reduce sediment deliveries from near-stream activities, they do not reduce mass wasting from the many, steep low order headwalls located outside the easements nor address road and culvert concerns on private lands. The importance of protecting unstable headwater areas and addressing road concerns is well documented.¹ To most effectively reduce sediment deliveries from private lands in the Canton Creek and Rock Creek watersheds, the FEIS should document the importance of including unstable and potentially unstable areas in the proposed easements, as well as address road location, design, and maintenance.

In addition, the FEIS should address the concerns regarding the design of the proposed easements (e.g., size, number and location of easements, as well as the length of time increased protection is to be provided). It should specify that unless permanent or long-term (100+ years) protections are obtained through the easements, the riparian easements proposed in the SA will provide only nominal benefits.

b. Waterway Failures

The well-intentioned measure requiring PacifiCorp to develop an emergency system for removing water from portions of the Lemolo 2, Clearwater 2, and Fish Creek canals in the event of a flume or canal wall failure is just one of the many Settlement Agreement's mitigations which are unlikely to produce the desired results. Despite years of practice, PacifiCorp has yet to demonstrate that waterway failures can be detected quickly. Even if PacifiCorp's ability is dramatically improved, considerable damage to National Forest lands is possible within 30 minutes. The environmental damage that will likely result regardless of the proposed emergency measure must be addressed in the FEIS.

¹ USDA Forest Service et. al (USDA Forest Service, USDI Fish and Wildlife Service, USDC NOAA National Marine Fisheries Service, USDI National Park Service, USDI Bureau of Land Management, Environmental Protection Agency). 1993. *Forest Ecosystem Management: An Ecological, Economic, and Social Assessment*.

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AR 19 The text in section 3.2.1.4 has been revised to include additional discussion of sediment depletion below Soda Springs dam.

AR 20

We agree that the proposed riparian easements in the Canton and Rock Creek watersheds would not, by themselves, be as effective in reducing sediment delivery to Canton and Rock Creeks as would a coordinated program of actions that includes other measures to reduce mass wasting and problems caused by roads and culverts. However, the parties to the Settlement Agreement specified these measures with the expectation that they would be coordinated with other habitat restoration measures in these watersheds, such as the measures described in the comment. As explained in Section VI of the Memorandum of Understanding, "Enhancement measures proposed for the Rock Creek Basin in this MOU represent only a portion of the restoration efforts planned for this basin and are intended to serve as a foundation for acquiring matching funds for habitat restoration on private and public lands."

Section 3.2.2.1 of the EIS discusses only the impacts of the off-site mitigation measures proposed in the Settlement Agreement. As stated in that section, we find that these measures would result in improvements over existing conditions in those watersheds even if they are not accompanied by other measures.

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PacifiCorp would develop a Conservation Easement Plan (CEP) to be reviewed and approved by ODFW (see MOU, Appendix E to the Settlement Agreement). The CEP would provide details regarding the easements. PacifiCorp has indicated that it would monitor the easements to ensure that landowners are managing the land in strict accordance with the terms of the easements and would take swift action to correct any activities that are not in accordance with their terms. In the event that PacifiCorp and ODFW determine that the CEP would not achieve an appropriate benefit for habitat, they have committed to pursue other alternatives for maximizing the benefit of the available funds, subject to approval by the Commission.

AR 22

The MOU (see Appendix E to the Settlement Agreement) indicates that the MOU shall extend for the life of the fish passage barriers for which passage is being waived. It also states, however, that the terms and conditions contained in the MOU may be revisited and revised by the parties upon expiration of the new FERC license term. Any future measures needed to achieve or to continue to provide such benefits would be reviewed at the time of the next relicensing.

AR 22 It is true that earlier detection of flume and canal failures could not completely prevent damage. However, as section 3.2.2.1 indicates, earlier detection of failures would result in less erosion and sediment deposition when a failure occurs. Also note that the Settlement Agreement would require an alternative plan for mitigating the effects of waterway failures if PacifiCorp is unable to devise a plan to meet the 30-minute goal.

Consequently, PacifiCorp should be required to include in its annual monitoring report an assessment of erosion or other damage to natural resources resulting from each failure of project facilities during the preceding year. In addition, the Commission should ensure that the canal dewatering efforts associated with canal and flume failures do not compound the problem by creating additional erosion (e.g., creating scour by dumping unnaturally high flows into first and second order stream channels).

AR 23

Finally, the SA alternative includes several positive sediment control measures, including the Erosion Control Plan requirement that if PacifiCorp cannot meet the 30-minute goal for dewatering waterways of highest concern, then "the most effective alternative" must be developed. The Commission should evaluate in the FEIS what we view as the most effective alternative. That involves shutting down the Lemole 2, Clearwater 2, and Fish Creek waterways when storm events produce the conditions when canal failures tend to occur.

AR 24

c. Reservoir Operations

The DEIS correctly notes that the SA alternative would result in increased fluctuation of most reservoir water levels. The DEIS notes that in addition to shoreline erosion concerns, the daily fluctuations proposed for Soda Springs Reservoir may destabilize a very large, deep-seated landslide deposit. However, the analysis does not consider the following concerns related to the proposed reservoir operations:

AR 25

- Increased fluctuations of water levels in project reservoirs may disturb bottom sediments and thereby increase turbidity in downstream stream reaches;
- The increased fluctuation of some project reservoirs are unlikely to be sustained without instilling dredging, an interrelated and interdependent action that has not been analyzed.

As noted above, the DEIS fails to evaluate either the economic or environmental effects of reservoir dredging, an action that is highly likely given the proposed fluctuation levels. Absent a comprehensive evaluation that includes these dredging costs, the alternatives analysis is considerably deficient.

4. Restoration of Fluvial Geomorphic Processes - Section 3.2.2.2

a. Settlement Agreement

The DEIS fails to provide sufficient evidence that the measure proposed in the SA - gravel augmentation - intended to restore fluvial geomorphic processes and streambed conditions will be an effective mitigation measure. Such an unproven technological measure has not been demonstrated effective in achieving the natural range of the sediment regime with regard to amount, character, or timing. In addition, DEIS does not consider the effects of other actions necessary to implement this measure. Specifically, it requires mining gravel (and perhaps other sediment) from some other location, and hauling, sorting, and dumping it. All these require the use of mechanized equipment, in or near water, thus posing a risk of further damage (see EIA Module 7, pg 16). In contrast, as noted below, the effectiveness of the NGO alternative in restoring the sediment regime is much more certain, and there is no long-term risk from mechanical failure of toxic spills. (WA Vol. 2, Chap. 7-3 and Vol. 3, Attach. 3-8).

AR 26

Moreover, structural modification of Clearwater 1 dam, as proposed in the SA, will not lead to improved passage of sediment and woody debris. Diversion of Bear Creek around Clearwater 1 dam to its historic channel is the recommended measure to achieve this objective.

AR 27

AR 23 The erosion monitoring program described in Section 14.5 of the Settlement Agreement would include identification and evaluation of new erosion sites, including erosion resulting from failures of project facilities.

The emergency canal dewatering system included in Section 14 of the Settlement Agreement has the objective of limiting erosion resulting from waterway failures. As discussed in the comment, redirection of high flows from failed waterways to minor streams could cause significant erosion. Because this would be contrary to the objectives of the system, it is likely that the parties to the Settlement Agreement would not agree to a dewatering plan that would redirect flows to stream channels that do not carry flows of similar magnitude under natural flood conditions.

AR 24 If PacifiCorp cannot meet the 30-minute goal for dewatering any section of one of the waterways of highest concern, the Settlement Agreement would require PacifiCorp to conduct an engineering feasibility study and identify the most effective alternative, in consultation with ODFW, ODEQ, and FS. The alternative suggested by the commenter is one that could be considered in this evaluation.

AR 25 Section 3.2.2.1 has been revised to acknowledge the potential for increased turbidity due to water level fluctuations.

Regarding dredging, see the responses to comments ODFW 5 and AR 15.

AR 26 Regarding the effectiveness of the measures proposed in the Settlement Agreement, see response to comment AR 18. Section 3.2.2.2 includes a discussion of the potential for adverse impacts to water quality from the acquisition and placement of gravel.

AR 27 The parties to the Settlement Agreement judged it feasible to modify Clearwater 1 dam to provide increased passage of sediment and woody debris. This modification would result in positive effects, relative to the No-Action Alternative, on streambed gravel availability and fish habitats in the Clearwater No. 1 bypassed reach. The NGO Alternative calls instead for the reconnection of Bear Creek, as advocated by the commenter. The reconnection of Bear Creek would be expected to provide somewhat greater benefits in the Clearwater No. 1 bypassed reach than the measures included in the Settlement Agreement. Section 3.2.2.2 has been revised to provide a clearer comparison between the impacts of the alternatives for this reach.

b. NGO Alternative

The DEIS does not accurately account for the benefits resulting from the removal of Soda Springs Dam. The removal or lowering of Soda Springs dam are the only measures that would restore all of the key components of a fully functional sediment regime. In particular, the timing, volume, rate and character of sediment input, storage, and transport in this portion of the basin will be substantially improved only when the mainstem North Umpqua River below Soda Springs dam is reconnected to its upper reaches. Leaving Soda Springs reservoir intact reduces the effectiveness of costly measures being undertaken to reconnect physical processes of the Clearwater River watershed to the North Umpqua River.

AR 28

In contrast to the consensus that exists concerning the effectiveness of removing Soda Springs dam, there is significant professional disagreement about the likelihood of effectively restoring the amount and quality of anadromous habitat anticipated by the Alluvial Restoration Project. The Watershed Analysis (Volume 3, Attachment 3-8) documents the findings of the Aquatic Subgroup on the relative benefits expected from removal or modification of Soda Springs dam. This disagreement calls into question the adequacy of the measures proposed in the SA alternative and should be acknowledged and evaluated in the FEIS.

AR 29

5. Aquatic Resources – Section 3.4

a. Affected Environment – Section 3.4.1

(i) Table 3.4-1

References to "aquatic resources" in the column headings in Table 3.4-1 should be changed to "fish resources" as the table does not account for other aquatic life such as insects, mammals, and amphibians.

AR 30

(ii) Other Aquatic Biota

The DEIS should recognize that there are several notable exceptions to the general downward trend of the ABA Bioassessment scores for benthic macroinvertebrates downstream through the project. In particular, the DEIS does not account for the significantly lower ABA scores found in stream reaches subjected to fluctuation flows resulting from peak power generation.

AR 31

b. Environmental Consequences and Recommendations – Section 3.4.2

The Conservation Groups offer the following additions or corrections to the information contained in Table 3.4-1. The FEIS should be modified accordingly.

AR 32

(i) Mainstem North Umpqua River between Soda Springs powerhouse and Rock Creek

Approximately half of this reach is water quality limited⁶ for salmonid rearing, while 90 percent is limited for anadromous spawning. Similar or even worse conditions are found throughout the Umpqua River Basin, making the upper portion of this reach and the historical habitat above Soda Springs and Slide Creek dams even more valuable to anadromous fish. The lower water

⁶ <http://www.dsq.state.or.us/wq/WQLData/ListView98.asp>

AR 28 See response to comments AR 17 and AR 18.

AR 29 The attachment to the Watershed Analysis cited by the commenter indicates that the Aquatic Subgroup found that the potential benefits of dam removal were highest among the options considered. That particular evaluation did not address the potential adverse impacts of dam removal, the substantial uncertainty involved in projecting the effects of dam removal, nor the likelihood that the potential benefits of dam removal would be realized. The adverse impacts could outweigh the advantages, particularly in the near term. Removal of the Soda Springs dam could cause significant damage to anadromous fish habitat downstream from the dam, thus negating the benefits. A more recent evaluation by the parties to the Settlement Agreement compared the Settlement Agreement with an alternative that included removing Soda Springs dam and constructing a new re-regulating dam upstream. That evaluation (PacifiCorp 2001e) provided evidence that the Settlement Agreement offered more certain environmental and power generation benefits than the re-regulating dam alternative. Additional discussion of dam removal has been included in the final EIS. See also response to comment AR 18.

AR 30 Table 3-7 has been revised.

AR 31 The text has been revised to include a discussion of the lower ABA scores.

AR 32 Table 3-7 has been revised. The lower water temperature in the upper portion of the reach of the North Umpqua River between the Soda Springs powerhouse and Rock Creek is one of possibly several factors responsible for the high densities of spring chinook redds in this reach.

temperatures in the upper portion of this reach of the North Umpqua River may contribute to the high densities of spring chinook redds observed here.

(ii) Soda Springs Bypass Reach

The riparian area in this reach, which is significantly impacted by road and hydroelectric facilities, is unlikely to be improved substantially by the proposed alluvial enhancement project. Removal of the Soda Springs dam would allow full restoration of this reach and its riparian area.

AR 33

(iii) Soda Springs dam and reservoir

These facilities serve as a barrier to fish as well as an obstacle to the movement of many other aquatic/riparian dependent species. In addition the downstream delivery of sediments and wood is affected. Further, the reservoir is prime habitat for brown trout, potentially affecting anadromous productivity since access is restricted and limiting the effectiveness of any brown trout control program. Finally, the proposed increase in daily water level fluctuations may decrease the productivity of the reservoir for native trout and salmon.

AR 34

(iv) Slide Creek Full-flow reach

Although not addressed in the analysis, this reach is of concern because of current and proposed peak power fluctuations. Macroinvertebrate indices from this reach are already low, and are not likely to improve with implementation of the Staff Alternative because ramping rates are to be unrestricted and maximum water level fluctuations in Soda Springs reservoir would be increased from 4.3 feet per day up to 16 feet per day. Proposed monitoring will only study effects upon fish. The effects to other aquatic biota need to be considered also.

AR 35

(v) Tolentine Bypass Reach (Slide Creek diversion to Tolentine dam)

The Watershed Analysis found that of all the project facilities, the Slide Creek diversion was ranked as the 3rd highest priority for modification in order to improve habitat connectivity. Only Soda Springs and Tolentine dams were ranked higher. Despite being currently limited in spawning gravel, due to project effects which will be addressed upon the reconstruction of Clearwater, this reach of stream contains excellent summer and winter rearing habitat for salmonids, has cool water temperatures, and based upon entrainment studies at the Slide Creek diversion, is also likely important to amphibians.

AR 36

(vi) Tolentine Lake headwaters to Lemolo 2 powerhouse (Lemolo 2 full-flow reach)

Although this reach is short, it warrants designation as a biological "hotspot." As the DEIS later notes, this low gradient, unconfined reach with multiple channels is significant because of the diversity of habitats provided, including a significant amount of high quality spawning gravel for the reservoir's trout population.

AR 37

Although the SA and Staff Alternatives would improve water quality and end ramping in this reach, any potential benefits to fauna in the wetland slated to receive peak power discharges from Lemolo 2 powerhouse can be best described as "speculative." Impacts to existing native species such as the Western pond turtle have not been discussed.

In addition, no quantitative instream flow/habitat relationships were developed for the Lemolo 2 full-flow reach. The impacts of reducing instream flows proposed for this reach have not been

AR 38

AR 33 Subsequent to the publication of the draft EIS, the parties to the Settlement Agreement determined that the alluvial habitat restoration measure proposed for the Soda Springs bypassed reach would not achieve its objectives. Accordingly they have expanded the proposed effort to a larger area, as discussed in response to comment AR 18. See also response to comment AR 18 and AR 29.

AR 34 Table 3-7 has been revised to note the effect of these facilities as barriers. The potential for measures contained in the Staff Alternative to reduce the effects of Soda Springs dam and reservoir on aquatic populations and processes are described in section 3.4.2. Measures to improve instream flows, ramping rates, fish passage, fluvial geomorphic processes, reservoir management, and brown trout (predator) control are all accompanied by the development and implementation of monitoring plans. See also response to comment ODFW 6.

AR 35 Ramping rates in the 0.2-mile-long Slide Creek full-flow reach would be re-evaluated and, if necessary, restricted if anadromous fish gain access to this area (Settlement Agreement section 6.2.1). We believe that ramping rate restrictions required to protect migratory and spawning habitat and to prevent fish stranding would also benefit other aquatic biota. See also response to comment ODFW 6.

AR 36 The statement noting the low priority for habitat connectivity improvement has been deleted from table 3-7.

AR 37 Impacts to fauna and wetland habitats are discussed in final EIS section 3.5.2.3. Impacts to sensitive species, such as the northwestern pond turtle, are discussed in final EIS section 3.5.2.5 and Appendix C.

AR 38 Although flows in the Lemolo No. 2 full-flow reach following re-routing would be smaller than present peak flows, the instream flow releases would be expected to provide considerable rainbow trout habitat (table 3-8). The instream flow releases in the extended Lemolo No. 2 bypassed reach (table 2-1) are in addition to natural accretion flows and flows from newly reconnected tributaries. These additional sources of water to the former Lemolo No. 2 full-flow reach may provide greater habitat for fish and other aquatic organisms than predicted in table 3-8. Also, under Settlement Agreement Section 5.3, prior to the new license becoming final or 2004 the parties to the Settlement Agreement would reconsider instream flow releases and may make adjustments.

sufficiently analyzed. For example, assessments of fish spawning habitat suitability or insect production have not been analyzed.

(vii) Lemolo 2 Bypass Reach

This 11.3-mile long reach of the North Umpqua River is the longest bypass in the project. Unlike other bypass reaches, the affected stream is relatively low gradient for its entire length. In addition, this reach provides more habitat diversity than other bypass reaches because it contains unconfined sections of stream that contribute floodplain processes and multiple channels.

Table 3.4-1 correctly identifies that re-establishing habitat connectivity to small streams intercepted by Lemolo 2 canal is another primary issue in this reach.

In addition, the sediment regime, including the timing, volume, and character of sediment delivery to the reach is also an important issue. The Watershed Analysis estimated that substantial project-induced erosion had replaced only half of the original sediment load trapped by Lemolo Dam. A decrease in riparian vegetation and potential channel straightening in this reach from pre-project conditions may be related to decreased sediment delivery.

The multiple benefits that would accrue from reconnecting Warm Springs Creek to the Lemolo 2 bypass reach were apparently overlooked by the watershed analysis and parties to the Settlement Agreement. The reconnection of Warm Springs Creek would improve habitat connectivity, restore important components of the sediment regime (i.e., timing, volume, and character), as well as provide a more natural hydrograph.

6. Aquatic Connectivity - Section 3.4.2.7:

The analysis in this section is flawed in that it overstates the certainty and level of benefits associated with measures contained in the SA, while incorrectly capturing the NGO's recommended measures and suggesting that the NGO alternative provides similar benefits. Because the DEIS provides little comparative description of mitigation or analysis, the NGO alternative appears similar to the SA despite being substantially better at protecting fish and wildlife resources.

The project facilities eliminate the function of 13 miles of Riparian Reserve, designated allocations intended to provide high quality corridors of connectivity for many aquatic and terrestrial species and restore ecosystem processes. The DEIS provides little evidence that the measures proposed in the SA will meet the function of the Riparian Reserves for all of the dependent species and processes and the Aquatic Conservation Strategy (ACS) contained within the USFS ROD 1994.⁹ The SA focuses more on a limited section of the stream and on only some aquatic organisms. This limited focus overlooks the Forest Plan ACS requirements with respect to both aquatic and riparian dependent species as well as the corridor width identified to accomplish this (Riparian Reserve widths) that was established in a science based process. The width of Riparian Reserves are intended to ensure species viability for terrestrial species, riparian species and aquatic species as described in the USFS ROD 1994. Open canals and site occupancy related to hydropower projects were found to be incompatible in the Umpqua Forest Plan (1990). Despite these requirements, the SA alternative selectively mitigates only a small part of the features and problems on site. And, the DEIS provides insufficient rationale and

⁹ Record of Decision and Standards and Guidelines for Management of Habitat for Late Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl, Attachment B (1994).

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AR 39 As discussed in section 3.4.2.7 of the final EIS, Warm Springs Creek is not diverted or intercepted by the project. We agree with the FS (2001d) that these streams already have a sufficient level of aquatic and riparian connectivity to meet FS management direction.

AR 40 The draft EIS states that many, but not all, of the NGO recommended measures are similar to those of the Settlement Agreement, and section 3.4.2.7 describes elements that are shared by the two plans, as we understand them.

AR 41 Riparian Reserves have many purposes. They maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and -associated species other than fish, enhance habitat conservation for organisms that depend on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater watershed connectivity (FS 2001d). Project facilities cross or pass through Riparian Reserves, but they do not eliminate all of their functions. Management of Riparian Reserves above and below project canals and flumes emphasizes these functions, resulting in the ability of species to move up and down slope between the riparian or aquatic zone and terrestrial areas. Only in the immediate area where a canal or flume intersects the Riparian Reserve is movement restricted up and down the drainage.

The Settlement Agreement includes provisions to reestablish the channel and floodplain at the points where the drainage is interrupted or intercepted, resulting in a much higher probability that species using the riparian zone would be able to move across or through these project features. While there would be potentially greater benefits to providing connectivity across or under the canals and flumes for the entire Riparian Reserve width, this is not necessary in order to restore physical processes and significantly improve species habitat connectivity (FS 2001d).

According to the FS (FS 2001d), a party to the SA, "Measures identified in the SA, especially in Sections 10 and 11, [would] restore ecological processes and functions and improve connectivity for aquatic and terrestrial species. Consequently, measures contained in the SA [would] ensure USDA FS objectives are attained."

Sections 3.3, 3.4, and 3.5 of the final EIS discuss the ACS and indicate staff's conclusion that the proposed Settlement Agreement and staff alternatives would be consistent with the ACS aspects of the Forest Plan.

supporting information for doing so. Rather, the DEIS relies upon illogical general statements of benefits. Since all of the species, features, and processes are interdependent, the FEIS should recognize the high likelihood that the proposed mitigation will not meet ACS objectives and other Forest Plan objectives and standards.

AR 41
(Cont)

The DEIS also overstates the expected benefits from the proposed structure at Stump Lake intended to improve aquatic connectivity for amphibians and macroinvertebrates. It is not restorative, is highly uncertain as to its efficacy, and does not address the entrainment of species in the canals by the diversion structure that will remain in place.

AR 42

The mitigation identified for White Mule Creek may improve riparian vegetation and remove the water diversion structure but the flume traversing the width of the Riparian Reserve effectively cuts off connectivity function and is causing the greatest problem, yet it is not effectively addressed. It is the same with Potter Creek.

AR 43

Further, the Conservation Groups do not support the exclusion of important tributaries such as Mowich Creek and Warm Springs Creek for "restoration" of connectivity in the SA. The DEIS states that these streams are not diverted and are connected. The Conservation Groups disagree with this conclusion. As noted above, multiple benefits would accrue from reconnecting Warm Springs Creek to the Lemoto 2 bypass reach. There are major diversion facilities into the canals immediately at the mouth of both of these streams sucking in organisms into the canals that come down the aquatic habitat with the dam further effectively capturing the water and shutting it in and any organisms that may be traveling in it. Upstream connectivity is adversely affected since most organisms would not be able to traverse the dam, diversion structures, and flumes that occupy the aquatic and terrestrial portions of the Riparian Reserve.

AR 44

While the DEIS notes that the SA calls for the reconnection 67 headwater streams, it is important to note that the mitigation only requires reconnecting the streams and flood prone area. Since these are headwater streams the "flood prone area" is very narrow but the connectivity function of the remaining Reserve width is important. Therefore the SA mitigation is substantially less than the size of the Riparian Reserve allocation that was identified as the functional area to protect and restore these resources causing uncertainty and high risk and creating a restrictive bottle-neck. Projects in Reserves are to restore impacted conditions and processes including animal and plant movement into their range of natural variability to meet the ACS. The SA does not do this.

AR 45

Finally, the DEIS provides no rationale and supporting information as to why the SA alternative is adequate to meet the function and objectives of the ACS and other Forest Plan objectives. It also ignores or overlooks analysis or discussion of the substantial information provided by the NGO alternative and other scientific information. The FEIS should be modified to more accurately reflect the anticipated benefits associated with the measures proposed in the SA and NGO alternatives. As currently written, potential benefits from the SA alternative are grossly overstated, while those likely to result from the NGO alternative are undervalued.

AR 46

7. Wildlife - Section 3.5.1.2

The DEIS should provide an evaluation and explanation of the differences in how certain mitigation between alternatives will function to meet ecosystem objectives. Unfortunately, much of the evaluation in the DEIS consists of general assertions of expected benefits, but very little quantitative analysis. For example, while claiming that the SA will improve aquatic and terrestrial connectivity, there is no description of how much connectivity and/or its adequacy in attaining the movement and connectivity functional levels and requirements needed for the

AR 47

AR 42 The proposed structure at Stump Lake (Settlement Agreement section 10.2) is not expected to completely restore aquatic connectivity for amphibians and macroinvertebrates to the condition found before the project was built in the 1950's. However, it would improve connectivity over current levels. Entrainment of animals in the canals is covered by Settlement Agreement section 10 and discussed in final EIS section 3.5.2.2.

The design specifications of the Stump Lake structure must be approved by ODFW and FS prior to the initiation of construction to insure that the design and operation of the structure would not significantly alter the operation of the diversion structure (Settlement Agreement, section 10.2).

AR 43 As proposed, removing the diversion dam and improving the riparian vegetation on White Mule Creek and Potter Creek would provide aquatic connectivity and restore Riparian Reserve function. The concrete flumes provide a limited opportunity for improving wildlife movement because they often transect very steep terrain that naturally prevents or inhibits wildlife movement and would be difficult to modify to improve connectivity (see section 3.5.2.2). Section 11.2 of the Settlement Agreement provides for the installation of 34 new wildlife crossings and for surveys in the proposed locations to identify areas where crossings would maximize benefits to rare, endemic species.

AR 44 The FS considers Warm Springs Creek and Mowich Creek to already have sufficient connectivity to meet their management goals (section 3.4.2.7), and we agree.

AR 45 We agree that the 100-year floodplain associated with steep, headwater streams is limited in area; nevertheless, reconnecting the stream and its flood-prone area by passing the drainage across canals or underneath flumes would provide connectivity for aquatic and riparian species. See also response to comment AR 41.

AR 46 See responses to comments AR 40 and AR 41.

AR 47 Except for the No-Action Alternative, all alternatives considered in the EIS would improve connectivity for terrestrial and aquatic species. The Settlement Agreement alternative would likely improve functional levels of connectivity for populations and communities as a whole in the area and would, in the long term, benefit species. Sections 3.4.2.7 and 3.5.2.2 discuss impacts of the Alternatives on aquatic and wildlife connectivity, respectively.

species of concern. Importantly, the SA measures have a low probability of maintaining functional levels of connectivity for the populations and communities as a whole in the area with adverse effects to species in the long term.

AR 47
(Cont)

8. Entrapment and Barriers to Wildlife Movement - Section 3.5.2.2:

This section contains many unsupported assertions, both as to the effects of the project and the potential benefits of proposed measures. The effects of the project on wildlife movement should be more accurately represented in the FEIS. Further, the FEIS should better describe the potential benefits of measures contained in both the SA alternative and the NGO alternative.

AR 48

The DEIS takes analysis from the Watershed Analysis that supports a broad range of waterway coverings, that includes burying, covering, and crossings, and uses it to support the implementation of just one kind of covering - the crossing structures. The Watershed Analysis, in fact, supports burying or covering long stretches of waterways in biologically rich areas. Also, in the Watershed Analysis, bridges and culvert type crossing structures were not cited as having a high likelihood for meeting Forest Plan objectives. The FEIS should recognize and more accurately characterize the ecological benefits of the various waterway coverings.

AR 49

The DEIS assertions that project waterways do not generally prevent movement by large and medium-sized animals is an overgeneralization and not supported by the record. (DEIS, p. 3-134). There has been inadequate documentation of carter, fisher, wolverine and ringtail to draw this conclusion, and in fact, some information suggests the opposite. While these species may move across forest structures with ease, some research suggests that they avoid facilities, clearings, and disturbance similar to the nature of the project (e.g. USDA GTR RM-254, USDS PNW GTR-485). In order to rely upon this rationale to justify wildlife and vehicle bridges, the DEIS must provide reliable, peer reviewed reports or publications upon which to base this conclusion.

AR 50

With regard to the SA alternative, the DEIS asserts that there could be up to "128 opportunities" for wildlife to cross the waterways (DEIS, p. 3-135). It fails, however, to identify just what constitutes such an opportunity, and as such, cannot, with any certainty, attribute potential benefits to these measures. The Conservation Groups believe that vehicle bridges and foot-bridges do not provide sufficient crossing opportunities and therefore, should not be considered as such. Additionally, the wildlife bridges have a high probability of failing to provide sufficient crossing opportunities. Therefore, without additional supporting information, it is misleading to suggest that the 128 potential opportunities are for all species.

AR 51

Further, in its analysis of the SA alternative, the DEIS asserts that the existing 8-foot-wide bridges are used by small mammals (DEIS, p. 3-136). There is, however, insufficient evidence to make such a finding. Surveys conducted by PacificCorp document some use by more invasive species favoring disturbance and no evidence of functional use by the species of concern. Importantly, the DEIS provides no discussion of the level of use, and therefore, potential benefits cannot be calculated.

AR 52

The DEIS analysis of the SA alternative also finds that the wildlife bridges will decrease chances of entrapment. There is insufficient data, however, to support this finding or that it is probable. For example, the likelihood that such bridges may increase entrapment from animals falling into the canal is just as great that entrapment will decrease. Further, animals disturbed by the ongoing daily and seasonal maintenance work may panic, choose the wrong direction, and end up in the canal. The DEIS finding regarding the benefits of wildlife bridges should be eliminated.

AR 53

AR 48 Section 3.5.2.2 of the EIS has been modified to include more detail on the effects of the project on wildlife movement and to clarify the benefits of all the alternatives.

AR 49 The ecological benefits of the various waterway coverings proposed as part of the NGO Alternative are discussed in section 3.5.2.2. The conclusion states, "Overall, this alternative would have greater beneficial effects for terrestrial species habitat connectivity than the Settlement Agreement." This conclusion has not been changed in the final EIS. However, as the FS (2001d) states, complete unencumbered movement of wildlife is not identified as a Northwest Forest Plan standard and guideline. Also, since there are no data to indicate that populations of any species have been significantly affected, the benefits of covering waterways as recommended in the NGO Alternative were found not to be worth the cost.

AR 50 These species tend to be wide-ranging and highly mobile and likely can seek out and use available crossings over the project waterways. Fisher, for example, travel an average of 3 - 4 miles per day (Powell and Zielinski 1994), and wolverines 19 - 25 miles per day (Banci 1994). Thus, the distances between crossings, an average of 1,000 feet following implementation of the Settlement Agreement, are within the capability of the species which can and do travel miles per day.

Information used in the EIS on movement of large and medium-sized animals across project waterways came primarily from the Watershed Analysis (Stillwater Sciences, Inc. 1998a). Several articles from Ruggiero et al. (1994) assess the scientific basis for conserving the American marten, fisher, lynx, and wolverine and are referenced in the EIS. These articles, written by recognized authorities, consist of literature reviews for each species and a discussion of management considerations and information needs.

Section 3.5.2.2 of the EIS has been revised to provide more specific information about the impact of the waterways on the movements of medium-size mammals.

AR 51 The 128 potential opportunities are delineated in the EIS: 25 existing and 9 new flume trestle underpasses, up to 68 wildlife bridges each 36 feet wide, 24 vehicle bridges, and two foot bridges. In addition, reconnecting Priority 1 and 2 intercepted tributaries and drainages and enlarging culverts to accommodate 100-year flood events could add about 67 additional opportunities for many terrestrial species to cross waterways affected by the project. The EIS has been revised to clarify that the crossing opportunities might not be used by all species.

- AR 52** The statement has been modified to indicate that use of existing bridges by small mammals is unknown.
- AR 53** The level of ongoing maintenance work should not increase under the Settlement Agreement. Thus, animals should not be disturbed more by such work under the Settlement Agreement than they are under the current license, so entrapment from panic should not increase. Any effects during proposed construction activities should be minor and short-term. Also, with many additional crossing opportunities under the Settlement Agreement any animal that is disturbed to the point of panic would be more likely to find an opportunity to cross rather than fall into and be entrapped in one of the canals than under the No-Action Alternative.

The DEIS highlights the monitoring intended to determine the efficacy of wildlife crossings. It notes that based on this monitoring, PacifiCorp may be required to install up to 5 additional crossings (DEIS, p. 3-136). The rationale for these additional crossings is unclear. If monitoring illustrates that the existing bridges are insufficient, what is the justification for adding additional crossings? While the Conservation Groups strongly support a comprehensive monitoring program, it must be much more clearly defined with proposed solutions intended to address the flaws of the existing measures. A commitment to construct additional crossings is absolutely meaningless without a greater understanding of the underlying measures. However, it is important to note that there are critical components and limitations associated with any monitoring program. Effectiveness of any program must consider the condition of the associated populations. Due to differences in species population characteristics and habitat relationships that continue to be poorly known, it is highly unlikely that any "track plate, camera, or video stations focused strictly on use of bridges would provide reliable evidence of effectiveness. And, it is insufficient to rely simply on reports of animal entrapments in the watersheds. Survey methods consisting of the current casual observations of project maintenance staff are not reliable.

AR 54

The OEIS incorrectly characterizes measures proposed in the NGO alternative as suggesting that only Riparian Reserves within the areas would be covered, buried, or elevated (DEIS, p. 3-137). The proposed 12 foot width for wildlife bridges in lower priority areas was the size presented by PacifiCorp at the time of the Watershed Analysis with no scientific basis. The width should be increased to 36 feet every 400 feet in the low priority areas.

AR 55

In addition, the DEIS fails to adequately consider supporting information and analysis provided to FERC in support of the proposed mitigation measures in the NGO alternative. Rather, the DEIS relies upon Forest Service assertions that there is little evidence to indicate that any particular species has been affected to a significant degree (i.e. population persistence or viability) by project-induced loss of connectivity or fragmentation for either terrestrial or riparian/aquatic species, particularly at the landscape level (DEIS, p. 3-138). The FEIS should incorporate and consider that information.

AR 56

Finally, despite information documenting increased reliance on the ability of individuals to move through the forest matrix and riparian reserves to maintain population persistence under the current habitat conditions, the DEIS fails to discuss this. The DEIS does not acknowledge or consider that the barrier effect of the waterways, dams, transmission lines and project roads directly and severely effect the function, of landscape features and allocations in the Forest Plan intended to address the need to maintain population persistence, while providing multiple use, by facilitating movement within and between habitat patches. Cumulatively, the ongoing barriers of the project facilities combined with other multiple uses create an ever changing, patchy habitat condition with increasing human activities, supporting a high risk and probability of population extirpation.

AR 57

9. Impacts on Wetland Habitat - Section 3.3.2.3

Although the DEIS states that the settlement agreement intends to restore riparian connectivity across the landscape and create an environment that supports healthy populations of stillwater amphibians, there is a general lack of information on many of these species, such that these assertions are not justified. Studies show that some move between wetland habitats and upslope terrestrial habitats, others can move in the larger Riparian Reserve areas corridors, while still others stick to the stream edges when moving between essential habitats to fulfill their life history requirements. The limited level of connectivity provided by the SA alternative provides greater

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AR 54 As stated in the EIS, PacifiCorp would develop and implement, in consultation with FS and ODFW, a monitoring program to evaluate the effectiveness of the crossings in providing opportunities for wildlife to cross the project facilities. Monitoring results would incorporate an adaptive management element that could lead to the placement of up to five additional crossings at other locations and also to the movement of structures to better locations where other terrestrial species might be benefitted (FS 2001d).

AR 55 Text in the EIS has been revised to clarify the characterization of the NGO alternative.

AR 56 Much of the information provided to FERC in support of the mitigation measures in the NGO Alternative came originally from the FS. However, they were preliminary draft working documents that have been superseded by the Justification Statements filed with the Commission in January 2002. Based on our review of the record, we agree with the FS that there is little evidence to indicate that any species population has been affected to a significant degree by project facilities.

AR 57 The cumulative impacts of the project on terrestrial resources are discussed in section 5.2.4 of the EIS. Many of the impacts from timber harvesting, roads, and other activities described in that section would continue under any of the alternatives. However, any of the alternatives except the No-Action Alternative would include measures (e.g., road decommissioning, additional wildlife bridges) that would improve habitat and connectivity within the project area and contribute to the reduction of cumulative impacts on terrestrial resources. Thus, in conjunction with other elements of the Northwest Forest Plan these measures would reduce the risk and probability of extirpation of a population of a species.

AR 58 The existing Project facilities have disrupted aquatic and terrestrial connectivity throughout the watershed and adversely affected amphibians by reducing their ability to move within the watershed and across the landscape. However, according to the FS (FS 2001d), "(t)here is little evidence to indicate that any particular species has been affected to a significant degree (i.e., population persistence or viability) by Project-induced loss of connectivity for ... riparian/aquatic species." Section 3.5.2.2 of the EIS discusses the addition of crossing structures under the Settlement Agreement that would increase the level of connectivity over that currently existing and would significantly improve habitat conditions for amphibians.

risk that these species will not maintain healthy populations. To be able to claim that the environment will support healthy populations of these species requires a reliable terrestrial connectivity strategy; these are not separate elements.

AR 58
(Cont)

10. Forest Service Sensitive Species and Survey and Manage Species – Section 3.5.2.5

The DEIS substantially misapplies and omits FS policy, as well as NEPA and Forest Plan Requirements. This provides an unbalanced focus on describing the terms of the SA rather than analyzing the environmental consequences effectively failing to show the conclusions are reliable (DEIS, p. 3-148). First, the relicensing of the hydroelectric project is a proposed action, and as such, the associated ongoing impacts to sensitive species must be considered and mitigated through the biological evaluation process. This includes surveys sufficient to assess the potential impacts of actions on populations and habitat, relative to the ability to avoid impacts. It also includes analysis of direct, indirect, and cumulative effects on these species. It requires compliance with the standard in the Forest Plan (1990) that states, "any management activity that will negatively affect a plant or animal species listed on the Regional Forester's Sensitive Species list, or their habitat will be modified to either avoid (preferable) or minimize the impact". The DEIS has not addressed these requirements in relation to the ongoing impacts of the hydroelectric project in the relicensing process. Rather, the DEIS limits these requirements to only those smaller activities that may be done in the subsequent license period and limits the survey area to 400 feet around any ground or habitat disturbing activity that might result from the SA alternative. Such an approach fails to adequately address the policy, impacts and risks for these species.

AR 59

Finally, the DEIS provides a list of the items that would be required in a sensitive species plan (DEIS, p. 3-149). The list, however, fails to include the requirement that impacts must be avoided or minimized, as required by Forest Service policy. Efforts to survey and complete biological evaluations must be accompanied by a clear statement of changes necessary to avoid or minimize impacts to any listed species or discovered listed species, as is required for all other FS activities.

AR 60

11. Federal and State-Listed Species – Section 3.6.2.1

The DEIS states that "any changes in the project that would, in general, improve habitat conditions for aquatic and terrestrial species would also improve habitat for federally and state-listed species" (DEIS, p. 3-164). This finding, however, depends on the kind of changes proposed and the species currently included on the list, which are likely to change over the period of the license. For example, a change that benefits a particular species may not in any way improve conditions for any other species. The DEIS, therefore, should provide this clarification to avoid overstating the potential benefits to listed species likely to result from the proposed measures.

AR 61

In addition, in its analysis of potential benefits to northern spotted owls from acquiring riparian easements in the Rock Creek Basin and enhancing habitat in the Pease Creek Basin, the DEIS fails to consider potential improvements from on-site rather than off-site mitigation. (DEIS, p. 3-167). On-site mitigation provides a greater opportunity to improve nesting, foraging, and dispersal habitat for the northern spotted owl than off-site mitigation. Since the proposed off-site easement is a narrow corridor surrounded by intensively managed private lands, it would not likely improve or provide nesting and foraging habitat. Moreover, improving connectivity for prey species would best be done in the project area by burying the ditches where greater gains can be achieved in all spotted owl habitat.

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AR 59 The ongoing impacts of the project are covered as part of the No-Action alternative in the EIS. See response to comment FS 117 about the biological evaluation.

AR 60 FS requirements for sensitive species are detailed in a footnote in section 3.5.1. See response to comment FS 117.

AR 61 We agree that habitat changes affect species differently. Therefore, we have deleted the indicated sentence from the final EIS.

AR 62 The EIS and the BA consider potential improvements from on-site PM&E measures under the Settlement Agreement alternative, including:

- restoring riparian habitats on White Mule and Popper Creeks, reconnecting tributary streams affected by project waterways, and enhancing and monitoring wildlife crossings of project waterways would improve habitat quality, quantity, and connectivity for small mammal prey species for the northern spotted owl; and
- modifying power poles that represent electrocution hazards, scheduling operations and maintenance activities and helicopter surveys of transmission lines near active raptor nests outside the nesting season unless the site is occupied or nesting efforts fail and there is no possibility of continued nesting, and continuing the Agreement for Management of Birds on Powerlines would reduce the risk of electrocution and disturbance of ... northern spotted owls and would maintain the current level of reporting on incidences of raptor mortality.

The EIS also discusses measures under the NGO Alternative that would improve terrestrial connectivity and reduce impacts on listed species.

The DEIS provides insufficient information to support the conclusion that "restoring riparian habitats and reconnecting tributary streams and enhancing and monitoring wildlife crossings of project waterways would improve habitat quality, quantity, and connectivity for small mammal prey species for the northern spotted owl..." (DEIS, p. 3-167). First, the quantity and quality of habitat for spotted owl prey will not be improved by the proposed mitigation in the SA alternative. Second, the proposed mitigation is likely inadequate to facilitate movement of species to a level that supports the numbers of individuals necessary to provide a substantial prey contribution. On the contrary, it is more probable that populations of spotted owl prey species will decline over the long term under the SA alternative. The FEIS must provide additional rationale and information to support its conclusion.

The DEIS acknowledges that the extent of increased recreational activities and their potential impacts on bald eagle is unknown (DEIS, p. 3-167). Such uncertainty is unacceptable. Since it is possible to identify the potential types of recreation, as well as different levels and densities of use, threshold determinations of adverse effects can be estimated. The recreation management plans should then specify the threshold levels and types of recreational activities that are not to be exceeded and the types of recreation activities that are not allowed. The FEIS must adequately analyze the potential effects of recreational development prior to a finding that the proposed environmental measures sufficiently protect fish and wildlife resources affected by the project.

There are insufficient data to conclude, as the DEIS does, that the Settlement Agreement would not adversely affect the wolverine (DEIS, p. 3-168). This conclusion is based on the rationale that the species is not known to occur in the area. However, the DEIS fails to consider that (1) the company did not effectively survey or "study" the species, (2) there are a reasonable number of reliable observations of wolverine in recent years in the project analysis area such that one cannot conclude absence, and (3) there is a high likelihood that this species is adversely affected by the cumulative effects of multiple use activities, particularly features like the project, which would be within its' home range, and as such, may be at drastically low numbers making it more difficult to detect. What is clear is that there is habitat in the project area, and that project and other roads, waterway structures, and transmission lines cumulatively contribute to adversely impact the suitable habitat for this species.

Further, the rationale upon which the DEIS concludes that the disturbance to wolverine created by the project would be unlikely to affect the population is unjustified. The disturbing character of project maintenance - daily patrol, plowing, scooping debris out and fixing canal failures of the open canals and flumes - is the very kind of impact that would deter the species from being able to use and move through the habitat in the area. And, there is insufficient data to support the determination that the proposed mitigation in the SA will improve and enhance connectivity for these species. Chronic maintenance and monitoring disturbance of the open canals may deter the wolverines from using the bridges and it is unclear how the wolverine would react if it did encounter the bridge. In contrast, canal burial would require less maintenance, resulting in reduced disturbance, and would provide a more effective means of movement. Such measures would have greater probability of addressing ongoing impacts to wolverine habitat connectivity.

12. Unavoidable Adverse Impacts - Section 3.11

The DEIS asserts that project structures such as penstock and flumes would continue to present barriers to movement for some wildlife species. This section should discuss the high probability of impacts to populations, viability risk and reduction in prey species populations such as those that are important to the northern spotted owl, the great gray owl and others as discussed above in

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AR 63 The diet of spotted owls varies with the season and includes a variety of mammals, birds, and insects, with mammals comprising 92 percent of all prey taken in one study (PacifiCorp 2002a). In general, diets were dominated by flying squirrels, red tree voles, and woodrats in forests of Douglas-fir and western hemlock in southern Oregon. These small mammals are some of the species for which the Settlement Agreement alternative would improve habitat connectivity, as analyzed in section 3.5.2.2 of the EIS.

AR 64 Several aspects of the RRMP (e.g., focusing recreational activity in defined areas; establishing procedures and funding for monitoring, law enforcement, and forest plan compliance) as discussed in sections 3.6.2.1 and 3.8.2.1, could benefit bald eagles. It is not possible, however, to define the level of recreation increase that would begin to adversely affect nesting success and use of project reservoirs. In general, the avian protection measures contained in section 13 of the Settlement Agreement would minimize eagle disturbance by restricting operation and maintenance activities, including those related to recreation, near active nests during the nesting season.

A bald eagle nest plan for Toketee Reservoir (FS 2000e) was developed to comply with the Umpqua National Forest Land and Resources Management Plan (FS 1990). The Settlement Agreement would include funds to implement guidelines in that plan for managing activities that might impact eagles. The plan includes continued monitoring of nest site use, productivity, and timing of nesting activities. If recreational activities are found to be adversely affecting nesting, additional measures could be developed and the license amended, with opportunity for hearing and comment, upon the request of PacifiCorp, FWS, or the Commission.

Section 3.6.2.1 of the final EIS has been modified to provide more details on the impact of recreation on bald eagles.

AR 65 Information from the FS that wolverine have been observed in the Diamond Lake Ranger District has been added to the EIS. The EIS has been revised to clarify the potential impacts of the Settlement Agreement and NGO Alternative on the species. See also response to comment AR 50.

AR 66 See responses to comments AR 50 and AR 65.

AR 67 As discussed in sections 3.5.2.2 and 3.6.2.1, there would not be a high probability of impacts to populations or viability risk and reduction in prey species populations such as those that are important to special status species (e.g., northern spotted owl). The statement in the draft EIS that major portions of the waterways would be covered under the No-Action Alternative has been corrected to indicate that it would be done under the NGO Alternative. The comparison of impacts of the alternatives is done in other sections of chapter 3. The purpose of this subsection is to identify the unavoidable adverse impacts under each alternative.

the wildlife comment section. This section also states that the SA alternative would improve this condition. However it has not been established that bridges would provide a functional level of connectivity so as to improve the condition. Also the section states, "or in the case of the No-Action Alternative, by covering major portions of the waterways. This is an incorrect statement. This section in general should convey the adverse effects that would not be avoided if the SA alternative is selected in comparison to the NGO alternative.

AR 67
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13. Relationship Between Short-term uses and Long-term Productivity - Section 3.13

This section lacks content and conveys erroneous information when there are significant differences between the alternatives and how they provide or reduce long-term productivity. For example the SA alternative and the No-action alternative reduce productivity of wildlife and plant populations due to the continued impacts to connectivity. The NGO alternatives for aquatic and terrestrial resources have a high probability of improving connectivity to an effective level so as to maintain stable populations of wildlife and plants.

AR 68

14. Developmental Analysis - Section 4.1

In addition to the comments provided above regarding this section, this section should include the benefits of implementing the NGO alternative to the community in the form of the substantial restoration work that could provide long-term family wage jobs.

AR 69

15. Cumulative Effects - Section 5.2

This section is an attempt to place the blame and responsibility for addressing cumulative effects on actions that the Forest Service should take while not adequately addressing the effects of the project. As a result, the DEIS fails to adequately recognize the project's contribution to ensure conditions that meet overall multiple use objectives including wildlife and aquatic resources.

AR 70

III. FERC STAFF PREFERRED ALTERNATIVE

A. Effectiveness Monitoring - Proposed modifications to Staff Alternative

The Staff Alternative modifies the SA alternative by adding four additional components. Two of the four are an explicit acknowledgment that the Settlement Agreement relies almost entirely on unproven techno-fixes. In particular, the Staff Alternative focuses on the need to add comprehensive "effectiveness monitoring (including detailed ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed) into the development of monitoring plans and programs."⁹⁰ The Conservation Groups strongly support the need for a comprehensive monitoring program to assess the effectiveness of any measures contained in the license.

AR 71

"Effectiveness monitoring", however, is not defined in the DEIS, nor are any details regarding the "ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation" provided. As such, we recommend that the Staff Alternative be further modified to (1) detail the ecological objectives, procedures and criteria for evaluating ecological effects through both effectiveness and validation monitoring; (2) establish 5 or 10 year intervals for review of monitoring results for adaptive management through additional mitigation or project modifications; and (3) require that the burden be on the licensee to

AR 72

⁹⁰ DEIS, p. xvi.

AR 68 The differing impacts of the alternatives are discussed earlier in section 3. The purpose of this subsection is to describe the relationship between short-term uses and long-term productivity.

AR 69 The purpose of the Developmental Analysis section is to estimate the project's net annual benefits to PacifiCorp under each alternative based on the difference between the power production cost and the power value (which is based on the cost of obtaining the same amount of power from a likely alternative source). The Developmental Analysis is not intended to reflect potential economic benefits to the local community from the various alternatives. We agree that there would be new jobs associated with Soda Springs dam removal and project area restoration under the NGO Alternative, but there would also be new jobs associated with implementing the mitigation and enhancement measures proposed under the Settlement Agreement Alternative, such as jobs associated with the construction of a fish ladder and construction of wildlife bridges. We conclude, however, that most of the new jobs created under any of the alternatives would be temporary and would provide only short-term (rather than long-term) economic benefits to the local community. We have not discussed these potential short-term economic benefits in the EIS because we conclude that they would not be significant in the context of the regional economy.

AR 70 The project is only one of the many activities that produce cumulative impacts to multiple use objectives in the Umpqua National Forest. Thus, section 5.2 of the EIS summarizes the impact of actions other than the project that contribute to cumulative impacts. The final EIS also discusses how the proposed actions would interact with these other actions.

AR 71 Monitoring would be undertaken to determine if the relicensed project is meeting the objectives set out in the Settlement Agreement. That is, its purpose would be to determine whether the measures being implemented are successfully improving habitat conditions. Monitoring plans would be developed by PacifiCorp in consultation with the FS, BLM, and other members of the RCC after a license is issued. The proposed monitoring plans would be prepared in consultation with the resource agencies. The RCC would facilitate coordination and consultation on the plans developed by PacifiCorp. As discussed in section 2.3.1 of the final EIS, staff recommends that plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement would need to be submitted to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation.

demonstrate that the ecological objectives are being met and, if not, that non-techno-fix options be implemented as additional mitigation.

As described in the 1994 USFS ROD, there are three components of monitoring¹¹, all of which should be a part of any license issued here: *implementation monitoring* to determine if the license terms (including the plans required to be filed under the terms of the Staff Alternative) are being followed; *effectiveness monitoring* to verify whether the desired results are being achieved; and *validation monitoring* to determine if underlying assumptions are sound.¹² All three levels of monitoring and the role they play in adaptive management are further described and discussed in the ROD.¹³

In addition, to ensure their effectiveness, the Commission should require peer review of all monitoring plans prior to approval. Because of the Staff Alternative's acknowledgment of the vital role effectiveness monitoring should play in any license issued for this project, these comments will focus primarily on that component. At a minimum, effectiveness monitoring should include the following:

1. *Sediment Regime*: This category includes the gravel augmentation below Soda Springs (including source areas), the proposed alluvial projects in the Slide and Soda Springs By-pass reaches (including source areas), and recovery of the Toketee By-pass reach from the reconnection of the Clearwater River.

a. *Monitoring purpose*: To assess and compare the effectiveness of the proposed measures in restoring the sediment regime, as compared to what would be expected in the absence of the hydropower project. It is equally important to assess the impacts to the source areas that are "mined" to provide the coarse sediment for some of the projects.

b. *Monitoring Parameters*:

- i. The total amount of sediment, including a comparison to the expected natural range.
- ii. The character of the sediment, including the relative size distribution, geologic make-up, and chemical content.
- iii. A description of sediment transport, including such measures as the amount, frequency of movement, distance traveled relative to discharge, and ultimate destination.
- iv. A description of deposition, including size distribution, location, and ecological interactions (e.g., hyporheic connections, riparian function, biotic responses, etc.).

c. *Possible Methods*: Sediment traps, pebble counts, freeze cores, lab analysis of hardness, chemical content, etc., macro invertebrate sampling (ABA protocol or equivalent), spawning surveys, aquatic habitat inventories.

2. *Fish Passage at Soda Springs Dam*:

a. *Monitoring Purpose*: The purpose of this element is to assess the effectiveness of upstream and downstream fish passage facilities for all expected native salmonid species and Pacific lamprey.

b. *Monitoring Parameters*:

¹¹ ROD, E-1.

¹² Through the studies suggested in the DEIS, p. v.

¹³ ROD, attachment E.

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AR 72 Comments on the draft EIS from parties to the Settlement Agreement (e.g., FS 4, FS 116, and SP 4) indicated that effectiveness monitoring and adaptive management have been considered in the settlement discussions and that it is premature to specify monitoring conditions for plans that have not yet been developed. Monitoring plans would be developed by PacifiCorp in consultation with appropriate agencies, and the RCC would facilitate coordination and consultation on any such plans. Section 2.3.1 of the final EIS identifies those plans staff recommends be filed with the Commission for review and approval and indicates that, in developing these plans, PacifiCorp consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

AR 73 See response to AR 71.

AR 74 Monitoring of gravel augmentation below Soda Springs dam would be required by Section 7.2 of the amended Settlement Agreement. Requirements for a monitoring plan are contained in Section 7.2.2.

Section 8.2 of the Settlement Agreement requires monitoring of the effectiveness of the Slide Creek Bypass Reach Habitat Enhancement Project. It contains specific requirements for monitoring the quality and quantity of spawning habitat, including a requirement for a baseline survey of habitat conditions, as well as subsequent monitoring to assess the effectiveness of the project in enhancing spawning habitat.

The Soda Springs Bypass Reach Alluvial Restoration Project is no longer included in the Settlement Agreement, as amended. Instead, Section 8.3 of the amended agreement would require PacifiCorp to design and implement the North Umpqua River Habitat Restoration/Creation Project. It contains specific requirements for monitoring the effectiveness of these measures, including a requirement for a baseline survey of habitat conditions, as well as subsequent monitoring to assess the effectiveness of the measures in restoring or creating spawning habitat.

The Settlement Agreement does not identify specific objectives or associated monitoring needs related to the recovery of the sediment regime in the Toketee bypassed reach following the reconnection of the Clearwater River, which is addressed in Section 7.5 of the agreement.

Also see responses to AR 71 and AR 72.

AR 75 Monitoring of upstream and downstream fish passage at Soda Springs dam is called for in Settlement Agreement sections 4.1.1 and 4.1.2, respectively. The monitoring plan would be developed in consultation with the agencies. Operation of the fish screen and downstream passage facilities would conform to the performance standards described in Settlement Agreement Appendix B.

- i. Amount of upstream delay/avoidance by adult and juvenile salmonids and adult lamprey.
- ii. Amount of pre-spawning mortality.
- iii. Location, timing, and abundance of spawners.
- iv. Quantity and quality of spawning habitat, including biotic.
- v. A characterization of survival rates of all life history stages (eggs, emergent fry, rearing juveniles, smolts, and adults).
- vi. A measure of productivity for all species of interest.
- vii. Amount of loss from predation in Soda Springs reservoir.
- viii. Amount of loss at downstream passage facilities.
- ix. Amount of loss from delayed downstream mortality from all sources, including injury, disease, and predation.

c. Possible Methods: Radio tagging, mark and recapture studies, out migrant trapping, stomach analysis (of predators), spawning surveys, pebble counts, emergent fry traps, macro invertebrate assemblage (ABA protocol or equivalent).

3. **Habitat Improvement Projects:** This would primarily be at the proposed off-site project sites in Rock, Canton, and Pass Creeks.

a. **Monitoring Purpose:** The purpose of this element is to assess the effectiveness of fish habitat improvements in improving fish habitat quality, increasing habitat quantity, and improving overall aquatic health in treated streams. The goal is to increase survival (and thus production) of native, wild fish.

b. **Monitoring Parameters:**

- i. Determine what is the relation between targeted native fish and the abundant hatchery fish present in Rock Creek.
- ii. Specifically determine if there are any wild fish left (coho, chinook, summer steelhead) in Rock Creek.
- iii. Assess the quantity and quality of treated habitat, including a biotic assessment.
- iv. Characterize survival rates of all life stages, eggs to adult, for all species of interest.
- v. Determine productivity for all species of interest.

c. Possible Methods: Radio tagging, out migrant trapping, mark and recapture studies, genetic analysis (mitochondrial DNA, micro-satellite or other appropriate method), spawning surveys, emergent fry traps, macro invertebrate monitoring, thermographs.

4. **Flow Regimes:** This element would apply throughout the project, in both by-pass and full-flow reaches.

a. **Monitoring Purpose:** The purpose of this monitoring is to assess the effectiveness of prescribed instream flows, including ramping proposals in full-flow reaches, in attaining aquatic ecosystem health, relative to what it would be without the hydropower project. Evaluate the applicability of the Spatial Niche Analysis.

b. **Monitoring Parameters:**

- i. Assess the quantity and quality of aquatic habitats, including a biotic assessment, of all diverted reaches.
- ii. Assess the effects of ramping (generally) and assess the effectiveness of the Lemolo 2 discharge modification (via the Sinkhole).

AR 75
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AR 76

AR 76 Components of the monitoring plan for off-project sites would be developed through a collaborative scientific review process involving ODFW, PacifiCorp, the RCC, and other interested agencies and groups (Settlement Agreement Section 19.1 and Appendix E).

AR 77

AR 77 Evaluation of the effectiveness of instream flow releases and ramping is included under Settlement Agreement sections 5.2, 5.3, and 6.2.1. The study plans would be developed by the parties to the Settlement Agreement.

c. Possible Methods: Aquatic habitat inventories, macro invertebrate assemblage monitoring, Spatial Niche Analysis.

5. *Vegetation Management*: This category addresses vegetation management and operation activities along the transmission lines, canals, flumes, and other facilities.

a. Monitoring Purpose: To assess the efficacy of improving wildlife habitat and connectivity in relation to the proposed vegetation management as compared to what would be expected in the absence of the hydroelectric project. This includes maintenance and hazard reduction activities, use of truck and other vehicles, vegetation height, plant species and structural habitat provided, invasion of noxious and non-native plant and animal species, hazard tree treatment, and fire spread rate in different vegetation types.

b. Monitoring Parameters:

- i. The reduction of forest fragmentation impacts through measuring relative abundance, selection and use of cover, forage, dispersal rates and nesting by species sensitive to fragmentation¹⁴ and comparing to use and dispersal rates outside the project area in comparable land allocations (matrix, riparian reserve, LSR).
- ii. Measure nesting/decaying/foraging for species dependent upon snags, wildlife trees & down wood¹⁵, in relation to disturbance & hazard tree removal.
- iii. Measure foraging use by season in relation to maintenance and operation activities for species utilizing ground level vegetation.
- iv. A description of the abundance, distribution and trend of noxious and exotic plants and animals.
- v. A description of how the resulting vegetation community and structure are facilitating ecological functions such as prey base population abundance, native seed dispersal, nutrient cycling.

c. Possible Methods: Telemetry, drift fence and pitfall/trap traps, grid sampling, track plates, camera-bait stations, nesting habitat/colony surveys, vegetation transects pre and post implementation, invertebrate collection transects, identification and comparison of seed dispersal and nutrient agents and rates of movement.

6. *Wildlife Entrapment and Barriers to Wildlife Movement*:¹⁶ This element monitors canals, flumes, penstocks, dams and associated facilities with wildlife bridges, vehicle bridges and foot crossings identified to maintaining biological flows that sustain well distributed wildlife populations in relation to the barriers created by the project.

a. Monitoring Purpose: To measure and compare the effectiveness of proposed measures in providing expected levels of biological flows to sustain well distributed animal and plant

¹⁴ Focal species from Appendix A DEIS to be monitored: Amphibians and Reptiles: clouded salamander, tailed frog, western toad, northern red-legged frog, sharp-shinned hawk. Mammals: pacific shrew, red tree vole, Pacific fisher, pine marten. Birds: Northern Goshawk, Pileated woodpecker, Harlequin duck, Great gray owl.

¹⁵ Northern Goshawk, Pileated woodpecker, Harlequin duck, Great gray owl, Long-eared myotis, martin, fisher.

¹⁶ DEIS 3.3.2.2

AR 77
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AR 78

AR 78 Monitoring for revegetation and noxious weed control would be included in the Vegetation Management Plan to be developed under section 12.1 of the Settlement Agreement. See also response to AR 72.

AR 79

AR 79 A monitoring plan addressing wildlife entrapment and barriers to wildlife movement would be implemented as part of section 11.3 of the Settlement Agreement. See also responses to comments AR 54 and 71.

AR 79 (Cont)

populations in Forest Plan allocations¹⁷ (natrix, riparian reserve, LSR) in the lands occupied by project facilities. Measure the frequency and rate of outmigrant for species not previously measured in all seasonal conditions. Assess the effectiveness of proposed measures to minimize outmigrant into the canals.

b. Monitoring Parameters:

- i. Measure local demographics and population trends of species of concern within affected area¹⁸. Amount of emigration and immigration between patches of habitat and sex ratios needed to provide biological flows that sustain well-distributed local populations.
- ii. Assess the comparative function and effective rate of plant seed and flagi spore dispersal across barriers (via animal movement, water movement, and other means) to expected natural range.
- iii. Measure rate of successful and unsuccessful movement of species of concern and important prey species across wildlife bridges, vehicle bridges, foot bridges and over structures associated with dams in terrestrial habitat in all seasonal conditions. Compare to normal movement and dispersal rates that support well distributed populations including an assessment of sex ratio and age of successful individuals.
- iv. A description of the cumulative effects of shifting habitat patch mosaics due to other land management activities and road densities on biological flows and population condition and trends for species of concern and important prey species.
- v. Measure season, frequency and location of outmigrant of species of concern and important prey species into waterways and include its influence upon cumulative effects analysis of population condition and trends and important prey species abundance.
- vi. Measure habitat quality on crossing structures including soil moisture in summer seasons, snow conditions in winter, vegetation cover, structures for cover, amount of bare soil cover, amount of human use.

c. Possible Methods: Telemetry, mark and recapture, grid trapping, drift fence and pitfall trapping, band search and transect protocol, track plates, pit tagging, camera stations, metapopulation measurements and modeling.

7. Avian Protection Monitoring¹⁹

a. Monitoring Purpose: Avian nesting areas are dynamic and expected to change over time. The purpose of this element is to ensure that nesting areas are identified and the effectiveness of disturbance mitigations measured to ensure reproductive success of avian species of concern. This element also monitors instances of colliding with project transmission lines or other features. The DEIS states FS did not identify instances of problems with collisions or electrocution; however this has not been adequately monitored.

b. Monitoring Parameters:

- i. Annual survey of nesting habitat for avian species of concern (Appendix A DEIS).

¹⁷ Matrix - landscape habitat providing unimpeded movement between patches of suitable habitat. Riparian Reserves and LSR - suitable habitat providing unimpeded movement within high quality cover, food sources, nesting and reproduction.

¹⁸ Species of concern from Appendix A DEIS: Amphibians and Reptiles: claudia allamander, tailed frog, western toad, northern red-legged frog, sharp-shinned hawk, Montane Pacific sparrow, red tree vole, western red-backed vole, Pacific fisher, pine marten, weaver.

¹⁹ (McCallough 1993). Hoyer et al. (1994) Monitoring and Monitoring Biological Diversity, Standard Methods for Amphibians.

in DEIS 3.3.2.4.

AR 80

AR 80 Avian protection would be monitored following measures delineated in section 13 of the Settlement Agreement and FWS's incidental take terms and conditions (FWS 2002b). See also response to comment 71.

- ii. Monitoring of reproductive success and productivity of all known and newly discovered active nests in relation to the effectiveness of implementation of disturbance mitigation measures.
- iii. Seasonal survey of transmission lines to detect and measure instances of mortality associated with collisions or electrocution.

AR 80
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c. Possible Methods: Published protocols and USPS protocol documents suitable for monitoring are available for the Northern goshawk, pileated woodpecker, great gray owl, black backed woodpecker, peregrine falcon, bald eagle, and harlequin duck.

8. Forest Service Sensitive Species and Survey and Manage Species²⁰, and USFWS Proposed Threatened, Endangered, Candidate and Species of Concern and State Listed Species²¹. This category includes meeting all policy and Forest Plan standards and guidelines for current and new species identified in the future during the period of a new license.

AR 81

AR 81

Rare species would be surveyed for or monitored under various sections of the Settlement Agreement (e.g., section 11.3 for wildlife, 11.5 for wetland species, 12.1 for vegetation, 21.5 and 21.7 for rare, endemic species within 400 feet of any ground- or habitat-disturbing activity). See also response to comment AR 71.

a. Monitoring purposes:

i. Sensitive species: a) Ensure that the North Unapqua Hydroelectric Project thoroughly explores and incorporates mitigation measures that effectively avoid ongoing and new impacts (Unapqua Forest Plan Standard IV pg. 37). It is important therefore to include a feasibility analysis backed by supportable data that provides sufficient evidence as to why a particular mitigation measure to avoid ongoing and new impacts is not feasible. If avoidance of impact is feasible, that measure should be taken. If it is not feasible to avoid an impact, it is to be minimized to the greatest extent possible. It is therefore also important to provide evidence and rationale as to why mitigation is the most effective, feasible mitigation and is highly likely to minimize the impacts. Further sufficient evidence and information is important to support a conclusion that a loss of a colony or population important to the distribution of the species will not occur (Unapqua Forest Plan Chapter IV pg. 37). b) Sensitive species populations are to be monitored in relation to the project to evaluate the effectiveness of mitigation. Thresholds for further action are a 20% decline in plant population and a 10% decline in animal population site specific to the activity area (Unapqua Forest Plan Chapter V pg. 19). It is also important to monitor mitigation that is to provide essential habitat function such as ensuring effective connectivity.

ii. Survey and Manage Species: The Northwest Forest Plan ROD 1994 described monitoring requirements. These requirements include monitoring that evaluates populations and distribution of species. It is also important to monitor necessary habitat function and components such as ensuring effective connectivity.

iii. USFWS and State P.T.A.E. C and SOC: To monitor effectiveness of population and habitat recovery, and other mitigation measures including connectivity, extirpation risks, and impacts of direct and indirect disturbance activities such as project operations and maintenance and recreational developments as a result of project impoundments and facilities.

b. Monitoring Parameters:

i. Measure and analyze population dynamics and population trends of each listed species within the influence zone of the project area ("activity area" UNF Forest Plan V pg. 19). Monitor the 5 types of biological flows required by different species to meet different requirements (breeding, feeding, over-wintering, dispersal (immigration and

²⁰ DEIS, 15.2.5.

²¹ DEIS, 14.2.1.

AR 81
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transmigration) and migration). Measure frequency and season of movement between patches of the different habitats associated with the 5 types of biological flows and set ratios needed to evaluate the effectiveness of levels of biological flows that will maintain well-distributed local populations.

ii. Measure habitat conditions including level of access to habitat components within or adjacent to project area. Measure diversity and productivity of food sources to determine if they are effective in providing forage. Measure quality of cover and breeding habitat and any other habitat requirements to determine if mitigation measures have effectively addressed species needs and avoided or minimized impacts.

iii. Measure and analyze rate of successful and unsuccessful movement of species of concern and important prey species across wildlife bridges, vehicle bridges, foot-bridges, dams and diversion structures associated with dams in terrestrial, riparian and aquatic habitats in all seasonal conditions in which movement activities are expected. Compare to an expected and desired normal range of movement and successful dispersal rates for these species to reverse declining trends and support recovery to well-distributed viable populations.

iv. A description of the abundance, distribution, trend and rate associated with invasive exotic plants and animals that may impact P, T&E, C and SOC, sensitive, and survey & manage species populations or habitat.

v. Determine whether there are unexpected changes in habitats or populations for species that were not identified as species of concern during the planning process.

vi. Measure activities that in theory to cause disturbance to any of the P, T&E, C and SOC, sensitive, and survey & manage species.

c. **Feasible Methods:** Method of data collection depends on species but includes grid sampling, telemetry, transect sampling, capture and recapture, monitoring of nesting or breeding productivity, sex ratio and maturity and molting. Monitoring of the timing, length, frequency, coloration and location and activity levels in relation to disturbance. A review of published data collection methods combined with an independent review of monitoring objectives, questions and methods by several scientists with a high degree of knowledge and expertise is important and should be provided to the public as part of monitoring information decisions. Examples of techniques that could be used to analyze population data are found in Thompson et al. (1990), Morris et al. (1997) and others. Reviews of factors that can influence viability are found in Gilpin and Bock (1985), Hollman et al. (1999), Martin (1994), and Noon et al. (1999). Techniques for analyzing viability must include future projections of the implications of management in addition to current conditions. Techniques analyzing population with habitat information resulting in a population viability assessment are simulation models (Larson et al. 1985; Regland et al. 1994; Alcala et al. 1992; and McCarthy et al. 1993). Parameters of most interest are ongoing project effects on habitat function (such as project habitat connectivity barriers) and associated effect on population performance such as fecundity, recruitment, dispersal, and adult survival.

g. **Impacts on Wetland Habitat:** This category includes impacts of installation, associated recreation and project operations affecting wetlands and their dependent species occurring in the project and the objective of creating an environment that supports healthy populations of all water amphibians. Areas to be monitored include identified enhancement or wetland creation areas and their riparian reserves. Also as identified in the DEIS, restoring stream riparian reserves connectivity affected by the project.

h. DEIS, G3.23.

AR 82

AR 82

Monitoring would be included in the site-specific plans developed under section 11.5 of the Settlement Agreement for wetland enhancement or creation. See also responses to comments FS 116 and AR 71.

AR 82 (Cont)

a. **Monitoring purpose:** To address effectiveness of proposed mitigation and restoration intended to support healthy populations of all water amphibians and connectivity between habitats to meet requirements and to provide interbreeding within and between populations. In addition to habitat, ensure project related recreation and operations avoid or prevent risks to wetland dependent species populations associated with any further intentional or unintentional introductions of exotic invasive animals and plants.

b. **Monitoring parameters:**

- i. Amount of egg, tadpole/larvae, juvenile mortality and survival rates as compared to a healthy population.
- ii. Size of breeding population as compared to a healthy population.
- iii. Amount of movement within and between populations and otherwise available habitats.
- iv. Measure of vegetation characteristics in aquatic and terrestrial habitats for breeding movements and cover around wetlands and streams to provide suitable conditions.
- v. Measure of diversity and abundance of aquatic invertebrates and plants in enhanced and created wetlands to determine habitat condition.
- vi. Annual systematic inventory of created, enhanced and project improvements and wetlands to detect introduction of exotic invasive species such as disease and parasites carrying mollusks or invasive plants that may be introduced and facilitated by project recreation activities and operations.

c. **Possible methods:** Amphibian inventory and monitoring methods publication by Dean Olsen, Bill Leonard, Charlotte Corbin and others. Western pond turtle inventory and monitoring protocol developed and tested by the Western Pond Turtle working group (Clarke Barkham, Ursprung Forest Biologist pers. comm.). Methods to monitor amount of amphibian and reptile movement between still water and other habitats include telemetry, jet tagging, and photographing markings combined with regular monitoring of movements in all seasons. There are many publications on wetland vegetation monitoring techniques and aquatic invertebrate sampling methods including those published by the USFWS. Surveys to detect invasive exotics require biological expertise to tell the difference between native species and non-native species. Use of species specific speciation for verification of species identity. Utilize pathologists to assess and detect disease, parasites or other problems that could be associated with non-native.

10. **Aquatic Connectivity Effectiveness Monitoring²⁸:** This element monitors the effectiveness of aquatic and riparian Reserve structures, functions, and processes. Also, population condition of aquatic and riparian dependent species as well as species that depend upon the transition zone will be monitored to determine the level of effectiveness of mitigation to provide function of connectivity corridors. Riparian Reserve and aquatic plant community composition and structure will be monitored to see if vegetation is progressing in a timely direction toward restoration and whether these elements have been restored to within the natural range of variability.

a. **Monitoring purpose:** The purpose of this monitoring is to measure and compare the effectiveness of engineered stream/riparian reserve connectivity structures and designs, in relation to the natural range of conditions. This would occur in the Riparian Reserves affected by the project with controls in lands not occupied by the project reflecting a condition believed to be representative of a natural range. Monitoring would measure streambank into the results to assess the effectiveness of proposed measures to maintain the

²⁸ DEIS, 3.4.2.7.

AR 83

Monitoring related to aquatic connectivity would be included in the site-specific plans developed under section 10.5 and 10.6 of the Settlement Agreement for restoring riparian habitats and reconnecting aquatic sites, and as discussed in section 14.5. In addition, funds would be provided under section 19.2 of the Settlement Agreement for long-term monitoring and predator control to monitor and evaluate the success of measures to reintroduce anadromous fish populations upstream of Soda Springs dam.

frequency and rate of this condition. This will focus on species not measured or monitored in PacificCorp's previous relicensing studies (some of the species identified in Appendix A DEIS as well as other riparian dependent species) and will include both areas that were mitigated and areas that were not. It is important that monitoring evaluate the effectiveness during the full effect of all seasonal conditions as this may facilitate or further limit the function or condition of engineered structures and entrainment risk.

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b. Monitoring parameters:

- i. Amount of adults and dispersing juveniles. Size of breeding population as compared to a healthy population. Sex ratio.
- ii. Rate and character of movement within and between populations both up and downstream and otherwise available habitats of species of concern (Appendix A) and Riparian dependent species²³.
- iii. Measure of diversity and abundance of aquatic invertebrates and plants to determine habitat condition.
- iv. Annual systematic inventory of streams and waterways to detect introduction of exotic invasive species such as disease and parasite carrying mollusks or invasive plants that may be introduced and facilitated by project recreation activities and operations.
- v. Assess the comparative function and effective rate of plant seed and fungi spore dispersal (via animal movement, water movement, and other means) to expected natural range.
- vi. Measure amount, frequency and location of entrainment of species of concern.
- vii. Measure habitat quality including different seasons, vegetation cover, structures, stream bed, amount of bare soil.
- viii. Measure amount of sediment and debris moving down the Riparian and channel.

c. Possible methods: telemetry, mark and recapture, grid trapping, drift fence and pitfall trapping, systematic time restricted search, and transects using published methods, track plates, pit tagging, camera stations, (many publication sources) classification of species meta-population structure (McCullough 1994), Hoyer et. al. (1994) *Measuring and Monitoring Biological Diversity, Standard Methods for Amphibians*.

B. Proposed Modifications to Staff Alternative

FERC should consider a range of modifications to the Staff Alternative identified in the DEIS. The Conservation Groups believe that the following modifications, while still falling short in providing adequate protection, mitigation, and enhancement of fish and wildlife resources, would significantly improve the alternative.

1. Soda Springs Dam Removal

The *North Umpqua Cooperative Watershed Analysis Synthesis Report* found that of all project facilities, Soda Springs dam was the highest priority for modification in order to improve habitat connectivity. Improving aquatic connectivity at Soda Springs dam "would rank in the highest potential benefits to anadromous fish and other aquatic organisms in the upstream reaches of the watershed." As such, Commission staff should modify the current Staff Alternative to require Soda Springs dam removal in lieu of fish passage. The FEIS should evaluate the economic and environmental effects of such an alternative.

AR 84

²³ Dunes salamander, southern torrent salamander, northern red-legged frog, tailed frog, western Toad, Pacific giant salamander, sharp tail snout, Pacific shrew, shrew mole, water vole, fisher.

AR 84 The economic impacts of the alternative of removing Soda Springs dam are evaluated in section 4 of the final EIS, and the environmental effects are evaluated as part of the NGO alternative in section 3 of the final EIS. Section 5.1 presents our discussion of balancing nondevelopmental and developmental resources for each of the alternatives evaluated in the final EIS.

In summary, removal or lowering of Soda Springs Dam would have multiple benefits of to a broad range of aquatic resources affected by the project:

- Prime brown trout habitat in Soda Springs reservoir would be restored to over 1 mile of high quality riverine habitat. In addition to providing substantial salmonid spawning habitat, conditions for juvenile salmon and other native species would be improved.
- Dam removal or lowering would increase the effectiveness of measures proposed upstream in the Clearwater River to restore wood and sediment transport and to reconnect this watershed to the North Umpqua River.
- The need for implementing fish spawning habitat enhancements in the Slide Creek and Soda Springs bypass reaches would be reduced substantially because fluvial geomorphic processes are likely to create and sustain suitable habitat.
- A greater number of native species and life stages would benefit from dam removal or lowering than from fish ladders and screens.

There is general agreement of the significant environmental benefits that would accrue from the removal of Soda Springs Dam. In contrast, there exists significant scientific disagreement about the effectiveness of many mitigation measures proposed in the Settlement Agreement and Staff Alternative. Modification of the staff alternative to include Soda Springs Dam removal rather than fish passage and accompanying measures would substantially improve that alternative and provide a greater balance between power and non-power values.

2. Soda Springs Dam - fish passage

If the Staff Alternative is not modified to require Soda Springs dam removal, there are additional measures that should be evaluated in the FEIS and incorporated into the Staff Alternative. First, the Commission should require additional on-site mitigation to increase the effectiveness of the investment in fish ladders and screens. For example, evaluating the productivity of the Tolmie Bypass for anadromous fish with a temporary trap and haul program over the Slide Creek diversion would resolve the uncertainty that exists about the appropriateness of restoring habitat connectivity to this reach. The NGO recommendation that a technical team evaluate the appropriateness of providing fish passage at the Slide Creek diversion is warranted given the scientific uncertainties that exist.

In addition, if the boulder placements in the Slide Creek Bypass Habitat Enhancement Project successfully capture gravel, their placement should also be considered in the upper reach of the Slide Creek bypass. Gravel retention in this portion of the reach would maximize the effectiveness of reconnecting the Clearwater River to the North Umpqua River. Although stream gradient increases in the upper portion of the reach, gradients are similar to Fish Creek, where boulders effectively retain spawning gravels.

Second, the FEIS should evaluate a Slide Creek bypass habitat enhancement project. The goal of the enhancement project would be that boulders placed in the Slide Creek bypass reach would capture sediment transported by Fish Creek and thereby create substantial amounts of salmonid spawning habitat. However, for this to occur, sediment transport through the Fish Creek bypass must occur. Although the Watershed Analysis assumed that bedload and large wood transport through the Fish Creek diversion is fully functional, in reality, the project facilities interrupt transport by intermittently removing large wood and gravel accumulations at the diversion.

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AR 85 The NGO recommendations, including the need for additional on-site enhancement in lieu of fish passage and for a Technical Committee to assess fish passage at Slide Creek dam, were reviewed and evaluated in draft EIS sections 3.4.2.3 and 5.1. Our review concluded that off-site enhancement (e.g., habitat enhancement in Rock Creek, Canton Creek, and East Fork Pass Creek), as required in the ODFW MOU, was preferred over fish passage facilities at Slide Creek dam. This enhancement has a substantially greater potential to increase anadromous fish stocks than providing access to an additional 1.4 miles above the dam of only moderate-quality habitat (i.e., the reach is high-gradient with limited spawning gravels). For similar reasons, we believe that a Technical Committee to evaluate fish passage at Slide Creek dam is unnecessary.

AR 86 The parties to the Settlement Agreement could consider implementing this recommendation if post-implementation monitoring of the effectiveness of the Slide Creek Bypass Habitat Enhancement Project indicates that the recommended approach would be more effective in achieving ecological objectives than other planned habitat enhancement measures.

AR 87 Section 8 of the Settlement Agreement requires a Slide Creek Bypass Habitat Enhancement Project. The proposed project has essentially the same objectives and includes essentially the same elements as the project that is recommended in this comment. The impacts of the Slide Creek Bypass Habitat Enhancement Project are evaluated in EIS sections 3.2.2.2 and 3.4.2.5. As noted in section 3.2.1.4, the Fish Creek diversion dam does trap a high proportion of the coarse sediment load in this stream. However, investigations of the stream have found that pulses of sediment do arrive in the Slide Creek bypassed reach. Post-implementation monitoring would determine whether the expected quantity and quality of spawning habitat was created under the Slide Creek Enhancement Project.

Therefore, in addition to the Slide Creek bypass enhancement project, the FEIS should also include passage of large wood and bedload at the Fish Creek Diversion. This will (1) restore natural fluvial geomorphic processes in the Fish Creek Bypass, (2) maximize spawning gravel retention in the Fish Creek bypass, and (3) to ensure suitable amounts of gravel reach the boulders placed in the Slide Creek Bypass.

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Third, the FEIS should consider increased flows in the Lemolo 2 full-flow reach and Lemolo 2 bypass reach. Pursuant to the Staff Alternative, the Lemolo 2 full-flow reach becomes an extension of the Lemolo 2 bypass reach because discharges from the Lemolo 2 powerhouse would be diverted into a wetland complex. Although aquatic and riparian resources in the full flow reach would benefit from decreased water fluctuations and improved water quality, many adverse impacts may merely be shifted into the wetland complex. In addition, the resultant instream flows into the full-flow reach would be substantially smaller.

AR 88

AR 88 The NGO instream flow recommendation for the Lemolo 2 bypassed reach is more than double that in the Settlement Agreement but would result in much less than a doubling of the WUA for adult rainbow trout. The NGO Alternative of 120 and 170 cfs in this reach for January to October and November to December, respectively, would provide at least 90 percent of the peak WUA for adult rainbow trout compared to the 50-80 cfs of the Settlement Agreement, which provides 81-99 percent of the peak WUA. In addition, the higher minimum flow under the NGO Alternative would result in decreased power generation. As discussed in draft EIS sections 3.4.2.1 and 5.1, we believe the Settlement Agreement represents the best balance between power production and the instream flows that would protect and enhance aquatic habitat for anadromous and resident species.

Both the Lemolo 2 full-flow and the Lemolo 2 bypass reaches contain unconfined reaches of stream that have allowed the formation of floodplain habitat and/or multiple channels. Given the scarcity of these habitats in the project area, providing an instream flow regime that will maintain functional floodplains and off-channel habitats is critical to species dependent upon these diverse habitats.

Moreover, quantitative fish habitat and flow relationships have not been developed for the Lemolo 2 full-flow reach, making selection of the appropriate instream flow problematic. The instream flows proposed in the Staff Alternative for Lemolo 2 bypass reach would likely provide a relatively low percent of peak weighted usable area (WUA) for trout rearing and spawning in the full flow reach. Substantial increases in fish habitat and other ecological benefits are likely to accrue with concomitant increases in instream flows because of the reach's low gradient, multiple channels, and abundant spawning gravel.

Therefore, increased flows for the Lemolo 2 bypass are recommended in order to (1) approximate the relatively constant water temperatures found in the reference condition; (2) inundate more floodplain and side channel habitat; and (3) increase salmonid spawning habitat. In addition, a flow regime similar to that proposed in the NGO Alternative is preferred because seasonal variations would mimic the natural hydrograph.

An effective way to ensure a larger instream flow that varies with the season to the Lemolo 2 bypass would be to reconnect Warm Springs Creek to the North Umpqua River. In addition to restoring elements of a more functional flow regime, reconnection of Warm Springs Creek would improve habitat connectivity and restore important components of the sediment regime (i.e., timing, volume, and character of sediment delivery and transport) to the longest and most diverse bypass reach in the project.

IV. CONCLUSION

As outlined above, the DEIS is replete with economic and environmental deficiencies. The FEIS should be modified in accordance with our comments to ensure a thorough and rational analysis of the range of relicensing alternatives. Such modifications will illustrate that the NGO alternative is that which best serves the public interest. 16 U.S.C. § 803(a). It would result in a new license that contains conditions that adequately and equitably protect, mitigate, and enhance fish and wildlife resources. 16 U.S.C. § 803(j).

AR 89


AR 89 We have evaluated the NGO Alternative in the EIS and document our conclusions in section 5.1.

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While the NCO alternative provides the greatest certainty that the coupling effects of the hydroelectric project will be adequately addressed, at a minimum, the Conservation Groups urge that the Staff alternative be modified consistent with the proposed recommendations with priority given to Soda Springs Dam removal. It would result in an alternative that achieves a significantly better balance between power production and "the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality," than either the SA alternative or the current Staff alternative.

Accordingly, we urge the Commission to revise the DEIS and recommend the NCO alternative as the preferred alternative. It is the only alternative that addresses the significant environmental effects of the project, while allowing a viable project and providing adequate protection for the outstanding resources of the North Umpqua Basin.

Respectfully submitted this 20 day of June, 2002.


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ORIGINAL

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June 20, 2002

Margie R. Soto, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Dear Secretary Soto,

We are writing on behalf of Friends of Living Oregon Waters (FLOW), a group of conservation advocates in Oregon advocating for the protection and restoration of Oregon's waters. FLOW seeks legal oversight and public education to help protect Oregon's rivers, watersheds, lakes, wetlands, and groundwater from the impacts of pollution and development. FLOW helps advocate for the protection and restoration of the Wild and Scenic Umpqua River. FLOW's office is based in Ashland, OR and we have statewide membership, including members whose interest is the protection and restoration of the Umpqua River.

Our comments regard the North Umpqua Hydropower Project in Oregon (FERC Project No. 1927).

1. Many of the mitigation measures may have limited benefits at the watershed scale or even at the site where they are to be implemented. There needs to be an established format for evaluation, feedback, and development of adaptive management. FLOW 1
2. Currently, the project facilities eliminate the function of 13 miles of Riparian Reserve (the designated allocations intended to provide high quality corridors of connectivity for many aquatic and terrestrial species and sustain ecosystem processes). The SA Alternative (Settlement Agreement) provides little evidence that it will meet the function of the Riparian Reserve for all of the dependent species and processes and the Aquatic Conservation Strategy (ACS) and other NW Forest Plan objectives and standards. FLOW 2
3. There is not an adequate review of the North Umpqua Hydro Project on Wild and Scenic River values. Section 10 of the National Wild and Scenic Rivers Act requires that actions which affect Wild and Scenic Rivers "protect and enhance" the values for which the river was designated. Due to ranging of flows and other project effects the FEIS should adequately analyze the project's effects on the Wild and Scenic values of the North Umpqua River. FLOW 3
4. The Commission should present monitoring plans proposed by the FERC for review before approval. FLOW 4
5. Any Preferred Alternative must include implementation, effectiveness and validity monitoring for all measures. Monitoring should include detailed ecological objectives, procedures and criteria for evaluating ecological effects. FLOW 5

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FLOW 1

The Staff Alternative incorporates enhancement measures that were developed for the Settlement Agreement using the North Umpqua Watershed Analysis as one of its principal bases. Thus, a watershed perspective was integral to the development of PM&E measures and includes consideration of ecosystem processes. The proposed off-site mitigation measures have been developed to contribute to watershed management goals. We discuss our consideration of balancing the developmental and nondevelopmental costs of the alternatives in section 5.1 and conclude that the PM&E measures proposed under the Settlement Agreement, combined with the additional measures recommended by staff, would adequately protect and enhance environmental resources and mitigate impacts of the project.

The Settlement Agreement includes many provisions for monitoring. The purpose of any monitoring program is to collect data to determine if PM&E measures are accomplishing the purposes for which they were implemented. In developing monitoring plans in consultation with the parties to the Settlement Agreement, PacifiCorp would incorporate plans to take appropriate actions if data indicate that PM&E measures are not meeting the goals and objectives for which they were established. As discussed in section 2.3.1 of the final EIS, staff recommends that plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement would need to be submitted to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation.

The benefits of site-specific PM&E measures are discussed in detail in section 3 of the EIS. Monitoring, as included in the Staff Alternative, would provide for evaluation, feedback, and modification of the project, if needed, to reduce adverse impacts.

FLOW 2

As a party to the Settlement Agreement, the FS finds that it would meet the Forest Plan obligations for riparian reserves, ACS, and other objectives and standards. We agree with this finding. See the FS justification and rationale statement in support of the Settlement Agreement (FS 2001d) for a discussion of the ACS objectives that are applicable to the project. Also see sections 3.3, 3.4, and 3.5 of the final EIS for a discussion of how the Settlement Agreement would satisfy those ACS objectives.

- FLOW 3** We believe that successful implementation of the protection, mitigation, and enhancement measures identified in the Settlement Agreement would prevent adverse impacts to the Outstandingly Remarkable Values (ORVs) for which the North Umpqua Wild and Scenic River was designated (i.e., fisheries, wildlife, scenery, and recreation). We have revised section 3.8.2.4 to discuss the FS's June 2002 preliminary determination under Section 7(a) of the Wild and Scenic Rivers Act that relicensing the project would not "invade the area or unreasonably diminish" the river's ORVs. The FS and BLM will issue their final Section 7(a) determination after this final EIS is issued.
- FLOW 4** Monitoring plans would be developed by PacifiCorp in consultation with the parties to the Settlement Agreement and the resource agencies. These would be filed with the Commission and would be subject to Commission review and approval as appropriate.
- FLOW 5** We believe that the purpose of monitoring is to determine if PM&E measures are effective and to take appropriate actions if monitoring data indicate that goals and objectives are not being met. The staff's recommendation in section 2.3.1 for PacifiCorp to consider incorporating effectiveness monitoring in the monitoring plans that are developed to evaluate various PM&E measures, such as ramping rates, instream flows, fish passage, and habitat enhancement, is consistent with the intent of the monitoring stipulated in the Settlement Agreement (i.e., sections 4.1.1, 4.1.2, 4.3.1, 4.3.2, 5.2, 6.2.1, 8.2.2, 8.3.3, as amended). The purpose of these plans, in part, is to evaluate the effectiveness of PM&E measures and determine if additional environmental measures are needed (see section 2.3.1). See also response to comment AR 71.

6. Effectiveness monitoring should be included in for the sediment regime including gravel augmentation below Soda Springs; proposed alluvial projects at Slide and Soda Springs by-pass reaches; fish passage at Soda Springs Dam; off-site habitat improvement projects in Rock, Canyon, and Pine Creeks; flow regimes and ramping proposals in by-pass and full-flow reaches; wildlife entrapment and barriers to movement; avian protection; impacts on wetland habitat; and aquatic connectivity measures.

FLOW 6

7. The DEIS uses questionable assumptions about depreciation, air credits, refinancing costs and operations/maintenance costs which inflates the cost of the No-Action Alternative, so which the NGO Alternative is compared and judged to be an unacceptable negative.

FLOW 7

8. PacifiCorp has chosen to recover most of the project equipment and structures over a 100-year period. Hence, less than 30% of the current capital investment has been recovered. This burdens the future operation of the project with nearly \$48 million in unrecovered capital.

FLOW 8

9. The Internal Revenue Service requires tax depreciation be taken based on its own rules, which normally would be less than the 50-year project license. Taking this tax depreciation, PacifiCorp has saved on its income taxes and this money should be in a Deferred Income Tax Account. With a \$48 million underappreciated capital account, the deferred income tax account should be about \$14 million plus accumulated interest. This money belongs to the project and should be identified as a project resource and should offset the carry-over deferred depreciation.

FLOW 9

10. While some mitigation proposed (e.g. boulders and screens at Soda Springs) in the SA Alternative will aid in fish passage, impairment of most other aspects of aquatic and riparian connectivity will remain. The NGO Alternative, on the other hand, would fully restore ecosystem processes, functional connectivity of habitat for all organisms (not just fish), restore habitat quality and quantity within and downstream from the project, and substantially (if not fully) restore watershed processes to the near natural extent.

FLOW 10

11. The DEIS states that the effect of stopping all coarse sediment transport below the Soda Springs for the past 50+ years has had minimal impact on the ecology of the river downstream of the project. These needs to be reassessed and analysis the effects downstream of the project will not be in violation of the Wild and Scenic Rivers Act.

FLOW 11

12. The SA Alternative proposes as mitigation to implement gravel augmentation. This technique has not demonstrated maintaining the natural range of the sediment regime with regard to amount, character, or timing. In addition, this requires the use of mechanized equipment, in or near water, thus posing a risk of further damage. In contrast, it is well documented that the NGO Alternative would actually restore the sediment regime (timing, amount, character). Dumping of gravel needs to be analyzed for consistency with the Wild and Scenic Rivers Act as the practice will have an immediate effect on the Wild and Scenic section of the North Umpqua River.

FLOW 12

13. The reach, Soda Springs Reservoir, contains several large alluvial features that are very unique. The NGO Alternative would result (eventually) in full restoration of this unique and productive reach.

FLOW 13

14. FLOW strongly supports the NGO Alternative. It would do a better job of restoring degraded aquatic habitats and ecological processes. The NGO Alternative is based on the

FLOW 14

FLOW 6 The details of the monitoring plans and programs would be developed in consultation with the resource agencies. Staff's recommendations for effectiveness monitoring and evaluation and reporting as suggested in this comment would be considered as plans are developed. The Settlement Agreement provides for monitoring for gravel augmentation (section 7.2, as amended); restoration and creation of spawning habitat below Soda Springs dam (section 8.3, as amended); fish passage at Soda Springs dam (sections 4.1.1 and 4.1.2); off-site habitat improvement projects (section VII of the ODFW MOU); instream flows (section 5.5); ramping (section 6.2.1); wildlife entrapment and barriers to movement (section 11.3); and avian protection (section 13.4). Staff recommendations include submitting site-specific plans for enhancing, restoring or creating riparian habitats and wetlands that would also address monitoring the success of these efforts. See also response to comment AR 71.

FLOW 7 See responses to comments AR 3 and AR 10.

FLOW 8 See response to comment AR 3.

FLOW 9 See response to comment AR 3.

FLOW 10 We continue to recommend implementation of the Staff Alternative that incorporates the provisions of the Settlement Agreement with some minor modifications. Also see response to comment AR 1.

FLOW 11 See response to comment AR 19.

FLOW 12 See responses to comments AR 18 and AR 26. Also, note that the amended Settlement Agreement requires PacifiCorp to obtain necessary approvals for habitat restoration or creation activities affecting the Wild and Scenic River Section of the North Umpqua River.

FLOW 13 Section 3.2.1.4 has been revised to include discussion of the alluvial features that were inundated by Soda Springs Reservoir. The deposition of large quantities of sediment in Soda Springs Reservoir has substantially altered the topography and geology of the surface across which the river would flow if fluvial conditions were restored in this reach. Following removal of the dam, a new stream channel would form and evolve over time. While it is likely that portions of the new stream channel would be alluvial in character, stream channel evolution following dam removal is unlikely to replicate the same features that existed before the dam was built.

FLOW 14 See response to comment AR 1.

work of agency and independent scientists, most of whom were involved in the *North Umpqua Cooperative Watershed Analysis Synthesis Report*.

15. FLOW supports the removal of Soda Springs Dam. This facility is a barrier to fish as well as an obstacle to the movement of many other aquatic/riparian dependent species. In addition, the downstream delivery of sediments and wood are affected. The *North Umpqua Cooperative Watershed Analysis Synthesis Report* found that of all project facilities, Soda Springs Dam was the highest priority for modification in order to improve habitat connectivity. Improving aquatic connectivity at Soda Springs Dam "would result in the highest potential benefits to anadromous fish and other aquatic organisms in the downstream reaches of the watershed."

16. The DEIS does not accurately account for the benefits resulting from the removal of Soda Springs Dam. The removal or lowering of Soda Springs Dam are the only measures that would restore all of the key components of a fully functional sediment regime. In particular, the timing, volume, rate and character of sediment input, storage, and transport in this portion of the basin will be substantially improved only when the remaining North Umpqua River below Soda Springs Dam is reconnected to its upper reaches. Leaving Soda Springs Reservoir intact reduces the effectiveness of costly measures being taken to reconnect the physical processes of the Clearwater River watershed to the North Umpqua River. The removal of Soda Springs Dam could occur in stages in order to limit risks to downstream resources, as well as to determine the most advantageous height for creating prime spawning gravel deposits in the 1.2 miles of stream inundated by the reservoir.

17. The NGO Alternative includes measures to improve flows in critical reaches. For example, both the Lemolo 2 full-flow and the Lemolo 2 bypass reaches contain unconfined reaches of stream that have allowed the formation of flood plain habitat and/or multiple channels, habitats that are scarce in the project area.

18. Increased flows for the Lemolo 2 bypass are recommended in order to (1) approximate the relatively constant water temperatures found in the reference conditions; (2) inundate more floodplain and side channel habitat; and (3) increase subtidal spawning habitat. In addition, a flow regime similar to that proposed in the NGO Alternative is preferred because seasonal variations would mimic the natural hydrograph.

19. The NGO Alternative provides for covering of canals to provide connectivity for terrestrial species, whereas the SA Alternative would provide wildlife bridges that are not as effective.

In closing, we urge you to consider the NGO Alternative as the Preferred Alternative in the Final EIS. Thank you for consideration of these comments.

Sincerely,

Peter Woodward

Peter Woodward, Project Analyst

Friends of Living Oregon Waters (FLOW)

FLOW 14
(Cont)

FLOW 15

FLOW 16

FLOW 17

FLOW 18

FLOW 19

FLOW 20

FLOW 15 The removal of Soda Springs dam is evaluated as part of the NGO Alternative. In Section 5.1 of the EIS (Comprehensive Development), we discuss our evaluation of removing the dam versus providing upstream passage and other measures contained in the Settlement Agreement. We agree with the parties to the Settlement Agreement that ecosystem goals throughout the project area and the upper North Umpqua River Basin could be achieved by the proposed fish passage measures, while avoiding negative economic and power production impacts.

FLOW 16 The EIS has been revised to include more discussion of the potential benefits of dam removal for restoration of fluvial geomorphic processes. However, as discussed in sections 3.2.2.2, 3.4.2.3, and 3.5.2.1, there is substantial uncertainty involved in projecting the impacts of dam removal. The adverse impacts could outweigh the advantages, particularly in the near term. Removing the dam in stages, as suggested by the commenter, could reduce some potential adverse impacts to downstream resources, but it also could increase the potential for other adverse impacts, for example by causing unacceptably high deposition of fine sediments in the river channel in reaches that now provide valuable spawning habitat.

FLOW 17 See response to comment AR 88.

FLOW 18 See response to comment AR 88.

FLOW 19 Section 3.5.2.2 of the EIS discusses the improvement of terrestrial connectivity for all alternatives except the No-Action Alternative. It acknowledges that the NGO Alternative would be more beneficial in terms of wildlife entrapment and connectivity. With more crossing opportunities under the Settlement Agreement and the Staff Alternative, there would be a reduced chance of animal entrapment in the waterways. However, even under current conditions (i.e., the No-Action Alternative) there is no information to indicate that entrapment is significantly affecting any wildlife populations. See also responses to comments AR 50 and AR 58.

FLOW 20 See response to comment AR 1.

June 20, 2002

Secretary Magale R. Bates
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20438

Dear Secretary Bates:

RE: North Umpqua Hydroelectric Project (#1927-02)
Draft Environmental Impact Statement - Comments

Please accept our comments regarding the DEIS for the North Umpqua Hydroelectric Project in Oregon (FERC Project No. 1927). We applaud the FERC staff's recommendations to improve monitoring of "Tactics-Flow" that comprise the Settlement Agreement (SA) Alternative, for development and analysis of an alternative based on recommendations from the Conservation Groups, and for inclusion of that as the Non-Governmental Organization (NGO) Alternative in the DEIS.

However, we believe the DEIS includes a number of gross misrepresentations of project costs and ecological effects. As a result, we strongly support the NGO Alternative which takes on project modifications that have a higher probability of success. Further, with an improved economic analysis, the NGO Alternative results in a profit for PacifiCorp. The following four key points further explain our concerns with the SA Alternative and why we support the NGO Alternative:

1. Inadequacy of "Tactics-Flow"
In contrast to the clearance on benefits that would accrue from removal of Snake Springs dam, there exists significant scientific disagreement about the effectiveness of many mitigation measures proposed in the Settlement Agreement (SA) Alternative.

If the SA Alternative is adopted, PacifiCorp will be allowed to continue "experimentation" with more engineered, expensive "quick fixes" that are not effective. Many of the mitigation measures may have limited benefits at the watershed scale or even at the site where they are to be implemented. They have no established format for evaluation, feedback, and development of adaptive management.

Neither the SA Alternative nor the Staff Alternative are adequate for the Forest Service to meet its legal obligations. Currently, the project facilities eliminate the function of 13 miles of Riparian Reserve (the designated education watershed to provide high quality services of connectivity for many riparian and terrestrial species and waters dependent processes). The SA Alternative provides little evidence that it will meet the function of the Riparian Reserve for all of the dependent species and processes and the Aquatic Conservation Strategy (ACS) and other NW Forest Plan objectives and standards.

We applaud the FERC staff for recognizing the uncertainty of measures included in the SA Alternative and for proposing four modifications, two of which explicitly acknowledge that the Settlement Agreement relies almost entirely on unproven tactics-flow.

2. Increased monitoring
The Staff Alternative focuses on the need to add comprehensive monitoring, to track project modifications included in the SA Alternative. We believe the monitoring plans proposed by FERC staff should be further strengthened and improved, as well as peer-reviewed by the Commission prior to approval.

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NFS 1 See response to comment AR 3.

NFS 2 The parties to the Settlement Agreement include the resource agencies responsible for managing and protecting the resources within the North Umpqua River Basin. Thus, the mitigation measures contained in the Settlement Agreement reflect agreement among these resource managers that they are appropriate and would benefit the resources within the watershed. In addition, the monitoring plans that would be developed in consultation with these agencies would provide data to assess the effectiveness of the measures.

NFS 3 See response to comment FLOW 2.

NFS 4 The Settlement Agreement adequately addresses uncertainties and includes provisions for modifying proposed measures if they prove to be ineffective. In response to comments from the parties to the Settlement Agreement, we have revised the staff recommendations to clarify that (1) plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement would need to be submitted to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation and (2) PacifiCorp, in developing these plans, consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

NFS 5 Monitoring plans would be developed by PacifiCorp in consultation with the parties to the Settlement Agreement and the resource agencies, as needed. These plans would be filed with the Commission and would be reviewed and approved by the Commission as appropriate.

See also response to comment AR 71.

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\$27.4 million, with fewer benefits of \$31 million, resulting in a net benefit of \$3.6 million for the NCO Alternative instead of the negative benefit shown in the DER.

NFS 12
(Cont)

b. Overstated ecological benefits from BA Alternative
Ecological benefits of the BA Alternative have been overstated in the DER, relying on fiction of certainty and great benefit. The DER mistakenly presents the BA Alternative and the NCO Alternative as having equal results, when there is, in fact, a significant difference between alternatives. Examples include:

Fish passage. While some mitigation proposed (e.g. barriers and screens at Soda Springs) in the BA Alternative will aid in fish passage, implementation of most other aspects of aquatic and riparian connectivity will remain. The NCO Alternative, on the other hand, would fully restore connectivity processes, functional connectivity of habitat for all native organisms (not just fish), restore habitat quality and quantity within and downstream from the project, and substantially (if not fully) restore watershed processes to the same great extent. These are very substantial and clear differences, with the NCO Alternative the only alternative that is truly restorative.

NFS 13

Sediment. The DER states that effects of stopping all coarse sediment transport below the Soda Springs for the past 50+ years has had minimal impact on the ecology of the river downstream of the project. This is simply not supported at all in the record, where several independent consultants and reviews by credible scientists have pointed out considerable uncertainty and likely adverse effects. Yet without any data, analysis or plausible explanation, the DER has simply dismissed these findings. Again, there are clear differences in the major alternatives.

NFS 14

The BA Alternative proposes no mitigation, not restoration (as is erroneously stated in numerous locations in the DER), to implement an expensive, untested "technological fix," gravel augmentation. This has not been demonstrated effective anywhere in the world for substituting the natural stages of the sediment regime with regard to amount, character, or timing. In addition, this "fix" requires adding gravel (and perhaps other material) from some place, loading, sorting, and dumping it. All these require the use of mechanical equipment, in or near water, thus posing a risk of further damage. In contrast, it is well documented that the NCO Alternative would actually restore the sediment regime (timing, amount, character), the effectiveness is certain, and there is no long-term risk from experimental failure or toxic spills.

Soda Springs Reach. The DER fails entirely to mention what is perhaps the most important, and ecologically significant, attribute the reach-way large, now unwooded reach that contained several large alwood features (including as much as 100,000 cu ft.) which lay under Soda Reachway.

NFS 15

As with aquatic and riparian connectivity above, the BA Alternative would do nothing to restore this now and potentially very productive "hot-spot," instead relying on mitigation consisting of several small, un-proven projects in technical reaches that have a low likelihood of success. The NCO Alternative, on the other hand, would result (eventually) in full restoration of this unique and productive reach.

To sum it up, the analysis of alternatives and mitigation in the DER lacks objectivity and is biased in every respect, and analysis towards the BA Alternative. The DER analysis lacks valid supporting information, measurable criteria and quantitative comparisons between alternatives. It ignores or excludes large bodies of relevant, available science; includes insufficient cost-benefit comparisons; leaves critical details in management plans after the NEPA EIS process; and inadequately analyzes cumulative effects. Many of the analyses and estimates developed in support of the BA Alternative are opinions, not peer-reviewed science, not based on a "preponderance of evidence", or even a consensus opinion by involved scientists. The deficiencies of the DER are inconsistent with the public interest and legal requirements on National Forest Lands for viability and aquatic resources.

4. Support the NCO Alternative

NFS 13 Section 10 of the Settlement Agreement specifically addresses aquatic and riparian connectivity by requiring such actions as breaching diversions, restoring riparian habitats, reconnecting aquatic sites, and replacing culverts. In addition, the Settlement Agreement provides for increases in instream flows (section 5) and for upstream and downstream fish passage (section 4). Collectively, these actions constitute a significant effort to mitigate project-related impacts and restore aquatic connectivity.

NFS 14 See responses to comments AR 18 and AR 26. Although the removal of Soda Springs dam would restore a more natural sediment regime, substantial uncertainty exists regarding the consequences of dam removal on fish habitat.

NFS 15 See response to comment FLOW 13.

Because of the problems outlined with the SA Alternative, even with FERC staff modifications, we strongly support the NGO Alternative. The NGO Alternative would take much of the guess work out of the initial and site-specific mitigation measures. It would do a better job of restoring degraded aquatic habitat and ecological processes. The NGO Alternative is based on the work of agency and independent scientists, most of whom were involved in the North Umpqua Cooperative Watershed Analysis Synthesis Report, and includes the following measures:

a. Removal of Soda Springs Dam
This facility is a barrier to fish as well as an obstacle to the movement of many other aquatic species dependent upon it. In addition, the downstream delivery of sediments and wood are affected. The North Umpqua Cooperative Watershed Analysis Synthesis Report found that of all project facilities, Soda Springs dam has the highest priority for modification in order to improve habitat connectivity. Improving aquatic connectivity at Soda Springs dam "would result in the highest potential benefit to anadromous fish and other aquatic organisms in the immediate reaches of the watershed."

The DNR does not adequately account for the benefits resulting from the removal of Soda Springs Dam. The removal or lowering of Soda Springs dam are the only measures that would restore all of the key components of a fully functional watershed system. In particular, the timing, volume, rate and character of sediment input, storage, and transport in this portion of the basin will be substantially improved only when the maximum North Umpqua River lower Soda Springs dam is reconstructed to its upper reaches. Leaving Soda Springs reservoir intact means the downstream delivery of sediment is substantially reduced, which in turn reduces the physical processes of the Chehalis River watershed in the North Umpqua River. The removal of Soda Springs Dam would occur in stages in order to avoid risks to downstream resources, as well as to determine the most advantageous layout for creating a new spawning ground deposits in the 1.2 miles of stream benefited by the reservoir.

b. Improvement of Gages
The NGO Alternative includes measures to improve gages in critical reaches. For example, both the Lonsdale 2 full-dam and the Lonsdale 2 bypass reaches require extensive reaches of stream that have altered the formation of sand plain habitat under multiple elements, including that are shown in the project area.

The Lonsdale 2 bypass proposed in the Staff Alternative for Lonsdale 2 bypass reach would likely provide a relatively low percent of peak suspended sediment (TSS) for load rating and spawning in the full flow reach. Substantial increases in fish habitat and other ecological benefits are likely to occur with non-sediment increases in stream flow because of the reach's low gradient, multiple channels, and abundant spawning gravel. Therefore, increased flows for the Lonsdale 2 bypass are recommended in order to (1) approximate the relatively constant water temperatures found in the tributary conditions, (2) increase stream flow and also channel habitat, and (3) increase sediment spawning habitat. In addition, a flow regime similar to that proposed in the NGO Alternative is preferred because sustained variations would affect the natural hydrograph.

c. Covering of weirs
The NGO Alternative provides for covering of weirs to provide connectivity for terrestrial species, whereas the SA Alternative would provide wildlife bridges that would not do the job needed. The DNR states that the wildlife bridges will decrease chances of entrapment. However, this is not proven nor is there adequate information to support it.

The DNR states that project outcrops do not generally prevent movement by large and medium-sized animals. This is an over-generalization and more information on there has been no adequate documentation of moose, deer, elk, and other animals to come to this conclusion and other information suggests the probability is not in favor of use. And similar concerns, amphibians, and reptiles and other species such as snails and mussels and turtles.

NFS 16

NFS 16 We present our rationale for supporting the Settlement Agreement with additional staff recommendations in section 5.1.

NFS 17

NFS 17 The Watershed Analysis does indicate that the potential benefits of dam removal were highest among the options considered. The EIS text has been revised to include more discussion of the potential benefits of dam removal for restoration of fluvial geomorphic processes. However, the potential adverse impacts of dam removal also are high. Also, as discussed in sections 3.2.2.2, 3.4.2.3, and 3.5.2.1, there is substantial uncertainty involved in projecting the effects of dam removal. The adverse impacts could outweigh the advantages, particularly in the near term. Removal of the Soda Springs dam could cause significant damage to anadromous fish habitat downstream from the dam, thus negating the benefits. Removing the dam in stages, as suggested by the commenter, could reduce some potential adverse impacts to downstream resources, but it also could increase the potential for other adverse impacts, for example by causing unacceptably high deposition of fine sediments in the river channel in reaches that now provide valuable spawning habitat. The Settlement Agreement addresses the impacts of the dam on fish passage by requiring installation of a vertical-slot fish ladder to provide upstream passage (section 4.1.1) and installation of facilities that provide downstream fish passage (section 4.1.2).

NFS 18

NFS 18 See response to comment AR 88.

NFS 19

NFS 19 See response to comment FLOW 19.

Investigation and plans all have a high likelihood of endorsement into the record. This is obvious from simply looking at the layout structure created by the open waterways spread dramatically across the landscape and the stream diversions and interconnections of through the project area.

In closing, we urge you to consider adopting the NDO Alternative as the Preferred Alternative in the Final EIS. Please help us to share the rich and beautiful North Umpqua River watershed. Thank you for consideration of these comments.

Sincerely,

Michael Park, Secretary
BB Bureau, Director
Portland, OR

Dave Wells, State Mountain Wilderness Council
10107 Commercial Highway
Astoria, OR 97103
503-325-0000 office

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Oregon Chapter of Trout Unlimited
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NFS 19
(Cont)

FERC ID#03 DOC 229025

http://www.ferc.gov/docs/ferc/ferc03/ferc030229025.pdf

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Clean Water Campaign Coordinator
Northwest Coalition for Alternatives to Pesticides
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Senator Ron Wyden
Congressman Peter DeFazio
Senator Gordon Smith

*Thomas Gilg, VP Conservation
Oregon Society of Fisheries
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June 20, 2002

Margalle R. Salas
Federal Energy Regulatory Commission
605 First Street N.E.
Washington, DC 20036

Re: Draft Environmental Impact Statement for PacificCorp's North
Umpqua Hydroelectric Project (No. 1927)

Dear Mr. Salas:

The Pacific Rivers Council (PRC) respectfully submits the following comments on the Draft Environmental Impact Statement (DEIS) for the North Umpqua Hydroelectric Project. PRC is a nonprofit conservation organization dedicated to the protection and restoration of rivers, watersheds, and the native aquatic species they support. We have reviewed the DEIS and have identified a severe deficiency in the analysis. Additionally, we jointly submitted comments on this project with American Rivers and others and incorporate by reference all issues raised therein.

The DEIS is legally deficient because it fails to assess the effect of the project on the high quality habitats in the upstream North Umpqua River. The primary source of degradation to the main river ecosystem is the ramping of flows. The DEIS addresses the ramping issue by narrowly focusing on the effects of fish ascending, and suggests protocols to minimize that. While this is indeed a negative impact resulting from project operations, it is not the major impact on the aquatic ecosystem. Rather, the major impact is on the aquatic food web. The first few inches of the water column, which are the most critical for food production, are disrupted each time the flows are ramped up and down. The ramping flows cause repeated washing and drying of the most productive areas, which in turn greatly impacts total food production. These food supply is one of the most important factors in survival of juvenile salmonids. Degradation of the food supply is one of the most adverse modifications that can be made to their habitat — and one of the easiest to circumvent. There should be no ramping of flows in the main river at any water level, because at any water level ramping substantially and adversely affects food production.

Since the DEIS fails to analyze the most important mechanism by which ramping affects the main river ecosystem and the endangered salmonids it supports, the DEIS is legally deficient. Merely acknowledging that the ramping of flows suppresses macroinvertebrate production does not constitute

PRC 1

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PO Box 10798 • Eugene, OR 97448 • (541) 343-0218 • Fax (541) 343-0219 - - -

PRC COMMENTED

PRC 1 As described in section 3.4.2.2, ramping rates have been eliminated or considerably restricted under the Settlement Agreement and the Staff Alternative, with the exception of a total of 1.3 river miles in three full-flow reaches. The effects of water level fluctuations in the Lemolo No. 2 full-flow reach would be minimized by rerouting flows into the expanded wetlands area around Stinkhole Pond. Another full-flow reach, Slide Creek, may have ramping rate restrictions in the future if anadromous fish gain access to the area and use it for spawning or migratory movements. We believe that ramping rate restrictions used to protect salmonid eggs and fry would also protect other aquatic organisms. In addition, ramping would not affect the input of terrestrial insects, which become part of the aquatic drift and are often a major food source to juvenile salmonids.

The proposed Settlement Agreement and the Staff Alternative would have a positive impact on listed species and improve habitat conditions for these species. We believe that successful implementation of the protection, mitigation, and enhancement measures identified in the Settlement Agreement would prevent adverse impacts to the Outstandingly Remarkable Values (ORVs) for which the North Umpqua Wild and Scenic River was designated (i.e., fisheries, wildlife, scenery, and recreation). We have revised final EIS section 3.8.2.4 to discuss the FS's June 2002 preliminary determination under Section 7(a) of the Wild and Scenic Rivers Act that relicensing the project would not "invade the area or unreasonably diminish" the river's ORVs. The FS and BLM will issue their final Section 7(a) determination after this final EIS is issued.

PRC 1
(Cont)

is relatively through our highly efficient system. Similarly, the project is
located in the proposed route in the staff documents, and the staff documents
already study the project's value, and it is proven and enhance the existing
project for value the North American area and other WPA and British protection.

We request that the DOD be considered for further analysis and that a review of
the proposed DOD be provided for the project's completion for value of working on the
existing and completion of staff documents.

[Signature]
David J. Taylor
Executive Director

6/14/02

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FLUKE ENERGY
REGULATORY COMMISSION

Margie R. Sales, Secretary
Federal Energy Regulatory Commission
988 First Street, NE
Washington DC 20426
June 14 2002

I live in the Umpqua River Watershed and am concerned with protecting it. You have invited the public to comment on the re-licensing of the North Umpqua Hydro Project. I have followed the developments through the media and other sources for several years.

In 1987 my friends and I started a festival on the river each year dedicated to public awareness of the need to protect the river and the life it affects. We are now in our 14th year. We initiated and now passed in 1998 a law which designated the third Saturday in July of each year as RIVER APPRECIATION DAY in Oregon. The current Governor of Oregon, John Kitzhaber, sponsored the bill.

Our committee has followed these issues relating to the re-licensing and wish to support the following:

1) Both Springs Dam should be removed. The planned fish screens are probably not going to work

and, in any case, will not be the best available. The dam is only a small part of the income of the project and effectively blocks the 10 plus miles of habitat above the dam in the Fish Creek Valley. WE KNOW THAT REMOVAL OF THIS ONE DAM OF EIGHT ON THE PROJECT WAS THE FIRST CHOICE OF THE FOREST SERVICE and that Pacific Power walked out of negotiations to strong-arm the agency to hand it to its will.

The reasons, based on science, which persuaded the Forest Service to support dam removal have not changed and are still valid.

2) Off-site mitigation funds are wasted on the Bank Creek site. This creek has been smothered by steady logging practices under private ownership for much of its length, and will take many decades to recover.

3) Monitoring programs to insure that the corporation stays true to its promises to maintain and improve water quality are crucial. They have the money. Runoff has been diverted in the recent past and must be strictly controlled.

4) The animals that carry water to the turbines must have adequate protection for animals, which can and do fall in. Turbidity screens must be large and frequently placed.

5) Fish are profoundly affected by the temperature of water. Warming of our air and waters is a fact.

These trends, projected into the future, suggest that we must make sure that stream flows are optimal for aquatic life. What will the temperature of the water be 30 years from now?

Robert F. Allen
9457 Garden Valley Road
Riverside, Oregon 97470
For the River Appreciation Day Committee

RFA 1

RFA 1 See response to comment FLOW 15.

RFA 2

RFA 2 See response to comment AR 20.

RFA 3

RFA 3 The Settlement Agreement and the Staff Alternative include extensive requirements for monitoring, including the §401 Water Quality Certification conditions.

RFA 4

RFA 4 See response to comment FLOW 19.

RFA 5

RFA 5 As described in section 3.3.2.2, the increased instream flow releases under the Settlement Agreement and the Staff Alternative are predicted to lower stream water temperatures in most stream reaches (in addition to providing more habitat for fish and other aquatic organisms).

RFA 6

RFA 6 See response to comment RFA 5.

DOCKETED

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June 13, 2003

FILED
OFFICE OF THE
SECRETARY

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FEDERAL ENERGY
REGULATORY COMMISSION

Magelin R. Selas, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

To Whom It May Concern,

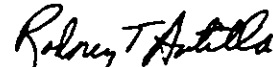
This letter is in reference to soliciting #19277 of the hydropower project on the North Umpqua River near
Bend, Oregon. I strongly support the Lead 9 Conservation Groups: Umpqua Watershed, Umpqua Valley
Audubon Society, Streamkeepers, The North Umpqua Foundation, American Rivers, Oregon Natural Resources
Council, Pacific Rivers Council, WaterWatch of Oregon, and Oregon Trout and their comments on the important
releasing process.

1. Do as the estimate says: Remove Snake Springs Dam, one of 8 in the project.
2. Improve stream flows to help the fish.
3. Design Effective Member Programs to make sure PermitCorp is accountable to the river.
4. Increase Canal Covers to protect terrestrial species.

[RTA 1
[RTA 2
[RTA 3
[RTA 4

We do not need any more studies or permits. This subject has been delayed and talked to death for more than three
years. Hold PermitCorp accountable now! We do not have large habitats of lawyers or large sums of money but
we do love the river. What will be written fifty years from now about the handling of this problem? Nothing
away is not the bottom line here. It is about preservation of a magnificent river and its fish.

Sincerely,



Rodney T. Astilla
PO Box 1494
Bend, OR 97709

RTA 1 See response to comment FLOW 15.

RTA 2 The instream flow releases under the Staff Alternative would increase
the amount of habitat for both resident and anadromous fish. See
section 3.4.2.1.

RTA 3 As described in section 2.3.1, staff recommendations include
consideration of effectiveness monitoring. See response to comment
AR 71.

RTA 4 See response to comment FLOW 19.

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REC-110

FILED
U.S. DEPARTMENT OF ENERGY
2003 APR 17 10 11 25
REGULATORY COMMISSION

4113 SW Commerce Drive
Portland, OR 97279
June 9, 2002

Margie R. Selin
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Comments on North Umpqua Hydroelectric Project (No. 1927) Draft Environmental Impact Statement
FERC/DMS - 01470

Dear Secretary Selin:

The following are my comments regarding the Draft Environmental Impact Statement (DEIS) for relicensing of the 18.5-megawatt North Umpqua Hydroelectric Project No. 1927 (North Umpqua Project).

I have 20 years of experience as a professional fish biologist with several state and federal agencies and am quite familiar with the North Umpqua River and the North Umpqua Project through my past employment with the Umpqua National Forest. As the Federal Energy Regulatory Commission (FERC) staff are aware, the entire North Umpqua Project, with the exception of permission, is located on lands administered by the Umpqua National Forest of the USDA Forest Service. Although most-called since 2000, my responsibilities from 1982 to 1997 included being the lead fisheries representative on the Umpqua National Forest's hydro-power relicensing team. I also contributed to the North Umpqua Cooperative Watershed Analysis Synthesis Report¹ by participating in the Commissioning, Water Quality, and Aquatic subgroups.

My comments include general comments about the DEIS, followed by specific examples of areas or overviews that I believe exist in portions of the analysis and conclusions. My comments are designed to aid FERC strengthen the Staff Alternative by better balancing waterpower development with the need for adequate protection, mitigation, and enhancement of the biologically diverse aquatic resources affected by the North Umpqua Project.

GENERAL COMMENTS

I appreciate FERC staff for their clear descriptions of the multi-staged North Umpqua Project and the equally complex DEIS alternatives.

Although an Inter-agency Settlement Agreement forms the basis of the Staff Alternative, some of the most experienced biologists and fisheries in the North Umpqua River-basin have strong reservations about the Agreement's terms, as well as its supporting logic and conclusions. Many of these biologists questioning the effectiveness of the Settlement Agreement also contributed to the North Umpqua Cooperative Watershed Analysis Synthesis Report.

In order to understand the range of public and scientific opinion surrounding the Settlement Agreement, FERC staff should consider the following information: (1) public comments submitted to the Oregon Department of Fish and Wildlife (ODFW) regarding the ODFW Comment/Paid/Comp Administrative Understanding (MCU); and (2) the Relating Information Analysis Materials included with the Conservation Corps comments dated February 27, 2001.

CB 1

¹ Settlement Agreement, 1998, North Umpqua Cooperative Watershed Analysis Synthesis Report, Prepared for Paid/Comp, Portland, Oregon, Volume 2.

020620-0333-3

FERC 04/08/2003

CB 1

We are aware of the range of public and scientific opinion surrounding the Settlement Agreement and have reviewed the extensive record on file with the Commission. We have reviewed the Environmental Information Analysis Modules that were filed with the NGO filings and have cited a number of them in appropriate sections in the EIS. We note that the FS has stated that these modules are draft reports and have been superseded by later submittals.

CB 2 See responses to comments FLOW 5 and FLOW 6.

CB 3 See response to comment AR 20.

Current and Best-Practice Examples

CB 4 See response to comment AR 21.

CB 5 See response to comment AR 23.

CB 6 See response to comment AR 22.

¹ USDA Forest Service as of USDA Forest Service, USDA Park and Wildlife Service, USDOC NOAA National Marine Fisheries Service, USDOC National Park Service, USGS Bureau of Land Management, Environmental Protection Agency) 1993 Forest Ecosystem Management: An Integrated, Remedial, and Sustained Assessment.

FERC should ensure that the canal de-watering efforts do not create additional erosion (e.g., creating more by dumping seasonally high flows into first and second order stream channels).

CB 7

The Settlement Agreement includes several positive sediment control measures, including the Russian Control Plan requirement that if PacificCorp cannot meet the 30-estimate goal for diverting waterways of highest concern, that "the most effective alternative" must be developed. Although burying the highest risk portions of the waterways in pipes would likely reduce future risk, the most effective alternative would be to shut down the Lantada 1, Charwater 2, and Fish Creek waterways when storm events produce the conditions when canal failures tend to occur.

CB 8

Reservoir Operations

FERC staff currently noted that the Settlement Agreement would result in increased fluctuations of some reservoir water levels. The DES notes that in addition to channel erosion concerns, the daily fluctuations proposed for Soda Springs Reservoir may destabilize a very large, deep-seated landslide deposit. However, FERC has not estimated for the following scenarios related to the proposed reservoir operations:

- (1) Increased fluctuations of water levels in project reservoirs may disturb bottom sediments and thereby increase turbidity in downstream stream reaches;
- (2) The increased fluctuations of some project reservoirs are unlikely to be contained without installing dredging, or incremental and interdependent action that has not been analyzed.

CB 9

3.2.3.3 RESTORATION OF FLUVIAL GEOMORPHIC PROCESSES

Settlement Agreement

Structural modification of Charwater 1 dam will not lead to improved passage of sediment and woody debris. Diversion of River Creek around Charwater 1 dam is in violation of the recommended measure to achieve this objective.

CB 10

NOO Alternative

The DES does not adequately account for the benefits resulting from the removal of Soda Springs Dam. The removal or lowering of Soda Springs dam are the only measures that would ensure all of the key components of a fully functional sediment regime. In particular, the timing, volume, rate and character of sediment input, storage, and transport in this portion of the basin will be substantially improved only when the sediment North Umpqua River below Soda Springs dam is unimpeded to its upper reaches. Lowering Soda Springs reservoir intent reduces the effectiveness of costly measures being undertaken to reconstruct physical processes of the Charwater River watershed to the North Umpqua River.

CB 11

The removal of Soda Springs Dam could occur in stages in order to flush debris to downstream reservoirs, as well as to determine the most advantageous height for existing plans operating gravel deposits in the 1.2 miles of stream inundated by the reservoir.

FERC staff can obtain pertinent information about how not to draw down a large reservoir by contacting ODFW³ and the US Army Corps of Engineers⁴ concerning the ongoing negotiations being made to Cougar Dam in Oregon. Draw downs of Cougar Reservoir are expected to be repeated over the next two years, which also allows them to evaluate adverse effects from altered sediment.

³ Oregon Department of Fish and Wildlife, 3150 Main, Springfield, OR 97474. Phone (541) 726-3515
⁴ Corps of Engineers, Willamette Valley Projects Office, Lockhart Point Dam, Lowell, OR 97032. Phone (541) 937-2131, (541) 767-9488, (541) 822-3344.

CB 7 See response to comment AR 23.

CB 8 See response to comment AR 24.

CB 9 See response to comment AR 25.

CB 10 See response to comment AR 27.

CB 11 The EIS has been revised to include more discussion of the potential benefits of dam removal for restoration of fluvial geomorphic processes. However, as discussed in sections 3.2.2.2, 3.4.2.3, and 3.5.2.1, there is substantial uncertainty involved in projecting the impacts of dam removal. The adverse impacts could outweigh the advantages, particularly in the near term. Removing the dam in stages, as suggested by the commenter, could reduce some potential adverse impacts to downstream resources, but it also could increase the potential for other adverse impacts, for example by causing unacceptably high deposition of fine sediments in the river channel in reaches that now provide valuable spawning habitat. The Army Corps of Engineers' experience with lowering the water levels in Cougar Reservoir on the McKenzie River during the spring of 2002 helps to illustrate the potential for unanticipated adverse impacts from this type of project and the large uncertainties involved in predicting the environmental consequences. The release of water from the dam resulted in turbidity levels in the river downstream from the dam that were much higher than had been projected. The high turbidity adversely affected fishing and other water-based recreation, as well as local businesses that depend on these recreational activities (Hobemicht 2002).

Soda Springs Bypass Reach Alluvial Restoration Project

In contrast to the comments that note concerning the effectiveness of removing Soda Springs dam, there is significant professional disagreement about the likelihood of effectively restoring the amount and quality of instream habitat anticipated by the Alluvial Restoration Project. I refer FERC to Attachment 3-6 in Volume 3 of the North Umpqua Cooperative Watershed Analysis, which documents the findings of the Aquatic Subgroup on the relative benefits expected from removal or modification of Soda Springs dam.

CB 12

CB 12 See response to comment AR 29.

3.4 AQUATIC RESOURCES

3.4.1 Affected Environment

Table 3-6:

The column heading in Table 3-6-1 titled "Existing aquatic resources" should probably be entitled "Existing fish resources," unless other aquatic life such as insects, mollusks, and amphibians are accounted for.

CB 13

CB 13 Table 3-7 has been revised. Obstacles to properly functioning habitats or ecosystem processes include degraded water quality, inadequate instream flow releases, excessive ramping rates, barriers to fish passage and aquatic connectivity, and diminishment of fluvial geomorphic processes. The mitigation measures that have been proposed to deal with these obstacles under the different alternatives are discussed in EIS sections 3.3.2 and 3.4.2.

Rather than addressing issues and obstacles to "enhancement," Table 3-6-1 and the CRES analysis would be improved by addressing obstacles to *presently functioning habitat or aquatic resources*.

Other Aquatic Life

The CRES does not state that there are several notable exceptions to the general downward trend of the ABA measurement scores for benthic macroinvertebrates downstream through the project. In particular, the CRES does not account for significantly lower ABA scores in stream reaches subjected to fluctuating flows from peak power generation.

CB 14

CB 14 The text in section 3.4.1 has been revised.

3.4.2 Environmental Consequences and Recommendations

I offer the following additions or corrections to the information about the following river segments listed in Table 3-6-1 in the hope that the CRES analysis and conclusions are improved:

Midstream North Umpqua River between Soda Springs powerhouse and Soda Creek

Approximately half of this reach is water quality limited¹ for salmonid rearing, while 90% is limited for salmonid spawning. Warmer or even worse conditions are found throughout the Umpqua River Basin, making the upper portion of this reach and the historical habitat above Soda Springs and Soda Creek dam even more valuable to groundwater fish. The lower water temperatures in the upper portion of this reach of the North Umpqua River may contribute to the high densities of spring chinook adults observed here.

CB 15

CB 15 Table 3-7 has been revised.

Soda Springs Bypass Reach

The riparian area in this reach, which is significantly impacted by road and hydroelectric facilities, is unlikely to be improved substantially by the proposed alluvial enhancement project. Removal of the Soda Springs dam would allow full restoration of this reach and its riparian area.

CB 16

CB 16 The impacts of dam removal on riparian vegetation are discussed in section 3.5.2.1. See responses to comments AR 18, AR 29 and AR 33.

Unless boundaries have recently been changed, this bypass reach is not designated as Wild and Scenic River.

CB 17

CB 17 Table 3-7 has been revised.

¹ <http://www.dwg.state.or.us/wq/WQData/LmViewWE.asp>

Slate Springs dam and reservoir

These fish¹⁸ are a barrier to fish as well as an obstacle to the movement of many other aquatic organisms dependent on them. In addition, the downstream delivery of sediments and wood are affected.

CB 18

Slate Springs reservoir inundated 1.3 miles of high value anadromous habitat. The reservoir is now prime habitat for brown trout, potentially affecting anadromous productivity once anadromy is restored and leading to the effectiveness of any brown trout control programs. There are also concerns about how productive the reservoir will be for native trout and salmon if daily water level fluctuations increase as proposed.

Slide Creek full-flow reach

Although not addressed in the analysis, this reach is of concern because of current and proposed peak power fluctuations. Maximum velocities inferred from this reach, which are already low, are not likely to improve with implementation of the Draft Alternative because ramping rates are to be unmitigated and maximum water level fluctuations in Slide Springs reservoir would be increased from 4.3 feet per day up to 16 feet per day. Proposed monitoring will only study effects upon fish. The effects to other aquatic biota need to be considered also.

CB 19

Tahoe River Reach (Slide Creek diversion to Tahoe dam)

The North Umpqua Cooperative Watershed Analysis Synthesis Report found that of all the project facilities, the Slide Creek diversion was ranked as the 3rd highest priority for modification in order to improve habitat connectivity. Only Slate Springs and Tahoe dams were ranked higher. Despite being limited to spawning gravel, this reach of stream contains excellent summer and winter rearing habitat for salmonids, has cool water temperatures, and based upon enrichment studies at the Slide Creek diversion, is also likely important to amphibians.

CB 20

Tahoe Lake headwaters to Lemolo 2 powerhouse (Lemolo 2 full-flow reach)

Although Table 3.4-1 refers to this reach as "short," this 0.9-mile long reach warrants designation as a biological "hotspot." As the DMS flow rates, this low gradient, meandering reach with multiple channels is significant because of the diversity of habitat provided, including a significant amount of high quality spawning gravel for the reservoir's trout population.

CB 21

Although the Proposed and Draft Alternatives would improve water quality and cold water sampling in this reach, any potential benefits to trout in the wetland slated to receive peak power discharges from Lemolo 2 powerhouse can be best described as "speculative." Impacts to existing native species such as the Western pond turtle have not been discussed.

In addition, no quantitative biomass flow-habitat relationships were developed for the Lemolo 2 full-flow reach. The impacts of reducing biomass flows proposed for this reach have not been sufficiently analyzed. For example, assessments of fish spawning habitat suitability or harvest production have not been analyzed.

Lemolo 2 Runway Reach

This 11.3-mile long reach of the North Umpqua River is the longest bypass in the project. Unlike other bypass reaches, the affected stream is relatively low gradient for its entire length. In addition, this reach provides more habitat diversity than other bypass reaches because it contains meandering sections of stream that to establish floodplain processes and multiple channels.

CB 18 See response to comment AR 34.

CB 19 See response to comment AR 35.

CB 20 See response to comment AR 36.

CB 21 As noted, restrictions on ramping in the Lemolo No. 2 full-flow reach are discussed in section 3.4.2.2. After the discharge from the Lemolo No. 2 powerhouse is re-routed into the wetlands around Stinkhole Pond, the instream flow regime for the newly extended bypassed reach would be the same as now provided in the Lemolo No. 2 bypassed reach, and should provide similar amounts of habitat for rainbow trout (see table 3-8). See response to comment AR 37.

Table 3.4-1 correctly identifies that re-establishing habitat connectivity to small streams intercepted by Laclede Dam is another primary issue in this reach.

In addition, the sediment regime, including the timing, volume, and character of sediment delivery to the reach is also an important issue. The North Umpqua Cooperative Watershed Analysis Synthesis Report estimated that substantial project-induced erosion had replaced only half of the original sediment load trapped by Laclede Dam. A decrease in riparian vegetation and potential channel straightening in this reach from pre-project conditions may be related to decreased sediment delivery.

The multiple benefits that would accrue from reconnecting Warm Springs Creek to the Laclede Dam bypass reach were apparently overlooked by the watershed analysis and parties to the Settlement Agreement. The reconnection of Warm Springs Creek would improve habitat connectivity, restore important components of the sediment regime (i.e., timing, volume, and character), as well as provide a more natural hydrograph.

MAJOR FINDINGS AND RECOMMENDED CHANGES TO THE STAFF ALTERNATIVE

Slide Springs Dam and Reservoir

The North Umpqua Cooperative Watershed Analysis Synthesis Report found that of all project facilities, Slide Springs dam was the highest priority for modification in order to improve habitat connectivity. Improving aquatic connectivity at Slide Springs dam "would result in the highest potential benefits to anadromous fish and other aquatic organisms in the upstream reaches of the watershed."

In summary, removal or lowering of Slide Springs Dam would have multiple benefits of a broad range of aquatic resources affected by the project:

- (1) Pools below best habitat in Slide Springs reservoir would be restored to over 1 mile of high quality juvenile habitat. In addition to providing substantial enhanced spawning habitat, conditions for juvenile salmon and other native species would be improved.
- (2) Dam removal or lowering would increase the effectiveness of extensive proposed upstream in the Chewaucan River to restore wood and sediment transport and to reconnect this watershed to the North Umpqua River.
- (3) The need for implementing fish spawning habitat enhancements in the Slide Creek and Slide Springs bypass reaches would be reduced substantially because fluvial geomorphic processes are likely to create and maintain suitable habitat.
- (4) A greater number of native species and life stages would benefit from dam removal or lowering than from fish ladders and screens.

In contrast to the numerous conserving benefits that would accrue from removal of Slide Springs dam, there were significant scientific disagreements about the effectiveness of many mitigation measures proposed in the Settlement Agreement.

Therefore, if Slide Springs reservoir is left in place, FERC should strongly consider additional on-site mitigation to improve the effectiveness of the investment in fish ladders and screens. For example:

- 1) Reducing the productivity of the Tule River bypass for anadromous fish with a temporary trap and haul program over the Slide Creek diversion would resolve the uncertainty that exists about the appropriateness of restoring habitat connectivity to this reach. The MOU recommendation that a technical team evaluate the appropriateness of providing fish passage at the Slide Creek diversion is warranted given the scientific uncertainties that exist.
- 2) If the boulder placements in the Slide Creek Bypass Habitat Enhancement Project successfully capture gravel, their placement should also be considered in the upper reach of the Slide Creek bypass. Gravel retention in this portion of the reach would stimulate the effectiveness of reconnecting the Chewaucan River to the North Umpqua River. Although stream gradient increases in the upper portion of the reach, gradients are similar to Fish Creek, where boulders effectively retain spawning gravel.

CB 22

CB 22 The entry in table 3-7 (numbered 3.4-1 in the draft EIS) has been clarified to indicate that reduced sediment delivery is one of the issues for this reach.

CB 23

CB 23 See response to comment AR 39.

CB 24

CB 24 The parties to the Settlement Agreement considered but rejected the proposal to provide fish passage at Slide Creek dam (section 3.4.2.3). A fish ladder at that diversion would make available only a relatively short reach of stream (1.4 miles) with relatively poor anadromous fish habitat (a steep-sided canyon with substrate dominated by bedrock and large basalt blocks). Anadromous fish spawning habitat is considered to be especially limited in this reach (an estimated 21 m² of mostly low quality gravel patches). The confined stream channel and high stream power make it unlikely that additional inputs of sediment and large woody debris would remain to add substantially to fish habitat.

Anadromous fish habitat enhancement in the upper reach of the Slide Creek bypass did not appear to be considered in the Settlement Agreement, the §401 Water Quality Certificate, or by the NGOs. If post-implementation monitoring of the effectiveness of the Slide Creek Habitat Enhancement Project suggests that substantial benefits could be obtained by placing additional boulders in the upper reach of the Slide Creek bypass, the parties to the Settlement Agreement could consider implementing this measure, using mitigation funds set aside under the Agreement. Note that the benefits of adding boulders to this higher-gradient area would need to be weighed against the potential impacts to whitewater recreation (section 3.4.2.5).

Fish Creek Bypass and the Slide Creek Bypass Habitat Enhancement Project

The design of the Slide Creek bypass enhancement project anticipates that boulders placed in the Slide Creek bypass reach will capture sediment transported by Fish Creek and thereby create substantial amounts of sediment spawning habitat.

However, for this to occur, sediment transport through the Fish Creek bypass must occur. The North Upstream Cooperative Watershed Analysis Synthesis Report incorrectly assumed that boulders and large wood transport through the Fish Creek diversion is fully functional. In reality, PuallCarp intercepts transport by immediately removing large wood and gravel accumulations at the diversion.

Therefore, it is recommended that FERC require that the passage of large wood and boulders at the Fish Creek Diversion be maintained in order to (1) ensure minimal fluvial geomorphic processes in the Fish Creek Bypass, (2) maintain spawning gravel quantities in the Fish Creek bypass, and (3) to ensure suitable amounts of gravel reach the boulders placed in the Slide Creek Bypass.

CB 25

See response to comment AR 87.

Lemolo 2 Full-Flow Reach and Lemolo 2 Bypass Reach Flows

With implementation of the Staff Alternative, the Lemolo 2 full-flow reach bottom on extension of the Lemolo 2 bypass reach becomes discharge from the Lemolo 2 powerhouse would be diverted into a wetland complex. Although aquatic and riparian resources in the full flow reach would benefit from decreased water fluctuations and improved water quality, many adverse impacts may occur by channel into the wetland complex. In addition, the channel bottom flows into the full-flow reach would be substantially smaller.

CB 26

Although flows in the Lemolo No. 2 full-flow reach following re-routing would be smaller than present peak flows, the instream flow releases would be expected to provide considerable rainbow trout habitat (table 3-8). Wetland habitats on the project area are adversely affected by project operations, recreational facilities, and the occurrence of non-native, exotic species (see section 3.5.2.3). Impacts to fauna and wetland habitats are discussed in section 3.5.2.3.

Both the Lemolo 2 full-flow and the Lemolo 2 bypass reaches contain excellent stretches of stream that have allowed the formation of floodplain habitat under multiple channels. Given the capacity of these habitats in the project area, providing an instream flow regime that will maintain functional floodplains and off-channel habitats is critical to species dependent upon these diverse habitats.

CB 27

The instream flow releases in the extended Lemolo No. 2 bypassed reach (table 2-1) are in addition to natural accretion flows and flows from newly reconnected tributaries. These additional sources of water to the former Lemolo No. 2 full-flow reach may provide greater habitat for fish and other aquatic organisms than predicted in table 3-8. Also, under Settlement Agreement Section 5.3, prior to the new license becoming final or 2004, the parties to the Settlement Agreement shall reconsider instream flow releases and may make adjustments.

Quantitative fish habitat and flow relationships have not been developed for the Lemolo 2 full-flow reach, making selection of the appropriate instream flow problematic. The instream flows proposed in the Staff Alternative for Lemolo 2 bypass reach would likely provide a relatively low percent of peak weighted middle area (WMA) for most rearing and spawning in the full flow reach. Substantial increases in fish habitat and other instream benefits are likely to occur with consistent increases in instream flows because of the reach's low gradient, multiple channels, and abundant spawning gravel.

Therefore, instream flows for the Lemolo 2 bypass are recommended in order to (1) approximate the relatively constant water temperatures found in the reference conditions; (2) provide more floodplains and side channel habitat; and (3) increase sediment spawning habitat. In addition, a flow regime similar to that proposed in the WOO Alternative is preferred because seasonal variations would mimic the natural hydrograph.

An effective way to ensure a larger instream flow that varies with the season is the Lemolo 2 bypass would be to maintain Warm Springs Creek to the North Upstream River. In addition to restoring elements of a more functional flow regime, construction of Warm Springs Creek would improve habitat connectivity and restore important components of the sediment regime (i.e., timing, volume, and diameter of sediment delivery and transport) to the largest and most diverse bypass reach in the project.

CB 28

We believe that water quality measures described in the Settlement Agreement and specified in the §401 Water Quality Certificate would adequately address water quality concerns. The potential for additional on-site enhancement and technical evaluations is included in both the Settlement Agreement and the Staff Alternative. The Settlement Agreement includes many PM&E measures that protect, enhance, and mitigate impacts to environmental resources. Monitoring is included under the Settlement Agreement.

CONCLUSION

I conclude that additional on-site mitigation and technical evaluation, as described above, are warranted if either the Proposed or Staff Alternative is selected. By doing so, PuallCarp would still be able to retain

peak power production in the Clearwater 1 and Clearwater 2 powerhouses with minimal environmental impact. Peak power generation in the Lemule 1 and Lemule 2 powerhouses may be possible if water quality concerns are effectively addressed and the impacts of diverting the Lemule 2 powerhouse discharge into the wetland complex can be kept to an acceptable level.

CB 28
(Cont)

From a watershed perspective, many of the Staff Alternative's mitigation measures emphasize (1) localized improvements that target site-specific problems and benefit relatively few species or life stages, (2) maintaining changes to the existing facilities and operations rather than making a few key modifications that would ensure multiple ecological processes and minimize significant power generation, and (3) finding off-site mitigation rather than preventing additional habitat degradation from occurring in the project area.

CB 29

From a project perspective (a smaller spatial scale), many of the mitigation measures may have limited benefits even at the site where they may be implemented, and have no established forum for evaluation, feedback, and development of adaptive management if necessary.

Thank you for consideration of my comments. I hope FERC will develop an alternative that better balances waterpower development with the restoration of biological and physical processes. Only then can we be assured of maintaining the aquatic and species dependent resources affected by the North Umpqua Project.

Respectfully Submitted,

Craig A. Burns 6/9/02

Craig A. Burns

CB 29 See response to comment FLOW 1.

PHONE (202) 448-0888

800 ENERGY NEWS
BIRMINGHAM, AL 35203-0000

NORMAN M. CHRISTENSEN, M. D.

June 17, 2003
Margalle R. Rubin, Secretary
Federal Energy Regulatory Commission
888 First St., NE
Washington, DC 20426Re: Re-licensing of 1127
North Umpqua River

Dear Margalle R. Rubin, Secretary:

I write to indicate my support of the LEAD 9 CONSERVATION GROUPS comments on the re-licensing of PacificCorp. FERC's recommendations do not adequately address the issues.

I have fished and fished the Umpqua since 1961. It is a great river with a history of great runs of steelhead and salmon. It (and the public) deserves better treatment than what is getting from PacificCorp. Among the many abuses there is one that salmon are no longer particularly abundant and that is damming of flows, which almost thousands of fish strangled and salmon in streamside pools. Another abuse is the Soda Springs Dam. Why not get rid of it? Why should a marvelous, one of a kind river, be managed by a commercial outfit, PacificCorp?

FERC has never been known as an environmentally oriented agency but it is clear that it looked more carefully at a plan to damming than than simple power generation.

Sincerely,


Norman M. Christensen, M.D.
Monday, June 17, 2003

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FERC 04/08/2003

RECEIVED
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FEDERAL ENERGY
COMMISSION
WASHINGTON, DC 20426

- NC 1 The potential for stranding of fish has been greatly reduced under the Staff Alternative and the Settlement Agreement by eliminating ramping in the bypassed reaches and restricting ramping in the Wild and Scenic River Reach of the North Umpqua River. See section 3.4.2.2.
- NC 2 See response to comment FLOW 15.
- NC 3 We balanced nondevelopmental and developmental resources in section 5.1 of the EIS and found that: (1) the project would provide a significant (820,900 MWh) and dependable source of electrical energy for the region; (2) the project would avoid the need for an equivalent amount of fossil-fuel-fired, electric generation and capacity, thereby continuing to help conserve these nonrenewable energy resources and reduce atmospheric pollution; and (3) the PM&E measures proposed under the Settlement Agreement, combined with the additional measures recommended by staff, would adequately protect and enhance environmental resources and mitigate impacts of the project. The overall benefits of this alternative would be worth the cost of proposed environmental measures and would outweigh the consequences of the other alternatives or license denial.

TO: Megalis R. Sales, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

FROM: Jeremy Hall
2610 Adams Street
Eugene, OR 97405

June 13, 2002

Re: Hydroelectric Project Re-Bidding DEIS (re-Bidding #1927)

Dear Mr. Sales,

I am concerned about the impacts that the eight dams have on the North Umpqua River ecosystem. While I understand that energy production is critical for our country, so are healthy rivers. I use and enjoy the North Umpqua River for recreation, and feel that restoration of the river must be the first priority of all responsible agencies, including FERC.

I feel that incorporating the comments of the Land 9 Conservation Groups would go a long way toward resolving these problems. While the technological fixes will minimize some of the ecological damage the dams cause, I recommend that you select the NGO alternative.

The elimination of habitat by Soda Springs and Slide Creek dams has reduced wild fish populations in the entire North Umpqua River. These dams have eliminated the many areas that are extremely valuable to the viability and production of the anadromous fish populations (e.g. Chinook salmon, steelhead, Coho salmon, cutthroat trout, and Pacific lamprey). Not only have these barriers to fish passage reduced populations of these important fish, but it has also disturbed the nutrient cycling of the riparian forests. These fish bring nutrients from the ocean when they return to spawn and die in their natal streams. This "nutrient pump" is extremely important to the health of the riparian ecosystem, and thousands of species are dependent—everything from tiny insects, to fish and birds, and large mammals. The Oregon coast Coho is currently listed as threatened under the Endangered Species Act (ESA), and the U.S. Fish & Wildlife Service has designated the Pacific lamprey as a candidate species for listing, and the coastal cutthroat and steelhead are under review.

I suggest that FERC look to accomplish the top management priority of the scientists by removing Soda Springs Dam. This dam has no fish ladders and is the first dam in the chain of eight. Removing this dam would restore significant portions of the historic range of the anadromous fish of the North Umpqua.

Currently, stream flows below the dams are highly variable and based on when power

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- JH 1 We have considered the NGO Alternative and present our recommendations and rationale for the recommended alternative in section 5.1.
- JH 2 Although the Soda Springs and Slide Creek dams affect the habitat of anadromous fishes, actions proposed under the Settlement Agreement would provide access to and/or enhance habitats of both anadromous and resident salmonids. For example, upstream fish passage facilities would be installed at Soda Springs dam, and off-site mitigation that includes habitat enhancement in Rock Creek, Canton Creek, and East Fork Pass Creek would be undertaken in lieu of fish passage facilities at Slide Creek dam (see response to comment AR 85).
- JH 3 As discussed in section 3.4.2.3 of the EIS, the parties to the Settlement Agreement have developed a number of measures to improve fish passage in the watershed. These measures would allow more fish to come back to their natal streams, thus returning nutrients to the riparian forest.
- JH 4 The Oregon coast coho is listed as threatened by the FWS (2001a) and is included in table 3-12. The Pacific lamprey is listed by the FWS (2001a) as a species of concern, as indicated in table A-1, a designation that applies to former candidate 2 species that require additional information to justify their being proposed as threatened or endangered under the ESA. The FWS (2001a) also lists the coastal cutthroat as a species of special concern, and the Oregon coast steelhead as a candidate species (see table 3-12).
- JH 5 We have evaluated the NGO Alternative that includes the removal of Soda Springs dam (see sections 3.4.2.3 and 5.1) and the Settlement Agreement that requires the installation of fish ladders rather than removal of the dam. On the basis of this evaluation, we conclude that installation of the vertical-slot fish ladder would provide access to historical spawning and rearing habitat for adult salmonids and lamprey upstream of the dam, while avoiding the adverse impacts on project economics and power production that dam removal would incur. Implementation of the Settlement Agreement would avoid the significant adverse impacts that dam removal would have on anadromous fish habitat downstream. See also response to comment FLOW 15.
- JH 6 Only page 1 of this letter was filed with the Commission.

Margie R. Selin
Federal Energy Regulatory Commission
888 First Street, NE
Washington DC 20426

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REGULATORY COMMISSION

Dear Secretary Selin,

I am writing in response to the Commission's invitation to the public to respond to the draft environmental impact statement issued in April of this year concerning the re-licensing of the North Umpqua Hydropower Project in Douglas County, Oregon. Because of the length of this license and the great part of the river involved I am moved to respond. I am a river user in the sense of following what happens to it and the animals and plants that depend on it and the quality of the water in it. I don't fish or hunt but drive along it often and enjoy its beauty. I do read, however and know that those who use the river more intimately are very concerned about the future and I share their concerns. I support the following:

1) The river's water quality must be carefully monitored. This license period will last a long time and I do not trust any corporation to do the right thing if it is going to cost them money over time. Who will monitor and what amounts of funding will be allocated for it? Will there be enforcement mechanisms in place? SM 1

2) The dams that bring water to the generators are hazardous to wildlife and must be adjusted to allow for effective ways for them to cross over. Covers should be required and seen to be effective. SM 2

3) Will the flows that are allowed now be adequate for the future, especially if the climate or annual rainfall drops? Should the primary determinate of water flows be the money that Pacific Power thinks that they must make? Please give a broad margin of water to the river and if there is doubt, err on the side of water for the plants and animals. SM 3

4) I remember when Pacific Power walked out of the ongoing negotiations because the Forest Service wanted to have Soda Springs Dam removed. They stayed away for nine months until the agency relented and changed its plan. The need to remove that dam still is a good one: that 30 to 40 miles of habitat is above it in the Fish Creek drainage. The planned fish screens are an improvement and a costly technology which have little hope of working given the plan to have a great swing (up to 16 feet) in the reservoir above the dam. SM 4

5) I understand that the plan is to put a lot of money and energy into improving Rock Creek. This area is a mess and over-logged. I believe that the money should be spent on mitigation on the project area. That is where the best water and the best hope for protection of the fish and other wildlife is. Please make them keep the resources to spend on the project area, not downstream. SM 5

Thank You,
Susan Morlang

Susan Morlang
June 17, 2002

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- SM 1 Both the Staff Alternative and the Clean Water Act §401 Water Quality Certificate (granted by the Oregon Department of Environmental Quality) specify considerable monitoring of water quality parameters, including the operation and maintenance of a permanent water quality monitoring station below Soda Springs powerhouse. If adopted by the Commission, monitoring recommendations in the final EIS and those included in the § 401 Certificate would become enforceable license conditions in any license issued.
- SM 2 See response to comment FLOW 19.
- SM 3 If adopted by the Commission, releases recommended in the final EIS would be requirements of any license issued and must be provided by the applicant, even if rainfall is insufficient to allow power generation.
- SM 4 We believe that the Staff Alternative contains sufficient enhancement measures to make much of the historical anadromous fish habitat available without removing Soda Springs dam.
- SM 5 The Tributary Enhancement Fund established in Settlement Agreement Section 19 would be used to implement habitat enhancement projects that are approved by the Oregon Department of Fish and Wildlife. The need for and ecological benefits of these projects are discussed in the Memorandum of Understanding between the Oregon Fish and Wildlife Commission and PacifiCorp (2001). These benefits include improving anadromous fish passage in Rock Creek, improving fish and invertebrate habitats by the addition of large woody debris, and long-term protection of stream habitats and water quality by the purchase of riparian conservation easements. Sections 3.2.2.1, 3.2.2.2, 3.4.23, 3.6.2.1, and 3.6.2.2 of the final EIS discuss ecological benefits of the off-site mitigation measures in Rock Creek. See also response to comment AR 20.

6/17/02

To: M.R. Salas, Secretary
FERC

Washington, D.C.

Greetings: This writing is in reference to re-licensing of the
Umpqua Hydroelectric Project Relicensing.

We, the undersigned, are frequent visitors to the North Umpqua
Watershed and are completely familiar with most of the facts that
pertain to the controversy surrounding the proposed re-licensing of the
hydro-electric facilities existing there.

The settlement agreement presently proposed is wrong. We object
strongly to it as constituting a continuation of the great damage already
done to this magnificent river. It is way overdue for your agency to
initiate and facilitate the proposals of the Lead 9 Conservation Groups.
The Umpqua River in it's entirety has been vandalized repeatedly by
these hydro-electric structures and mis- management of stream flows
solely for the purpose of profit above all. The environmental damage
has been co-continually denied, hidden and covered-up for too long.
Now we cannot silently tolerate 35 years more of these on-going
abuse. Your agency represents the public interest of the whole
nation, not just the tunnel vision of Scottish power. Allow us to remind
you that we, the people, own most of the Umpqua Watershed and our
interests urgently require that your agency should promote and defend
our interests as your sacred and primary duty.

Please exert yourselves diligently in our behalf to protect us from the
single-minded, profit-driven demands of Scottish Power. Support the
NGO Alternative!

Sincerely yours, Mr. Peter C. Mortenson *P.C. Mortenson*
Mrs. Carlotta J. Mortenson *C.J. Mortenson*
Ms. Jill C. Mortenson *Jill C. Mortenson*

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Approved

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PCM 1

PCM 1 Under Section 4(e) of the FPA, the Commission must "give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality." Furthermore, Section 10(a)(1) of the FPA provides that licensed projects "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 adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat)], and recreation [and other purposes referred to in Section 4(e) of the FPA]." In section 5.1 of the EIS, we present our rationale in balancing these developmental and nondevelopmental values and our recommendations for the plan best adapted to comprehensive development. Our balancing analysis considers the comparative environmental impacts of the alternatives (section 3), their economic viability (section 4), and their consistency with relevant agency recommendations, comprehensive plans, laws, and policies (sections 5.3, 5.4, and 5.5). Based on our independent review and analysis of current operations (section 2.1), the proposed Settlement Agreement (section 2.2), and modifications to the Settlement Agreement recommended by the NGOs (section 2.3), we recommend relicensing the project as proposed under the Settlement Agreement with our additional recommended modifications to PM&E measures in the Settlement Agreement as discussed in section 2.3.1 and 5.1.

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385 Oakview Drive
Renoir, OH 97470
June 19, 2003

Margie K. Sales, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426


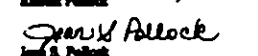
Re: North Umpqua Hydroelectric Project Re-Licensing #1927

It is our opinion that the Draft Environmental Impact Statement which the Federal Energy Regulatory Commission has published is inadequate to protect the North Umpqua River and its wild inhabitants. The river, the fish and the water quality have been compromised enough; we spend many hours each year on the North Umpqua fishing, hiking, and taking photographs, and it is very obvious to us that the river needs more protection than PacifiCorp is willing to give it.

We support the comments of the Lead 9 Conservation Groups. Specifically, 1) remove Soda Springs Dam, 2) improve stream flows to help the fish, 3) design effective monitoring programs to make sure PacifiCorp is accountable to the river, 4) increase stream flows to protect terrestrial species, and 5) make on-site improvements on the hydropower project, not off-site in Rock Creek.

Please approve the alternative that the non-governmental organizations proposed.

Thank you for considering our opinion.

Respectfully,

Janet S. Pollock

Janet S. Pollock


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- Poll 1 We believe that the Settlement Agreement and the Staff Alternative provide adequate protection for the resources in the North Umpqua River affected by the project.
- Poll 2 The Staff Alternative is expected to enhance river flows, water quality, and populations of fish and other aquatic organisms over existing conditions.
- Poll 3 See response to comments FLOW 6, FLOW 15, FLOW 17, FLOW 19, and FLOW 20.
- Poll 4 We continue to recommend the Staff Alternative that includes the Settlement Agreement with some minor modifications. The rationale for this recommendation is provided in section 5.1.

ORIGINAL
 Angela A. Lee, Director
 Federal Bureau of Investigation
 205 - 15th Street, N.E.
 Washington, DC 20036
 Dear Mr. Baker:

I am most successful about the location
of our North Tongue River.
I have certainly secured the amount
of our contribution thanks to:
Ranger Lake Spring Run
Angus Steen flows to help find
North Pacific Cap mountain with
Hudson's mountain program
Secured coal mine - in the land
mineral field is and our son
Thomson
Backs north of our
environment and
in the back.



 Meeting of the American Society of Mammalogists

 8520 N. Dodge Rd., Bushong, OK 74700

MAW 1

MAW 2
MAW 3
MAW 4
MAW 5
MAW 6

MAW 1 Response provided for the following comments.

MAW 2 See response to comment FLOW 15.

MAW 3 See response to comment RTA 2.

MAW 4 See response to comment RTA 3.

MAW 5 See response to comment FLOW 19.

MAW 6 See response to comment SM 5.

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June 21, 2002

Via Overnight Mail

Ms. Magalie R. Salas
 Secretary
 Federal Energy Regulatory Commission
 228 First Street, NE
 Washington, DC 20426

Re: Comments of PacifiCorp on Draft Environmental Impact Statement;
 North Unquago Hydroelectric Project (FERC Project No. 1927-008)

Dear Ms. Salas:

PacifiCorp appreciates the opportunity to provide comments to the Commission on the April 2002 Draft Environmental Impact Statement ("DEIS") prepared by Commission staff in response to PacifiCorp's application for a new license for the North Unquago Hydroelectric Project, FERC Project No. 1927-008 (the "Project"), and the June 13, 2001 Settlement Agreement which PacifiCorp and certain federal and state agencies filed with the Commission on June 21, 2001 (the "Settlement Agreement" or "Agreement").

The Settlement Agreement is the product of extensive negotiations and compromise among PacifiCorp and federal and state resource agencies (the "Settlement Parties").¹ Through these negotiations and compromise, the Settlement Agreement establishes terms and conditions for the new license and carefully crafted procedures for implementation of those terms and conditions. Each term and condition includes measures for the protection, mitigation, and enhancement of the resources of the Upper Unquago River system. The express purpose of the

¹ The parties to the Settlement Agreement are PacifiCorp, U.S. Department of Agriculture, Forest Service ("Forest Service"), National Marine Fisheries Service ("NMFS"), U.S. Department of the Interior, Fish and Wildlife Service ("FWS"), U.S. Department of the Interior, Bureau of Land Management ("BLM"), Oregon Department of Environmental Quality ("ODEQ"), Oregon Department of Fish and Wildlife ("ODFW"), and Oregon Water Resources Department ("OWRD") collectively, the "Settlement Parties" or "Parties". The Settlement Agreement negotiations began in 1997 among the Parties and certain non-governmental organizations (the "NGOs"). In July 2000, the Parties, the Douglas County Board of Commissioners, and the NGOs agreed to enter into a collaborative process following the Commission's alternative licensing procedures with a goal of reaching an agreement by September 2000. This goal was not achieved and the NGOs withdrew from the settlement negotiations. The Parties agreed to proceed with settlement discussions. These ongoing discussions led to the Settlement Agreement among PacifiCorp and the other Settlement Parties.

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considering these alternatives, the DEIS considers various mitigation measures proposed in both the NOO alternative and Staff Alternative not included in the Proposed Action. The DEIS also adequately addresses staff's concerns for eliminating certain alternatives from detailed study, including the alternative of removing all eight Project developments.² These careful and meaningful analyses of the environmental impacts allow the Commission to take a hard look at the range of reasonable alternatives to the Proposed Action and to make an informed decision regarding the disposition of the North Upstream Hydroelectric Project. NEPA requires nothing more.

II. Future Use of Commission's EIS by Forest Service and BLM

The Proposed Alternative and the Staff Alternative acknowledge that future decisions with environmental impacts will be made by the Forest Service and BLM. For example, in conjunction with GCPW and PacificCorp, the Forest Service will choose the location of thirty-four to thirty-nine wildlife bridges across Project waterways. Settlement Agreement § 11.2, 11.3. Similarly, PacificCorp and the Forest Service will decide whether to modify the stream flow levels in Chapter 2 bypass contained in Appendix C, Tables 1 and 2. Settlement Agreement § 5.3. These and other decisions by the Forest Service and BLM may involve the need for site-specific NEPA review.

Under the CEQ regulations, federal agencies may adopt or tie from, as appropriate, either NEPA documents in partial fulfillment of their NEPA review responsibilities. 40 C.F.R. §§ 1502.39 - 21, 1504.26. Adopting or tying NEPA documents and tying from a broader NEPA document are encouraged where appropriate to eliminate repetitive discussion of the same issues and to focus analyses on novel issues ripe for discussion.

Neither the Forest Service nor BLM is a component agency or a joint lead agency for issuing the EIS. However, many of the issues addressed in the DEIS are the same as those which the Forest Service and BLM may need to review under NEPA in support of future actions by these agencies. In order to share future Forest Service and BLM review of actual issues ripe for discussion, PacificCorp recommends that these agencies adopt or tie from the Commission's final EIS as appropriate. The DEIS is organized and analyzes environmental issues in a manner which would allow the Forest Service and BLM to do so. PacificCorp encourages the Commission to prepare the final EIS in a manner that will maximize opportunities for the Forest Service and BLM to adopt or tie from the final EIS so that future Forest Service and BLM NEPA reviews can focus on any discrete issues that may not be addressed in the Commission's final EIS.

² Notwithstanding the sufficiency of the Commission's reviewing the impact of both hydropower developments is enabled to shed to the Commission's review of the NOO Alternative.

PC 1

PC 1 The FS has provided comments on the draft EIS. We have incorporated information and analysis requested by the FS to the extent possible. The ultimate use of the document by the FS is at that agency's discretion.

III. Staff Recommended Modifications to Settlement Agreement

This section presents PacifiCorp's specific comments on staff's recommended modifications to the Settlement Agreement, as presented in the Staff Alternative. First, Section 3.1 presents a general objection to the recommended modifications as a whole. Next, Section 3.2 discusses the overall cost of the recommended modifications. Section 3.3 provides PacifiCorp's position on the staff recommended modifications that would place the subject to Commission review and approval. Section 3.4 discusses how PacifiCorp's specific comments on the staff recommended modifications that PacifiCorp neither reserves for discussion nor does it propose. Section 3.5 agrees to the recommended modifications regarding effectiveness monitoring, monitoring, and ecological effects. Section 3.6 provides PacifiCorp's comments on the additional proposed recommendations by Commission staff. Finally, Section 3.7 requests clarification of the Staff Alternative as it relates to wildlife crossings and monitoring.

3.1 General Objections

3.1.1 As part of the Staff Alternative, Commission staff recommends several modifications to the PM&E measures proposed in the Settlement Agreement. The DCEB as well as PacifiCorp's specific response to each of these recommendations is discussed in further detail below. As a preliminary matter, however, and except as regarding those below, PacifiCorp objects to general to staff's recommended modifications to the Settlement Agreement as summarized by its recent:

PC 2

We do not intend or believe that our additional recommendations depart in any substantive way from the Settlement Agreement. Our recommendations as described in section 2.3.1 are intended to ensure that (1) plans for monitoring and implementing certain enhancement measures included in the Settlement Agreement would be submitted to the Commission for review and approval, as appropriate, after license issuance and prior to their implementation and (2) PacifiCorp, in developing these plans, consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

PC 2

3.2 PM&E Costs

3.2.1 The DCEB states that staff's recommended modifications of the Settlement Agreement's PM&E measures will cost approximately \$100,000 to implement. The revised by

PC 3

The final EIS contains additional text that outlines how the costs of additional PM&E measures were calculated.

PC 3

which this estimate was calculated is not reflected in the DEIS. Assuming as described in the DEIS that the staff's recommended PMAS measures will cost approximately \$100,000 to implement, PacifiCorp agrees with staff's characterization that the costs of these measures would be "insubstantial." DEIS at 5-3. It is not clear, however, whether the costs of the proposed PMAS modifications would in fact be just \$100,000. To ensure that the costs of the proposed modifications will be no more than "insubstantial," i.e., approximately \$100,000, the final EIS should demonstrate how the Commission calculated the anticipated cost of such recommended modifications approved by the Commission. In fact, that cost should be a guide used by the Commission in implementing any such measures under the new license.

PC 3
(Cont)

3.3 Commission Review and Approval of Plans

3.3.1 Staff recommends that various plans required by the Settlement Agreement be submitted to the Commission for review and approval before implementation. DEIS at 5-3. The Settlement Agreement does not provide for Commission review and approval of these plans before implementation. PacifiCorp understands that the Commission is obligated by Section 18(a) of the Federal Power Act to ensure that any license issued for the Project is best adapted, among other things, for the protection, utilization, and enhancement of fish and wildlife (including related spawning grounds and habitat). While the Settlement Agreement does not require that these plans be submitted to the Commission for review and approval before implementation, PacifiCorp does not object to the addition of a requirement for Commission review and approval, except as noted in Section 3.7 below, and provided the Commission sets forth its standards and criteria for review and approval in the final EIS.

PC 4

3.4 Monitoring of Shoreline Erosion in Reservoirs from Peaking Operations

3.4.1 Staff recommends that the erosion control monitoring plan "include monitoring of shoreline erosion in reservoirs from peaking operations" as addressed as part of the overall monitoring program." DEIS at xxvi and 3-23. Sections 12 and 14 of the Settlement Agreement comprehensively address development and implementation of a vegetation management plan and monitoring and remediation of erosion at high and medium priority erosion sites and new sites under all operational conditions, including but not limited to reservoir peaking operations. The Settlement Agreement includes a procedure for conducting erosion control measures at medium and new sites with the cooperation of a Reservoir Coordination Committee composed of representatives of the Settlement Parties.

PC 5

3.4.2 To the extent the staff recommendation only requires that the vegetation management plan and erosion control plan ensure monitoring of shoreline erosion in reservoirs from peaking operations, and assuming that the costs of such monitoring together with the costs of other staff-recommended measures are "insubstantial," PacifiCorp does not object to this additional PMAS measure. However, if this measure alone or together with other staff-recommended changes would impose a substantive obligation or remediation obligation beyond what is provided in Sections 12 and 14 of the Settlement Agreement, the measure would be contrary to the Settlement Agreement. Moreover, monitoring a shoreline erosion and vegetation program in

PC 4 We have included this recommendation to ensure that (1) the Commission is appropriately apprised of plans related to license conditions; (2) compliance with the terms of the license can be followed; and (3) the actions are in the public interest.

PC 5 The Settlement Agreement did not explicitly indicate that monitoring of reservoir shoreline erosion would be included in the scope of the erosion monitoring addressed in sections 12 and 14. The staff recommendation that the monitoring plan should ensure monitoring of shoreline erosion in reservoirs from peaking operations is intended primarily to clarify that this monitoring would be included. Several parties to the Settlement Agreement, including PacifiCorp, consider this monitoring to be included in the scope of the Settlement Agreement.

We have modified the text to note that the parties to the Settlement Agreement consider monitoring of shoreline erosion to be included in the scope of the Settlement Agreement. Also, see response to comment FS 31.

reservoir beyond the scope of what the Settlement Agreement requires staff to assess under the Settlement Agreement. For these reasons, PacifiCorp recommends that the Commission clarify in the final EIS that the staff's recommended measures only apply to monitoring and does not require or authorize any mitigation or other measures beyond those provided in Sections 13 and 14 of the Settlement Agreement.

PC 5
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14.3 The purpose of the mitigation fund created by Section 19 of the Settlement Agreement is to mitigate Project impacts not otherwise mitigated under Sections 4 through 18 of the Agreement. If the Settlement Parties or the Commission believe that additional erosion control is necessary, the Settlement Parties could determine what is necessary and fund those actions under Section 19, subject to Commission approval.

PC 6

14.4 The DEIS recommends that any plan for drainage on any flume where it is not feasible to meet the 30-minute dewatering goal describe plans for dewatering that flume. DEIS at 3-21. Although this plan component is not included within Section 14.2 of the Settlement Agreement, PacifiCorp agrees to include the plan recommended by staff provided that, where subsequent designs reveal that initial feasibility predictions were not accurate, PacifiCorp may amend its flume dewatering plan.

PC 7

15 Effectiveness Monitoring, Biological Objectives, and Damaged Effects

15.1 General Comments

15.1.1 The DEIS recommends incorporation of "effectiveness monitoring" including "detailed ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed" into the development of monitoring plans and programs for Intermountain Flume (DEIS at 3-64; Settlement Agreement § 5.2), downstream fish monitoring in Hole Creek; full-flow reach (DEIS at 3-62; Settlement Agreement § 4.2.1), post construction plan for upstream and downstream fish passage (DEIS at 3-100 to 3-104; Settlement Agreement §§ 4.1.1, 4.3.1, and 4.3.2), and the specific plans for enhancing, restoring, or creating wetlands (DEIS at 3-144; Settlement Agreement §§ 14.5 and 11.5). DEIS at 5-2. Although not mentioned in the summary of staff recommendations (DEIS at 5-2), other portions of the DEIS include staff recommendations regarding "ecological objectives" and detailed performance criteria for restoration of fluvial geomorphology (DEIS at 3-104; Settlement Agreement § 7), and upstream maintenance fish spawning habitat enhancement (DEIS at 3-106 to 3-107; Settlement Agreement § 8).

PC 8

15.1.2 The phrases "effectiveness monitoring," "ecological objectives," and "ecological effects" are vague, subjective, and undefined in the DEIS and there is no consensus as to their objective, verifiable meaning and use in Commission licensing proceedings or in the scientific community. PacifiCorp is concerned that the use of phrases which superficially seem objective but in fact are highly subjective and, absent objectively verifiable meaning, will lead to uncertainty, dispute, and costs beyond the

PC 9

- PC 6 This approach is consistent with our understanding of the purpose of the mitigation fund. Section 3.2.2.1 has been revised to reflect this approach for implementing additional measures not specifically contemplated by the Settlement Agreement.
- PC 7 In staff's revised recommendations identifying plans that would be submitted for Commission review and approval, as appropriate (section 2.3.1), we list the erosion control plan, including any plans or amendments to plans for implementing waterway drainage on any flume segment where it is not feasible to meet the 30-minute goal of draining the waterway.
- PC 8 The Settlement Agreement includes monitoring in a number of sections as listed in this comment. However, it does not include details on biological or ecological objectives, procedures and criteria for evaluating effects, and procedures for developing additional mitigation, if needed.
- We believe that the details of the monitoring plans would best be determined by PacifiCorp in consultation with the parties to the Settlement Agreement. We have modified the EIS text to clarify our view of how such plans should be developed. See also responses to comments AR 71 and FLOW 5.
- PC 9 See response to comment PC 8.

"natural" level occurred by Commission staff, not to mention unreasonable conflicts with specific provisions of the Settlement Agreement. PacifiCorp recommends that the final EIS and new license reject use of these terms.

PC 9
(Cont)

3.5.2 Specific Comments

3.5.2.1 Instream Flows

3.5.2.1.1 Section 5 of the Settlement Agreement provides the following with respect to instream flows: implementation of instream flow regimes for the North Umpqua River as set forth in Tables 1 and 2 of Appendix C to the Agreement, an implementation schedule, procedures for reevaluation and modification of flows, design of fish passage facilities at Soda Springs Dam such that flows discharging from fish passage facilities enter the Soda Springs bypass reach upstream of the natural riffled reach, monitoring of instream flows, minimum flow to ODFW's salmon holding ponds adjacent to the Soda Springs bypass reach, and minimum flows from Clearwater 2 bypass reach through the new reconstruction to supplement flows in Tolmie bypass reach. Section 6 complements these provisions with specific, detailed instream flow standards for certain reaches within the North Umpqua River system, including provisions for monitoring and flow regulation.

PC 10

3.5.2.1.2 Staff's recommendation for "effectiveness monitoring" and "identified ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional obligation, if needed" regarding instream flows is not based on a finding that the measures proposed in the Settlement Agreement are inadequate to meet the Commission's Section 16(a) obligations or that the staff's recommended measures are necessary to meet that obligation. DEIS at 3-64. In addition, the DEIS recommends that PacifiCorp be required to prepare a "study plan for evaluating instream flow." DEIS at 3-43. The detailed and carefully negotiated Settlement Agreement provisions have no room for modifications based on vague and highly subjective standards recommended by staff. Moreover, staff's recommendations would result in evaluation criteria, a monitoring plan, and obligations significantly different in substance from that specified in detail in the Settlement Agreement. Therefore, the modifications proposed by staff are inconsistent with the Settlement Agreement. In addition, the staff's recommended evaluation, monitoring, and mitigation criteria could add more than "natural" events over those contemplated by the Settlement Agreement. If included in the EIS and new license, these terms would be grounds for PacifiCorp's withdrawal from the Settlement Agreement and rejection of the new license. See Settlement Agreement § 23.3.1. The final EIS and new license should reject staff's recommendations for "effectiveness monitoring" based on "identified objectives" and "ecological effects" and for additional obligations regarding instream flow. The final EIS should clarify that the "study plan for evaluating instream flow" referred to in the DEIS at 3-43 is the same as that required by Section 5.2 of the Settlement Agreement.

PC 11

PC 10 As noted in EIS section 3.4.2.1, the flow regime under the Settlement Agreement was based on a number of ecological criteria, i.e., the need to establish a range of flows to provide habitat for anadromous and resident fish, amphibian populations, aquatic invertebrate production, and other aquatic habitats; different flows to reflect seasonal shifts in habitat use; seasonal flow patterns to meet the objectives of the Aquatic Conservation Strategy; and flows that address the ODFW trout management plan.

The parties to the Settlement Agreement devoted considerable efforts to developing instream flow releases that would realize these ecological objectives. As a result, in staff's revised recommendations identifying plans that would be submitted for Commission review and approval, as appropriate (section 2.3.1), we include the study plan for reevaluating instream flows pertaining to the Clearwater No. 2 bypassed reach (Settlement Agreement section 5.2). We also recommend that, in developing these plans, PacifiCorp consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring.

PC 11 See response to comment PC 10.

3.5.2.2 Anadromous Fish Monitoring and Mitigation in Slide Creek Fall-Flow Reach

3.5.2.2.1 Section 6.2.1 of the Settlement Agreement provides that PacifiCorp shall develop in consultation with the other Settlement Parties, except ELM, a monitoring plan to evaluate the effects of current ramping levels on anadromous fish in the Slide Creek fall-flow reach. The monitoring plan is to "establish criteria for evaluating effects on spawning, rearing, and migration of anadromous salmonids," including the effects on anadromous salmon of emergency shutdowns of the Slide Creek powerhouse. Section 6.2.1 establishes a schedule for approval of the monitoring plan by the combined Parties and implementation by PacifiCorp. Section 6.2.2 provides that if the Parties determine, based on the results of the monitoring plan and applying the criteria established in accordance with Section 6.2.1, that (1) anadromous salmonids use the Slide Creek fall-flow reach for spawning (unless PacifiCorp demonstrates that such spawning is not adversely affected), or (2) migratory movements of anadromous salmonids in this reach are adversely affected by the existing ramping regime, PacifiCorp must commence operating the Tolovana powerhouse operations to ensure that generation units are brought into operation individually, in one hour intervals, to protect against rapid flow fluctuations.

3.5.2.2.2 In the DMR, staff recommends "enhanced monitoring" and "established ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed" regarding the Slide Creek fall-flow reach monitoring plan. Staff's recommendation is not based on a finding that the measures proposed in Section 6.2 are inadequate to meet the Commission's Section 16(b) obligations or that the staff's recommended measures are necessary to meet that obligation. DMR at 3-46, 3-47; 5-2. Section 6.2 of the Settlement Agreement establishes definitively the reason by which the Settlement Parties will develop the Slide Creek fall-flow reach monitoring plan, criteria for evaluating effects on spawning, rearing and migration of anadromous salmonids, and provisions for mitigation, if needed. Those detailed and carefully negotiated Settlement Agreement provisions leave no room for modification based on vague and highly subjective standards recommended by staff. Moreover, staff's recommendations could result in evaluation criteria, a monitoring plan, and mitigation significantly different in substance from that specified in Sections 6.2.1 and 6.2.2 of the Settlement Agreement. Therefore, the modifications proposed by staff are inconsistent with the Settlement Agreement. In addition, the staff's recommended evaluation, monitoring, and mitigation criteria could add more than "incremental" costs beyond those contemplated by the Settlement Agreement. If included in the final EIS and new license, those costs would be grounds for PacifiCorp's withdrawal from the Settlement Agreement and rejection of the new license. See Settlement Agreement § 22.3.1. The final EIS and new license should reject staff's recommendations for "enhanced monitoring" based on "ecological objectives" and "ecological effects" and for additional mitigation regarding the Slide Creek fall-flow reach.

PC 12

PC 12 We do not recommend monitoring in addition to that stipulated in section 6.2.1 of the Settlement Agreement. Rather, the monitoring plan that is developed to evaluate the effects of current ramping levels on anadromous fish, in compliance with the Settlement Agreement, should include, as appropriate, objectives, procedures, and criteria to assess these effects. The discussion of the Staff Alternative in section 3.4.2.2 of the EIS has been revised to clarify this issue.

3.5.2.3 Fish Passage

3.5.2.3.1 Sections 4.1.1, 4.2.1, and 4.3.1 of the Settlement Agreement require PacifiCorp to design, construct, test, operate, and maintain fish passage facilities at Soda Springs Dam and Lumsden 2 based on designs approved by ODFW, Forest Service, and FWS. These sections also require PacifiCorp to submit operation, maintenance and post-construction evaluation plans to these agencies for their review and approval and, upon approval, to implement such plans. Each of these sections has performance standards and requires PacifiCorp must take all necessary measures to ensure that performance criteria are satisfied. All of these sections include schedules for the implementation of the required actions.

3.5.2.3.2 In Section 3.4.2.3 of the DEIS, at 3-100 to 3-101, staff recommends that the fish passage measures should be accompanied by detailed plans for monitoring post-construction effectiveness of these measures. Staff goes on to state that these plans should include goals and objectives for the mitigation, as well as performance criteria. Staff's recommendations are not based on a finding that the measures proposed in Sections 4.1.1, 4.2.1, and 4.3.1 of the Settlement Agreement are inadequate to meet the Commission's Section 10(a) obligations or that the staff's recommended measures are necessary to meet that obligation. The relevant sections of the Settlement Agreement provide for development of detailed plans (which will have goals and objectives) for post-construction monitoring and evaluation of the performance of fish passage measures and any further mitigation efforts to ensure that performance standards agreed to in the Settlement Agreement are satisfied. In making its recommendations to the Commission, staff concluded that the Settlement Agreement does exactly what the staff recommends at pages 3-100 to 3-101 of the DEIS. Because the staff's recommendation adds nothing to what the Settlement Agreement already requires, PacifiCorp requests that the staff's recommendations on pages 3-100 to 3-101 of the DEIS be deleted from the final EIS.

3.5.2.3.3 Elsewhere in the DEIS, at xxvii and at 3-2, staff goes beyond its recommendations on pages 3-100 to 3-101 to recommend effectiveness monitoring (including detailed ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed) in the development of monitoring plans and programs. The detailed and carefully negotiated Settlement Agreement provisions for upstream and downstream fish passage have no room for modification based on vague and highly subjective standards such as "effectiveness monitoring" and "detailed ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed."

3.5.2.3.4 Staff's recommendations could result in evaluation criteria, a monitoring plan, and mitigation significantly different in substance from that specified in sections 4.1.1, 4.2.1, and 4.3.1 of the Settlement Agreement. The modifications proposed by staff are inconsistent with the Settlement Agreement. In addition, the staff's

PC 13

PC 13 We do not recommend monitoring in addition to that stipulated in sections 4.1.1, 4.1.2, 4.3.1, and 4.3.2 of the Settlement Agreement. However, the monitoring plans that are developed to evaluate the effectiveness of the upstream and downstream fish passage facilities should, as appropriate, include ecological objectives, procedures, and criteria in the evaluation.

recommendations could add more than "minimal" costs to those contemplated by the Settlement Agreement. If included in the final EIS and new Issues, these terms would be grounds for PacifiCorp's withdrawal from the Settlement Agreement and rejection of the new Issues. See Settlement Agreement § 22.3.1. The final EIS and new Issues should reject staff's recommendations for "effectiveness monitoring" based on "ecological objectives" and "ecological effects" and for additional mitigation regarding fish passage.

PC 13
(Cont)

3.5.2.4 Site Specific Plans for Enhancing, Restoring or Creating Wetlands

3.5.2.4.1 Section 10.5 of the Settlement Agreement requires PacifiCorp to restore riparian habitat along White Mule Creek and certain Project-affected habitat at Potter Creek. Required restoration measures include planting with native species and integration with the site plan development for the comprehensive erosion control actions required by Section 14 of the Settlement Agreement. Similarly, Section 11.5 of the Settlement Agreement requires PacifiCorp, in consultation with the Forest Service and ODFW, to enhance or create new wetlands in eight locations. Neither section requires monitoring or additional mitigation based on any effects. Commission staff recommends that the wetland restoration or creation plan include monitoring of the effectiveness of created or rehabilitated wetlands to determine whether they are properly functioning, together with an adaptive management strategy specifying procedures if any wetlands are not fulfilling their objectives.

3.5.2.4.2 Under the Settlement Agreement, PacifiCorp's obligations are satisfied by implementation of the required actions without the additional measures recommended by staff. To require more, as proposed by staff, would deprive PacifiCorp of the benefit of the Agreement: certainty and predictability regarding PacifiCorp's obligations. Moreover, one stated purpose of the mitigation fund created by Section 19 of the Settlement Agreement is to mitigate Project impacts to wetlands and other habitat not otherwise mitigated under Sections 4 through 13 of the Agreement. If additional wetlands measures are desired by the Forest Service, the Forest Service and other Settlement Parties can initiate a process to assess the need under Section 19, subject to Commission approval. To require that PacifiCorp carry out the additional wetland measures recommended by staff impacts and creates uncertainty regarding PacifiCorp's obligations and denies PacifiCorp the benefit of the Settlement Agreement. Staff has not said that the undertakings proposed in the Settlement Agreement do not satisfy the Commission's obligations under Section 10 of the Federal Power Act.

PC 14

3.5.2.4.3 The Settlement Agreement was painstakingly negotiated and reflects many compromises by all Parties. Departure from Sections 10.5, 11.5, and 19 as proposed in the DEIS could result in wetland evaluation criteria, a monitoring plan, and mitigation significantly different and substantially more costly than specified in the Settlement Agreement. Indeed, the extensive wetlands obligations and costs of staff's recommendations, standing alone, might exceed staff's assertion that all of staff's recommendations would result in only "minimal" additional costs of approximately

10

PC 14 As noted in section 3.5.2.3 of the final EIS, the wetland and riparian habitat modifications proposed under the Settlement Agreement had several ecological goals. These goals included (1) creating an environment that supports healthy and diverse populations of still-water amphibians and other native vertebrate and invertebrate species and (2) creating and maintaining wetland species diversity. A variety of problems can be encountered in restoring or creating wetlands, and attempts to do so are not guaranteed to be successful.

Although the Settlement Agreement does not specify that monitoring plans would be prepared for those activities associated with enhancing, restoring, or creating riparian habitats and wetlands, the FS has indicated that monitoring would be a component of the site plans developed for each of those actions (FS 2001d). Thus, in staff's revised recommendations identifying plans that would be submitted for Commission review and approval, as appropriate (section 2.3.1), we include site-specific plans for enhancing, restoring or creating riparian habitats and wetlands (Settlement Agreement sections 10.5, 11.5, and 21.5) with the understanding that monitoring would be a component of such plans.

\$100,000. If included in the final EIS and new license, the staff recommended terms would be grounds for PacifiCorp's withdrawal from the Settlement Agreement and rejection of the new license. [See Settlement Agreement § 22.3.1]. The final EIS should include staff's recommendations that the wetland restoration or creation plan include monitoring of the effectiveness of created or substituted wetlands to determine whether they are properly functioning, together with an adaptive management strategy specifying procedures if any wetlands are not fulfilling their objectives.

3.5.2.5 *Fluvial Geomorphology*

3.5.2.5.1 The staff recommends that the license include requirements for "ecological objectives" and detailed performance criteria for restoration of fluvial geomorphology. DQES at 3-164. Many of the actions required by Section 7 of the Settlement Agreement simply need to be spelled out. Examples include continuation of PacifiCorp's existing gravel augmentation plans, passage of 400 cubic yards of gravel annually, at a cost of \$5,000 annually, with continuation of the Soda Springs Bypass Reach Alluvial Restoration Project, construction of the streambank of Clearwater River in the Tule River bypass reach, and other tributary streambank and modification of Clearwater I Dam at Shing Lake to allow passage of sediment and large woody debris at high-flow events to be completed upon information based on design that is subject to Commission review and approval. It is hard to see how objective ecological objectives and performance criteria could meaningfully be developed for these actions. Furthermore, for other actions, development of "ecological objectives" and detailed performance standards would be highly subjective and require others' disagreement to any environmental benefit that might be obtained through propagation of current plans. Even assuming that additional fluvial geomorphology actions could be taken, and more was always to done, the Settlement Agreement does not require PacifiCorp to do so and staff's recommendation does not explain why PacifiCorp should be required to do so.

3.5.2.5.2 Under the Settlement Agreement, PacifiCorp's fluvial geomorphology obligations are satisfied by implementation of the actions required by Section 7. To require more, as proposed by staff without justification, would deprive PacifiCorp of the benefit of the Agreement. As noted previously, one purpose of the mitigation fund created by Section 19 of the Settlement Agreement is to mitigate Project impacts not otherwise mitigated under Sections 4 through 18 of the Agreement. If additional fluvial geomorphology measures are necessary, the Settlement Parties could determine what is necessary and fund those actions under Section 19, subject to Commission approval. To require in addition to Section 19 that PacifiCorp carry out the additional fluvial geomorphology measures recommended by staff significantly increases PacifiCorp's obligations. Yet staff has not said that the undertakings proposed in the Settlement Agreement do not satisfy the Commission's obligations under Section 16 of the Federal Power Act.

PC 14
(Cont)

PC 15

PC 16

PC 15 The actions included in the Settlement Agreement related to restoration of fluvial geomorphology are intended to achieve ecological objectives, particularly to provide suitable spawning habitat for anadromous fish. Although the parties to the Settlement Agreement devoted considerable effort to devising these measures, uncertainty exists regarding the most effective ways to accomplish the intended objectives. Indeed, subsequent to the publication of the draft EIS the parties re-evaluated some of the Settlement Agreement provisions related to fluvial geomorphology and modified the gravel augmentation program and replaced the Soda Springs Alluvial Bypass Restoration Project with the North Umpqua River Habitat Restoration/Creation Project (PacifiCorp 2002f). Ecological monitoring, with stated objectives and performance criteria would help the parties to the Settlement Agreement evaluate whether the goals of the Aquatic Conservation Strategy are being met, or whether modifications or additional measures are needed. Any additional measures determined to be necessary could be funded according to Section 19 of the Settlement Agreement.

PC 16 See response to comment PC 15.

PC 17

3.5.2.6 Minimum Academic Requirements for Spring Entry

| PC 18

PC 19

PC 19 See response to comment PC 18. We do not recommend additional anadromous fish spawning enhancement measures, but rather recommend that in developing monitoring plans required in sections 8.2.2 and 8.3.3 (as amended) of the Settlement Agreement, PacifiCorp consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring. Consistent with the Settlement Agreement, we anticipate that monitoring would help identify the need for additional measures. Additional measures, if needed, could be funded according to Section 19 of the Settlement Agreement. Without monitoring, however, it is difficult to determine whether additional measures would be needed.

staff, would deprive PacifiCorp of the benefit of the Agreement: certainty and predictability regarding PacifiCorp's obligations. As noted previously, one purpose of the mitigation fund created by Section 19 of the Settlement Agreement is to mitigate Project impacts not otherwise mitigated under Sections 4 through 18 of the Agreement. If additional mitigation measures for riparian habitat enhancement are necessary, the Settlement Parties could determine what is necessary and fund those efforts under Section 19, subject to Commission approval. To require in addition to Section 19 that PacifiCorp carry out the mitigation measures for riparian habitat enhancement recommended by staff doubles PacifiCorp's obligations.

PC 19
(Cont)

3.3.2.6.4 The detailed and carefully negotiated Settlement Agreement provisions for mitigation measures for riparian habitat enhancement leave no room for modification based on vague and highly subjective standards such as "effectiveness monitoring," and "detailed ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed." Dependent from the Settlement Agreement mitigation measures for riparian habitat enhancement in the new license as proposed by staff would be inconsistent with the Settlement Agreement because staff's recommendations could result in evaluation criteria, a monitoring plan, and mitigation significantly different from that specified in the Settlement Agreement. If included in the final EIS and new license, these items would be grounds for PacifiCorp's withdrawal from the Settlement Agreement and rejection of the new license. See Settlement Agreement § 22.3.1. In addition, the staff's recommended evaluation, monitoring, and mitigation criteria could add costs beyond those contemplated by the Settlement Agreement - costs which are unknown and which may be more than "minimal." The final EIS should therefore delete staff's recommendations for mitigation measures for riparian habitat enhancement beyond those set forth in the Settlement Agreement.

3.6 Examination of Dam Operations

Commission staff recommended that PacifiCorp remove operation of the existing stream gauges located at Boulder Creek, as well as post real-time stream flow data to the Internet for this gauge and all other Project gauges described in, and required by, the Agreement. Staff also recommended that PacifiCorp provide notice and specific flow information when scheduled maintenance and other releases at Project developments could provide additional boating opportunities.

The Settlement Parties have discussed their staff recommendations, and believe that such recommendations go beyond the requirements of the Settlement Agreement. Nevertheless, PacifiCorp agrees to remove operation of the Boulder Creek gauge and to post real-time stream flow data to the Internet for this and all other Project gauges required by the Settlement Agreement.

Staff recommends that PacifiCorp provide notice and specific flow information when scheduled maintenance releases at Project developments could provide additional boating opportunities. PacifiCorp believes that implementing this recommendation may create significant

PC 20

PC 20 We recommend that PacifiCorp provide notice and specific flow information when scheduled maintenance releases at the project developments could provide additional boating opportunities because these measures would better enable boaters to use whitewater resources upstream of Soda Springs dam. However, we have revised final EIS section 3.8.2.3 to reflect the potential safety concerns mentioned in this comment. To better characterize the potential for boating during maintenance periods, PacifiCorp could monitor boating during maintenance releases and document actual use levels and safety-related concerns. If the results of this monitoring indicate that boating during maintenance releases is not occurring or is very limited, or that such boating is occurring but is unsafe, PacifiCorp could request that the Commission modify the license to remove the requirement for providing information about maintenance releases.

public safety issues since doing so will encourage renovations/leading during periods of time not in project reaches (e.g., bylaws/changes) that are made for such activities. PublicCorp recommends that the Commission report this recommendation.

3.7 20th Century and Life

12.21 In recommending that the Commission review and approve certain plans developed pursuant to the Settlement Agreement, respondents also requested that the Commission approve 17 additional copyright and misappropriation (COPM) and 138 trademark (TM) rights of plaintiffs under the Settlement Agreement provided for by the game bundles, website mappings, and merchandise plans to facilitate the efficiency of website creation, and website mappings, specifically, Section 11.3 requires that Prodigy develop and implement a trademarking plan to address trademark issues in coordination with the Forest Service and COPM and trademark the merchandise plan to address trademark issues for the new licenses in 2007, while there is no time limit for the trademarking plan. While 3 years of "open application including website mappings and other marketing are encouraged" based on the trademarking plans, Prodigy can build up to five additional website mappings based on the Forest Service and COPM. Now in building any of the 34 new website mappings if completed by the end of 2007, Prodigy will have 34 website mappings. Prodigy also has 17 website mappings, Prodigy's "Inventory and Manage Species" program produced reports while 269 of the 269 species of the inventory system were taken such mapping is proposed. In addition to these mappings for website mappings, the Agreement requires that Prodigy maintain a minimum of 17 website mappings for website mappings, and a minimum of 138 trademark mappings for trademarks.

13.2. Paid-Up does not refer to a requirement that the vehicle existing plan, including limitations of coverage, numbering methods, and criteria for determining the need for additional coverage, be filed with and approved by the Commissioner. Paid-Up requires classification, however, that paid is an understanding of a new plan necessary for vehicles in "transmission, maintenance, and other" subject to the Commissioner's review and approval as stated in Article 11 of the Lettering Agreement. Finally, Paid-Up requires classification that the seller's responsibility for the vehicle is not transferred to the buyer. The vehicle is required to be "paid" only to the "to be additional vehicle" and "to be additional vehicle" which may be required pursuant to Article 11.3, and "would not require any higher or different number of additional vehicle numbers, nor any additional vehicle numbers."

3.3 If any recommendations are not consistent with their recommended destination, PacificCorp recommends that the additional requirements not be included in the final EIS or the new license on the ground of requirements and licensing that additional requirements would be inconsistent with the Fisheries Agreement and Section 1(b) of the FPA.

PC 20
(Cont)

PC 21

The Staff Alternative has been clarified to indicate that it would not include additional requirements beyond those included in the Settlement Agreement. That is, we are not recommending (1) a new plan requirement for wildlife underpasses or (2) that more than five additional wildlife crossings be constructed. We note that the criteria for determining if or when the five additional crossing would be constructed would be determined by the RCC as described in Section 21 of the Settlement Agreement.

PC 22

PC 22 See responses to comments DOI 4, ODFW 5, and AR 15.

14

While FluidCorp does not presently operate Santa Springs Recovery up to 16 that, the project does present the structural ability to do so, and FluidCorp agrees to retain the possibility of doing so in the future, consistent with the terms of the Agency's recent technology only tank recovery lead commitment in the scope of the Agency's tight source closures technology only offer for greater Steamtown while meeting tight source requirements. In addition, hoppers and streams will not be installed and fully functioning until the seventh anniversary of issuance of the new license. Therefore, opportunities may exist for recovery lead Steamtown prior to installation of a tank hopper and provide tank recovery.

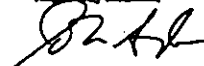
V. Summary and Conclusions

13

have look at the Proposed Action, while preserving the careful balance of waterway use developed by the Parties to the Settlement Agreement.

The Settlement Parties have carefully crafted a comprehensive settlement agreement that resolves matters pertaining to Project relicensing. The Agreement is the product of substantial scientific study and negotiation. The Settlement Parties conclude that adoption of the Agreement is fair, reasonable, and in the public interest, and well supported by substantial evidence contained in the record. The Settlement Parties likewise conclude that the Agreement represents a reasonable compromise between a variety of competing interests. The Settlement Parties, including PacifiCorp, strongly urge the Commission to reject recommendation (3) to unnecessary since Agreement measures already address the concerns and desires reflected in this alternative through specific FERC measures, monitoring plan requirements, and provisions for both on- and off-site mitigation.

Respectfully submitted,



John Sample
Relicensing Project Manager
North Unapapa Hydroelectric Project
PacifiCorp

cc: Service List
Ant Miller, FERC
John Smith, FERC
Vince Yonick, FERC

PC 23

PC 23 See response to PC 2.

Appendix A

Additional Comments and Corrections

[illegible]

#	Page	Line	Comment	
			(proposed §§ 9.2(a), 9.2(b), 9.2(c), 9.2(d), 9.2(e); (9) monitor temperature, pH, flow, turbidity, dissolved oxygen, chlorophyll-a, TDS, specific conductance, and other parameters (proposed §§ 1.2, 2.4, 3.2, 3.3, 4.1, 6.4, 6.5, 8.2, 9, 11.2); and (10) prepare and submit reports to ODEQ on monitoring data and on evaluations of specified water quality issues (proposed §§ 1.2, 2.4, 3.2, 3.3, 4.1, 6.4, 8.2, 9, 11.2). Unless PacifiCorp notifies ODEQ's certification conditions or involves the dispute resolution provisions of the Settlement Agreement based on the certification, which PacifiCorp does not anticipate doing, the final EIS should include in the Settlement Agreement Alternative the additional measures required by ODEQ's certification conditions.	PC 24
B	xxv	3-4	The measures that would be required by ODEQ's proposed section 401 certification conditions are expected to cost between \$5 - \$10.1 million and would reduce power generation by up to 9,391 kW for on-peak power and 7,094 kW for off-peak power.	PC 25
C	1-4	16-18	See comment A, above.	PC 26
D	3-10	26	Water for the Lemule No. 1 waterway no longer exists from White Mule Creek, which was reconnected to the North Umpqua River in 2000.	PC 27
B	3-12	16-17	The discussion of the Lemule No. 2 development which states that the waterway intercepts seven side channels along its length implies that the gravel circles have not been constructed. In fact, they were tossed back to the North Umpqua River. These diversion infrastructure still exist, and will be removed in accordance with the Settlement Agreement. Settlement Agreement § 10.4.	PC 28
F	3-27	1-3	The EIS states that active storage at Lemule Lake is 491.4 acre-feet. In fact, however, current active storage is only 144 acre-feet, between the elevations of 3426.5 and 3430 feet. See 1995 Application, Volume 2, Exhibit B, Figure 3.3-3. Active storage would increase to 253 acre-feet if the low elevation were dropped to 3424. See 1995 Application, Volume 2, Exhibit B, Figure 3.3-3.	PC 29
G	3-32	13-14	These ramping rates do not reflect current practice. Typically, since 1996, PacifiCorp has been implementing voluntary ramping restrictions in this reach of 0.1 feet per hour, which satisfies sediment regulations.	PC 30
H	3-34	3-5, 31-33	See comment A, above.	PC 31
I	3-35 to 3-36	table 3-1	See comment A, above. The proposed section 401 certification would require (1) a minimum flow of 100 cfs in the Lemule No. 1 stream until July and (2) minimum	PC 32

PC 24 The water quality analysis (section 3.3.2.2) has been updated to reflect the § 401 Water Quality Certificate conditions.

PC 25 The final EIS economic analysis has been changed to reflect ODEQ's certification requirements. Text has been modified to indicate that §401 conditions apply as well.

PC 26 See response to comment PC-25.

PC 27 Text has been modified to indicate White Mule Creek was reconnected in 2000.

PC 28 Text has been modified in section 2.1.4 to include this updated information.

PC 29 Text has been modified in section 2.1.6 to correct the figure for active storage capacity.

PC 30 Text has been modified in section 2.1.9 to include this additional information.

PC 31 See response to comment PC 24.

PC 32 Table 2-1 has been modified to reflect the new § 401 instream flows.

#	Page	Line	Comment
			Down of up to 140 cfs and 180 cfs in June and July, respectively, in the Little No. 2 bypass reach as needed to meet the summer temperature criterion of 12.8°C during.
J	2-28	9-10	The DEIS states that certain control measures will not be implemented under the Settlement Agreement until the second anniversary of the new license becoming final. The Settlement Agreement, however, provides for implementation of certain control measures upon completion of an action control plan at the end of 2001 in accordance with Schedule 7.4.4, which sets forth specific dates by which such measures are to be completed.
K	2-29	17-19	The statement regarding negotiation of flow flows should be moved to the DEIS' discussion of reservoir and fluvial management (see DEIS at 2-12, then 5-39). The Settlement Agreement provides for cooperative management of Little No. 2 Reservoir to balance the interests of power generation, fisheries, and recreation. See Settlement Agreement § 9.1. For the period preceding new license issuance, the Agreement includes certain measures for management of Little No. 2 Reservoir to address energy emergencies while protecting downstream reaches, including the WRM and Sennie River Reach. 16. The Settlement Agreement's statement that PacifiCorp will consult with ODFW, ODFQ and other interested parties to determine appropriate negotiation of flow flows below Bids Springs powerhouse for opening Chinook salmon should be read in that context. In other words, PacifiCorp has committed to consulting with the resource agencies IC during the Chinook opening season, energy emergency conditions result in base flows under the reservoir management structure which are inadequate to support Chinook opening. Under such circumstances, negotiation of flow flows below Bids Springs powerhouse would be accomplished by adjusting the timing of the Little No. 2 releases.
L	2-29	26-37	The discussion of Settlement Agreement sampling provisions should include a discussion of ramping during outages and maintenance. See Settlement Agreement §§ 6.5 - 6.8. In addition, this section should state that the ramping regime outlined in the Settlement Agreement allows PacifiCorp to more closely mimic the natural hydrograph. See Settlement Agreement §§ 6.1 - 6.9.
M	2-33	21-22	The DEIS text should clearly state the specific wetland locations and restoration implementation dates set forth in Section 11.5 of the Settlement Agreement.

PC 32
(Cont)

PC 33

PC 33 Text has been modified to reflect dates provided in Table 3.4-1 of PacifiCorp (2002e).

PC 34

PC 34 Text has been moved as suggested in this comment.

PC 35

PC 35 Additional text has been added to this section to discuss ramping during outages and maintenance.

PC 36

PC 36 We believe the comment refers to p. 2-34, lines 21-22. Text has been added to specify wetland locations and implementation dates.

#	Page	Line	Comment
N	2-32	33-40	The discussion of the Settlement Agreement's proposed restoration of White Mule and Peter units under the title "Reservoir and Forebay management" should be moved to the following section, entitled "Aquatic connectivity." See DEIS at 2-32.
O	2-33	3-7	In its discussion of the Settlement Agreement's proposed measures for aquatic connectivity, the DEIS should note that reconstruction of the Clearwater River and the North Umpqua River will allow a portion of the Clearwater 2 bypass reach flow to travel down the original Clearwater River channel to the confluence of the North Umpqua River downstream of Tolmie Dam. See Settlement Agreement § 10.2.
P	2-34	31	"PacifiCorp would begin measures..." should be replaced with "In 2002, PacifiCorp began implementing measures..."
Q	2-35	15-21	The DEIS improperly combines two measures proposed in the Settlement Agreement which should be listed as separate measures. Specifically, Section 12.3 of the Settlement Agreement states that PacifiCorp will conduct archaeological site discovery surveys before implementing ground-disturbing activities. Section 12.4 commits PacifiCorp to preserving, restoring or re-creating data from archaeological sites as provided in its specific plans.
R	2-35	27-29	This line should be changed to reflect that the Restoration Resource Management Plan will be completed in April 2002, as agreed by the Settlement Parties at the May 22, 2002 Executive Meeting.
S	2-36	6-9	The following should be added to the text: "Funds collected, into overhead container and expended at the site by the UREDA-PB as provided by statute, shall continuously reduce PacifiCorp's annual obligations at that site. Fees will be used to coordinate travel meeting at those facilities the full service Mountain Meadows standard." See Settlement Agreement § 17.4.
T	2-36	15-20	The DEIS should clarify that Section 9.3 of the Settlement Agreement would allow PacifiCorp to draw Lemake Lake down by up to 1.5 feet once full pool between Memorial Day and Labor Day.
U	2-36	32	"By 2002..." should be replaced with "By April 2002..." as agreed by the Settlement Parties at the May 22, 2002 Executive Meeting.
V	2-37	23	"By June 2002..." should be replaced with "By April 2002..." as agreed by the Settlement Parties at the May 22, 2002 Executive Meeting.

PC 37

PC 38

PC 39

PC 40

PC 41

PC 42

PC 43

PC 44

PC 45

PC 37 Text has been modified in response to this comment.

PC 38 Text has been modified in response to this comment.

PC 39 Text has been reworded as suggested.

PC 40 We have revised section 2.2.2 as suggested in this comment.

PC 41 We have revised section 2.2.2 as suggested in this comment.

PC 42 We have revised section 2.2.2 as suggested in this comment.

PC 43 Text has been modified in response to this comment.

PC 44 The date has been changed to reflect the May 22, 2002 meeting as documented in PacifiCorp 2002e.

PC 45 The date has been changed to reflect the May 22, 2002 meeting as documented in PacifiCorp 2002e.

#	Page	Line	Comment
W	2-37	35	"PacifiCorp and the FR..." should be replaced with "PacifiCorp, in consultation with the FR..." See Settlement Agreement § 15.3.
X	2-37	35	The following should be added under an additional Land Use subheading: "Culverts (section 15.6). • PacifiCorp, in consultation with FR, will inventory culverts on Project lands. • Culverts will be upgraded for fish passage by the fifth anniversary of the new license. • Culverts will be upgraded to meet a 100-year flood by the eleventh anniversary of the new license. • The cost of upgrading culverts will be allocated on the same basis as costs for road maintenance measures."
Y	3-39	39	The FRMS would benefit from a more complete discussion of the proposed Resource Coordination Committee ("RCC"). Information on the RCC may be found in Section 21.1 of the Settlement Agreement.
Z	3-40	7	PacifiCorp applied to OGBQ for water quality certification on July 3, 2009.
AA	3-25		The FRMS' discussion of sediment conditions and the potential for enhancement of both springs reflects the Settlement Parties' understanding at the time the Agreement was executed; however, further analysis has since shown that this reach was never in fact an elevated channel that supported significant salmonid spawning. See Stillwater Technical Memorandum, attached as Exhibit A. Moreover, the reach has little potential for creating salmonid spawning gravel. 26. The Settlement Parties are engaged in ongoing discussions regarding the appropriate response to this new information, and will alert the Commission to any amendments made to the Settlement Agreement on that basis. In the meantime, the Commission should amend the referenced language to reflect this new information and the ongoing nature of discussions in response to such information.
BB	3-36	11-12	The FRMS mistakenly states that three Sun Diamond Lake are impounded. In fact, the Oregon Department of Fish and Wildlife notes such flows during the spring and fall months.
CC	3-36	6	(1) In Table 3-4, the 12.5°C temperature criterion expressly applies only to native salmonid spawning, etc. See OAR 340-041-0283(2)(b)(A)(i). For example, it does not apply to non-native brown and brook trout spawning. (2) In addition, the temperature criteria are amended as the

PC 46

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PC 46 Text has been modified as suggested.

PC 47 The new subheading and bullets have been added under Land Use as suggested.

PC 48 Additional discussion of the RCC has been added to this section.

PC 49 Text has been modified to indicate that final § 401 Water Quality Certificate has been issued and to discuss the conditions.

PC 50 Text has been modified to reflect Amendment No. 1 to the Settlement Agreement. See response to comment FS 34.

PC 51 The text has been revised in response to this comment.

PC 52 The text has been revised.

#	Page	Line	Comment
DD	3-56	7	moving 7-day average of daily maximum temperatures. See OAR 340-041-0066(54). The turbidity criterion is: "No more than a ten percent cumulative increase in natural stream turbidity shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity." OAR 340-041-0283(2)(c). Table 3-6 should reflect that natural turbidity levels are not subject to the criterion (and in fact define the baseline for applying the criterion to human-caused turbidity). Turbidity caused by natural incidents or large storm events does not exceed the criterion, provided that the turbidity is not 10 percent greater than the turbidity that would have occurred naturally.
EE	3-36	8-9	(1) The dissolved oxygen criterion for warm and cool water are inappropriate and should be deleted. ODEQ has not designated any of the waters affected by the Project for warm or cool water aquatic life. See ODEQ, Evaluation Report and Findings on the Application for Water Quality Certification 30 (March 8, 2002, draft) (Draft Evaluation Report). (2) The dissolved oxygen criterion for cold water aquatic life is not "between 6.0 and 8.0 mg/L." The criterion is a minimum of 8.0 mg/L, although, if there is sufficient data, ODEQ has the discretion to treat the criterion as a 30-day mean minimum and apply 6.0 mg/L as the absolute minimum. See OAR 340-041-0283(2)(b)(A)(i). (3) The dissolved oxygen criterion for salmonid spawning is not "between 6.0 and 11.0 mg/L." The integrated dissolved oxygen ("DOOI") criterion for salmonid spawning is a minimum of 6.0 mg/L. OAR 340-041-0283(2)(b)(A)(ii). In addition, because DOOI levels are high throughout waters affected by the Project, ODEQ has determined that the applicable water column dissolved oxygen criterion for salmonid spawning is a minimum of 9.0 mg/L. See OAR 340-041-0283(2)(b)(A)(iii); Draft Evaluation Report 41.
FF	3-56	11-13	(1) The chlorophyll-a value is an action level that triggers further evaluation by ODEQ of potential adverse effects on designated beneficial uses; it is not a water quality standard. See OAR 340-041-0150(1), (2). (2) The chlorophyll-a action level is an average based on at least three samples collected over any three consecutive months; the average need not be exceeded for three consecutive months. OAR 340-041-0150(1)(c).

PC 52
(Cont)

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PC 54

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PC 53 The text has been revised in response to this comment.

PC 54 The dissolved oxygen entry in table 3-6 has been revised in response to this comment.

PC 55 This entry in table 3-6 has been revised to reflect this information.

#	Page	Line	Comment
00	3-36 to 3-39	17 (6, 3-50) to 12 (6, 3-59)	(1) In Table 3-4, the maximum values presented are misleading because they are single values, not 3-month average values. All observations of average values were below the action level of 6.0 mg/l. See Draft Evaluation Report (7-9).
02	3-38	18, 21	The discussion of water quality in these pages appears to be limited to data collected in 1992 through 1994. The fact that 228 should reflect more recent data is noted. This data is included in "Appendix A" of July 2001 version 01.1 and is included in "Appendix A" of July 2001 version 01.1 and is included in "Appendix A" of July 2001 version 01.1.
03	3-38	18, 21	Because the average chlorophyll <i>a</i> value of 6.0 mg/l is above the action level, it should be addressed as such, rather than as a "trend," which is potentially confusing.
05	3-38	23-39	(1) The discussion of dissolved oxygen levels should refer to the applicable water column maximum values instead of 8.0 mg/l (cold water) and 9.0 mg/l (seasonal averages), and the action level, which apply only to limited circumstances.
07	3-38	35	(2) The KDOO standard of 6.0 mg/l is no longer a "primary" standard. Moreover, the fact that 228 should note that KDOO levels in "Tribute" effluent waters exceed the maximum 8.0 mg/l "action level" is OAR 340-61-0030. See Draft Evaluation Report (7-9).
09	3-38	35	The total dissolved gas value of 121 percent saturation that was observed before Washington Park was caused by the natural fall, and the Page 6, See Draft Evaluation Report (7-9).
10	3-41 to 3-43	27 (6, 3-41) to 9 (6, 3-46)	Again, the discussion of water quality on these pages does not reflect the most recent information, particularly "Appendix A" of July 2001 version 01.1 and is included in "Appendix A" of July 2001 version 01.1 and is included in "Appendix A" of July 2001 version 01.1.
12	3-41	34-38	(1) With respect to the "water" component of water quality standards, the text on these standards is outdated. OAR 340-61-0032, not "loading or potential" standard.
			(2) There is no "implementation" of the water quality standards are presently met." Degradation is observed if the criteria for degradation are not. Monitoring and evaluation report, See OAR 340-61-0032(1)-(3). The Washington Agreement Alternative, however, would result in only temporary water quality degradation from implementing protection, mitigation, and enhancement measures.

PC 56 The water quality data collected in 1992–1994, as well as more recent, supplemental data, are included in the Evaluation Report and Findings (ODEQ 2002b) related to the project's § 401 Water Quality Certificate that was issued on June 28, 2002. Data from both the 1992–1994 and the more recent studies were reviewed, and table 3-6 and section 3.3.1.2 have been revised.

PC 57 The text has been revised in response to this comment.

PC 58 The text and table 3-6 have been revised.

PC 59 The text has been revised to indicate the value was caused naturally by the waterfall.

PC 60 See response to comment PC 56.

PC 61 The text has been revised in response to this comment.

e	Page	Date	Comments
104	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
105	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
106	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
107	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
108	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
109	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
110	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
111	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
112	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
113	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
114	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
115	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
116	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
117	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
118	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
119	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
120	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
121	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
122	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
123	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
124	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
125	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
126	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
127	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
128	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
129	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
130	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
131	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
132	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
133	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
134	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
135	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
136	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
137	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
138	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
139	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
140	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
141	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
142	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
143	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>
144	3-43	1-19	<p>PC 61 (Cost)</p> <p>PC 62</p> <p>PC 63</p> <p>PC 64</p> <p>PC 65</p>

PC 62 The text has been revised in response to this comment.

PC 63 The text has been revised in response to this comment.

PC 64 The text has been revised in response to this comment.

PC 65 The text has been revised in response to this comment.

S	Page	Line	Comments
			Moreover, fish are capable of detecting and avoiding high dissolved gas concentrations by remaining in water that is deeper than the compensation depth. See Draft Evaluation Report 118.
QQ	3-43	34-35	Neither periphyton nor phytoplankton blooms are a significant source of turbidity in Project-affected waters. See Draft Evaluation Report 89, 121.
RR	3-46	1-3	During normal operations, the Project does not significantly increase turbidity over background levels, and this could have an bearing on higher salmon or steelhead populations in the WRM and Snake River Reach. See Draft Evaluation Report 117, 123.
SS	3-46	7-8	As discussed in comment 118 and RR, the Project as currently operated does not cause increases of water quality criteria for dissolved oxygen or nuisance algae, does not cause smothering of the pit criteria in Lemote Reservoir, and during normal operations does not significantly increase turbidity levels.
TT	3-46	22-33	This paragraph should be updated to reflect ODEQ's section 401 certification conditions. In addition: (1) As discussed above, ODEQ has determined that there are no occurrences of dissolved oxygen criteria or the nuisance algae action level in Project-affected waters. (2) "Flow certification" is not a certified condition or a criterion for which ODEQ will develop a TACR.
UU	3-48	6-16	As discussed in comment CC, above, submersed and nuisance algae are not significant issues in Project-affected waters. Although the Settlement Agreement concerns described in this paragraph would further reduce the risk of nutrient and algae problems, the paragraph should be updated to reflect the most recent data and analyses, which demonstrate that there are not significant issues.
VV	3-48, 3-49	20 (p. 3-48), 18 (p. 3-49)	TDO is not a significant issue at the Chewaucum No. 1 powerhouse, and PacifiCorp does not propose specific measures to reduce TDO at this powerhouse. See Draft Evaluation Report 122.
WW	3-49	8-9	Again, as discussed above, submersed is not a significant issue in Project-affected waters.
XX	3-71 to 3-73	table 3.4-1	Table 3.4-1 should be increased to several impacts: (1) As discussed in comment RR, above, the Project's normal operations have no significant "turbidity impacts" on the WRM and Snake River reach. See Draft Evaluation Report 117, 123. (2) The table includes the Snake Springs bypass reach in the description of the WRM and Snake River reach. This is

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PC 66 The text has been revised in response to this comment.

PC 67 The text has been revised in response to this comment.

PC 68 The text has been revised in response to this comment.

PC 69 The text has been revised in response to this comment.

PC 70 The text has been revised in response to this comment.

PC 71 The text has been revised in response to this comment.

PC 72 The text has been revised in response to this comment.

PC 73 The text has been revised in response to this comment.

#	Page	Line	Comment
			incorrect because the upstream end of the Wild and Boreal River mouth is Soda Springs powerhouse, not Soda Springs dam. In other words, the bypass reach is not included in the Wild and Boreal River reach.
			(3) The Lomata No. 1 and Lomata No. 2 references in the second column of the fourth and fifth rows are incorrect: the fourth row should refer to Lomata No. 2 Dam; the fifth row should refer to the Lomata No. 1 Dam.
			(4) It is misleading to state that water temperatures in Lomata Reservoir are "above optimum for minnows." Water temperatures in Lomata Reservoir exceed water quality criteria for temperature only near the surface, where and when minnows are not present. Below the surface, temperatures remain cold and dissolved oxygen levels remain high throughout the year. See Draft Evaluation Report 94.
			(5) The final row in the table regarding Slide Creek discusses instream flows and fish counts. Slide Creek itself is not regulated; instream flows are not affected by the Project, and access to the reach is not affected by the Project except as restricted downstream at Soda Springs dam. Presumably, this row is meant to refer to the Slide Creek bypass reach, which is addressed earlier in the table. Therefore, the row should be deleted.
YY	3-79	23	This reference to Slide Creek and summary of the 16 Action Alternatives should be removed. Slide Creek is already addressed in Table 3-5 on page 3-78, line 11-22.
ZZ	3-212	9	"...within 12 months after the effective date of the Settlement Agreement..." should be changed to "...by April 2001..." as agreed by the Settlement Parties at the July 22, 2000 Settlement Meeting.
AAA	3-213	33-35	As discussed in comment CC, above, the Project does not contribute significantly to dissolved nutrient concentrations. ODEQ has found that the Project is not a significant source or sink for nutrients. See Draft Evaluation Report 25-26, 92.
BBB	4-3	30-32	The DEIS estimates that implementing the Settlement Agreement would result in a loss of 131,000 kWh, distributed as approximately two-thirds off peak. It appears as if the on- and off-peak numbers have been transposed. In any case, the source of these numbers should be indicated.
CCC	4-1 to 4-6	n/a	Section 4 of the final EIS should incorporate the additional costs that will be associated with ODEQ's certification conditions. See comment A, above.

PC 73
(Cont)

PC 74

PC 75

PC 76

PC 77

PC 78

PC 74 The information on Slide Creek has been removed from table 3-8.

PC 75 We have revised sections 2.2.2 and 3.10.2.2 as suggested in this comment.

PC 76 "Dissolved nutrient concentrations" has been deleted from the sentence.

PC 77 The numbers reported are not transposed. They were derived from our use of the PacifiCorp spreadsheet model of the North Umpqua Project. Specific reference to this model is provided in the previous paragraph of the EIS.

PC 78 Additional costs associated with ODEQ's § 401 Certificate have been included in the final EIS economic analysis.

#	PR#	Lib#	Comment
000	5-11	15-16, 36-37	As discussed in comment 000, above, the Project does not contribute significantly to disturbed conditions or concentrations. CDRQ has found that the Project is not a significant impact or risk to the estuary. See (Draft) Evaluation Report 9-40, 49. In addition, algae blooms (which occur only in Loma Linda Reservoir and for only brief periods during warm years) and the dumping of trash (from the two adjacent sources of turbidity, San Diego Creek and San Juan 135). The paragraph on macrobenthos should be deleted or substantially revised for the reasons stated in comment 000, above. Again, the more recent water quality data and conclusions show that macrobenthos is not a significant issue in Project-affected waters and that the Project is not a cause or source of macrobenthos. CDRQ has concluded that the Project is not a significant source or sink for nutrients and that there are no estuary conditions associated with phytoplankton or periphyton within Project-affected waters. See (Draft) Evaluation Report 9-40, 49. The turbid water and jet problems associated with Loma Linda Reservoir are primarily due to excessive flow. Damaged LCRs, which is above the Project, San Juan 135. Permit/CRP submitted its water quality monitoring applications to CDRQ on July 2, 2001. Permit/CRP anticipates that CDRQ will issue the modification by July 2, 2002. The final EIS should reflect these monitoring applications.
008	5-12	11-29	
PR#	5-28	1-4	

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PC 79 The text in section 5.2.2 has been revised to delete reference to dissolved nutrient concentrations.

PC 80 This section discusses cumulative impacts and explicitly states that the project does not contribute nutrients to the river. Text has been modified to reflect the most recent water quality data and ODEQ's conclusions.

PC 81 The § 401 Water Quality Certificate was issued on June 28, 2002, and the text in section 5.5.1 has been revised to incorporate this information.

A-151

RE: M.E. McManus, July 1, 2002
Portland, Ore.
DNR 01-001



June 21, 2002

VIA OVERNIGHT MAIL

Ms. Magella R. Sales
Secretary
Federal Energy Regulatory Commission
500 First Street, N.E.
Washington, D.C. 20426

Re: North Umpqua Hydroelectric Project (P-1927-000); Response to Staff
Recommended Alternative for Project Refinement

Dear Ms. Sales:

On or about April 30, 2002, the Federal Energy Regulatory Commission ("the Commission") issued a draft environmental impact statement (DEIS) for the North Umpqua Hydroelectric Project (P-1927-000) ("the Project"). The staff alternative consists of adoption of the North Umpqua Settlement Agreement ("the Agreement") previously filed with the Commission by the undersigned parties ("the Settlement Parties"), on June 21, 2001, with few modifications. The purpose of this letter is to set forth the Settlement Parties' responses regarding staff's recommended modifications to the Agreement, and to request that the Commission modify these recommendations in accordance with the Settlement Parties' recommendations.

1. Background

On June 21, 2001, the Settlement Parties submitted a comprehensive settlement agreement to the Commission for purposes of resolving issues relating to the refinancing of the Project. Subsequent to this filing, the governmental parties filed revised terms, conditions, and recommendations adopting the Agreement in its entirety, and requesting that the Commission adopt the Agreement as its preferred alternative in the refinancing process.

On or about April 30, 2002, the Commission issued a DEIS recommending that the Commission approve the Agreement with few modifications.

(1) To help ensure the effectiveness of the planned measures, the plans on: review current, the Slide Creek Bypass Ranch Habitat Enhancement Project and the Slide Creek Bypass Ranch Alluvial Restoration Project, wildlife crossings and underpasses; reevaluation of instream flow; continuous fish monitoring for the Slide Creek full-flow reach; post construction evaluation for upstream and downstream fish passage; and site-specific measures for enhancing, restoring or creating wetlands with the Commission for review and approval prior to implementation.

(2) Ensure that monitoring of shoreline erosion in connection with parking operations is addressed as part of the overall monitoring program.

(3) Explicitly incorporate effectiveness monitoring (including detailed ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed) into the development of monitoring plans and programs.

(4) Remove operation of the existing gauge at Boulder Creek (USGS # 14316497) and post real-time data from this gauge and all the project gauges described in the Settlement Agreement on the Internet to provide notice and specific flow information when scheduled maintenance schemes at the project developments could provide additional whitewater boating opportunities.

DEIS at xxvi; see also DEIS at 2-43 through 2-44.

The Settlement Parties have reviewed staff's recommended modifications to the Settlement Agreement, and submit this joint response to the Commission providing specific comments on these recommended modifications.

II. Response to Recommended Modifications to the Agreement

Below the Settlement Parties respond to each of staff's recommended modification to the Agreement in order, and recommend Commission action on each of these modifications.

A. Filing of Plans for Commission Review and Approval Prior to Action

Staff recommend that PacifiCorp file a variety of plans with the Commission for its review and approval before PacifiCorp commences implementing measures contained in such plans. The Settlement Parties believe it is appropriate to file the specified plans for Commission review once such plans are completed. However, it is important to note that several of these plans are scheduled for completion prior to the Commission's issuance of a new license. For example, it is likely that plans for implementing and evaluating the Slide Creek Bypass Ranch Alluvial Restoration Project will be completed before issuance of a new license. Consequently, it may be impossible to obtain Commission review and approval of certain plans without substantially delaying implementation of associated PM&E measures as provided in the Settlement Agreement.

SP 1

SP 1

Under the Settlement Agreement, PacifiCorp would implement certain plans prior to license issuance. However, the Commission would reserve the right to require modifications upon its review of the plans.

The Settlement Parties recommend that the Commission clarify that PacifiCorp and the Settlement Parties need not submit plans that will be prepared prior to license issuance. The Parties believe that such plans do not require modifications to the existing Project license. Adopting this clarification will help ensure that PacifiCorp is able to implement PM&E measures in accordance with implementation schedules completed in the Settlement Agreement.

SP 1
(Cont)

B. Monitoring of Shadeline Erosion in Reservoirs

Commission staff recommend that shadeline erosion in reservoirs from Project peaking be addressed as part of the overall monitoring program. Section 14 of the Agreement provides for the formulation of an erosion control plan and monitoring plan for erosion along located within the Project boundary. The scope and content of such plans will address "shadeline erosion in reservoirs." Consequently, this staff recommendation will be addressed through existing Agreement provisions. The Parties recommend that the Commission specifically note this in any final license order.

SP 2

SP2 See responses to comments PC 5 and FS 31.

C. Incorporation of Effectiveness Monitoring into Plans and Programs

Commission staff recommend that the license "explicitly incorporate effectiveness monitoring (including detailed ecological objectives, procedures and criteria for evaluating ecological effects, and procedures for developing additional mitigation, if needed) into the development of monitoring plans and programs." DEIS at 2-46. Such plans include, but are not limited to, (1) the study plan for re-evaluating instream flows; (2) the effectiveness fish monitoring plan for the Slide Creek fall flow reach; (3) post-construction evaluation plans for upstream and downstream fish passage; and (4) site specific plans for enhancing, restoring, or creating wetlands. *Id.*

SP 3

SP 3 Comments on the draft EIS from various parties to the Settlement Agreement indicated that effectiveness monitoring would be considered in developing certain plans. We have revised our recommendations in section 2.3.1 of the final EIS to clarify that, in developing these plans, PacifiCorp consider, as appropriate, biological or ecological objectives, procedures and criteria for evaluating effects, and, if needed, procedures for developing any additional environmental measures based on the results of the monitoring. See also response to comments AR 71 and PC 2.

The Settlement Parties ask the Commission to reject this recommendation as unnecessary.

SP 4

SP 4 The examples of effectiveness monitoring that are cited in this comment (and the Settlement Agreement) are consistent with our recommendations. We agree that adaptive management and effectiveness monitoring should be incorporated into the Settlement Agreement where appropriate. We expect that the monitoring and evaluation plans, to be developed by the parties to the Settlement Agreement and submitted to the Commission for approval, would satisfy the need both to ascertain ecological benefits and to provide operational/economic certainty. See responses to comments PC 10-12, PC 18-19, and SP 3.

While effectiveness monitoring can be a valuable and useful tool, the Settlement Parties believe that staff's recommendation is unnecessary for several reasons. First, the Settlement Parties discussed at length the concepts of "adaptive management" and "effectiveness monitoring" and incorporated them into Agreement outcomes where appropriate. The end result of this discussion and negotiation was a suite of specific environmental measures and processes that address the governmental parties' needs for certainty of ecological benefits and PacifiCorp's need for certainty with respect to Project operations and economic impacts. For example, in the case of downstream fish passage at Slide Springs dam, the Settlement Parties devised specific injury and mortality criteria that these facilities must meet to ensure that the governmental parties' goals and objectives are attained. See Section 4.1.3 and Appendix B of the Agreement. Further, sections 4.1.206 and 4.1.207 of the Agreement specifically provide for the formulation of a monitoring plan that will measure compliance with injury and mortality criteria, as well as procedures for modifying the screens should such criteria not be achieved. Other similar examples of

"Chickadees" monitoring include evaluation of upstream fish passage facilities at Soda Springs dam (section 4.1.16) of the Agreement), evaluation of wildlife crossings (section 11.3 of the Agreement), and monitoring of erosion control after according to the Erosion Control Plan (see section 14.1 of the Agreement). These measures and review procedures were developed to address each Settlement Parties' interests, and are supported by the Implementary Agreement and the Settlement Parties' respective filings in support of the Agreement.

SP 4
(Cont)

Aside from providing specific measures and evaluation protocols, the Agreement recognizes that the Project will result in some unavoidable level of impact to the environment. To address such unavoidable impacts, the Settlement Parties incorporated a variety of mitigation funds into the Agreement. Such funds, described in section 19 of the Agreement, will provide the Settlement Parties to implement a variety of environmental measures both on- and off-site that will, in turn, benefit natural resources in the North Umpqua River basin, and offset unavoidable impacts attributable to Project operations. For example, as stated in section 4.1.26) of the Agreement, the Settlement Parties recognize that some amount of fish mortality may be unavoidable, and that such mortality will be mitigated through use of monies contained in the Enhancement Account. Consequently, the Settlement Parties have developed detailed procedures for addressing the performance of PM&E measures; however, the parties recognized that it will be infeasible to eliminate entirely all potential Project impacts, and have made specific provisions for addressing such impacts.

SP 5

While staff recommendation (3) appears relatively simple, it is more complex than it seems. Nowhere in the DEIS does staff provide a specific basis for this recommendation, nor does staff explain how the Settlement Parties and Puget Sound can practically implement this recommendation. Further, while staff appear to focus this recommendation on four categories of plans, staff does not limit this recommendation to those specific plans; rather, this recommendation applies to all plans and programs contemplated by the Agreement. This introduces new and extremely complicated requirements into a process that has been the subject of negotiation and study for almost ten years.

SP 6

We believe staff recommendation (3) should be consistent with other measures in the Settlement Agreement to avoid triggering the need for the Settlement Parties to engage in extended negotiations and dispute resolution concerning the terms of the Agreement. Section 21.3.1 of the Agreement provides that if the new Review issued by the Commission contains any modification of PM&E measures, or includes additional measures related to the matters covered by the Agreement, a disputing party may initiate dispute resolution proceedings.

In sum, the Agreement has been carefully crafted to provide PM&E measures intended to attain the Settlement Parties' respective goals and objectives, while at the same time providing the certainty necessary for all Settlement Parties to commit to this Agreement. The Commission should not upset the delicate balance struck by the Settlement Parties in this case about a more compelling sharing of risk. In view of the fact that all Settlement Parties believe staff recommendation (3) is unnecessary and otherwise addressed in the Agreement, the Settlement Parties ask the Commission to reject this recommendation.

SP 7

SP 5 Unavoidable adverse impacts are discussed in section 3.11 and include effects from soil erosion and water level fluctuations, and impacts on water quality (e.g., increased turbidity and temperature), aquatic and terrestrial connectivity, and aesthetics. Although the PM&E measures proposed in the Settlement Agreement would substantially reduce these impacts, they would not eliminate all of them. The mitigation fund described in section 19.3 of the Settlement Agreement would compensate for those impacts not adequately addressed elsewhere in the Agreement. We have modified the text to note that the mitigation fund defined in section 19.3 of the Settlement Agreement would be used to further benefit these resources.

SP 6 See responses to comments AR 71, PC 13, and SP 3.

SP 7 The Staff Alternative incorporates all the conditions of the Settlement Agreement. We do not intend or believe that any of our recommendations interfere with the negotiated agreement in any substantive way.

D. Stream Crossing and Data Access

Commission staff recommended that PacificCorp remove operation of the existing stream gauge located at Boulder Creek, as well as past real-time stream flow data to the Internet for this page and all other Project pages described in, and required by, the Agreement. Staff also recommended that PacificCorp provide online and specific flow information when requested by the Commission and other stakeholders at Project developments could provide additional benefit opportunities.

The Settlement Parties have discussed these staff recommendations, and believe that such recommendations are not required by the Settlement Agreement. Nevertheless, PacificCorp agrees to remove operation of the Boulder Creek page and to past real-time stream flow data to the Internet for this and all other Project pages required by the Settlement Agreement. Settling Stream before Boulder Creek page are not impacted by project maintenance. The Settlement Parties believe that flow of any funding opportunities are available to Project residents, and funding issues for "watermaster activities do not exist in such areas. Furthermore, watermaster funding is by-passed because could make public safety issues. For these reasons, the Settlement Parties will not stop its recommendations for relevant roles of Settlement in Stream due to watermaster activities.

III. Summary and Conclusion

The Settlement Parties have mutually crafted a comprehensive settlement agreement that resolves matters pertaining to Project realignment. The Agreement is the product of substantial scientific study and negotiations. The Settlement Parties conclude that adoption of the Agreement is fair, reasonable, and in the public interest, and well supported by the record. The Settlement Parties therefore conclude the Agreement represents a reasonable solution to address a variety of competing interests. Through this letter, the Settlement Parties hereby state that the Commission should adopt the Agreement and a new Project license without modification, except as provided in this letter.

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SP 8 See response to comment PC 20.

SP 9 As stated in the response to comment SP 7, we do not intend or believe that any of our recommendations would interfere with the negotiated agreement in any substantive way. They are included to assist the Commission in following compliance with the license and to ensure the license is in the public interest. Our recommendation to provide flow information for whitewater boaters would be a nominal effort to which PacificCorp has agreed.

APPENDIX B

FEDERAL AND STATE SENSITIVE SPECIES AND SPECIES OF CONCERN

Table B-1. Federal and state sensitive species and species of concern that may be present in the project area

Common name	Scientific name	Federal Status			State Status ⁴
		FWS ¹	FS ²	BLM ³	
Fish					
Pacific lamprey *	<i>Lampetra tridentata</i>	SOC	–	–	SV
Oregon coastal cutthroat trout *	<i>Oncorhynchus clarki spp.</i>	–	SD	–	–
Chum salmon *	<i>Oncorhynchus keta</i>	–	SI	–	–
Oregon coast steelhead trout *	<i>Oncorhynchus mykiss irideus</i>	–	SD	–	–
Oregon coast chinook salmon *	<i>Oncorhynchus tshawytscha</i>	–	SD	–	–
Umpqua Oregon chub *	<i>Oregonichthys kalawatseti</i>	SOC	SD	–	SV
Umpqua dace *	<i>Rhinichthys evermannii</i>	–	SS	–	–
Amphibians					
Clouded salamander *	<i>Aneides ferreus</i>	–	–	–	SU
Tailed frog *	<i>Ascaphus truei</i>	SOC	–	–	SV
Western toad *	<i>Bufo boreas</i>	–	–	–	SV
Del Norte salamander	<i>Plethodon elongatus</i>	SOC	–	–	–
Northern red-legged frog *	<i>Rana aurora aurora</i>	SOC	–	–	–
Foothills yellow-legged frog	<i>Rana boylei</i>	SOC	SD	–	SV
Cascades frog *	<i>Rana cascadae</i>	SOC	–	–	SV
Southern torrent (seep) salamander	<i>Rhyacotriton variegatus</i>	SOC	SD	–	SV

Table B-1. Continued

Common name	Scientific name	Federal Status			State Status ⁴
		FWS ¹	FS ²	BLM ³	
Reptiles					
Northwestern pond turtle *	<i>Clemmys marmorata marmorata</i>	SOC	SD	BS	SC
Sharptail snake *	<i>Contia tenuis</i>	–	–	–	SV
Common kingsnake *	<i>Lampropeltis getulus</i>	–	SS	BA	SV
California mountain kingsnake *	<i>Lampropeltis zonata</i>	–	–	BA	SV
Invertebrates					
Cascades apatanian caddisfly	<i>Apatania</i> (= <i>Radema</i>) <i>tavala</i>	SOC	–	–	–
Franklin's bumblebee	<i>Bombus franklini</i>	SOC	–	–	–
Vertrees's ceracleean caddisfly ⁵	<i>Ceraclea</i> (= <i>Athripsodes</i>) <i>vertreesi</i>	SOC	–	–	–
Mr. Hood primitive brachycentrid caddisfly	<i>Eobrachycentrus gelidae</i>	SOC	–	–	–
Tombstone Prairie farulan caddisfly	<i>Farula reapi</i>	SOC	–	–	–
Sagehen Creek goeracean caddisfly	<i>Goeracea oregona</i>	SOC	–	–	–
Vertrees's ochrotrichian micro caddisfly ⁶	<i>Ochrotrichia vertreesi</i>	SOC	–	–	–
Mammals					
Pacific pallid bat	<i>Antrozous pallidus pacificus</i>	–	SS	BS	–
White-footed vole	<i>Arborimus</i> (= <i>Phenacomys</i>) <i>albipes</i>	SOC	–	–	SU
Ringtail *	<i>Bassariscus astutus</i>	SOC	–	–	SU
Pacific (western) big-eared bat *	<i>Corynorhinus</i> (= <i>Plecotus</i>) <i>townsendii townsendii</i>	–	–	–	SC
Pine martin *	<i>Martes americana</i>	–	–	–	SV
Pacific fisher *	<i>Martes pennanti pacifica</i>	SOC	SD	–	–
Long-eared myotis (bat)	<i>Myotis evotis</i>	SOC	S&M	BS, S&M	SU

Table B-1. Continued

Common name	Scientific name	Federal Status			State Status ⁴
		FWS ¹	FS ²	BLM ³	
Fringed myotis (bat) (a.k.a. Pacific fringe-tailed bat) *	<i>Myotis thysanodes</i>	SOC	SD, S&M	BS, S&M	SV
Long-legged myotis (bat)	<i>Myotis volans</i>	SOC	S&M	BS, S&M	SU
Yuma myotis (bat)	<i>Myotis yumanensis</i>	SOC	–	BS	–
Pacific shrew	<i>Sorex pacificus cascadenis</i>	–	SD	–	–
Birds					
Northern goshawk *	<i>Accipiter gentilis</i>	SOC	–	BS	SC
Bufflehead *	<i>Bucephala albeola</i>	–	SD	–	SU
Barrow's goldeneye *	<i>Bucephala islandica</i>	–	–	–	SU
Ferruginous hawk	<i>Buteo regalis</i>	–	–	–	SC
Olive-sided flycatcher	<i>Contopus cooperi</i> (= <i>borealis</i>)	SOC	–	–	SV
Yellow rail	<i>Coturnicops noveboracensis</i>	–	SS	–	–
Pileated woodpecker *	<i>Dryocopus pileatus</i>	–	–	BA	SV
Western Oregon little willow flycatcher	<i>Empidonax trailii brewsteri</i> (= <i>E. brewsteri</i>)	SOC	–	–	SV
Greater sandhill crane *	<i>Grus canadensis tabida</i>	–	–	–	SV
Harlequin duck *	<i>Histrionicus histrionicus</i>	SOC	SD	–	SU
Lewis' woodpecker	<i>Melanerpes lewis</i>	–	–	–	SC
Mountain quail	<i>Oreortyx pictus</i>	–	–	–	G
Black-backed woodpecker *	<i>Picoides arcticus</i>	–	S&M	S&M	SC
Purple martin	<i>Progne subis</i>	–	–	–	SC
Great gray owl *	<i>Strix nebulosa</i>	–	S&M	BS, S&M	SV

Table B-1. Continued

Common name	Scientific name	Federal Status			State Status ⁴
		FWS ¹	FS ²	BLM ³	
Plants					
Koehler's rockcress *	<i>Arabis koehleri</i> var. <i>koehleri</i>	SOC	—	—	C
Shasta arnica *	<i>Arnica viscosa</i>	—	SD	BA	—
Grass-fern *	<i>Asplenium septentrionale</i>	—	SD	BS	—
Victorin's grape-fern	<i>Botrychium minganense</i>	—	SS	—	—
Crawford's sedge	<i>Carex crawfordii</i>	—	SS	—	—
Sawtooth sedge	<i>Carex serratodens</i>	—	SS	—	—
Tall bugbane	<i>Cimicifuga elata</i>	SOC	SD	BS	C
Mount Mazama collomia *	<i>Collomia mazama</i>	SOC	SD	—	—
Clustered lady's-slipper *	<i>Cypripedium fasciculatum</i>	SOC	SD, S&M	BS, S&M	C
Umpqua green-gentian (a.k.a. Umpqua swertia)	<i>Frasera umpquaensis</i>	SOC	SD	BS	C
Shaggy horkelia	<i>Horkelia congesta</i> ssp. <i>congesta</i>	SOC	—	BS	C
Broad-bracted globe mallow	<i>Ilhamna latibracteata</i>	—	SD	BA	—
Umpqua kalmiopsis* ⁷	<i>Kalmiopsis fragrans</i>	SOC	SD	BS	—
Slender meadow-foam *	<i>Limnanthes gracilis</i> var. <i>gracilis</i>	SOC	SU	—	C
Adder's tongue *	<i>Ophioglossum pusillum</i>	—	SD	—	—
Coffee fern *	<i>Pellaea andromedaefolia</i>	—	SS	BA	—
Red-root yampah *	<i>Perideridia erythrorhiza</i>	SOC	SS	—	C
California sword-fern *	<i>Polystichum californicum</i>	—	SD	BA	—
Thompson's mistmaiden *	<i>Romanzoffia thompsonii</i>	—	SD	—	—

Table B-1. Continued

Common name	Scientific name	Federal Status			State Status ⁴
		FWS ¹	FS ²	BLM ³	
Western bog violet *	<i>Viola primulifolia</i> ssp. <i>occidentalis</i>	–	SU	–	C
Columbia water-meal *	<i>Wolffia columbiana</i>	–	SS	–	–

¹ SOC = Species of concern, former candidate 2 species which need additional information in order to justify being proposed as threatened or endangered under the ESA (FWS 2001).

² S=sensitive species on the FS Region 6 Forester's 2000 Sensitive Animal List or 1999 Sensitive Plant List; SD=sensitive species documented to occur on the Umpqua National Forest; SS=sensitive species suspected to occur on Umpqua National Forest; SU=sensitive species not listed for the Umpqua National Forest; SI=sensitive that may be influenced by actions on Umpqua National Forest; S&M=Survey and Manage species that are late-successional and old-growth forest-related species within the range of the northern spotted owl as designated under the Forest Plan.

³ BS = BLM sensitive species, BA=BLM assessment species, S&M = Survey and Manage species that are late-successional and old-growth forest-related species within the range of the northern spotted owl as designated under the Forest Plan.

⁴ State status is listed only for species in Western Cascades region; C = plants that are State of Oregon Department of Agriculture candidates for listing as threatened or endangered; SC=sensitive critical species—listing as threatened or endangered is pending, or listing as threatened or endangered may be appropriate if immediate conservation actions are not taken; SV=sensitive vulnerable species—listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protective measures and monitoring; SU=sensitive undetermined—status of species in this category is unclear; G=gamebird; ONHP=listed by the Oregon Natural Heritage Program as of conservation concern but not currently threatened or endangered

⁵ Considered but not listed by ONHP because it was too common with no significant threats

⁶ Considered but not listed by ONHP because it was too common

⁷ At the time of the relicensing surveys this species was considered an undescribed Douglas County variety of *K. leachiana* (PacifiCorp 1995a).

* = species observed in primary or secondary study area during PacifiCorp relicensing studies or historically known to occur in or near the project vicinity (source: PacifiCorp 1995a)

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APPENDIX C

ADDITIONAL BIOLOGICAL INFORMATION ON FOREST SERVICE SENSITIVE SPECIES, BUREAU OF LAND MANAGEMENT SENSITIVE AND ASSESSMENT SPECIES, AND NORTHWEST FOREST PLAN SURVEY AND MANAGE SPECIES

North Umpqua Hydroelectric Project, Oregon

C.1. INTRODUCTION

The purpose of this appendix is to discuss the likely effects on certain rare species of the no-action alternative and the three action alternatives. The effects of the existing project (i.e., the no-action alternative) and the three action alternatives on species listed by the federal government or the state of Oregon as threatened or endangered or as candidates for such listing are discussed in section 3.6 of the FEIS. Section 3.5.2.5 of the FEIS addresses, in general, effects on rare plants and animals (1) listed as sensitive species by the Regional Forester in Forest Service (FS) Region 6 (Oregon and Washington) and (2) listed as sensitive or assessment species by the Bureau of Land Management (BLM) in Oregon.

This appendix considers the effects on those species that are not considered in the body of the FEIS and presents more detailed information on some species that are briefly mentioned in section 3.5.2.5. It includes only those species and habitats that exist in the area of the project or that might be impacted by it (see Table C-1). The determination of effects is based on an analysis of the changes that would likely occur to the baseline for each species by implementing the action alternatives. For this FEIS the baseline means the conditions established by the No-Action Alternative, including those actions taken by PacifiCorp since the license period ended.

Table C-1. FS sensitive species and BLM sensitive and assessment species and survey and manage species that may be present in the project area ¹

Common name	Scientific name	Status	
		FS ¹	BLM ³
Fish			
Oregon coastal cutthroat trout	<i>Oncorhynchus clarki spp.</i>	SD	—
Chum salmon	<i>Oncorhynchus keta</i>	SI	—
Oregon coast steelhead trout	<i>Oncorhynchus mykiss irideus</i>	SD	—
Oregon coast chinook salmon	<i>Oncorhynchus tshawytscha</i>	SD	—
Umpqua Oregon chub	<i>Oregonichthys kalawatseti</i>	SD	—
Umpqua dace	<i>Rhinichthys evermanii</i>	SS	—
Reptiles			
Northwestern pond turtle	<i>Clemmys marmorata marmorata</i>	SD	BS
Common kingsnake	<i>Lampropeltis getulus</i>	SS	BA
California mountain kingsnake	<i>Lampropeltis zonata</i>	—	BA
Mammals			
Pacific fisher	<i>Martes pennanti pacifica</i>	SD	—
Fringed myotis (bat) (a.k.a. Pacific fringe-tailed bat)	<i>Myotis thysanodes</i>	SD, S&M	BS, S&M
Birds			
Northern goshawk	<i>Accipiter gentilis</i>	—	BS
Bufflehead	<i>Bucephala albeola</i>	SD	—
Pileated woodpecker	<i>Dryocopus pileatus</i>	—	BA
Harlequin duck	<i>Histrionicus histrionicus</i>	SD	—
Black-backed woodpecker	<i>Picoides arcticus</i>	S&M	S&M
Great gray owl	<i>Strix nebulosa</i>	S&M	BS, S&M
Plants			
Shasta arnica	<i>Arnica viscosa</i>	SD	BA
Grass-fern	<i>Asplenium septentrionale</i>	SD	BS

Table C-1. Continued.

Common name	Scientific name	Status	
		FS ¹	BLM ³
Mount Mazama collomia	<i>Collomia mazama</i>	SD	–
Clustered lady's-slipper	<i>Cypripedium fasciculatum</i>	SD, S&M	BS, S&M
Umpqua kalmiopsis ⁴	<i>Kalmiopsis fragrans</i>	SD	BS
Slender meadow-foam	<i>Limnanthes gracilis</i> var. <i>gracilis</i>	SU	–
Adder's tongue	<i>Ophioglossum pusillum</i>	SD	–
Coffee fern	<i>Pellaea andromedaefolia</i>	SS	BA
Red-root yampah	<i>Perideridia erythrorhiza</i>	SS	–
California sword-fern	<i>Polystichum californicum</i>	SD	BA
Thompson's mistmaiden	<i>Romanzoffia thompsonii</i>	SD	–
Western bog violet	<i>Viola primulifolia</i> ssp. <i>occidentalis</i>	SU	–
Columbia water-meal	<i>Wolffia columbiana</i>	SS	–

¹ Species observed in primary or secondary study area during PacifiCorp relicensing studies or historically known to occur in or near the project vicinity (source: PacifiCorp 1995).

² SD=sensitive species (i.e., species on the FS Region 6 Forester's 2000 Sensitive Animal List or 1999 Sensitive Plant List) documented to occur on the Umpqua National Forest; SS=sensitive species suspected to occur on Umpqua National Forest; SU=sensitive species not listed for the Umpqua National Forest; SI=sensitive that may be influenced by actions on Umpqua National Forest; S&M=Survey and Manage species that are late-successional and old-growth forest-related species within the range of the northern spotted owl as designated under the Forest Plan.

³ BS = BLM sensitive species, BA = BLM assessment species, S&M = Survey and Manage species that are late-successional and old-growth forest-related species within the range of the northern spotted owl as designated under the Forest Plan.

⁴ At the time of the relicensing surveys, this species was considered an undescribed Douglas County variety of *K. leachiana* (PacifiCorp 1995).

Under the action alternatives detailed biological evaluations (BEs) for FS sensitive species would be completed by PacifiCorp as part of the planning process for specific future actions. Thus, this appendix focuses in general on impacts of the alternatives on rare species not discussed in chapter 3 of the FEIS in order to provide information that could be used in preparation of the BEs.

C.2. BACKGROUND

Plants and animals are listed as FS sensitive species by the Regional Forester if there is a documented concern for population viability within one or more administrative units within the species' historic range (FS 1995, 1999a). Evidence documenting such concern can include significant current and predicted downward trends in population numbers, density, and/or habitat capability that would reduce a species' existing distribution.

BLM sensitive species are plants and animals that could easily become endangered or extinct in a state (BLM 2000). They include species that are eligible for federal or state listing or candidate status and that have been designated as sensitive by the State BLM Director. Sensitive species also include animals listed by the state of Oregon as critical,¹ plants listed by the state of Oregon as candidates, and plants or animals on List 1 of the Oregon National Heritage Data Base (ONHP 2001).

BLM assessment species are plant and vertebrate animal species (but not invertebrates or fungi) not eligible for official federal or state status but which are of concern in Oregon and may, at a minimum, need protection or mitigation in BLM activities (BLM 2000). They include species on List 2 of the Oregon Natural Heritage Data Base (ONHP 2001).

The Forest Plan Records of Decision (RODs) (FS and BLM 1994b, 2001) identify survey and manage species² associated with late-successional habitat whose viability would be uncertain without additional consideration.

¹ An Oregon state sensitive critical species is one for which listing as threatened or endangered is pending or listing as threatened or endangered may be appropriate if immediate conservation actions are not taken.

²Standards and guidelines for managing habitat for survey and manage species were provided in Attachment A to the initial Record of Decision for the Forest Plan (FS and BLM 1994b). In early 2001 the FS and BLM amended some of the mitigation measures related to these species (FS and BLM 2001). On October 21, 2002, FS and BLM issued a notice of intent to prepare a supplement to the final EIS for the Northwest Forest Plan to evaluate removing the survey and manage mitigation measures standards and guidelines (*Federal Register* 67, 64601). Habitat needs of the affected rare or little-known species would rely on other elements of the Forest Plan and the existing FS sensitive species and BLM special status species programs.

C.3. DETERMINATIONS

The impacts, in general, to FS sensitive and BLM sensitive or assessment species of the proposed alternatives are discussed in section 3.5.2.5 of the FEIS. Table C-1 lists FS sensitive, BLM sensitive or assessment species, and Northwest Forest Plan survey and manage species that were observed in the primary or secondary study area during PacifiCorp relicensing studies or that are historically known to occur in or near the project vicinity (PacifiCorp 1995). They include six fish, two reptiles, three mammals, three birds, and thirteen plants. Two of the organisms that are listed as sensitive by the FS are also listed as Survey and Manage Species under the Northwest Forest Plan: a vascular plant, the clustered lady's-slipper, *Cypripedium fasciculatum*, and a mammal, the fringed myotis (a.k.a. Pacific fringe-tailed bat), *Myotis thysanodes*. Two other Survey and Manage species were observed in the primary or secondary study area during PacifiCorp relicensing studies or are historically known to occur in or near the project vicinity: black-backed woodpecker and the great gray owl (PacifiCorp 1995). These two species are not listed by FS as sensitive species, but the great gray owl is listed by BLM as a sensitive species.

Several Settlement Agreement measures (PacifiCorp 2001) could benefit FS sensitive and BLM sensitive or assessment species. PacifiCorp would conduct surveys consistent with current protocols for FS sensitive species and survey and manage species within 400 feet of any ground- or habitat-disturbing activity that might result from the Settlement Agreement. Wetlands restoration and creation (see section 3.5.2.3 of the FEIS) and development of a vegetation management plan (VMP) (see section 3.5.2.1 of the FEIS) that emphasized the use of native species would provide an opportunity for enhancement of sensitive plant species. Aquatic protection, mitigation, and enhancement (PM&E) measures could also benefit sensitive species (see section 3.4 of the FEIS).

The NGOs did not specifically mention these species in their February 2001 comments and recommendations (attached to Umpqua Watersheds 2001) or in their July 2001 comments on the Settlement Agreement (Umpqua Watersheds 2001). However, attachments to the latter document included Existing Information Analysis modules that discuss sensitive species. The NGOs do not, however, state whether these terms and conditions would be part of their alternative. Other measures in the NGO's alternative could benefit sensitive species. Wetlands restoration and creation (see section 3.5.2.3 of the FEIS) and development of a VMP (see section 3.5.2.1 of the FEIS) that emphasized the use of native species would provide an opportunity for enhancement of sensitive plant species similar to that provided by the Settlement Agreement. Aquatic PM&E measures would also benefit sensitive species.

The Staff Alternative would include all the features of the Settlement Agreement and also the FS and BLM section 4(e) conditions as described in section 3.5.2.5 of the FEIS, including the development and implementation of a sensitive species plan by PacifiCorp. This plan would ensure that (1) a list of sensitive species that may be present in the project area is maintained and updated as necessary, (2) criteria for BEs to meet FS requirements are identified, (3) BEs to analyze the potential effects of proposed actions are completed by PacifiCorp in a timely manner as proposed actions and projects are designed, and (4) coordination is continued with the FS and BLM on management of sensitive species. Thus, implementing this sensitive species plan would ensure that project operations and facilities are managed throughout the term of any new license so as not to contribute to reductions in species abundance that might lead to a loss of viability of sensitive species or a need for adding them to the federal threatened and endangered species list.

For all the species that have been reported from the project area, the determination is *may impact, but not likely to result in a trend toward federal listing*. For species not known to occur in the project area, the determination is *not likely to impact*.

C.4. SPECIES IMPACTS

C.4.1 Fish

Background and Affected Environment. Several fish species that are listed by the FS as sensitive species are documented (4 species) or suspected (1 species) to occur in the Umpqua National Forest or may be influenced (1 species) by actions on the Umpqua National Forest (FS 2001) (see table C-1). None of these species are listed by BLM as sensitive or assessment species. One of the species, the Umpqua Oregon chub, is listed by the state of Oregon as sensitive, vulnerable.³ Of these six species the FS indicates that at least steelhead trout and the salmon species are documented as occurring in the project area.

Environmental Consequences and Comparison of Alternatives. All actions and projects proposed on BLM- or FS-administered lands must meet the Aquatic Conservation Strategy (ACS) objectives of the Northwest Forest Plan (FS/BLM 1994a, 1994b, 2001). The BEs would analyze the effects of proposed actions and projects to

³ A state sensitive vulnerable species is one for which listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protective measures and monitoring.

sensitive species of fish and would identify the needs of the fish species and habitat elements that would be required to meet ACS objectives.

Existing impacts to fish (see section 3.4 of the FEIS) would continue under the no-action alternative. A number of the PM&E measures included in all action alternatives are intended to improve habitat for fish species in the project area. Thus, any impacts to fish species from the action alternatives would, for the most part, be beneficial. Any adverse impacts would be short term and would be mitigated by the long-term benefits. Therefore, for the three action alternatives the determination is *may impact, but not likely to result in a trend toward federal listing* for these fish species.

C.4.2 Northwestern Pond Turtle, Common Kingsnake, and California Mountain Kingsnake - *may impact, but not likely to result in a trend toward federal listing*

Background and Affected Environment. The *northwestern pond turtle* is a federal species of concern, a state sensitive critical species, and a BLM and FS sensitive species. FS indicates that it is documented to occur in the Umpqua National Forest. It is an aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches that typically have a rocky or muddy bottom and are grown up with aquatic vegetation (Stebbins 1985). It is found in woodland, grassland, and open forest habitats and may be seen basking on logs, cattail mats, and mud banks. It was observed during relicensing surveys in four ponds in the project vicinity and in three other locations near the project vicinity (PacifiCorp 1995). Three of the ponds where it was observed are along the transmission line right-of-way (ROW). The fourth one was in the so-called Stinkhole area, an excavated deepwater pond adjacent to Toketee Reservoir, that is the upper known extent of this species in the North Umpqua River Basin.

The *common kingsnake* is a FS sensitive species, a BLM assessment species, and a state sensitive vulnerable species. It frequents a great variety of habitats (e.g., coniferous forest, woodland, swampland, coastal marshes, river bottoms, farmland, prairie, chaparral, desert) (Stebbins 1985). It is often found in the vicinity of rocky outcrops and clumps of vegetation and under rotting logs, old lumber, and rocks. It is chiefly terrestrial, but sometimes climbs into bushes or trees. It was observed once in the study area during relicensing surveys along the transmission line ROW west of Steamboat Creek (PacifiCorp 1995).

The *California mountain kingsnake* is a BLM assessment species and a state sensitive vulnerable species. It inhabits moist woods, including coniferous forest, woodland, and chaparral, ranging from sea level high into the mountains (Stebbins 1985). It is often found in the vicinity of well-lit rocky streams in wooded areas where there are

rotting logs. It was observed once in the study area during relicensing surveys along the transmission line ROW west of Steamboat Creek (PacifiCorp 1995). Data from BLM and ONHP suggest that it may be well-distributed in the project vicinity along the transmission line ROW on the north side of the North Umpqua River below Dry Creek.

Environmental Consequences and Comparison of Alternatives. At least eight wetlands would be enhanced or created under the action alternatives. Specific locations for some of them are identified in section 3.5.2.3 of the FEIS. Additional investigations would be undertaken to select the remaining areas for wetland development or enhancement. Some of those areas would provide additional habitat for these reptiles. Specifically, all of the action alternatives would include creating a permanent pond at Stinkhole that would improve management of low- to moderate-elevation species such as the northwestern pond turtle. However, as the FS indicates (FS 2001), since northwestern pond turtles would be directly impacted by the PM&E measures proposed by the Settlement Agreement in the Stinkhole area (e.g., recontouring the area to expand the existing wetland complex), there would be a continuing need to evaluate and monitor the effects of these actions on this species. We provide for such monitoring, as appropriate, in the staff alternative.

Under the no-action alternative current impacts from transmission line maintenance could continue. PM&E measures under the action alternatives to improve management of the transmission line ROWs could benefit these species that were found in the ROWs.

Therefore, for the three action alternatives the determination is *may impact, but not likely to result in a trend toward federal listing* for the northwestern pond turtle, the common kingsnake, and the California mountain kingsnake.

C.4.3 Pacific Fisher - *may impact, but not likely to result in a trend toward federal listing*

Background and Affected Environment. The *Pacific fisher* is a federal species of concern and a FS sensitive species. It is a medium-size carnivore that occurs most commonly in landscapes dominated by mature forest cover. In west-side Cascade forests fishers are associated with low- to mid-elevation forests dominated by late-successional and old-growth Douglas-fir and western hemlock (Powell and Zielinski 1994). They appear to disproportionately use riparian areas. The precarious status of the fisher population in Washington and Oregon is believed to be related to the extensive clear-cutting of late-successional forests and the fragmented nature of those forests that still remain. No observations of this species were made at project facilities during the 1992-

1994 field studies, but it has been historically observed in or near the project vicinity (PacifiCorp 1995).

Environmental Consequences and Comparison of Alternatives. Maintenance activities under any of the alternatives could disturb individual fisher present in the project area, but such disturbance would be temporary and unlikely to affect their populations as a whole.

At the landscape level fisher are not at risk of being affected by the loss of connectivity from current project facilities to the extent that population viability would be a concern (FS 2001). At the local level existing project waterways do not generally prevent movement by large and medium-sized animals including fisher, but they may alter movement patterns or corridors, making individual animals more susceptible to predation or hunting mortality (PacifiCorp 1995). Well-used game trails that may be used by fishers lead to most of the existing wildlife bridges, parallel many sections of the waterways, and are evident under the elevated flume trestles.

All of the action alternatives would include measures to improve wildlife connectivity (see section 3.5.2 of the FEIS). Under the Settlement Agreement and the Staff Alternative, PM&E measures to improve wildlife connectivity would include enhancing and monitoring wildlife crossings of project waterways and acquiring riparian conservation easements in Rock Creek Basin.

Under the NGO Alternative project waterways would be covered to improve terrestrial habitat connectivity. This measure would further reduce potential entrapment and entrainment of fishers in project waterways and would prevent either direct death or reduced viability. But because there have been no reports of fishers being entrapped in project waterways, benefits to the species from this measure may be limited.

Implementation of the Recreation Resources Management Plan (RRMP) under the Settlement Agreement and the Staff Alternative would not alter ongoing recreation activities, and they would likely continue to increase in the future. Increased recreation in the project area, especially activities such as snowmobiling and skiing during winter months, could disturb individual animals that were present. However, most recreation occurs in the summer and controlling recreation under the RRMP may benefit fishers by focusing recreational activity in defined areas and establishing procedures and funding for monitoring and law enforcement (PacifiCorp 2002). Thus, impacts from recreation, even if it increases, should be lower under any of the action alternatives as compared to the no-action alternative.

The action alternatives would be beneficial to any fishers that might be present in the area. Therefore, the determination is *may impact, but not likely to result in a trend toward federal listing*.

C.4.4 Fringed Myotis - *may impact, but not likely to result in a trend toward federal listing*

Background and Affected Environment. The fringed myotis (a.k.a. Pacific fringe-tailed bat) is a federal species of concern, a FS and BLM sensitive species, a sensitive species considered vulnerable by the state of Oregon, and a survey and manage species under the Northwest Forest Plan. It is found throughout much of the western United States, usually roosting in caves, mines, or buildings (Harvey et al. 1999). It occurs in a variety of habitats from desert-scrub to fir-pine associations. Oak and pinyon woodlands appear to be the most commonly used vegetative associations. No observations of fringed myotis were made at project facilities during the 1992-1994 field studies, but it has been historically observed in or near the project vicinity (PacifiCorp 1995).

Environmental Consequences and Comparison of Alternatives. Bats are most often harmed by habitat loss or by human disturbance to maternity colonies or during hibernation. No actions are proposed under any of the action alternatives that would alter or remove roosting habitats.

Increased recreation under any alternative could have a negative impact on this species. However, controlling recreation under the RRMP may benefit them by focusing recreational activity in defined areas and establishing procedures and funding for monitoring, law enforcement, and forest plan implementation (PacifiCorp 2002). In addition, a VMP developed under any of the action alternatives could improve habitats.

Therefore, the determination for the fringed myotis is *may impact, but not likely to result in a trend toward federal listing*.

C.4.5 Harlequin Duck and Bufflehead - *may impact, but not likely to result in a trend toward federal listing*

Background and Affected Environment. The *harlequin duck* is a federal species of concern, a FS sensitive species, and a species whose status in Oregon the state considers to be unclear. It lives in turbulent mountain streams (Peterson 1961). It was not recorded during the 1992-1994 field studies, but it has been observed historically in or near the project vicinity (PacifiCorp 1995).

The *bufflehead* is a bird that is listed by the FS as a sensitive species and is considered by the state to be a species with an unclear status. Bufflehead habitat includes lakes, ponds, and rivers (Peterson 1961). Bufflehead were among the most frequently observed wildlife at project impoundments during the 1992-1994 field studies, being seen at all projects except Slide Creek (PacifiCorp 1995). They appear to use project water bodies almost exclusively for wintering.

Environmental Consequences and Comparison of Alternatives. Under the no action alternative there would be no modifications to the project facilities to improve habitat conditions for the two birds.

All of the action alternatives would include PM&E measures that could enhance or improve habitat for water birds (e.g., improving water quality). Any adverse impacts would be short term and would be compensated for by the long-term benefits. Therefore, the determination for these species is *may impact, but not likely to result in a trend toward federal listing* for the harlequin duck and bufflehead.

C.4.6 Northern Goshawk and Great Gray Owl - *may impact, but not likely to result in a trend toward federal listing*

Background and Affected Environment. The *northern goshawk* is a federal species of concern, a BLM sensitive species, and a state sensitive critical species. It is found in northern forests and mountain woodlands (Peterson 1961). Mature mixed-conifer and lodgepole pine stands in the project vicinity provide potential foraging and nesting habitat for the species (PacifiCorp 1995). It was observed during relicensing surveys in a mixed-conifer forest stand adjacent to Stump Lake.

The *great gray owl* is a BLM sensitive species, a state sensitive vulnerable species, and a survey and manage species under the Northwest Forest Plan (FS and BLM 2001) (see section 3.5.1.1). It is the largest North American owl (Peterson 1961). Its habitat is dense, boreal forests and adjacent meadows. There is some indication that opening up closed canopy cover forest may provide increased foraging habitat for this species, but perhaps at the expense of suitable nesting habitat (FS 2001). The species was not recorded near project facilities during the relicensing field studies, but a single great gray owl was observed on four occasions about 1.5 miles south of Toketee Lake in the secondary study area (PacifiCorp 1995).

Environmental Consequences and Comparison of Alternatives.

Management recommendations for the great gray owl are to be developed following the standards and guidelines in FS/BLM (2001). Until they are approved, management of known sites would follow the former Forest Plan Protection Buffer direction, latest information, and best professional judgement.

Pocket gophers are a principal prey for great gray owls, and they tend to thrive (or at least are more observable) in early successional forests (FS 2001). It is possible, therefore, that vegetation management along transmission lines, canals, and flumes under any of the alternatives would be an advantage for the species.

Surveys are needed to determine the presence of these species, identify nest sites if present, and allow for the application of needed mitigation for these sites in terms of protection zones, including seasonal restrictions for project operations and maintenance activities. Surveys for sensitive and survey and manage species would be conducted within 400 feet of any ground- or habitat-disturbing activity under Section 21.5 of the Settlement Agreement.

Therefore, the determination for these species is *may impact, but not likely to result in a trend toward federal listing* for the northern goshawk and great gray owl.

C.4.7 Pileated and Black-backed Woodpeckers - *may impact, but not likely to result in a trend toward federal listing*

Background and Affected Environment. The *pileated woodpecker* is a BLM assessment species and a state sensitive vulnerable species. It is a large black bird, found in much of western North America, that inhabits coniferous and mixed forests (Peterson 1961). ONHP records indicate that this species uses a variety of habitats throughout the North Umpqua drainage, including broadleaf forests, recent clearcuts, and old-growth conifer forests (PacifiCorp 1995). Pileated woodpeckers were observed during relicensing field studies in mid-successional to mature mixed-conifer forest near the Lemolo No. 1 and 2, Soda Springs, Fish Creek, and Toketee developments. They have also been recorded along the transmission line ROW between Dixonville and Rock Creek.

The *black-backed woodpecker* (a.k.a. black-backed three-toed woodpecker) is a survey and manage species under the Northwest Forest Plan and a state sensitive critical species. It is not listed as a FS sensitive species or a BLM sensitive or assessment species. It inhabits the boreal fir and lodgepole pine forests of the mountains in North

America (Peterson 1961). Such habitats occur in the upper portions of the project area (FS 2001). Black-backed woodpeckers were observed in lodgepole pine forests near Lemolo Lake during relicensing studies (PacifiCorp 1995).

Environmental Consequences and Comparison of Alternatives.

As a survey and manage species, the black-backed woodpecker would not be sufficiently aided by application of mitigation measures for riparian habitat protection or other elements of the Northwest Forest Plan (FS/BLM 2001). Therefore, additional mitigation for the species needs to be applied to ensure its numbers do not severely decline. This mitigation includes maintaining adequate numbers of large snags and green-tree replacements for future snags within the species range in appropriate forest types.

Transmission lines, canals, and flumes have bisected the habitats used by these woodpeckers. Construction activities and continued vegetation management maintain a variable width area of early successional habitats with few or no snags remaining within the corridor. Green-trees that could become future snags are generally cut before reaching sufficient size to provide a suitable snag. Occasional felling of hazard trees also occurs outside the immediate corridor and may include any tree tall enough to reach the powerline, canal, or flume.

The amount of large woody material and snags along the project facilities is probably minimal for these species, due both to continued vegetation management precluding the development of large trees and, where human access is allowed within the corridors, the desirability and, therefore, removal of this material for use as firewood. Vegetation management throughout the period of any new license would balance the need for system reliability with wildlife habitat needs. Ensuring the reliability of project transmission lines requires that right-of-way vegetation be maintained at heights and widths that (1) do not create the potential for flash overs between the transmission line and adjoining vegetation that could result in fires and loss of electricity and (2) continue to provide adequate access for routine maintenance. In areas within and adjacent to project corridors hazard trees (i.e. those trees that could fall into the transmission line or onto other facilities) should be topped, if possible, to create a snag rather than felled. When a tree threatens the integrity of the project features and must be felled, it should be left on-site to provide large woody material. Thus, through appropriate vegetation management and operating procedures, potential hazards can reasonably be protected against, and the routine maintenance required for the project facilities can be accomplished in a manner that at the same time improves wildlife habitats. The Settlement Agreement establishes a mechanism to integrate fire management and power

reliability concerns into the VMP while providing for wildlife needs to the extent possible (FS 2001).

Therefore, the determination for these species is *may impact, but not likely to result in a trend toward federal listing* for the pileated and black-backed woodpeckers.

C.4.8 Plants - *may impact, but not likely to result in a trend toward federal listing*

Background and Affected Environment. Thirteen plant species that are listed by the FS region as sensitive were documented in the study area during field surveys (PacifiCorp 1995) (see table C-1). Two of these plant species, slender meadow-foam and western bog violet, are not listed by the FS as sensitive in the Umpqua National Forest. Five of these plant species are also federal species of concern: Mount Mazama collomia, clustered lady's-slipper, Umpqua kalmiopsis, slender meadow-foam, and red-root yampah. Three of these plant species—grass-fern, clustered lady's-slipper, and Umpqua kalmiopsis—are listed by BLM as sensitive species. Three other plant species are listed by the BLM as assessment species: Shasta arnica, coffee fern, and California sword-fern. Four of these thirteen species are listed by the state as candidates for listing as threatened or endangered: clustered lady's-slipper, slender meadow-foam, red-root yampah, and western bog violet. Finally, the clustered lady's-slipper is listed as a survey and manage species under the Northwest Forest Plan.

Table C-2 describes the habitats where these plant species are likely to be found.

Environmental Consequences and Comparison of Alternatives. Under the no-action alternative PacifiCorp would continue to operate the project under the terms and conditions of the existing license. Ongoing maintenance of transmission line ROWs (e.g., mowing, herbicide application, vehicle use) could continue to affect individual plants that were located in or near the ROWs (e.g., Umpqua kalmiopsis, Columbia water-meal). There would be no modifications to the project facilities or maintenance practices to improve habitat conditions for plants. No additional surveys for sensitive plant species would be done. Thus, current impacts on sensitive plants would continue.

Maintenance, emergency repairs, and new construction all have the potential to impact sensitive plants (FS 2001). The maintenance and operations protocol in place under the no-action alternative appear to be adequate for protecting existing sites, but protections would be strengthened by the resource coordination plan identified in the Settlement Agreement.

Table C-2. Habitats of rare plants.¹

Common name	Scientific name	Habitat ²
Shasta arnica	<i>Arnica viscosa</i>	disturbed openings at high elevations
Grass-fern	<i>Asplenium septentrionale</i>	rock outcrops, usually breccia/tuff
Mount Mazama collomia	<i>Collomia mazama</i>	high elevation dry meadows and canopy gaps
Clustered lady's-slipper	<i>Cypripedium fasciculatum</i>	moderate elevation general forest
Umpqua kalmiopsis	<i>Kalmiopsis fragrans</i>	moderate elevation breccia/tuff rock outcrops
Slender meadow-foam	<i>Limnanthes gracilis</i> var. <i>gracilis</i>	sunny, vernal wet meadows and stream edges, in valleys and low foothills ³
Adder's tongue	<i>Ophioglossum pusillum</i>	wetlands
Coffee fern	<i>Pellaea andromedaefolia</i>	low elevation rocky ravines and ridges
Red-root yampah	<i>Perideridia erythrorhiza</i>	upland prairie and pastures
California sword-fern	<i>Polystichum californicum</i>	low to moderate elevation, mesic rock outcrops and overhangs
Thompson's mistmaiden	<i>Romanzoffia thompsonii</i>	seep springs in rocky areas
Western bog violet	<i>Viola primulifolia</i> ssp. <i>occidentalis</i>	serpentine substrate in freshwater-marsh and bog/fen habitats ⁴
Columbia water-meal	<i>Wolffia columbiana</i>	low elevation ponds

¹ Species observed in primary or secondary study area during PacifiCorp relicensing studies or historically known to occur in or near the project vicinity (source: PacifiCorp 1995).

² Source: FS 2001, except where noted otherwise.

³ Source: FS 1999b.

⁴ Source: Calflora 2002.

Under the action alternatives a number of PM&E measures would improve conditions for these plant species. Surveys would be done consistent with current protocols for sensitive species and survey and manage species within 400 feet of any ground- or habitat-disturbing activity that might result from a proposed action. The Resource Coordination Committee would establish transmission line ROW maintenance procedures that would avoid the potential adverse effects of ongoing maintenance on sensitive plant species. Implementation of the VMP, including noxious weed control

measures and increased use of native plant species, would benefit sensitive plant species by minimizing the loss of potential habitat from invasive plants and ensuring that populations of these species are identified so that impacts to the species can be minimized. It is possible that there might be some short-term adverse impacts to some species from disturbance during project implementation. However, these would be offset by the long-term beneficial impacts.

Settlement Agreement measures considered in other sections of the FEIS could also benefit these species in the long-term. Wetlands restoration and creation (see section 3.5.2.3) and development of a VMP (see section 3.5.2.1) that emphasized the use of native species would provide an opportunity for enhancement of sensitive plant species. Sensitive species that are found in wetlands could be planted in restored wetland habitats (FS 2001). Potential candidates for planting in restored wetland habitats include adder's tongue, two species of sedge (*Carex crawfordii* and *C. serratodens*), and the locally rare small bladderwort (*Utricularia minor*) (FS 2001).

Habitat for a number of species could have been inundated by reservoir creation. For example, rock cliff habitat for the California sword-fern was inundated behind the Soda Springs dam when it was originally built. The NGO alternative would include removing that dam, potentially providing an opportunity for reestablishment of this sensitive plant species in that area.

The NGO's measures considered in other sections of the FEIS could also benefit these species. Wetlands restoration and creation (see section 3.5.2.3) and development of a VMP (see section 3.5.2.1) that emphasized the use of native species would provide an opportunity for enhancement of sensitive plant species similar to that provided by the Settlement Agreement.

Therefore, the determination for these species is *may impact, but not likely to result in a trend toward federal listing* for these plants species.

C.5. LITERATURE CITED

BLM (Bureau of Land Management). 2000. *Oregon and Washington Bureau of Land Management Special Status Species List*. Information Bulletin No. OR-2000-092. January 25.

Calflora. 2002. Information on California plants for conservation, research, and education. <http://www.calflora.org/> (accessed on October 28, 2002).

- FS (U.S. Department of Agriculture, Forest Service). 1995. Forest Service Manual (FSM). Title 2600 - Wildlife, Fish, and Sensitive Plant Habitat Management. Available on the Internet at: <http://www.fs.fed.us/im/directives/fsm/2600/2670-2671.txt> (accessed April 3, 2002).
- FS. 1999a. Sensitive Species Plant List. U. S. Forest Service, Region 6, Portland, Oregon. http://roadless.fs.fed.us/documents/feis/data/sheets/summspd/tes_supp/r6_ssspecies_plant.pdf (accessed on December 19, 2001).
- FS. 1999b. Biological Evaluation. Botany. Appendix G. *IN* NICORE Mining Plan of Operations. Final EIS. Pacific Northwest Region. R6-11-077-99.
- FS. 2001. *Justification Statement for USDA Forest Service Revised Terms and Conditions*. Pacific Northwest Region, Portland, Oregon, dated December 13, 2001, filed with the Commission January 15, 2002.
- FS/BLM. 1994a. *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*. Two volumes.
- FS/BLM. 1994b. *Record of Decision, Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* for the SEIS on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl. 74 p.
- FS/BLM. 2001. *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*.
- Harvey, Michael J., J. Scott Altenbach, and Troy L. Best. 1999. *Bats of the United States*. Arkansas Game & Fish Commission. 64 pp.
- ONHP (Oregon Natural Heritage Program). 2001. *Rare, Threatened & Endangered Plants and Animals of Oregon*. <http://www.abi.org/nhp/us/or/tebook.pdf> (Accessed May 28, 2001).
- PacifiCorp. 1995. *Application for New License for Major Modified Project: North Umpqua Hydroelectric Project, FERC Project No. 1927, Douglas County, Oregon*. Portland, Oregon. January.

PacifiCorp. 2001. *Settlement Agreement among PacifiCorp, USDA Forest Service, National Marine Fisheries Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, Oregon Water Resources Department Concerning the Relicensing of the North Umpqua Hydroelectric Project, FERC project No. 1927-8, Douglas County, Oregon.* PacifiCorp, Portland Oregon, dated June 13, 2001, and filed with the Commission on June 21.

PacifiCorp. 2002. *Comments of PacifiCorp on Draft Environmental Impact Statement; North Umpqua Hydroelectric Project (FERC Project No. 1927-008).* Portland, Oregon, dated June 21, 2002, and filed with the Commission on June 24, 2002.

Peterson, Roger Tory. 1961. *A Field Guide to Western Birds.* Second Edition. Houghton Mifflin Company. Boston. 309 pp plus 60 plates.

Powell, Roger A., and William J. Zielinski. 1994. Fisher. pp 38-73. *IN: L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, eds. 1994. The Scientific Basis for Conserving Forest Carnivores, American Marten, Fisher, Lynx and Wolverine in the Western United States.* USDA For. Serv. Rocky Mt. For. and Range Exp. Station., Gen. Tech. Rep. RM-254, Fort Collins, Colo.

Stebbins, Robert C. 1985. *A Field Guide to Western Reptiles and Amphibians.* Houghton Mifflin Company. Boston. 336 pp plus 48 plates.

Umpqua Watersheds. 2001. *North Umpqua Hydroelectric Project No. 1927, Offer of Settlement, Affidavit and Comments Submitted on Behalf of Umpqua Watersheds, Umpqua Valley Audubon Society, Steamboaters, the North Umpqua Foundation, and Oregon Natural Resources Council (collectively Conservation Groups).* Roseburg, Oregon, July 26.