FINAL ENVIRONMENTAL ASSESSMENT

FOR HYDROPOWER LICENSE

Prospect No. 3 Project
FERC Project No. 2337-077

Oregon

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, DC 20426

April 16, 2018

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

7-DAD Max	7-day average of the daily maximum temperature
Advisory Council	Advisory Council on Historic Preservation
APLIC	Avian Power Line Interaction Committee
APE	Area of Potential Effect
applicant	PacifiCorp
AW	American Whitewater
AWS	average weighted suitability
BLM	U.S. Bureau of Land Management
BMPs	best management practices
BP	before present
ºC	degrees Celsius
certification	Section 401 Water Quality Certification
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
Corps	U.S. Army Corps of Engineers
Cow Creek Band	Cow Creek Band of Umpqua Tribe of Indians
CPUE	catch per unit effort
CWA	Clean Water Act
CWQMP	Construction Water Quality Monitoring Plan
DO	dissolved oxygen
EA	environmental assessment
EDF	energy dissipation factor
ESA	Endangered Species Act
ESCP	Erosion and Sediment Control Plan
ºF	degrees Fahrenheit
Fed. Reg.	Federal Register
FERC	Federal Energy Regulatory Commission
Forest Plan	Rogue River National Forest Land and Resource Management Plan
Forest Service	U.S. Forest Service
FPA	Federal Power Act
fps	feet per second
FWS	U.S. Fish and Wildlife Service
GPS	Geographic Positioning System
HPMP	Historic Properties Management Plan
HRA	Historical Research Associates
HSC	habitat suitability curve
Interior	U.S. Department of the Interior
IPaC	Information, Planning, and Conservation system
kWh	kilowatt-hour

kV	kilovolt
mg/L	milligram per liter
mm	millimeter
msl	mean sea level
MW	megawatt
MWh	megawatt-hour
National Forest	Rogue River-Siskiyou National Forest
National Register	National Register of Historic Places
NERC	North American Electric Reliability Council
NFS	National Forest System
NHPA	National Historic Preservation Act of 1966
NMFS	National Marine Fisheries Service
NP	not present
NTU	nephelometric turbidity unit
NWPP	Northwest Power Pool
OAR	Oregon Administrative Rule
O&M	operation and maintenance
Oregon DA	Oregon Department of Agriculture
Oregon DEQ	Oregon Department of Environmental Quality
Oregon DFW	Oregon Department of Fish and Wildlife
Oregon DOT	Oregon Department of Transportation
ORBIC	Oregon Biodiversity Information Center
PA	Programmatic Agreement
pH	hydrogen ion concentration
PIT	passive integrated transponder
project	Prospect No. 3 Project
PR valve	pressure relief valve
RM	river mile
ROW	right-of-way
SEFA	System for Environmental Flow Analysis
SHPO	State Historic Preservation Officer
SOC	Species of Concern
TCP	traditional cultural property
TDG	total dissolved gas
TMDL	total maximum daily load
USGS	U.S. Geological Survey
VQO	Visual Quality Objectives
Washington DFW	Washington Department of Fish and Wildlife
WECC	Western Electricity Coordinating Council

EXECUTIVE SUMMARY

Proposed Action

On December 30, 2016, PacifiCorp filed an application for a new license to continue operating the 7.2-megawatt (MW) Prospect No. 3 Hydroelectric Project (Prospect Project or project). The project is located on the South Fork Rogue River (South Fork), a tributary of the Rogue River, near the town of Prospect in Jackson County, Oregon. The project currently occupies 32.4 acres of federal land managed by the U.S. Forest Service (Forest Service) as part of the Rogue River-Siskiyou National Forest.

Project Description

The project includes a 172-foot-long concrete diversion dam located on the South Fork. The dam has a 98-foot-long, ungated ogee spillway. At a normal pool elevation of 3,375.7 feet (mean sea level), the reservoir impounded by the dam has a surface area of about one acre and a gross storage capacity of 19 acre-feet.

Water from the reservoir is conveyed to the powerhouse through a 15,894-foot-long water conveyance system consisting of a combination of concrete-lined canals, woodstave pipeline (flowline), concrete-lined tunnel, a forebay, and steel penstock. The water conveyance system extends from the 18-foot-wide intake on the dam's right abutment to a powerhouse located near the confluence of the Middle Fork Rogue River (Middle Fork) and Daniel Creek. Stream flow diverted to the powerhouse is not returned to the South Fork, but is discharged to the Middle Fork Canal of the Prospect Nos. 1, 2, and 4 Project (FERC Project No. 2630) and conveyed to the Prospect Nos. 1, 2, and 4 powerhouses and then discharged into the North Fork Rogue River, thus bypassing a 10.5-mile segment of the South Fork between the project's diversion dam and Lost Creek Lake.[1]

The powerhouse contains a vertical-shaft Francis-turbine with an installed capacity of 7.2 MW, operating at a minimum hydraulic capacity of 3 cubic feet per second (cfs) and a maximum hydraulic capacity of 150 cfs. Powerhouse flows discharge into a 20-foot by 20-foot by 5-foot tailrace, with a concrete-lined overflow spillway that discharges in an easterly direction to Daniel Creek. A 66-inch-diameter, 887-foot-long, inverted siphon (sag pipe) routes flow from the project tailrace to the Middle Fork Canal.

[1] The North Fork and South Fork Rogue River combine and flow into Lost Creek Lake, which is the impoundment created by the U.S. Army Corps of Engineers' William L. Jess Dam.

The sag pipe is primarily of woodstave construction with the exception of an approximately 250-foot-long section of steel pipe where it crosses over the Middle Fork. Project power is transmitted through a 6.97-mile-long, 69-kilovolt transmission line to an interconnection at the Prospect Central substation.

An 86-foot-long concrete pool-and-weir fish ladder located on the right (north) bank of the bypassed reach provides upstream fish passage past the diversion dam. A 25-foot long, 9-foot, 9-inch wide inclined-plane fish screen, located about 215 feet downstream of the intake within a canal section of the water conveyance system, prevents trout entrainment into the powerhouse. A downstream fish bypass system consisting of a combination of steel flume and steel pipe begins at the fish screen terminus and discharges a portion of the diversion canal flow and any screened fish into the fish ladder. The flows used to operate the fish ladder and fish bypass system exit the downstream end of the fish ladder and are used to continuously provide a 10-cfs minimum flow in the South Fork bypassed reach below the diversion dam.

Project Operation

The project is operated in a run-of-river mode. The current license requires a continuous year-round minimum flow of 10 cfs in the bypassed reach of the South Fork. Inflows to the project impoundment up to 150 cfs are diverted for power generation. Inflows greater than 160 cfs are spilled over the ungated, ogee-style spillway.

The project is operated automatically and is remotely monitored during normal business hours by PacifiCorp's Hydro Control Center in Ariel, Washington. PacifiCorp also has operators nearby in Prospect, Oregon that can respond immediately if notified by the Hydro Control Center.

Project Boundary

The project occupies a total of 336.7 acres, of which about 32.41 acres are federal land managed by the Forest Service. PacifiCorp proposes to remove 9 acres of land that are no longer needed for project operation from the project boundary, and add 39.5 acres needed for access routes and power and communication lines. Therefore, the proposed project boundary would occupy a total of 376.2 acres, of which 52.5 acres would be federal land.

Proposed Facility Modifications

- Replace the existing woodstave flowline and sag pipe with steel pipe to reduce leakage, ruptures from rockfalls, and associated erosion.

- Reconstruct the vehicle access bridge over the flowline with a new structure that meets Forest Service design standards following woodstave flowline replacement.

- Construct a new 117-foot-long, 10-foot-wide spur road to facilitate gravel augmentation in the South Fork bypassed reach**.**

Proposed Environmental Measures

Geologic and Soil Resources

- Finalize the draft Erosion and Sediment Control Plan (ESCP) filed with the license application to minimize the effects of ground-disturbing activities from the flowline and sag pipe replacement.

Fisheries Resources

- Augment trout spawning gravel below the diversion dam with dredged gravel from the impoundment into the bypassed reach.

- Continue to operate the project in a run-of-river mode.

- Increase minimum flows to the bypassed reach from 10 cfs year-round to 30 cfs from March 1 to July 31, and 20 cfs from August 1 to February 28, as measured at the existing U.S. Geological Survey (USGS) gage, or inflow, whichever is less, to improve juvenile and adult trout habitat.

- Construct an auxiliary flow release system in the diversion canal to pass the higher minimum flow to the bypassed reach more reliably.

- Restrict flow ramping rates in the bypassed reach to 0.2 foot per hour from May 1 through September 30, and 0.3 foot per hour from October 1 through April 30 to protect trout fry and water quality.

- Continue to use the USGS gage located in the bypassed reach 0.25 mile downstream of the diversion dam to monitor compliance with proposed minimum flows and ramping rates, and install a communication link between the gage and project control systems to provide real-time monitoring of project operation requirements.

- Report minimum flow and ramping rate deviations within 24 hours of discovery and file annual compliance summary reports.

- Implement the Fish Passage Facilities Operation and Maintenance Plan filed with the license application to ensure that the project's fish passage facilities are operating effectively.

- Pass large woody debris collected at the diversion dam downstream into the bypassed reach to enhance aquatic habitat.

- To protect water quality, restrict to July through September planned maintenance activities requiring the dewatering of the water conveyance system and release of all flows to the bypassed reach.

- Notify Oregon DFW and FWS two weeks prior to planned maintenance outages and salvage live fish during outages and return them to the South Fork.

Terrestrial Resources

- Widen the 6 existing 4-foot-wide wildlife crossings over the canal to 12 feet; install a total of 5 new 12-foot-wide wildlife crossings either over or under the project flowline, and construct 8 new, 2-foot wide wildlife crossings over the canal to enhance wildlife habitat connectivity.

- Continue to protect birds from electrocution and collision through PacifiCorp's corporate-wide Avian Protection Plan that includes measures for designing all new or rebuilt lines to meet avian-safe standards; documenting all bird mortalities, bird-caused outages, and problem nests; and notifying agencies of mortalities and remedial actions.

- Implement a Vegetative Management Plan filed with the license application to promote the reestablishment and maintenance of native plant communities, protect sensitive plant species, promptly revegetate disturbed areas, and control noxious weeds.

Cultural Resources

- Implement a Historic Properties Management Plan (HPMP) filed with the license application to protect cultural resources.

Public Involvement and Areas of Concern

Before filing its license application with the Commission, PacifiCorp conducted pre-filing consultation in accordance with the Commission's Integrated Licensing Process. The intent of the Commission's pre-filing process is to involve the public early

in the project planning process and to encourage citizens, governmental entities, tribes, and other interested parties to identify and resolve issues prior to an application being formally filed with the Commission. As part of the pre-filing process, staff conducted scoping to identify issues and alternatives. Staff distributed a scoping document to stakeholders and other interested entities on August 30, 2013. Scoping meetings were held in Medford, Oregon on September 24, 2013. A revised scoping document was distributed on December 19, 2013.

PacifiCorp filed its license application on December 30, 2016. On March 15, 2017, the Commission issued a public notice accepting the application and soliciting motions to intervene and protests, stating that the application is ready for environmental analysis, and requesting comments, terms and conditions, recommendations, and prescriptions.

The primary issues associated with relicensing the project are: (1) upstream and downstream passage for trout at the diversion dam, (2) minimum flows and ramping rates in the bypassed reach, (3) wildlife crossing over the project's water conveyance system, and (4) protection of cultural resources.

Alternatives Considered

This draft environmental assessment (EA) analyzes the effects of continued project operation and recommends conditions for any license that may be issued for the project. In addition to PacifiCorp's proposal, we consider two alternatives: (1) the applicant's proposal with staff modifications (staff alternative); and (2) no action—continued operation with no changes.

Staff Alternative

Under the staff alternative, the project would include most of PacifiCorp's proposed measures, with the exception of restricting ramping rates to 0.3 foot per hour from October 1 to April 30. The staff alternative also includes the Forest Service's 4(e) conditions, and some additional measures. The additional measures include: (1) a road plan for reconstructing the vehicle access bridge over the flowline and constructing the new road spur; (2) a plan to guide the proposed disposal of the dredged gravel in the bypassed reach; (3) a plan to guide the proposed trout salvage procedures during planned maintenance activities that require dewatering of the diversion canal or fish ladder; (4) restrict ramping rates in the bypassed reach to 0.2 foot per hour year-round during adjustments to project flow control facilities or startup or shutdown of the water conveyance system; (5) an operation compliance monitoring plan that includes PacifiCorp's stream flow monitoring provisions, with additional procedures for monitoring and reporting compliance with the project's operating requirements; (6) specific notification and reporting procedures in the case of accidental spills or flowline

failures; and emergency circumstances in which fish or wildlife are being endangered, harmed, or killed; (7) a wildlife crossing plan that provides for constructing the proposed new wildlife crossings at locations selected after agency consultation and installing a fine mesh screen to a height of 40 inches at the base of the existing canal fencing and around the large and small animal crossings to prevent small animals from entering the canal; (8) a revised annual crossing and fencing inspection program that includes the new crossing structures and fencing, photographically documenting any signs of wildlife use of the crossings and reporting the results annually to Oregon DFW, and monitoring deer and elk use of the new flowline crossings for 5 years and filing a report with any recommended measures needed to provide deer and elk access across the flowline; (9) a project-specific avian protection plan that adopts the provisions of PacifiCorp's corporate-wide Avian Protection Plan applicable to the project, considers the Avian Power Line Interaction Committee's guidelines in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art* in 2006, and includes a provision to provide annual reports to Oregon DFW and FWS; and (10) a fire and fuel management plan that describes PacifiCorp's responsibilities for prevention, reporting, emergency response, and investigation of fires related to project operation.

Project Effects

Geology and Soils

Ground-disturbing activities associated with replacing the woodstave flowline and sag pipe, and constructing the vehicle access bridge over the flowline and new spur road could cause erosion and a temporary increase in suspended sediment and turbidity in adjacent waterways. Implementing a site-specific ESCP would minimize erosion and protect water quality. The staff-recommended and Forest Service required road plan would include evaluation and design measures that ensure early identification and resolution of any road stability and erosion issues like slumps and slides.

Aquatic Resources

The South Fork supports populations of rainbow and cutthroat trout. Increasing minimum flows to the bypassed reach from 10 cfs year-round to 30 cfs from March 1 to July 31, and 20 cfs from August 1 to February 28, as proposed by PacifiCorp, would increase juvenile and adult habitat for both trout species in that section.

PacifiCorp's proposed flow release system would enable PacifiCorp to balance flow releases between the fish screen bypass pipe, fish ladder, and new flow release system, enabling a more efficient operation of the fish passage facilities and minimum flow releases.

The existing license does not include ramping rate restrictions. Although the

project's run-of-river operation results in only infrequent stage changes in the bypassed reach, implementing staff's recommended ramping rates would protect trout fry, juveniles, and water quality during ramping events in the bypassed reach when minor adjustments are being made to the project's flow control facilities and during maintenance activities that require the water conveyance system to be dewatered and all flows to be discharged to the bypassed reach.

Installing the proposed communications link between the existing USGS gage and PacifiCorp's control systems at the diversion dam would allow PacifiCorp to detect and respond to minimum flow or ramping rate deviations in real time. Staff's recommended operation compliance monitoring plan would provide a means to monitor and document compliance with run-of-river operation as well as the minimum flow and ramping rate requirements.

Continuing to operate the fish ladder at the diversion dam would provide effective passage for the larger size classes of trout (i.e., greater than 110 millimeters) in the South Fork. Continuing to operate the fish screen and bypass system within the water conveyance system would prevent entrainment of most size classes of trout into the powerhouse. However, the screen was not designed to exclude trout fry smaller than 60 millimeters so there would continue to be some losses of trout fry due to turbine entrainment. The fish bypass system discharges into the fish ladder instead of directly to the bypassed reach, which would continue to cause some downstream passage delay for trout attempting to exit the fish ladder.

The diversion dam obstructs the downstream transport of sediment into the bypassed reach, contributing to a build-up of excess sediment behind the dam and reducing spawning gravels for trout in the bypassed reach. Currently, PacifiCorp periodically dredges the impoundment to remove excess sediment and disposes of the dredged material off site. PacifiCorp's proposal to deposit the sediments along the streambank below the diversion dam where they can be redistributed during high-flow events would enhance trout spawning gravels in the bypassed reach. A new spur road to the bypassed reach would be required to facilitate disposal of the dredged sediment. Staff's recommendation to develop a sediment and dredging plan that identifies the specific location and size of the sediment disposal site would help ensure that dredged gravel placed along the streambank is effectively transported downstream to enhance trout spawning habitat in the bypassed reach.

Terrestrial Resources

Replacing the woodstave flowline and sag pipe with steel pipes would require clearing 0.40 acre of second-growth forest. Replacing the vehicle access bridge and constructing the new spur road would have a negligible effect on vegetation because of the small area that would be disturbed.

Implementing PacifiCorp's Vegetation Management Plan would minimize the area of disturbance, control noxious weeds during construction, protect special-status plant species, and promote the reestablishment of native vegetation. PacifiCorp's Vegetation Management Plan also includes protocols for conducting project operation and maintenance activities involving vegetation clearing which would have similar benefits.

The 15,894-foot-long water conveyance system is a barrier to wildlife movement and wildlife can become trapped in the canals and drown. Widening the existing canal wildlife crossings, installing new crossings as proposed by PacifiCorp, and installing fine mesh fencing along the canal as recommended by staff would enhance wildlife movement, reduce or eliminate small wildlife mortality from drowning, and enhance wildlife use of the project area. Updating the existing operation and maintenance program to include the new wildlife crossings and fencing would ensure detection and repair of any problems with the crossings and fencing in a timely manner.

Currently, PacifiCorp follows a corporate-wide program for addressing avian electrocution and collision hazards with its transmission and distribution systems. The program includes retrofitting or replacing problem poles and substation components following recommended avian protection guidelines, maintaining a database of electrocution and collision mortalities, and procedures for handling carcasses and reporting mortalities to FWS. The staff-recommended project-specific avian protection plan would incorporate the elements of PacifiCorp's corporate Avian Protection Plan applicable to the Prospect No. 3 Project. This would facilitate the Commission's administration of the license by including only those provisions over which the Commission would have jurisdiction, and would protect birds from electrocution and collision with the project transmission line and substation.

Threatened and Endangered Species

Continued project operation and maintenance, including construction activities associated with the flowline, sag pipe, vehicle access bridge and spur road, would not affect the endangered gray wolf because wolf use of the project area is transitory and infrequent.

Continued project operation and maintenance would have no effect on the threatened northern spotted owl because no occupied spotted owl habitat occurs in the project area. Vegetation clearing for constructing the new and modified project facilities would be small and would not affect preferred old-growth habitats of spotted owls. Vegetation clearing and construction activities would occur outside designated critical habitat for the spotted owl which is located 400 feet from the project boundary. Therefore, the proposed action would have no effect on this critical habitat. There is no designated critical habitat for the gray wolf within or near the project boundary.

Cultural Resources

The proposed modifications to the project flowline and sag pipe, which are contributing elements to the Prospect Hydroelectric Project Historic District, would adversely affect cultural resources that are eligible for inclusion on the National Register of Historic Places. PacifiCorp's HPMP, filed September 8, 2017, includes measures that would mitigate adverse effects to these resources and protect known and previously undiscovered cultural and historic resources. It also includes a consultation process for any discoveries made during the term of any new license.

Recreation and Land Use

Recreational use at the project is light due to limited public access through adjacent private property and the steep terrain along the South Fork bypassed reach. While some whitewater kayaking occurs in the bypassed reach, use is limited to a small number of highly skilled boaters who can negotiate the narrow passages and difficult rapids. Considerable whitewater boating occurs nearby on the North Fork, which offers a wider range of boating opportunities.

The project does not provide any recreation facilities; however, a portion of the South Fork Rogue River Trail on National Forest System land runs adjacent to, but outside of, the project boundary as it traverses a bluff above the project impoundment. PacifiCorp does not propose, and no entity has recommended, any measures to enhance recreation.

Preparing a fire and fuels management plan that identifies specific fire prevention, control, response, and monitoring measures would minimize the risk of project operation and maintenance activities causing wildfires.

Aesthetic Resources

Constructing the spur road to the bypassed reach would cause some temporary landscape alterations that would be visible to hikers along a portion of the South Fork Rogue River Trail near the project impoundment or users of the Forest Service road that runs adjacent to, and occasionally through, the project. The revegetation and landscaping measures defined in the proposed Vegetation Management Plan would restore areas disturbed during project-related construction and maintenance activities, minimizing any project-related visual impacts.

License Conditions

Staff recommendations for conditions for any new license for the project are based on the analysis presented in this EA. Draft license articles are attached in Appendix B.

Conclusions

Based on our analysis, we recommend relicensing the project as proposed by PacifiCorp with staff modifications and additional measures, as described above under *Alternatives Considered*.

In section 4.2 of the EA, we estimate the likely cost of alternative power for each of the two alternatives identified above. Our analysis shows that during the first year of operation under the applicant's proposal, project power would cost $330,624, or about $10.95/MWh, more than the likely alternative cost of power. Under the staff alternative, project power would cost $339,844, or about $11.26/MWh, more than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the 7.2-MW project would save the equivalent amount of fossil-fueled generation and capacity, thereby helping to conserve non-renewable energy resources and reduce atmospheric pollution; and (2) the recommended environmental measures proposed by PacifiCorp, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

We conclude that issuing a new license for the project, with the environmental measures that we recommend, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, DC

Prospect No. 3 Hydroelectric Project
FERC Project No. 2337-077
April 16, 2018

1.0 INTRODUCTION

1.1 APPLICATION

On December 30, 2016, PacifiCorp filed an application for a new license to operate and maintain the Prospect No. 3 Hydroelectric Project (project). The 7.2-megawatt (MW) project would be located on the South Fork Rogue River (South Fork), near the town of Prospect in Jackson County, Oregon (figure 1). The project currently occupies 32.4 acres of federal land administered by the U.S. Forest Service (Forest Service) as part of the Rogue River-Siskiyou National Forest. The project generates an average of about 35,050 megawatt-hours (MWh) of energy annually.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Prospect No. 3 Project is to continue to provide a source of hydroelectric power. Therefore, under the provisions of the Federal Power Act (FPA), the Federal Energy Regulatory Commission (Commission or FERC) must decide whether to issue a license to the applicant for the project and what conditions should be placed in any license issued. In deciding whether to issue a license for a hydroelectric project, 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.

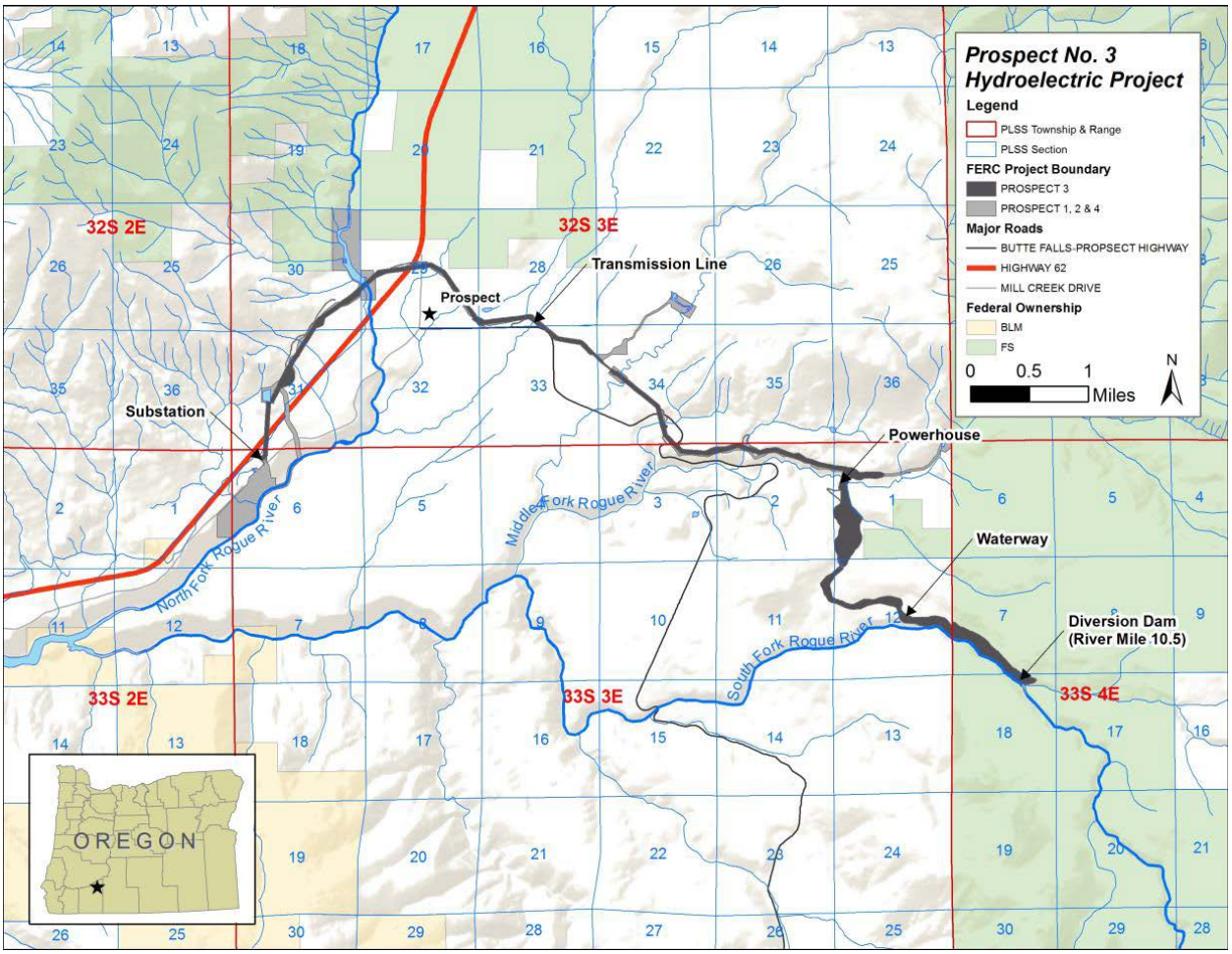

Figure 1. Location of Prospect No. 3 Hydroelectric Project (Source: PacifiCorp License Application).

Issuing a license for the project would allow PacifiCorp to continue to generate electricity at the project for the term of the license, making electric power from a renewable resource available to their customers.

This final environmental assessment (EA) assesses the environmental and economic effects of constructing and operating the proposed hydroelectric project: (1) as proposed by PacifiCorp, and (2) with our recommended measures and agency mandatory conditions. We also consider the effects of the no-action alternative. Important issues that are addressed include: (1) upstream and downstream passage for trout at the diversion dam, (2) minimum flows and ramping rates in the bypassed reach, (3) wildlife crossing over the project's water conveyance system, and (4) protection of cultural resources.

1.2.2 Need for Power

The project would provide hydroelectric generation to meet part of Oregon's power requirements, resource diversity, and capacity needs. The project has an installed capacity of 7.2 MW and generates approximately 35,050 MWh per year.

The project is located in the Northwest Power Pool area of the Western Electricity Coordinating Council (WECC) region of North American Electric Reliability Corporation (NERC). The NERC annually forecasts electric supply and demand nationally and regionally for a 10-year period. For the 2017-2026 time period, NERC projects that total demand for the summer, the peak season for the entire WECC Region, will increase by 2.5 percent due to generally high temperatures early in the summer season, while the annual energy load is projected to increase by 1.0 percent per year for the same time period.

We conclude that power from the proposed project would help meet a need for power in the WECC region in both the short and long-term. The project would provide power that displaces generation from non-renewable sources. Displacing the operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

A license for the project is subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescription

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of the U.S. Department of Commerce or the U.S. Department of the Interior (Interior). Interior, by letter filed May 8, 2017, requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

1.3.1.2 Section 4(e) Conditions

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. The U.S. Forest Service filed preliminary conditions on May 9, 2017, pursuant to section 4(e) of the FPA, and modified conditions 3 and 11 on November 30, 2017. These conditions are described under section 2.2.4, *Modifications to Applicant's Proposal—Mandatory Conditions*.

1.3.1.3 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

Oregon DFW timely filed, on May 12, 2017, recommendations under section 10(j). On March 1, 2018, Oregon DFW revised its section 10(j) recommendations to attempt to resolve the inconsistencies identified in the draft EA and discussed at the January 12, 2018, section 10(j) meeting. The recommendations are summarized in table 18 in section 5.4.1, *Recommendations of Fish and Wildlife Agencies*. In section 5.4.1, we also discuss how we address the agency recommendations and comply with section 10(j).

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On March 27, 2017, the applicant applied to the Oregon Department of

Environmental Quality (Oregon DEQ) for 401 water quality certification (certification) for the Prospect No. 3 Hydroelectric Project. Oregon DEQ received the application on March 29, 2017.[2] On February 13, 2018, PacifiCorp withdrew and refiled its certification application, which Oregon DEQ received on the same day. Oregon DEQ has not yet acted on the certification request. The certification is due February 13, 2019.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modifications of the critical habitat of such species. On March 15, 2018, Commission staff generated an official species list on FWS's Information, Planning, and Conservation (IPaC) website that indicates that two listed species: the endangered gray wolf (*Canis lupus*) and the threatened northern spotted owl (*Strix occidentalis caurina*) may occur in the project area. There is no critical habitat within the project boundary for these species. See section 3.3.4, *Threatened and Endangered Species*, for our analysis of project effects on these listed species. We conclude that the proposed action would have no effect on the endangered gray wolf because any wolf use of the project area is transitory and infrequent. Similarly, licensing the project would have no effect on the threatened northern spotted owl because no occupied spotted owl habitat occurs within or immediately adjacent to the project boundary.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The project is not located within the state-designated Coastal Management Zone, which extends inland to the community of Agness (RM 27) for the Rogue River Basin, and the project would not affect Oregon's coastal resources. By a January 11, 2016 email filed September 25, 2017, the Oregon Department of Land Conservation and Development concurred that the project is not subject to Oregon coastal zone program review and no consistency certification is required for project relicensing.

[2] The email confirming receipt was dated April 3, 2017, and PacifiCorp filed a copy of this email with the Commission on April 6, 2017.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (section 106) as amended requires that every federal agency "take into account" how the agency's undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties (TCPs), and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

Operation and maintenance, including the proposed modification of some of the project's facilities by PacifiCorp, have the potential to adversely affect National Register-eligible contributing elements associated with the Prospect Hydroelectric Project Historic District.[3] On September 8, 2017, PacifiCorp filed a revised HPMP with the Commission, addressing comments by the Oregon SHPO. Based on our review of the HPMP we find that it is adequate for protecting cultural resources that could be affected by the project.

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) for the protection of historic properties from the effects of operation and maintenance involving the Prospect No. 3 Project. The terms of the PA would ensure that PacifiCorp address any potential adverse effects to historic properties identified within the project's area of potential effects (APE) through the implementation of the HPMP. The PA would stipulate that PacifiCorp must implement its HPMP upon the effective date of the license.

1.4 PUBLIC REVIEW AND CONSULTATION

The Commission's regulations (18 Code of Federal Regulations [CFR], section 4.38) require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the ESA, the NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

Relicensing of the project was formally initiated on July 1, 2013, when PacifiCorp filed with the Commission a Pre-Application Document (PAD) and a Notice of Intent to license the project using the Integrated Licensing Process (ILP). The Commission issued a Notice of Commencement of Proceeding on August 30, 2013.

[3] The Prospect Hydroelectric Project Historic District includes National Register-eligible contributing elements associated with the Prospect No. 3 and Prospect Nos. 1, 2, and 4 projects.

1.4.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. During this pre-filing consultation process, scoping meetings were held to determine what issues and alternatives should be addressed in the EA. Scoping Document 1 (SD1) was issued on August 30, 2013. Scoping meetings were held in Medford, Oregon on September 24, 2013 to request comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the project. An environmental site review was held on September 24, 2013.

In addition to comments provided at the scoping meetings, the following entities provided written comments pertaining to SD1, the PAD, and additional study needs.

Commenting Entity	Date Filed
Doug Heiken	September 23, 2013
PacifiCorp	October 15, 2013
Rogue Riverkeeper and Geos Institute	November 13, 2013
FWS	November 14, 2013
Forest Service	November 14, 2013
National Park Service	November 14, 2013
Oregon DEQ	November 14, 2013
Oregon DFW	November 14, 2013
Oregon Water Resources Department	November 14, 2013
Cow Creek Band of Umpqua Tribe of Indians	November 14, 2013
American Whitewater	November 14, 2013

A revised Scoping Document addressing these comments was issued on December 19, 2013.

1.4.2 Interventions

On March 15, 2017, the Commission issued a notice stating that PacifiCorp's application was accepted and ready for analysis. This notice set May 15, 2017, as the deadline for filing protests and motions to intervene. The following entities filed motions to intervene.

Intervenor	Date Filed
Forest Service	May 9, 2017
Interior	May 11, 2017
Trout Unlimited	May 12, 2017

Oregon DFW	May 12, 2017
American Whitewater	May 15, 2017
Oregon DEQ	May 15, 2017

1.4.3 Comments on the License Application

The March 15, 2017, notice solicited comments, terms and conditions, recommendations, and fishway prescriptions. The following entities filed comments, terms and conditions, recommendations, or prescriptions:

Commenting agencies	Date filed
Interior	May 8, 2017
Forest Service	May 9, 2017
Oregon DFW	May 12, 2017

PacifiCorp filed reply comments on June 16, 2017.

1.4.4 Comments on Draft EA

On October 17, 2017, the Commission issued a draft EA for the relicensing of the Prospect No. 3 Project. Comments on the draft EA were due by December 1, 2017. Comments on the draft EA were filed by the following entities:

Commenting entity	Date filed
Kevin Goodrich	October 23, 2017
PacifiCorp	November 21, 2017
Oregon DEQ	November 24, 2017
Oregon DFW	November 30, 2017
Forest Service	November 30, 2017
American Whitewater	December 1, 2017

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative as the baseline environmental condition for comparison with other alternatives.

2.1.1 Existing Project Facilities

The project consists of the following existing project facilities: (1) a 24.7-foot-high, 172-foot-long concrete diversion dam with an integrated 98-foot-long ungated ogee spillway section; (2) a 1-acre reservoir that extends 550 feet upstream from the dam with a gross storage capacity of 19 acre-feet at normal full pool elevation of 3,375.7 feet;[4] (3) an 86-foot-long, 15-pool concrete pool-and-weir-type ladder to provide upstream fish passage past the dam; (4) a 15,894-foot-long water conveyance system consisting of: a 273-foot-long concrete-lined canal with a 25-foot-long, 9.75-foot-wide inclined-plane fish screen located about 215 feet downstream of the dam; a 5.5-foot-diameter, 5,448-foot-long woodstave pipe (flowline); another 5,805-foot-long concrete-lined canal; a 5-foot-wide, 6.5-foot-high, 698-foot-long concrete-lined horseshoe-shaped tunnel; a 416-foot-long forebay; and a 5.5- to 5.75-foot-diameter, 3,254-foot-long riveted steel penstock; (5) a 2,486-foot-long spillway channel that discharges flows spilled at the forebay into Daniel Creek; (6) a powerhouse containing one vertical-shaft Francis-turbine with an installed capacity of 7.2 MW; (7) a 20-foot-long, 20-foot-wide, 5-foot-deep concrete tailrace with a 172-foot-long concrete overflow spillway discharging flows into Daniel Creek; (8) a 5.5-foot-diameter, 887-foot-long inverted woodstave siphon (sag pipe) that connects to the Middle Fork Canal of the Prospect Nos. 1, 2, and 4 Hydroelectric Project;[5] (9) a 6.97-mile-long, 69-kilovolt (kV) transmission line interconnecting at the Prospect Central substation; and (10) appurtenant facilities.

The existing project occupies a total of 336.7 acres, of which about 32.41 acres are lands of the United States administered by the Forest Service. The project boundary starts at the South Fork impoundment and follows the flow conveyance system to the powerhouse. At the forebay, the project boundary widens to include the spillway channel extending from the forebay to Daniel Creek, as well as Daniel Creek from the confluence with the spillway channel to the powerhouse. From the powerhouse, the project boundary generally follows the transmission line with 100 feet of right-of-way on either side to the Prospect Substation.

PacifiCorp proposes to modify the project boundary to eliminate some uplands no longer needed for project operation, and include lands for new access roads and the communication link between the U.S. Geological Survey (USGS) gage and dam control structures. The new proposed project boundary would occupy a total of 376.2 acres, of which about 52.5 acres are federal lands.

---

[4] All elevations are referenced to mean sea level.

[5] The woodstave sag pipe is also a project feature of the Prospect Nos. 1, 2, and 4 Project (FERC Project No. 2630).

2.1.2 Project Safety

The project has been operating for more than 85 years and under the existing license for the last 30 years. Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. As part of the relicensing process, the Commission staff evaluates the continued adequacy of the proposed project facilities under a new license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to assure continued adherence to Commission-approved plans and specifications, special articles relating to construction, operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The project is operated in run-of-river mode. The powerhouse is operated automatically by a programmable logic controller system, but may also be operated manually by an on-site operator, as needed. The project currently diverts flows from the South Fork at the South Fork Diversion Dam into its 3-mile-long flow conveyance system to the project powerhouse. The current license requires PacifiCorp to maintain a continuous minimum flow of 10 cubic feet per second (cfs) or natural inflow to the impoundment, whichever is less, in the bypassed reach of the South Fork. Minimum flow is maintained by means of flow through the fish ladder and fish screen bypass pipe, which discharges into pool 6 of the fish ladder. The project generates about 35,050 MWh of energy per year.

2.1.4 Existing Environmental Measures

Under the current license, PacifiCorp maintains a continuous minimum flow of 10 cfs in the bypassed reach, and ensures the USGS gage is operated to document compliance with the minimum flow. PacifiCorp also maintains and operates a fish ladder and fish screen and bypass system to provide upstream and downstream fish passage past the diversion dam.

To provide habitat connectivity across the water conveyance structures, PacifiCorp maintains two wildlife crossings under the flowline, five wildlife crossings under the penstock, and six 4-foot-wide wildlife crossings over the canal. Fencing has been installed along both sides of the canal and canal crossings to prevent wildlife from falling into the canal.

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

PacifiCorp proposes to replace the existing woodstave flowline and sag pipe with a steel pipe to reduce leakage, and exposure to rupture from rockfall. PacifiCorp also propose to replace the vehicle access bridge over the flowline with a permanent structure that meets Forest Service design standards following flowline replacement. A new 117-foot-long, 10-foot-wide spur road would be required to dispose of dredged sediment from the reservoir in the bypassed reach to enhance aquatic habitat.

2.2.2 Proposed Project Operations

The project would continue to be operated in a run-of-river mode.

2.2.3 Proposed Environmental Measures

Geology and Soils

- Finalize the draft Erosion and Sediment Control Plan (ESCP) filed with the license application to minimize the effects of ground-disturbing activities from the flowline and sag pipe replacement.

Fisheries Resources

- Augment trout spawning gravel below the diversion dam with dredged gravel from the impoundment into the bypassed reach

- Continue to operate the project in a run-of-river mode.

- Increase minimum flows to the bypassed reach from 10 cfs year-round to 30 cfs from March 1 to July 31, and 20 cfs from August 1 to February 28, as measured at the existing USGS gage in the bypassed reach, or inflow, whichever is less, to improve juvenile and adult trout habitat.

- Construct an auxiliary minimum flow release system (auxiliary flow system) in the diversion canal to pass the higher minimum flow to the bypassed reach more reliably.

- Restrict flow ramping rates in the bypassed reach to 0.2 foot per hour from May 1 through September 30, and 0.3 foot per hour from October 1 through April 30 to protect trout fry and water quality.

- Continue to use the USGS gage located in the bypassed reach 0.25 mile downstream of the diversion dam to monitor compliance with proposed minimum flows and ramping rates, and install a communication link between the gage and project control systems to provide real-time monitoring of project operation requirements.

- Report minimum flow and ramping rate deviations within 24 hours of discovery and file annual compliance summary reports.

- Implement the Fish Passage Facilities Operation and Maintenance Plan filed with the license application to ensure that the project's fish passage facilities are operating effectively.

- Pass large woody debris collected at the dam downstream into the bypassed reach to enhance aquatic habitat.

- To protect water quality, restrict to July through September planned maintenance activities requiring the dewatering of the water conveyance system and release of all flows to the bypassed reach.

- Notify Oregon DFW and FWS two weeks prior to planned maintenance outages and salvage live fish during outages and return them to the South Fork.

Terrestrial Resources

- Widen the six existing 4-foot-wide canal wildlife crossings to 12 feet, install a total of five 12-foot-wide wildlife crossings either over or under the project flowline, and construct eight 2-foot-wide wildlife crossings over the canal to enhance wildlife habitat connectivity.

- Continue to protect birds from electrocution and collision through implementation of PacifiCorp's corporate-wide Avian Protection Plan that includes measures for designing all new or rebuilt lines to meet avian-safe standards; documenting all bird mortalities, bird-caused outages, and problem nests; and notifying agencies of mortalities and remedial actions.

- Implement a Vegetation Management Plan filed with the license application to promote the establishment and maintenance of native plant communities, protect sensitive plant species, promptly revegetate disturbed areas, and control noxious weeds.

Cultural Resources

- Implement a HPMP to protect cultural resources.

2.2.4 Modifications to Applicant's Proposal—Mandatory Conditions

2.2.4.1 Section 4(e) Land Management Conditions

The Forest Service filed 11 mandatory conditions under FPA section 4(e). We consider conditions 1 through 7 to be administrative or legal in nature or insufficiently detailed to analyze. We therefore do not analyze these conditions in the EA.

The administrative conditions are as follows: (condition 1) reserves to the Forest Service the right to amend or add new conditions; (condition 2) obtain a Forest Service special use authorization prior to the expiration of the existing special use authorization for the project, receive written approval from the Forest Service prior to making changes to any project features or facilities on National Forest System (NFS) lands, prepare site-specific plans for all habitat and ground-disturbing activities, and consult with the Forest Service prior to starting any activity on NFS lands that the Forest Service determines may affect another authorized activity; (condition 3) conduct an annual resource coordination meeting with the Forest Service and stakeholders and prepare an annual report; (condition 4) avoid disturbing public land survey monuments, private property corners, and forest boundary markers and reestablish or reference any that are destroyed; (condition 5) file a surrender plan that provides for the restoration of NFS lands concurrent with the filing of any application to surrender the license; (condition 6) indemnify the United States from licensee actions or omissions; and (condition 7) annually review the list of special status species to determine if new listings have occurred and may be affected by project operation.

Conditions 8 through 11 are analyzed in this EA.

- Condition 8 stipulates that PacifiCorp revise the ESCP filed with the application to include specific components, such as initial and periodic monitoring to identify erosion sites and assess each site's condition; a schedule for treating erosion sites; and a provision for effectiveness monitoring.

- Condition 9 stipulates that PacifiCorp submit to the Forest Service a fire and fuels management plan describing PacifiCorp's responsibility for the prevention, including fuels treatment of; reporting of; emergency response to; and investigation of fires related to project operation and implement the plan following Forest Service and Commission approval.

- Condition 10 stipulates that PacifiCorp implement the HPMP filed with the license application.

- Condition 11 stipulates that PacifiCorp submit to the Forest Service a road plan for reconstructing the vehicle access bridge over the flowline and constructing the new road spur that includes plans and specifications, a description of all slide removals, a description of slump repairs, and identification of disposal sites for materials removed from slides.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include PacifiCorp's proposals described above, except PacifiCorp's proposal to restrict ramping rates to 0.3 foot per hour from October 1 to April 30. The staff alternative includes the section 4(e) conditions specified by the Forest Service described above.

In addition, the staff alternative includes the following additional measures:

- develop a plan to guide the proposed disposal of the dredged gravel in the bypassed reach;

- develop a plan to guide the proposed trout salvage procedures during planned maintenance activities that require dewatering of the diversion canal or fish ladder;

- restrict ramping rates in the bypassed reach to 0.2 foot per hour year-round during adjustments to project flow control facilities or startup or shutdown of the water conveyance system;

- develop an operation compliance monitoring plan that includes PacifiCorp's stream flow monitoring provisions, with additional procedures for monitoring and reporting compliance with the project's operating requirements such as run-of-river operation and ramping rates;

- notify the Oregon Emergency Response System within 24 hours, and the Commission within 10 days, of any hazardous substance spills or water conveyance system failures; notify Oregon DFW within 24 hours, and the Commission within 10 days, of any deviations from project operating requirements or emergency circumstances in which fish or wildlife are being endangered, harmed, or killed by the project or its operation; take immediate reasonable action to remediate the spill or water conveyance system failure; or deviation from run of river, minimum flow, or ramping rate requirements; and within 30 days of the initial notification of the incident or deviation, file a detailed

report with the Commission for approval that identifies: (a) the nature and chronology of the event, (b) the circumstances that led to the event, (c) any observed or reported adverse environmental impacts resulting from the event, (d) corrective actions taken, and (e) any recommended measures to ensure similar events do not occur in the future;

- develop a wildlife crossing plan that provides for constructing the proposed new wildlife crossings at locations selected after consultation with Oregon DFW, FWS, and the Forest Service, and installing fine-mesh fencing to a height of 40 inches at the base of the existing canal fencing and around the large and small animal crossings;

- Revise the existing wildlife crossing and fencing inspection program to include the new crossings and fine-mesh fencing; annually inspect and maintain the wildlife crossings and fencing at the project, photographically document any signs of wildlife use of the crossings, and provide Oregon DFW, FWS, and the Forest Service with annual reports of these activities; and file a summary of the first 5 years of deer and elk use of the new flowline crossings and proposals for new or modified crossing structures, if any, to ensure deer and elk have access across the new flowline; and

- develop a project-specific avian protection plan that adopts the provisions of PacifiCorp's corporate-wide Avian Protection Plan applicable to the project, considers the Avian Power Line Interaction Committee's (APLIC) guidelines in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*, and includes a provision to send annual reports of bird mortalities associated with the project to Oregon DFW and FWS.

Proposed and recommended measures are discussed under the appropriate resource sections and summarized in section 4 of this EA.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

We considered several alternatives to PacifiCorp's proposal, but eliminated them from further analysis because they are not reasonable in the circumstances of this case. They are: (1) issuing a non-power license, (2) federal government takeover of the project, and (3) retiring the project.

2.4.1 Issuing Non-power License

A non-power license is a temporary license that the Commission will terminate when it determines that another governmental agency will assume regulatory authority

and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license for the project and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider issuing a non-power license a realistic alternative to relicensing in this circumstance.

2.4.2 Federal Government Takeover of the Project

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

2.4.3 Retiring the Project

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

No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. The power generated by the project is an important resource, and is relied upon to provide clean, renewable energy. This source of power would be lost if the project were retired, and replacement power would need to be found. There also would be significant costs associated with retiring the project's powerhouse and appurtenant facilities. Thus, dam removal is not a reasonable alternative to relicensing the project with appropriate protection, mitigation, and enhancement measures.

The second project retirement alternative would involve retaining the dam and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. Nor have we any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we don't consider removal of electric generating equipment to be a reasonable alternative.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the

proposed action and other recommended environmental measures. Sections are organized by resource area (e.g., aquatic resources, recreation). Under each resource area, historical and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.2, *Comprehensive Development and Recommended Alternative.*[6]

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Prospect No. 3 Project is located on the South Fork within the Upper Rogue River sub-basin, about 9 miles from the town of Prospect, Oregon. The Upper Rogue River sub-basin drains approximately 1,616 square miles and is part of the larger 215-mile-long Rogue River Basin. The Rogue River Basin drains an area of approximately 5,156 square miles from its headwaters on the west slope of the Cascade Mountains to its terminus at the Pacific Ocean in Gold Beach, Oregon

The South Fork originates at elevations between 5,600 feet and 5,700 feet in the South Blue Lake Group, a series of small lakes and springs in Sky Lakes Wilderness Area of the Rogue River-Siskiyou National Forest. The South Fork flows approximately 26 miles from its headwaters to the confluence of the mainstem Rogue River just downstream of the town of Prospect. From its headwaters, the South Fork flows about 10 miles through a wide, low gradient valley and dropping about 1,000 feet in elevation. The South Fork then flows into a canyon with a steep gradient, dropping in elevation from approximately 4,600 feet to 3,400 feet over a five mile stretch, as it reaches the South Fork diversion dam at river mile (RM) 10.51. Downstream of the diversion dam, the South Fork generally flows through a steep-walled, narrow canyon, joining the Rogue River just upstream of Lost Creek Lake.

The primary land use in the sub-basin is evergreen forest. Additional land uses include timber harvest, livestock pasture, cropland, and outdoor recreation (Crown, Meyers, Tugaw, and Turner, 2008). The majority of the land is federally owned within the Rogue River – Siskiyou National Forest and Crater Lake National Park. There are limited (less than 1.0 square mile) state holdings and no tribal holdings in the sub-basin. The remaining land is privately owned and primarily utilized for pasture, cropland, and/or rural development. The town of Prospect, which is adjacent to the western extent of the project transmission line, supports an estimated population of 650 people.

[6] Unless noted otherwise, the sources of our information are the final License Application filed on December 30, 2016 (PacifiCorp, 2016a) and additional information filed on December 20, 2013 (PacifiCorp, 2013) and March 7, 2017 (PacifiCorp, 2017a).

There are no other hydroelectric projects on the South Fork; however, other hydroelectric projects are located in the Upper Rogue River sub-basin or use water diverted from the South Fork. The 41.6-MW Prospect Nos. 1, 2, and 4 Hydroelectric Project (FERC Project No. 2630) is located on the North Fork Rogue River, Middle Fork Rogue River, and Red Blanket Creek. The U.S. Army Corps of Engineers' (Corps) 49.2-MW William L. Jess Dam, which impounds the 3,430-acre Lost Creek Lake, is located approximately 10 miles downstream of the confluence of the South and North Fork Rogue River. Other minor power development projects are located in Geppert Creek in the South Fork watershed and in Skookum Creek in the headwaters of the Rogue River watershed.

Average annual precipitation and seasonal temperatures in the sub-basin are largely dependent on location and elevation. The high-elevation areas of the sub-basin near Crater Lake average about 66 inches of precipitation and 495 inches of snow annually. At William L. Jess Dam, near the mouth of the South Fork, annual average precipitation is 33 inches and snowfall is 2 inches. At Crater Lake, minimum winter and maximum summer temperatures average 18.1 and 65.5 degrees Fahrenheit (ºF), respectively. Minimum winter and maximum summer temperatures at William L. Jess Dam average 29.8 and 85.9 ºF, respectively. The western slope of the High Cascades Physiographic Province exhibits a defined, wet winter season and warm, dry summer season. More than half of the average annual precipitation falls from November through February.

3.2 SCOPE OF CUMULATIVE EFFECTS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 CFR, section 1508.7), cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application and agency and public comments, we have identified fisheries resources and terrestrial resources, as resources that may be cumulatively affected by the project in combination with other past, present, and future activities. Other activities that may cumulatively affect these resources in the upper basin include hydroelectric projects, road construction and maintenance, timber harvest, animal grazing, agriculture, rural residences, irrigation, and fish stocking.

3.2.1 Geographic Scope

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

We have determined that the geographic scope for cumulatively affected fisheries resources would encompass the Upper Rogue River Basin upstream of William L. Jess Dam and Lost Creek Lake. The William L. Jess Dam blocks upstream movement of fish, including anadromous salmon and steelhead. Therefore, the Upper Rogue River Basin fishery consists predominately of resident fish species and is structurally different than the lower river below the William L. Jess Dam. We chose this geographic scope because the operation and maintenance of the Prospect Project, in combination with the other developmental activities specified above, may affect fisheries resources in the upper basin. We do not expect the project to contribute to any cumulative effects downstream of William L. Jess Dam because any such effects would be attenuated by the large 3,430-acre Lost Creek Lake, as well as the 10.5-mile distance between the Prospect No. 3 Project and Lost Creek Lake.

The geographic scope for terrestrial resources would also encompass the Upper Rogue River Basin upstream of the William L. Jess Dam. We chose this geographic scope because the river downstream of the William L. Jess Dam enters valley terrain and becomes less rural than the upper basin. The potential effects of operation and maintenance of the Prospect Project, in combination with the effects of other hydroelectric projects and land use practices more typical of the upper basin, including logging and animal grazing, become less discernible downstream of the William L. Jess Dam.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and reasonably foreseeable future actions and their effects on fishery and water quality resources. Based on the term of the proposed license, we will look 30 to 50 years into the future, concentrating on the effects on fish, fish habitat, and water quality from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the specific cumulative and site-specific environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that geology and soils, water quality, fishery, terrestrial, threatened and endangered species, recreation, cultural, and aesthetic resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to socioeconomics associated with the proposed action, and therefore, socioeconomics is not assessed in this EA. We present our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative*.

3.3.1 Geologic and Soil Resources

3.3.3.1 Affected Environment

The project is located in the volcanic formations of the High Cascades physiographic province. The High Cascades were covered in glacial ice, ultimately resulting in subsequent glacial outwash deposits at higher elevations (>5,000 feet). The topography of the High Cascades is characteristic of a broad upland plateau with scattered volcanic cones that are easily recognizable due to only slight modifications by erosion (Johnson, 1993). Steep relief in the High Cascades also occurs in glacially carved river canyons such as that of the Middle Fork. The project vicinity includes some exposed, older deposits of basalt overlain with younger lava flows of basaltic andesite (Forest Service, 1998).

The primary project works, including the powerhouse and the majority of the waterway, are within four primary soil types: Coyata-rock outcrop complex, Crater Lake-Alcot association, Crater Lake-rock outcrop complex, and Dumont-Coyata association.

The South Fork canyon is mapped as Coyata-rock outcrop complex for approximately 2.62 miles. The Coyata-rock outcrop complex is found on 35- to 80-percent slopes of the South Fork canyon and is likely associated with the diversion site and woodstave flowline alignment.

The Crater Lake-Alcot association occurs below a small portion of the penstock and on large tracts of land between the North and Middle forks beneath the transmission line alignment. Both soil types are deep, well- to somewhat-excessively drained, and formed in volcanic ash and pumice. The depth to bedrock is 60 inches or more. Because these soils are moderately well drained, the speed of runoff and hazard of water erosion are primarily a function of slope and aspect. The unit under the penstock is on a 12- to 35-percent north slope, and as such, runoff is moderate, and the hazard of water erosion is moderate to high.

The Crater Lake-rock outcrop complex is found on both aspects of 35- to 70-percent hill slopes in the Middle Fork canyon. The powerhouse and terminal 565 feet of

penstock are located on this soil unit. The complex is approximately 55-percent Crater Lake soil and 20-percent rock outcrop. The Crater Lake soil, which was formed in volcanic ash and pumice, is very deep and well drained. The depth to bedrock is 60 inches or more. This complex is subject to rapid runoff and high potential for water erosion.

The majority of project features, including all of the canal, tunnel, and forebay, as well as segments of the woodstave flowline and penstock, occur on Dumont-Coyata association soils. The soil is deep and well drained, but permeability is slow. The depth to bedrock is 60 inches or more. Runoff and erosive hazards are a function of the slope, but the majority of the project waterway is located on a plateau, for which runoff is slow and the hazard of water erosion is slight.

In March and April of 1989, significant horizontal movement of an existing landslide adjacent to the forebay required remediation and additional monitoring of the slide area. The landslide, which dates back to the late 1940s or early 1950s, is located on the downstream, northeast side of the forebay entrance to the penstock. In 1951, the forebay and adjoining canal segment were realigned to repair or prevent damage to the canal because of landslide action. Formal monitoring of the slide, consisting of manual measurements of displacement, began in 1982. The significant movement in early 1989 amounted to 7-8 inches of horizontal movement, and erosion within the forebay spillway contributed to movement of the slide. Repair activities in 1990 consisted of filling the spillway ravine with 20,000 cubic yards of rock fill to a depth of approximately 25 feet and a distance of approximately 400 feet to control erosion in the spillway and buttress the slide area. Post-construction monitoring revealed that additional horizontal movement had been reduced. Automation of the pressure-relief valve (PR valve), completed in 2014, reduced the frequency, duration, and volume of forebay spillway discharge and reduced the potential for erosion and/or additional landslide movement at the forebay and forebay spillway.

In March 2006, a rockslide occurred uphill of the woodstave flowline. A large boulder fell and punched a hole in the flowline, which caused the generating unit to trip offline and the flowline to spill approximately 130 cfs of water into the bypass reach. Slope stabilization and flowline footing replacement were completed in 2006. The flowline incurred additional damage approximately 1,200 feet from the head works from a large boulder in late 2012. Repairs were completed in 2013.

Rockfall from the slopes above the woodstave flowline is coincident to the project and is generally not the result of project construction, operations, or maintenance. However, the preliminary geotechnical report identifies nine locations with evidence of rock failures and/or high potential of falling rock along the flowline. These locations exhibit potential to damage the flowline and result in water erosion of sediments adjacent to and below the flowline. Water leakage from the woodstave pipe currently exists along

the flowline, resulting in several small slope failures. Leakage from the sag pipe also results in erosion and mobilization of sediments below the sag pipe to the Middle Fork. Construction and maintenance of project access roads, waterways, and staging areas has resulted in the removal of vegetative cover and the exposure and compaction of soils. There are no known existing erosive conditions, mass soil movement, slumping or other unstable conditions associated with the project impoundment shoreline and stream banks.

3.3.3.2 Environmental Effects

Erosion and Sediment Control

To reduce leakage, exposure to the potential for rupture from rockfall and erosion, PacifiCorp proposes to replace the existing 5,350-foot-long, 66-inch-diameter woodstave flowline and 734-foot-long, 66-inch-diameter woodstave sag pipe facilities with new steel pipelines with the same massing and alignment. Replacement of pipeline would require construction of several wide turn-out areas in geologically stable reaches of the alignment to assist with moving and staging equipment and materials, as well as rehabilitation of the vehicle bridge installed over the flowline. The existing steel pipe segment crossing the Middle Fork would be reconditioned and remain in place. The 64-foot section of woodstave pipe supported by a steel trestle on the north bank of the Middle Fork would be replaced with 0.50-inch-thick steel pipe.

PacifiCorp proposes to implement the ESCP filed with its application to minimize the effects of ground-disturbing maintenance and construction projects, including the flowline and sag pipe replacements. The ESCP includes inspection and maintenance schedules and specifications for ensuring the proper operation of erosion and sediment controls. The ESCP includes the following erosion control best management practices (BMPs) to be implemented during any ground-disturbing activities:

- identify and protect areas of vegetation to be preserved;
- identify and demarcate grading limits in the field;
- identify existing stabilized construction entrance and laydown areas or construct stabilized entrance and laydown areas to prevent tracking of fines on to adjacent improved roads;
- stabilize all equipment access routes as required to prevent erosion;
- establish a concrete wash-out area away from any watercourse;
- install perimeter sediment control silt fence or staked straw waddles to prevent any stormwater runoff or sediment transport into adjacent waterways;

- identify suitable upland area(s) for onsite water disposal and infiltration of construction dewatering water;

- hold a pre-construction meeting with contractor team to review project schedule, installation and maintenance of erosion and sediment control BMPs, project inspection and corrective action protocols;

- stockpile extra straw waddles and silt fence onsite;

- regularly inspect all erosion control BMPs and modify as necessary;

- stabilize exposed soils that would remain unworked for over forty-eight hours;

- monitor onsite water disposal areas and modify or relocate as necessary to assure that infiltration is occurring;

- provide final grading and permanent erosion and sediment controls on all exposed soils;

- remove and properly dispose of all construction materials and waste, including sediment retained by temporary BMPs;

- remove all temporary BMPs as areas are stabilized; and

- revegetate all disturbed soil with native seed and plants, with priority given to locally adapted native species.

The Forest Service (condition 8) would require consultation and approval of a revised ESCP to include: conducting inventory and monitoring of entire project area, erosion control measures that incorporate current standards or BMPs, monitoring for effectiveness of completed erosion control treatment measures, protocols for emergency erosion and sediment control, and documenting and reporting inventory and monitoring results. Condition 8 further requires the development of site-specific temporary erosion control measures, approved by the Forest Service for new construction or non-routine maintenance on or affecting NFS lands.

Forest Service condition 11 requires PacifiCorp to develop a road plan for reconstructing the vehicle access bridge over the flowline and constructing the new road spur that includes plans and specifications, a description of all slide removals, a description of slump repairs, and identification of disposal sites for materials removed from slides. Oregon DFW also recommends that PacifiCorp consult with it and prepare an ESCP 90 days prior to any ground-disturbing, land-clearing, or spoil-producing activities at the project.

Our Analysis

Erosion and Sediment Control Plan

Replacing the woodstave pipeline with a steel pipeline would eliminate erosion stemming from existing leakage and reduce the potential for flowline failures that could result in erosion and sedimentation. Post-construction stabilization and effective site restoration from implementing the ESCP would minimize long-term effects on environmental resources. With effective erosion control measures in place, sediment from construction activities would not likely enter the Middle Fork.

Once the pipelines have been replaced, the project should have little or no effect on geology and soils. Proper implementation of PacifiCorp's ESCP would prevent excessive runoff, thereby protecting water quality, wetlands, and soil resources.

PacifiCorp's current ESCP appears to address the Forest Service's requirements as listed in condition 8. Revising the ESCP based on site-specific conditions and final design of flowline replacement, access bridge and spur road would ensure that any effects on geology and soils from ground-disturbing activities on lands would be dealt with properly.

Future unforeseen project-related operation and maintenance activities could result in ground-disturbing activities. However, the need to develop additional site-specific erosion control plans for such activities would be based on, among other things, the nature of the activity, the extent of ground disturbance, and the likelihood that the activity would cause soil erosion. Because any future potential ground-disturbing project operation and maintenance activities are as-yet unspecified, it would be impossible to determine the need for preparing additional erosion control plans for future activities until they are proposed.

Road Plan

Developing a road plan as required by the Forest Service would ensure early identification and resolution of any road stability and erosion issues like slumps and slides. Implementing the plan would minimize the potential for erosion and sedimentation along the vehicle access bridge and road spur.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

Water Quality

Oregon Administrative Rule (OAR) 340-41-0271 designates the mainstem Rogue River and tributaries upstream of William L. Jess Dam, including the South Fork and Imnaha Creek, as having beneficial uses for public domestic water supply, private domestic water supply, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, and hydropower. Fish use designations for the South Fork and its tributaries in the project area are salmon and trout rearing and migration.

Water temperature, dissolved oxygen, pH, and turbidity are water quality parameters that could be affected by the project. State of Oregon water quality standards for these parameters are shown in table 1.

Table 1. Water quality standards applicable to the project (Source: license application as modified by staff).

Parameter	Applicable Standard	Description
Temperature	OAR 340-041-0028	The seven-day-average maximum temperature may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit).
Dissolved Oxygen	OAR 340-041-0016	Dissolved oxygen may not be less than 8.0 mg/L as an absolute minimum, and 11 mg/L during the trout spawning through emergence period.
pH	OAR 340-041-0275	pH values must be between 6.5 and 8.5.
Turbidity	OAR 340-041-0036	No more than a 10% cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity.

Notes: pH – hydrogen ion concentration
mg/L – milligram per liter

PacifiCorp monitored water quality at five monitoring sites in the project area during 2014 and 2015: (1) Imnaha Creek inflow site, (2) South Fork inflow site, (3) upper bypassed reach, (4) middle bypassed reach upstream of the spring site,[7] and (5) lower bypassed reach downstream of the spring site.

Water temperatures were recorded at hourly intervals at each of the five monitoring stations for one year. Dissolved oxygen and pH levels were recorded at hourly intervals for 72-hour periods each month from June through October 2014 and in May 2015 at each of the three bypassed reach monitoring sites. PacifiCorp also monitored turbidity at the Imnaha Creek and South Fork inflow sites as well as at the upper bypassed reach site for a 5-day period in September 2015 to coincide with a bypassed reach ramping event associated with a planned powerhouse outage.

The water quality monitoring results are presented in the following sections.

Water Temperature

Overall, water temperatures in the South Fork and Imnaha Creek were typically less than 10 degrees Celsius (C), with daily average temperatures exceeding 10 degrees C only during the summer and early fall. At all sampling locations, daily average water temperatures were lowest during winter and highest during the summer, with daily averages ranging from a low of about 0 degrees C in March 2015 to a high of 12.7 degrees C in July 2015.

The water temperature data collected at the five sampling stations were used to calculate the 7-day average of the daily maximum temperature (7-DAD Max).[8] The 7-DAD Max is the average of seven consecutive daily maximum temperature measurements and is used in determining compliance with the State of Oregon water temperature criteria. All 7-DAD Max results from each of the five sampling locations were in compliance with the State of Oregon's water temperature criterion of 18 degrees C. The highest 7-DAD Max temperatures measured during the monitoring period were 14.4 degrees C on July 17, 2014, at the middle bypassed reach monitoring station. For the entire sampling period, the maximum hourly temperature of 15.1 degrees C was also recorded at this location on the same date.

[7] Beginning about 2.8 miles downstream of the diversion dam, there is a substantial increase in flows from numerous springs that flow into the bypassed reach.

[8] The 7-DAD Max for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior to, and the three days after, that date.

Dissolved Oxygen

PacifiCorp's 2014 dissolved oxygen monitoring coincided with the summer and early fall period when flows are low and water temperatures are typically at their highest levels of the year. PacifiCorp also monitored dissolved oxygen conditions in May 2015 to characterize dissolved oxygen levels during the trout spawning and emergence period when the state criterion is 11.0 mg/L.[9]

The data indicate that dissolved oxygen levels met the state water quality criterion of 8.0 mg/L as an absolute minimum at all of the monitoring sites, with daily averages ranging from 9.4 to about 12 mg/L throughout the monitoring period. The minimum hourly measurement recorded was 9.1 mg/L during July 2014.

The data also indicate that mean dissolved oxygen levels during the trout spawning through emergence period[10] met the 11.0 mg/L criterion at the upper and lower bypassed reach monitoring sites during May, with mean concentrations of 11.3 mg/L at the upper site and 11.1 mg/L at the lower site. Mean dissolved oxygen levels during May were slightly less than the state criterion at the middle bypassed reach monitoring site, however, with mean concentrations of 10.8 mg/L.

During the remaining two months of the trout spawning through emergence period (June and July), mean dissolved oxygen levels at all three monitoring sites were less than the state criterion, with mean concentrations ranging between a low of 9.6 and a high of 10.7 mg/L.

pH

All pH measurements collected in 2014 and 2015 were within the State of Oregon's water quality standard of 6.5 to 8.5.

Turbidity

PacifiCorp monitored turbidity at three sampling locations in September 2015, 72 hours prior to, and 48 hours after, an outage event in which the diversion canal headgate

---

[9] As showing in figure 2 below, the cutthroat and rainbow trout spawning through emergence period extends from January through July.

[10] Although the periodicity table shown in figure 2 indicates that trout spawning and emergence also occurs from January through April, PacifiCorp did not monitor dissolved oxygen prior to May because concentrations are usually higher in the winter when flows are higher and water temperatures are colder.

was closed and all inflows were released into the bypassed reach to assess the influence of up-ramping associated with the outage on turbidity levels in the bypassed reach. Prior to the outage event, turbidity at the South Fork inflow site ranged from 2.8 to 3.5 nephelometric turbidity units (NTUs), -0.1 to 1.1 NTU at the Imnaha Creek inflow site, and -0.45 to 0.9 NTU in the South Fork bypassed reach. Following the outage event, turbidity levels remained generally the same at the two sampling locations above the diversion dam but increased by a maximum of 56.4 percent (during one 0.25-hour interval) to 4.25 NTUs at the South Fork bypassed reach location compared to the turbidity levels recorded for the South Fork sampling location upstream of the diversion dam. This increase in turbidity resulted in an exceedance in the State of Oregon's water quality standard for turbidity (i.e., maximum cumulative increase in natural turbidities of no more than 10 percent compared to background conditions). PacifiCorp reported that elevated turbidity levels lasted about 1.75 hours.

Fisheries Resources

Aquatic Habitat

In August 2014 PacifiCorp completed an aquatic habitat inventory of about 13 miles of the South Fork in the project area using methods specified in the Forest Service Region 6 Stream Inventory Handbook (Forest Service, 2014).

The survey included a 6-mile segment of the bypassed reach beginning at about river mile (RM) 4.5 near the confluence within the Middle Fork and extending upstream to RM 10.5 at the diversion dam. The survey also included an approximately 7-mile reach of the South Fork upstream of the project dam and impoundment between RM 10.5 and 17.3.

South Fork Bypassed Reach

The geomorphology of the bypassed reach was characterized as steeply sloped and deeply incised basalt canyons and bedrock gorges etched into a gently sloped landscape derived from volcanic deposition. The stream channel was stable and controlled by bedrock or colluvial boulders. Stream gradient averaged three to four percent, and aquatic habitats consisted of boulder and cobble-dominated rapids, deep plunge pools, scour pools, and bedrock trench pools. Channel substrate was dominated by coarse particles (large cobble and boulders) and lacked small sediment (sand, gravel, and small cobble). Stream and channel morphology was characterized by pool-drop sequences within a confined, low sinuosity channel. Large woody debris was rare and had little influence on channel morphology.

Three waterfalls ranging in height from four to 10 feet were identified at the downstream end of the survey within the bypassed reach. The largest 10-foot-high waterfall was estimated to be an upstream fish passage barrier at low streamflows.

Five tributaries were identified within the bypassed reach survey segment, with each contributing at least one percent of the total flow volume of the South Fork at the location of the tributary's confluence. Two of the tributaries were characterized as fish-bearing and one tributary was considered likely to be fish bearing; the other two were not fish bearing. In addition to the five tributaries, there are numerous small springs that enter the South Fork within the bypassed reach that cumulatively contribute a substantial amount of flow to the reach.

South Fork Upstream of Diversion Dam and Impoundment

Upstream of the dam and impoundment, the geomorphology of the South Fork was characterized as a gently to moderately sloped, V-shaped, colluvial canyon or flat-floored, alluvial canyon. Map and field-estimated valley widths ranged from 80 feet to greater than 200 feet, but were generally 100 to 200 feet wide. Stream gradient averaged one to two percent and the most common aquatic habitats observed were long rapids, riffles, and large mid-channel scour pools. Substrate primarily consisted of gravel and cobble with substantial amounts of sand in both fast water (rapids) and slow water (pools). Large woody debris was moderately abundant and was found as scattered pieces and in log jams. The log jams were influencing channel morphology by retaining large amounts of sediment (sand, gravel, and small cobble) and by creating and maintaining side channel habitat. The log jams were indicative of a system that experiences occasional flooding from rain-on-snow as a result of a large portion of this watershed being located in the transient snow zone (elevation range 3,500 to 5,000 feet). No fish passage barriers were observed in the 7-mile survey reach.

Fish Community

Historically, resident salmonids in the project area included the native rainbow trout and coastal cutthroat trout. Both brook trout and brown trout were introduced to the Rogue River; however, stocking of brook trout and brown trout into project area waters has been discontinued. Spring Chinook salmon and winter steelhead may have historically migrated to the South Fork; however, since 1977, the Corps' William Jess Dam, located on the Rogue River about 18 miles downstream of the project, has prevented upstream movement of anadromous fish into the South Fork. No federal or state-listed fish species currently occur in the bypassed reach.

Figure 2 shows the periodicity for the various life stages of native rainbow and cutthroat trout in the project area.

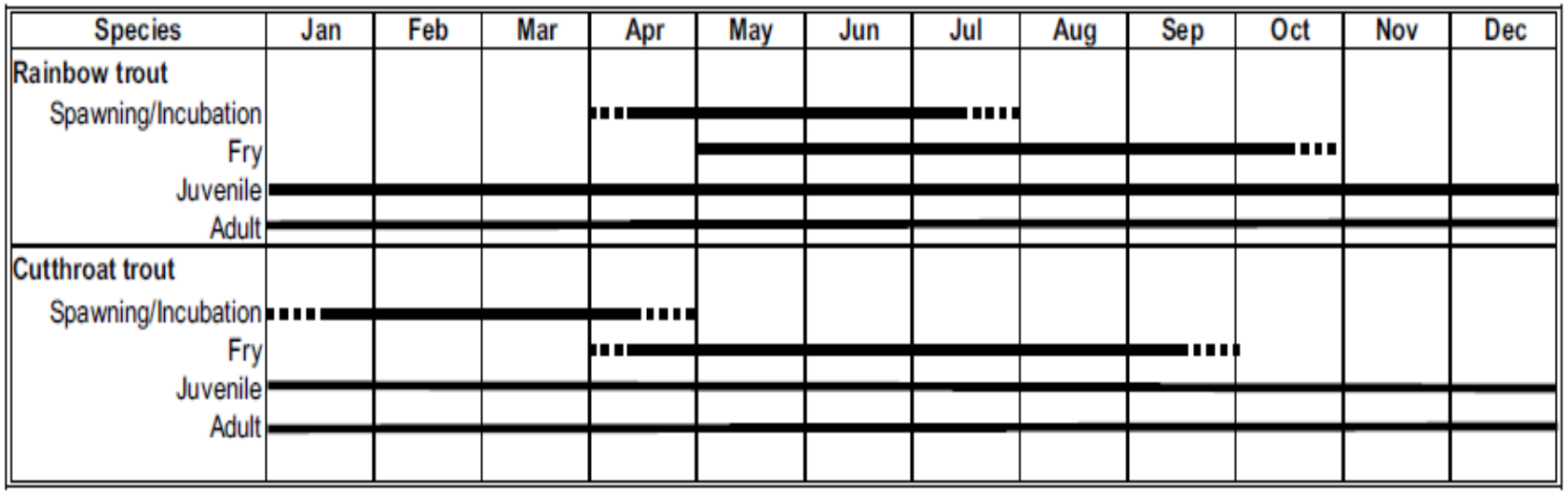

Figure 2. Periodicity of rainbow and cutthroat trout in the Rogue River Basin (source: PacifiCorp, 2003b).

PacifiCorp conducted fish surveys in the project area in August 2014 using a variety of sampling techniques, including snorkeling, electrofishing, and hook and line sampling. The survey objectives were to evaluate the fish species assemblage, relative abundance, and distribution in the same stream reaches described above for the aquatic habitat surveys, but also included the project impoundment and the lower segment of Imnaha Creek near its confluence with the project impoundment. The surveyors identified rainbow trout, cutthroat trout, brook trout, and sculpin during the surveys. Overall, the snorkel surveys reported significantly greater fish abundance than the other sampling methods, likely as a result of a greater survey effort and area, and because of the limitations of sampling with hook and line sampling, and with a backpack electrofisher in a deep complex channel and in waters with low conductivity, as was the case in most of the survey reaches.

In the bypassed reach, 979 trout were observed during snorkel surveys within a sampling area encompassing 13,540 square meters (m^2), or a density of 0.072 fish/m^2, and a catch per unit effort (CPUE) of 0.077 fish/second. Ninety-one percent of the observed trout were rainbow trout, 5 percent were cutthroat trout, and 4 percent were non-native brook trout. Electrofishing in the bypassed reach within two 750-foot sampling units collected 53 trout resulting in a CPUE of 0.022 fish/second.

During snorkel surveys, PacifiCorp grouped fish that it observed into three size classes: (1) 0 – 100 mm, (2) 100 – 200 mm, and (3) > 200 mm. The number of observed trout and percent of total observed in each size class during the bypassed reach surveys are summarized in table 2.

Table *2.* Bypassed reach trout snorkel survey results by size class for each of three sampling reach (Source: license application as modified by staff).

Bypassed Reach No.	**Trout Numbers by Size Class**		
	0-100 mm	**100-200 mm**	**>200 mm**
1 (RM 4.4 to 6.1)	34	270	47
2 (RM 6.1 to 7.7)	42	242	20
3 (RM 7.7 to 10.5 at diversion dam)	94	207	23
Total	170	719	90
Percent of Total	17.4	73.4	9.2
RM = river mile			

Snorkel surveys in the 7-mile segment of the South Fork upstream of the diversion dam and impoundment resulted in a visual estimate of 571 trout in an area encompassing 13,149 m^2 or a fish density of 0.043 fish/m^2, and a CPUE of 0.077 fish/second. Ninety-seven percent of the observed trout were rainbow trout, about 2.5 percent were brook trout, and less than 1 percent were cutthroat trout. By size class, 37 percent were 0-100 mm, 58 percent were 100-200 mm, and 5 percent were greater than 200 mm. Electrofishing in a 600-foot-long sampling unit just upstream of the project impoundment collected 10 salmonids with a CPUE of 0.0096 fish/second.

July 2014 hook and line sampling in the project impoundment collected nine rainbow trout with an average fork length of 169 millimeters for a CPUE of 0.0038 fish/second. Two snorkel surveys conducted on the same day in April 2015 observed six rainbow trout and a CPUE of 0.0023 fish/second during the first survey and two rainbow trout and a CPUE of 0.00067 fish/second during the second survey.

Electrofishing surveys in a 400-foot section of Imnaha Creek near the project impoundment collected 22 salmonids with a CPUE of 0.027 fish/second.

In October 2014, The Cow Creek Band of Umpqua Tribe of Indians (Cow Creek Band) surveyed the South Fork upstream and downstream of the diversion dam and in the diversion dam impoundment to determine if lamprey are present in the project area. No lamprey were detected during these surveys.

3.3.2.2 Environmental Effects

Bypassed Reach Minimum Flows

Under the existing license, PacifiCorp is required to maintain a 10-cfs minimum flow in the South Fork bypassed reach. During periods when the dam is not spilling, all minimum flows are released to the bypassed reach through the fish ladder. When project inflow exceeds 160 cfs, which is the combined maximum generation for the project plus the minimum flow requirement, water passes through the ungated spillway on the dam into the bypassed reach. The spill period typically begins in April and ends in June when low-elevation snowmelt runoff ceases for the year.

To evaluate the effects of minimum flows on fish habitat in the bypassed reach, PacifiCorp conducted an instream flow study of the South Fork using the System for Environmental Flow Analysis (SEFA) model. The output of the hydraulic models used in the SEFA modeling analysis was used in conjunction with approved habitat suitability curves (HSC) to produce habitat-flow relationships for target rainbow trout and cutthroat trout fry, juvenile, adult, and spawning life stages. The SEFA model computes a habitat metric known as Average Weighted Suitability (AWS) in units of square-feet of habitat per lineal foot of channel.

To enhance the existing environment for aquatic resources in the bypassed reach, PacifiCorp proposes to maintain a minimum flow of 30 cfs from March 1 through July 31, and 20 cfs from August 1 through February 28, as measured at the existing bypassed reach USGS gage located about 0.25 mile downstream of the diversion dam.

Oregon DFW recommends that PacifiCorp maintain a minimum flow of 30 cfs from March 1 through October 31, and 20 cfs from November 1 through February 28, as measured at the bypassed reach USGS gage.

In its reply comments, PacifiCorp states that its proposal to provide 30 cfs from March 1 through July 31 (instead of through the end of October) more accurately reflects the natural reduction of inflows to the project during the summer and fall. Mean average inflows to the project drop from 270 cfs in June to 132 cfs in July and 92 cfs in August, and the lowest inflows to the project typically occur in October at a mean average inflow of 74 cfs. PacifiCorp contends that rainbow trout spawning and incubation have typically ceased by the end of July (PacifiCorp, 2003b), and reducing flows to 20 cfs in August would strike a balance between maximizing AWS for trout spawning earlier in the summer and fry for the remainder of the summer and fall. Therefore, maintaining a 30-cfs minimum flow release through the end of October is not warranted and is not justified in light of the costs.

Our Analysis

Project flow diversions for power generation have the greatest effect on aquatic habitat within the upper 2.8 miles of the bypassed reach between RM 10.5 and 7.7, and to a lesser extent between RM 7.7 and 7 where springs begin to augment project flow releases. Downstream of RM 7, flows are considerably higher[11] as a result of spring inflows, groundwater, and tributaries, including the Middle Fork Rogue River at about RM 4.5.

The modeled relationships between habitat and flow for the target life stages of cutthroat and rainbow trout are displayed in figure 3. Habitat is expressed as AWS.

Rainbow and Cutthroat Trout Fry

[11] PacifiCorp measured streamflow during June and August 2014 at RM 7 and compared the results to the USGS gage data for the same dates and conservatively estimated that springs between RM 7.7 and 7 contributed an average of about 16 cfs of additional flow when compared to streamflows measured at the USGS gage.

Cutthroat trout fry habitat increases steeply as flows rise in the bypass to a peak habitat level that occurs at 6 cfs. At flows above 6 cfs, cutthroat trout fry habitat drops back down until 14 cfs, after which the habitat essentially levels off, decreasing only gradually as flows increase.

The habitat-flow relationship for rainbow trout fry is similar to that described above for cutthroat trout. The habitat rises steeply with increasing flow to a peak habitat level at 3 cfs and then decreases gradually as flows increase above 3 cfs.

Rainbow and Cutthroat Trout Juveniles

Habitat for juvenile cutthroat trout increases steeply as flows rise to a peak habitat level at 32 cfs. The inflection point on the habitat-flow curve is at 20 cfs. At flows above 32 cfs, juvenile cutthroat trout habitat declines gradually as flow increases. The amount of computed habitat for juvenile cutthroat trout was relatively high across the range of simulated flows compared to the other species' life stages.

Habitat for juvenile rainbow trout rises as flows initially increase to a peak at 50 cfs. The inflection point on the habitat-flow curve is at 30 cfs.

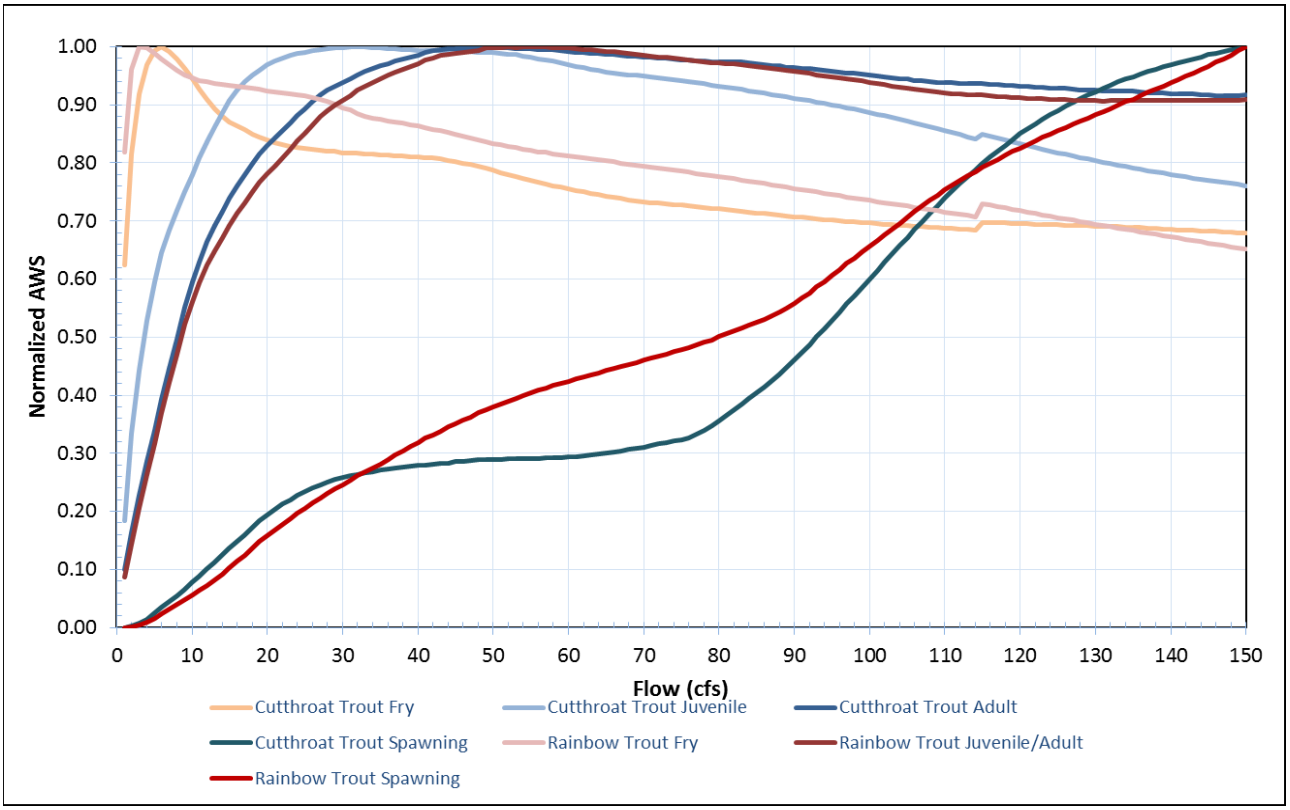

Figure 3. Percent of maximum average weighted suitability for target cutthroat and rainbow life stages (Source: license application as modified by staff).

Rainbow and Cutthroat Trout Adult Habitat

The adult rainbow and cutthroat trout habitat-flow relationship are nearly identical because their habitat preferences are essentially the same. Peak habitat for both species occurs at a flow of 50 cfs, while the inflection point on the habitat-flow curve is at 28 cfs for cutthroat trout and 30 cfs for rainbow trout. Habitat levels drop gradually at flows above 50 cfs.

Rainbow and Cutthroat Trout Spawning Habitat

Available information suggests that trout spawning habitat is limited in the bypassed reach and is likely a limiting factor for the trout population, with spawning habitat confined to small patches in and around boulders, behind fallen logs, and other areas that allow gravel to accumulate (Pacific Power and Light Co., 1986b). The model results show that spawning habitat availability for cutthroat and rainbow trout is the lowest of all the life stages evaluated. There is little trout spawning habitat at flows less than about 30 cfs, and spawning habitat increases gradually as flow increases to a maximum at 150 cfs.

Minimum Flows and South Fork Hydrology

As shown in table 3, during the March through June period of peak snowmelt runoff, even with the required 10-cfs minimum flow release to the bypassed reach, median (i.e., 50 percent exceedance) bypassed reach flows for these months range from a low of 67 cfs in March to a high of 164 cfs in May.[12] Therefore, under median flow conditions, flows from March through June would nearly always exceed the proposed and recommended minimum flow of 30 cfs. During the remainder of the year, however, bypassed reach flows would typically fall to levels that equal the proposed and recommended minimum flows of 20 cfs or 30 cfs, depending on season.

Table 3. Percent exceedance levels for average monthly flows at historic USGS gage no. 14332000 in the bypassed reach (Source: license application as modified by staff).

Month	10% Exceedance Flow (cfs)	50% Exceedance Flow (cfs)	90% Exceedance Flow (cfs)
January	244	20	5
February	194	29	10
March	209	67	12
April	294	111	22

[12] Based on 28-year flow record measured from October 1984 to September 2012 at USGS gage no. 14332000 in the bypassed reach.

May	363	164	19
June	275	74	12
July	58	14	9
August	38	13	5
September	76	14	5
October	68	13	4
November	72	15	5
December	187	16	5
cfs = cubic feet per second			

As shown in tables 4, 5, and 6, when compared to existing median flow conditions in the bypassed reach, PacifiCorp's proposed and Oregon DFW's recommended minimum flows would have no effect on habitat availability for all rainbow and cutthroat trout life stages from January through June because bypassed reach flows would typically already exceed the proposed or recommended minimum flows.

Table 4. Percent change in average weighted suitability for cutthroat trout fry and juvenile life stages in upper South Fork bypassed reach between existing, bypassed reach median flows and proposed or recommended minimum flows (Source: PacifiCorp, 2015a as modified by staff).

	Cutthroat Trout Fry			**Cutthroat Trout Juvenile**		
Month (median flow)	AWS (ft^2/ft) under median flows existing conditions[a]	AWS PacifiCorp proposal (percent change versus existing)	AWS Oregon DFW recommendation (percent change versus existing)	AWS (ft^2/ft) under median flows existing conditions	AWS PacifiCorp proposal (percent change versus existing)	AWS Oregon DFW recommendation (percent change versus existing)
Jan. (20 cfs)	NP	NP	NP	13.75	13.75 (0%)	13.75 (0%)
Feb. (29 cfs)	NP	NP	NP	14.17	14.17 (0%)	14.17 (0%)
Mar. (67 cfs)	NP	NP	NP	13.67	13.67 (0%)	13.67 (0%)
Apr. (111 cfs)	6.71	6.71 (0%)	6.71 (0%)	11.98	11.98 (0%)	11.98 (0%)
May (164 cfs)	6.58[b]	6.58 (0%)	6.58 (0%)	10.80[b]	10.80 (0%)	10.80 (0%)
Jun. (74 cfs)	7.30	7.30 (0%)	7.30 (0%)	13.30	13.30 (0%)	13.30 (0%)
Jul. (14 cfs)	8.53	7.93 (-7%)	7.93 (-7%)	12.58	14.18 (13%)	14.18 (13%)

Aug. (13 cfs)	8.67	8.14 (-6%)	7.93 (-9%)	12.23	13.75 (12%)	14.18 (16%)
Sept. (14 cfs)	8.53	8.14 (-5%)	7.93 (-7%)	12.58	13.75 (9%)	14.18 (13%)
Oct. (13 cfs)	NP	NP	NP	12.23	13.75 (12%)	14.18 (16%)
Nov. (15 cfs)	NP	NP	NP	12.86	13.75 (7%)	13.75 (7%)
Dec. (16 cfs)	NP	NP	NP	13.14	13.75 (5%)	13.75 (5%)

[a] PacifiCorp (2015a) provided model results for flows between 1 and 10 cfs; however, at flows greater than 10 cfs PacifiCorp only modeled even-numbered flows between 10 and 50 cfs; flows in increments of 5 cfs between 50 and 100 cfs; and flows in increments of 10 cfs between 100 and 150 cfs. For those flows that PacifiCorp did not model, we estimate habitat values by averaging the modeled habitat values for the closest higher and lower modeled flows.
[b] PacifiCorp did not model flows higher than 150 cfs; therefore, we report the habitat value for the highest modeled flow.
AWS = average weighted suitability
cfs = cubic feet per second
ft = feet
NP = life stage not present

Table 5. Percent change in average weighted suitability for cutthroat trout adult and spawning life stages in upper South Fork bypassed reach between existing, bypassed reach median flows and proposed or recommended minimum flows (Source: PacifiCorp, 2015a as modified by staff).

	Cutthroat Trout Adult			**Cutthroat Trout Spawning**		
Month (median flow)	AWS (ft^2/ft) under median flows existing conditions[a]	AWS PacifiCorp proposal (percent change versus existing)	AWS Oregon DFW recommendation (percent change versus existing)	AWS (ft^2/ft) under median flows existing conditions	AWS PacifiCorp proposal (percent change versus existing)	AWS Oregon DFW recommendation (percent change versus existing)
Jan. (20 cfs)	8.67	8.67 (0%)	8.67 (0%)	0.23	0.23 (0%)	0.23 (0%)
Feb. (29 cfs)	9.73	9.73 (0%)	9.73 (0%)	0.29	0.29 (0%)	0.29 (0%)
Mar. (67 cfs)	10.29	10.29 (0%)	10.29 (0%)	0.35	0.35 (0%)	0.35 (0%)
Apr. (111 cfs)	9.77	9.77 (0%)	9.77 (0%)	0.64	0.64 (0%)	0.64 (0%)
May (164 cfs)	9.58[b]	9.58 (0%)	9.58 (0%)	NP	NP	NP
Jun. (74 cfs)	10.24	10.24 (0%)	10.24 (0%)	NP	NP	NP
Jul. (14 cfs)	7.48	9.81 (31%)	9.81 (31%)	NP	NP	NP

Aug. (13 cfs)	7.21	8.67 (20%)	9.81 (36%)	NP	NP	NP
Sept. (14 cfs)	7.48	8.67 (16%)	9.81 (31%)	NP	NP	NP
Oct. (13 cfs)	7.21	8.67 (20%)	9.81 (36%)	NP	NP	NP
Nov. (15 cfs)	7.71	8.67 (12%)	9.81 (27%)	NP	NP	NP
Dec. (16 cfs)	7.94	8.67 (9%)	9.81 (24%)	NP	NP	NP

[a] PacifiCorp (2015a) provided model results for flows between 1 and 10 cfs; however, at flows greater than 10 cfs PacifiCorp only modeled even-numbered flows between 10 and 50 cfs; flows in increments of 5 cfs between 50 and 100 cfs; and flows in increments of 10 cfs between 100 and 150 cfs. For those flows that PacifiCorp did not model, we estimate habitat values by averaging the modeled habitat values for the closest higher and lower modeled flows.
[b] PacifiCorp did not model flows higher than 150 cfs; therefore, we report the habitat value for the highest modeled flow.
AWS = average weighted suitability
cfs = cubic feet per second
ft = feet
NP = life stage not present

Table 6. Percent change in average weighted suitability for target rainbow trout life stages in upper South Fork reach between existing, bypassed reach median flows and proposed or recommended minimum flows (Source: PacifiCorp, 2015a as modified by staff).

	Rainbow Trout Fry			**Rainbow Trout Juvenile/Adult**			**Rainbow Trout Spawning**		
Month (median flow)	AWS (ft^2/ft) under median flows existing conditions[a]	AWS PacifiCorp proposal (percent change versus existing)	AWS Oregon DFW recommendation (percent change versus existing)	AWS (ft^2/ft) under median flows existing conditions	AWS PacifiCorp proposal (percent change versus existing)	AWS Oregon DFW recommendation (percent change versus existing)	AWS (ft^2/ft) under median flows existing conditions	AWS PacifiCorp proposal (percent change versus existing)	AWS Oregon DFW recommendation (percent change versus existing)
Jan. (20 cfs)	NP	NP	NP	7.92	7.92 (0%)	7.92 (0%)	NP	NP	NP
Feb. (29 cfs)	NP	NP	NP	9.12	9.12 (0%)	9.12 (0%)	NP	NP	NP
Mar. (67 cfs)	NP	NP	NP	10.03	10.03 (0%)	10.03 (0%)	NP	NP	NP
Apr. (111 cfs)	NP	NP	NP	9.30	9.30 (0%)	9.30 (0%)	0.68	0.68 (0%)	0.68 (0%)
May (164 cfs)	6.42[b]	6.42 (0%)	6.42 (0%)	9.22[b]	9.22 (0%)	9.22 (0%)	0.87[b]	0.87 (0%)	0.87 (0%)
Jun. (74 cfs)	7.78	7.78 (0%)	7.78 (0%)	9.96	9.96 (0%)	9.96 (0%)	0.40	0.40 (0%)	0.40 (0%)
Jul. (14 cfs)	9.21	8.82 (-4%)	8.82 (-4%)	6.81	9.21 (35%)	9.21 (35%)	0.08	0.21 (163%)	0.21 (163%)
Aug. (13 cfs)	9.23	9.11 (-1%)	8.82 (-4%)	6.57	9.11 (39%)	9.21 (40%)	NP	NP	NP
Sept. (14 cfs)	9.21	9.11 (-1%)	8.82 (-4%)	6.81	9.11 (34%)	9.21 (35%)	NP	NP	NP
Oct. (13 cfs)	9.23	9.11 (-1%)	8.82 (-4%)	6.57	9.11 (39%)	9.21 (40%)	NP	NP	NP
Nov. (15 cfs)	NP	NP	NP	7.42	9.11 (23%)	9.11 (23%)	NP	NP	NP
Dec. (16 cfs)	NP	NP	NP	7.23	9.11 (26%)	9.11 (26%)	NP	NP	NP

[a] PacifiCorp (2015a) provided model results for flows between 1 and 10 cfs; however, at flows greater than 10 cfs PacifiCorp only modeled even-numbered flows between 10 and 50 cfs; flows in increments of 5 cfs between 50 and 100 cfs; and flows in increments of 10 cfs between 100 and 150 cfs. For those flows that PacifiCorp did not model, we estimate habitat values by averaging the modeled habitat values for the closest higher and lower modeled flows.
[b] PacifiCorp did not model flows higher than 150 cfs; therefore, we report the habitat value for the highest modeled flow.
AWS = average weighted suitability
cfs = cubic feet per second
ft = feet
NP = life stage not present

When comparing Oregon DFW's recommended and PacifiCorp's proposed minimum flows, the two alternatives are the same with the exception of the 3-month period between August 1 and October 31 when Oregon DFW recommends that PacifiCorp further increase minimum flows by an additional 10 cfs above its proposed 20-cfs minimum during this period. Below we discuss the effects of the two alternative minimum flows on rainbow and cutthroat trout habitat during this 3-month period, based on the modeling results.

Both alternatives would cause a reduction in fry habitat for both trout species, with PacifiCorp's proposal reducing habitat by 1 percent and Oregon DFW's alternative further reducing fry habitat by an additional 3 percentage points (i.e., total reduction of 4 percent) when compared to the existing minimum flows.

For the juvenile life stage, PacifiCorp's proposal would increase cutthroat trout habitat by 9 to 12 percent over existing conditions, while Oregon DFW's alternative would further increase cutthroat habitat by an additional 4 percentage points during each of these months, providing an overall increase in juvenile cutthroat habitat ranging from 13 to 16 percent compared to existing conditions. For rainbow trout juveniles, PacifiCorp's proposal would increase habitat by 34 to 39 percent during these months, while Oregon DFW's alternative would further increase habitat availability by an additional 1 percentage point for each of these months resulting in an overall increase of 35 to 40 percent compared to existing minimum flows.

The greatest difference in habitat gains between the two minimum flow alternatives would be for cutthroat trout adults. PacifiCorp's proposal would increase adult habitat by 16 to 20 percent compared to existing conditions, while Oregon DFW's recommended alternative would increase adult habitat by 31 to 36 percent. Therefore, Oregon DFW's recommendation would result in an additional increase in cutthroat adult habitat ranging from 15 to 16 percentage points during these months, when compared to PacifiCorp's proposal.

The modeling results for rainbow trout adults are the same as those discussed above for rainbow trout juveniles because the habitat preferences for both life stages are the same.

There would be no difference in spawning habitat availability between the two alternatives because neither species spawns between August and October.

Upstream Fish Passage

Under existing conditions, PacifiCorp operates an existing 15-pool, 86-foot-long concrete fish ladder at the diversion dam to provide upstream fish passage. The fish ladder was constructed in 1931 and modified in 1973 and 1996. The 1996 modifications

were designed to comply with Oregon DFW's fish passage criteria that were in effect at that time. However, Oregon DFW has since revised its fish passage criteria. PacifiCorp studied the hydraulic and biological performance of the fish ladder to determine if the fish ladder meets current Oregon DFW fish passage criteria,[13] and to assess the biological performance of the fish ladder to determine whether it passes fish under existing conditions. The study results documented that the ladder effectively passes trout, but the ladder does not meet current Oregon DFW criteria for all measured ladder characteristics (e.g., jump height over weirs).

PacifiCorp proposes to continue to operate the fish ladder under any new license issued. PacifiCorp also initially proposed in its license application to improve the hydraulic conditions in the lower portion of the fish ladder by modifying the weirs within pools 6 through 2 to reduce the jump height, water surface depth of weir notches, and flow velocity in the weirs. In its February 12, 2018 filing, however, PacifiCorp stated that because these proposed modifications were not adopted by staff in the draft EA, it is no longer proposing any modifications to the fish ladder.

Oregon DFW states in its 10(j) recommendations and again in its March 1, 2018 comments on the 10(j) meeting that the fish ladder is out of compliance with current Oregon DFW fish passage criteria and must be designed and operated to be consistent with its recommended criteria that are known to effectively pass juvenile and adult rainbow and cutthroat trout. Oregon DFW states that the existing ladder doesn't even meet the 1-foot jump height criterion between pools for adult salmon, let alone the 6- to 9-inch jump height criterion needed to pass smaller juvenile and adult trout. Therefore, Oregon DFW recommends that PacifiCorp modify the fish ladder to meet the following criteria within 18 months of license issuance:

(1) provide uninterrupted fish passage across the full range of project operating conditions (i.e., forebay and tailwater fluctuations), between the 5-percent and 95-percent exceedance flows for the South Fork at the diversion dam;
(2) vertical slots must measure at least 12 inches wide, pool to pool surface water differentials (i.e., jump height) must not exceed 0.75 foot (9 inches), pool

[13] In its Fish Passage Facilities Updated Study Report and Final License Application Exhibit E, PacifiCorp evaluated the hydraulic and physical characteristics of the fish ladder and compared them to the State of Oregon fish passage criteria established by OAR 635-412-003. However, Oregon DFW's recommended fish passage criteria that it filed as an FPA section 10(j) recommendation differ from the criteria established by the OAR in that they do not include a requirement for a 12-inch minimum water depth over weir notches, and the jump height criterion for Oregon DFW's recommendation is 0.75 foot (9 inches) instead of 6 inches as specified in the OAR.

depths must be at least 2 feet, and velocities within the vertical slot must not exceed 8 feet per second; and

(3) pools must have sufficient volume to have a maximum energy dissipation of 4 foot pounds per second per cubic foot.

Trout Unlimited states that it supports Oregon DFW's recommendation for upstream fish passage. Trout Unlimited indicates that the recommended ladder modifications would facilitate trout movement, allow trout to reach suitable habitat conditions through a broader reach of the South Fork stream network, and allow for a fuller expression of life history traits, including the potential for fluvial/migratory life histories.

In its reply comments, PacifiCorp states that its modeling of hydraulic conditions in the fish ladder indicates that it meets Oregon DFW's recommended criteria for all parameters except jump height. PacifiCorp also states that its biological evaluation for the fish ladder confirms that the ladder effectively passes fish as small as 110 mm; therefore, PacifiCorp asserts that the additional modifications needed to meet current criteria would provide limited incremental fish passage benefits that would not be justified in light of their costs.

Our Analysis

PacifiCorp evaluated the physical and hydraulic conditions within the fish ladder to determine whether the fish ladder is compliant with current State of Oregon criteria under low flow conditions (95 percent exceedance) on June 1 and July 2, 2014, and under high flow conditions (5 percent exceedance) on January 18, 2015.

Flow volume in the 15-pool fish ladder differs between the upper (i.e., pools 7 through 15) and lower (i.e., pools 1 through 6) portions of the ladder. A relatively small proportion of total ladder flow enters the upstream end of the fish ladder through the ladder exit orifices in pool 15. The remainder of the total ladder flow enters the ladder at pool 6 via the fish screen bypass pipe exit, located about half the distance between the entrance and exit of the ladder. This configuration results in a significant increase in flow volume in the lower portion of the fish ladder when compared to the portion upstream of the bypass pipe discharge point. At the time of the evaluations, flows in the upper ladder were estimated to be 2.2 cfs during the low flow evaluation and 8 cfs during the high flow evaluation. Flows in the lower ladder were estimated to be 14 cfs and 21.3 cfs during the low and high flow evaluations, respectively. Figure 4 shows some of the main components of the fish ladder and the location of the fish bypass return pipe within pool 6.

Tables 7 and 8 provide a summary of the physical and hydraulic conditions in the fish ladder during the low and high flow evaluations, as well as a comparison of the measured characteristics to Oregon DFW's recommended criteria. The results of the

physical evaluation show that the fish ladder meets all of Oregon DFW's recommended criteria except for jump height between pools, especially under low flow conditions.

Figure 4. Photograph of the Prospect No. 3 Project diversion dam fish ladder and diversion canal, looking downstream from diversion dam during high flow conditions (Source: PacifiCorp, 2016c).

Table 7. Summary of fish ladder measurements under low-flow conditions and whether they meet Oregon DFW recommended criteria (Source: license application as modified by staff).

Pool/Weir No.	**Estimated Flow**	**Jump Height**		**Weir Notch Velocity**		**Pool Depth**		**Energy Dissipation**		
	Cubic feet per second	Jump Height (in.)	Meets Oregon DFW recommended criteria (0.75 ft./9 in.)?	Velocity (ft./sec.)	Meets Oregon DFW recommended criteria (8 ft/sec)?	Average measured depth (ft.)	Meets Oregon DFW recommended criteria (2 ft.)?	Pool Volume (cubic ft.)	Energy Dissipation Factor (EDF)	Meets Oregon DFW recommended criteria (EDF must not exceed 4)?
1	15	19.2	**No**	7.1	Yes	2.2	Yes	195	1.66	Yes
2	15	4.8	Yes	5.6	Yes	4.0	Yes	380	2.78	Yes
3	15	15.6	**No**	5.6	Yes	5.8	Yes	551	2.21	Yes
4	15	18	**No**	5.3	Yes	6.0	Yes	570	1.99	Yes
5	15	16.8	**No**	5.6	Yes	9.0	Yes	900	1.35	Yes
6	15	18	**No**	5.3	Yes	6.6	Yes	660	0.18	Yes
7	2.2	12	**No**	2.4	Yes	2.9	Yes	254	0.57	Yes
8	2.2	14.4	**No**	2.3	Yes	3.5	Yes	307	0.47	Yes
9	2.2	14.4	**No**	2.8	Yes	4.4	Yes	522	0.30	Yes
10	2.2	15.6	**No**	2.3	Yes	2.7	Yes	258	0.52	Yes
11	2.2	13.2	**No**	2.4	Yes	2.9	Yes	290	0.63	Yes
12	2.2	18	**No**	2.5	Yes	3.6	Yes	490	0.32	Yes
13	2.2	15.6	**No**	2.4	Yes	4.2	Yes	568	0.19	Yes
14	2.2	10.8	**No**	2.6	Yes	4.9	Yes	285	0.43	Yes
15	2.2	12	**No**	2.5	Yes	5.2	Yes	565	1.66	Yes

Table 8. Summary of fish ladder measurements under high-flow conditions and whether they meet Oregon DFW recommended criteria (Source: license application as modified by staff).

Pool/Weir No.	**Estimated Flow**	**Jump Height**		**Weir Notch Velocity**		**Pool Depth**		**Energy Dissipation**		
	Cubic feet per second	Jump Height (in.)	Meets Oregon DFW recommended criteria (0.75 ft./9 in.)?	Velocity (ft./sec.)	Meets Oregon DFW recommended criteria (8 ft/sec)?	Average measured depth (ft.)	Meets Oregon DFW recommended criteria (2 ft.)?	Pool Volume (cubic ft.)	Energy Dissipation Factor (EDF)	Meets Oregon DFW recommended criteria (EDF must not exceed 4)?
1	21.3	4.5	Yes	4.3	Yes	3.8	Yes	349	1.41	Yes
2	21.3	1.5	Yes	3.0	Yes	4.8	Yes	469	0.35	Yes
3	21.3	3.5	Yes	5.1	Yes	5.7	Yes	572	0.67	Yes
4	21.3	Submerged	N/A	6.5	Yes	5.6	Yes	551	2.87	Yes
5	21.3	Submerged	N/A	6.5	Yes	5.2	Yes	540	3.24	Yes
6	21.3	Submerged	N/A	5.9	Yes	6.3	Yes	651	2.85	Yes
7	8	19.5	**No**	6.7	Yes	3.7	Yes	337	2.41	Yes
8	8	Submerged	N/A	4.8	Yes	4.3	Yes	395	1.32	Yes
9	8	Submerged	N/A	4.8	Yes	4.8	Yes	616	1.01	Yes
10	8	18.5	**No**	4.4	Yes	3.5	Yes	378	2.04	Yes
11	8	Submerged	N/A	4.8	Yes	4.2	Yes	445	1.21	Yes
12	8	17	**No**	4.7	Yes	5.1	Yes	703	1.01	Yes
13	8	18	**No**	4.8	Yes	5.5	Yes	746	1.00	Yes
14	8	Submerged	N/A	4.9	Yes	5.9	Yes	359	1.10	Yes
15	8	Submerged	N/A	4.8	Yes	5.5	Yes	306	2.04	Yes

In addition to the physical and hydraulic evaluation of the fish ladder, PacifiCorp also completed a biological evaluation to determine the ladder's effectiveness at passing live trout. The primary objective of the upstream passage evaluation was to determine the passage success rate and travel time of Passive Integrated Transponder (PIT)-tagged, naturally produced trout that were released into the fish ladder and tracked upstream through the ladder exit. Thirty naturally produced rainbow trout were captured in the bypassed reach downstream of the diversion dam and five naturally produced rainbow trout were captured in the South Fork upstream of the project impoundment for use in the biological evaluation. All captured trout used in the evaluation were between 89 mm and 215 mm fork length, with most between 100 and 149 mm fork length. Test fish were tagged with 23-mm PIT-tags and released into pool 1 of the fish ladder between June 11 and June 13, 2015. One continuously detecting and recording PIT antenna was installed in each of pools 1, 6, 8, and 15 (i.e., 4 total antennas) and operated until July 31, 2015.

Three of the 30 fish captured downstream of the diversion dam successfully ascended the fish ladder. All three of the fish that successfully ascended the fish ladder milled around in the lower portion of the ladder for several days before moving upstream. However, once beginning their ascent, two of these fish successfully ascended the ladder in less than seven hours. The third fish exited the ladder then reentered and slowly ascended the ladder over a period of approximately 88 hours (3 days and 16 hours). Six of the 30 test fish from the downstream capture group were never detected, meaning they likely either stayed in the fish ladder between pools 1 and 6 or exited the fish ladder entrance without being detected[14] and returned to the bypassed reach below the dam. The 21 remaining test fish from the downstream capture group were detected at least once but did not appear to ascend the ladder, although it's possible that some of these could have ascended the ladder but were undetected when doing so because of tag collision. It's also possible that some or all of these fish were not inclined to migrate upstream at all, and therefore, exited the ladder via the entrance and returned to the bypassed reach.

Four of the five (80 percent) fish from the upstream capture group successfully ascended the fish ladder. Upstream travel time (time from the last detection at pool 1 to ladder exit at pool 15) ranged from 12 to 25 hours for this test group.

The smallest fish that successfully ascended the fish ladder was 110 mm (4.3 inches), while the largest was 207 mm (8.1 inches). Seventy-three percent (i.e., 719 individuals) of trout observed during snorkel surveys of the bypassed reach were

[14] PacifiCorp released 65 PIT-tagged fish simultaneously in the ladder during the upstream (i.e., 35 fish) and downstream (i.e., 30 fish) biological evaluations suggesting that tag collision may have adversely affected the study results. Tag collision occurs when more than one tag is present in a given antenna's detection area at the same time, essentially cancelling out the signal from one or more tags.

categorized in the 100-200 mm size class; only seventeen percent (i.e., 170 individuals) of trout observed during snorkel surveys were categorized in the 0-100 mm size class. Therefore, the ladder would effectively provide passage for the majority of trout in the bypassed reach.

Oregon DFW's recommended modifications would reduce jump heights between some of the pools in the fish ladder, which could reduce the existing upstream travel time through the ladder for the larger size classes of trout that are known to use the ladder. However, information in the project record suggests that there is a low level of trout use of the fish ladder for upstream movements. Pacific Power and Light (1986a) captured a total of 45 rainbow trout in a trap set in the fish ladder during 500 hours of sampling between April and October 1986. All fish captured were between 100 and 180 mm in length. In addition, during PacifiCorp's pre-filing upstream passage studies, all but one of the trout that successfully passed upstream through the ladder did so in about a day or less, with several passing the ladder in as little as 7 hours once they began their ascent. These data suggest that there is not a substantial delay when upstream migrants elect to ascend the ladder. Because trout use of the fish ladder is low and the ladder already provides effective upstream passage for trout greater than about 100 mm over a period of about one day or less, there would be minor benefits, if any, to larger size classes of trout from modifying the fish ladder to reduce travel time.

While the recommended modifications to the fish ladder would also reduce jump heights for smaller size classes of trout such as fry and juveniles that have a weaker swimming ability than adult trout, smaller size classes of trout such as fry and juveniles do not typically make long upstream movements. Rather, fry and juvenile salmonids tend to disperse downstream from spawning areas (Anderson, 2016) to find unoccupied habitats and then establish localized positions in the river for feeding and growth. As noted above, Pacific Power and Light (1986a) did not collect any trout less than 100 mm during 500 hours of upstream migrant trapping in the fish ladder in 1986. Because most fry and juvenile trout do not make long upstream migrations, there would be little to no benefit to fry and juvenile trout from modifying the fish ladder to improve upstream passage conditions for these life stages.

Downstream Fish Passage

To prevent fish entrainment into the powerhouse, PacifiCorp operates and maintains an existing 193-square-foot wedge-wire inclined-plane fish screen with 0.25-inch screen openings that is situated in the diversion canal about 215 feet downstream of the diversion dam. The fish screen was constructed in 1996 according to the interim criteria provided by Oregon DFW at the time. The screen was not designed to prevent entrainment and impingement of all size classes of trout. Instead, it was designed to provide for the safe downstream passage of trout greater than 60 mm in length.

Fish that enter the diversion canal and pass downstream to the screen are diverted into an 18-inch-diameter bypass pipe that discharges to pool 6 of the fish ladder where they must continue downstream through pools 5 through 1 to exit the ladder through the ladder entrance and access the South Fork below the dam. This configuration enables PacifiCorp to utilize the fish screen bypass flows to increase attraction flows for upstream migrating fish at the ladder entrance. In 1998, PacifiCorp installed baffles[15] on the screen to create a more-uniform flow through the screen, and in 2015 it modified the baffles to further improve flow uniformity.

PacifiCorp does not propose any modifications to the fish screen, but does propose to continue to operate the screen under its current configuration. PacifiCorp also initially proposed in its license application to modify the bypass pipe exit section to improve downstream passage conditions by extending it about 54 feet past pools 6 through 2 so that it discharges to pool 1 of the fish ladder. In its February 12, 2018 filing, however, PacifiCorp states that because the proposed bypass pipe modifications were not adopted by staff in the draft EA, it is no longer proposing any modifications to the bypass pipe.

Oregon DFW states in its 10(j) recommendations and again in its March 1, 2018 comments on the 10(j) meeting that the fish screen and bypass system does not meet current Oregon DFW fish passage criteria for the safe downstream passage of juvenile and adult trout. Oregon DFW considers rainbow and cutthroat trout in the project area to be native migratory fish that must migrate to meet their life cycle needs, and contends that the fish screen and bypass must be upgraded to fully protect all life stages of trout. Therefore, it recommends that PacifiCorp modify the fish screen and bypass pipe to ensure the safe and effective passage of juvenile and adult trout by ensuring it meets the following criteria within 18 months of license issuance:

(1) locate the screen as close as practicable to the diversion site, yet downstream from the headgate and far enough below the gate to provide uniform flow conditions;
(2) approach velocity must not exceed 0.4 foot per second;
(3) sweeping velocity must exceed approach velocity, and screens longer than six feet must be angled at 45 degrees or less to the flow;
(4) screens must be self-cleaning and must be cleaned automatically as necessary to prevent debris accumulation, obstruction of flow, and to avoid creating hot spots that exceed the approach velocity criterion;

[15] Baffles are physical structures placed in the flow path of the screen that are designed to dissipate energy or to re-direct flow for the purpose of achieving more uniform flow conditions.

(5) screen material must provide at least 27 percent open area;
(6) screen openings must not exceed 3/32 inch for perforated plate or mesh/woven wire, and 1.75 mm for profile bar or wedge wire;
(7) the bypass pipe should be extended and placed near the entrance of the fish ladder and exit directly into the South Fork below the entrance; and
(8) bypass pipe flows should not exceed 25 cfs and the pipe exit should not be perched above the water surface as measured during spring base-flow conditions.

Trout Unlimited supports Oregon DFW's recommended modifications to the fish screen and bypass system.

In its reply comments, PacifiCorp states that the existing fish screen meets current Oregon DFW criteria for all measured parameters except for the approach velocity criterion. PacifiCorp asserts that the existing screen successfully prevents entrainment of fish for approximately 95 percent of the time during the year (accounting for periods when the screen is not in the screening position because it is in the automated back-flushing cycle for self-cleaning, or is in plane-mode operation during periods of icing or heavy debris loads) and has not been observed to result in delay, injury, or mortality of screened fish. Physical inspection of the screen components, including rubber seals, indicates that the screen forms an effective barrier to entrainment into the diversion canal. PacifiCorp states that modifying the fish screen as recommended by Oregon DFW would essentially require replacement of the existing screen with an entirely new one. PacifiCorp contends that because the screen is already effectively screening fish and meets most of Oregon DFW's current fish screen criteria, the recommended modifications would yield limited incremental fish passage benefits compared to existing facilities, and therefore, are not justified in light of their costs.

PacifiCorp also disagrees with Oregon DFW's recommendation to modify the bypass pipe and relocate the pipe exit away from the fish ladder so that it discharges directly into the South Fork downstream of the fish ladder entrance. PacifiCorp states that under its current configuration the bypass flows serve as attraction flows for the fish ladder. Therefore, PacifiCorp argues that the recommended modifications are not warranted.

Our Analysis

During pre-filing, PacifiCorp evaluated the physical and hydraulic conditions of the fish screen and bypass system to determine whether it conforms to current State of Oregon criteria. PacifiCorp completed the low flow evaluation on August 20, 2014, when flows in the diversion canal were 51 cfs.

For the high-flow evaluation, PacifiCorp measured the hydraulic characteristics of the screen and bypass on January 17, 2015, when canal flows were about 147 cfs. After reviewing the initial high-flow results, PacifiCorp modified the fish screen baffles to attempt to improve the screen hydraulics and provide a more-uniform flow distribution through the screen. PacifiCorp then repeated the high-flow evaluation on February 1, 2016, at the highest flows available at the time (i.e., 119 cfs).

Fish Screen Physical Evaluation Results

Physical contact between a fish and screen during downstream passage can cause injury or death. The primary objective in the design of fish screens is to match the swimming ability and behavior of fish to the hydraulic characteristics of the screen to minimize the probability of contact with the screen. Fish screens are typically designed to create velocities low enough that target fish species and life stages can voluntarily keep themselves from being impinged on or entrained into the screen (Washington Department of Fish and Wildlife (Washington DFW), 2000). Therefore, one of the most important considerations when evaluating the performance of a fish screen is the water velocity near the screen. The velocity of the water moving towards a screen can be broken down into two components: (1) the velocity component perpendicular to the screen face (i.e., rate of water moving through the screen) is known as the approach velocity (Washington DFW, 2000; National Marine Fisheries Service (NMFS), 2011), (2) the velocity component parallel to the screen face is known as the sweeping velocity and should always be greater than the approach velocity (NMFS, 2011).

Tables 9 and 10 provide the measured values for the fish screen approach and sweeping velocities for the low-flow and post-maintenance high-flow evaluations, respectively.

Under low flow conditions, the average screen approach velocity across all measurement points on the entire screen was approximately 0.26 fps, and the approach velocity at each measurement point met Oregon DFW's recommended criterion of 0.4 fps. Additionally, all measured values except for one met Oregon DFW's recommendation that sweeping velocity must exceed the approach velocity at each measurement point.

Under high flow conditions after the baffles were modified, the average screen approach velocity was approximately 0.62 fps, and, with one exception, all measured values for approach velocity did not meet Oregon DFW's recommended criterion because the velocities exceeded 0.4 fps. However, similar to the low-flow results, all measured values except for one met Oregon DFW's recommendation that sweeping velocity must exceed the approach velocity at each measurement point.

Table 9. Fish screen hydraulic measurements under low-flow conditions (Source: license application and PacifiCorp, 2016a, as modified by staff).

Transect No.[a]	**Location on Transect**									
	Left		Mid-left		Mid-canal		Mid-right		Right	
	Velocity Measurement Type									
	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)
1	0.08	1.13	0.07	1.66	0.06	1.18	0.09	0.88	0.04	0.55
2	0.12	1.75	0.02	1.59	0.12	1.44	0.04	0.93	0	0.09
3	0.04	1.77	0.06	1.76	0.07	1.39	0.01	0.28	0.05	0.54
4	0.03	1.86	0.07	1.89	0.04	1.74	0	0.01	0.02	0.14
5	N/A		0.08	2.00	0.08	1.80	0.01	0.98	N/A	
6			0	0	0.06	**0.06** [a]	0.02	0.03		
7			0.06	1.24	N/A		0.06	1.04		

Notes:
fps = feet per second
N/A = not applicable
Values in bold font do not meet Oregon DFW recommended criteria.
[a] Transects began at the upstream portion of the screen and continued sequentially downstream toward the bypass pipe (i.e., transect 1 is the farthest upstream closest to the diversion dam). Because the screen tapers at the downstream end, some measurements were not applicable as the screen narrows as it approaches the screen terminus at the bypass pipe entrance.
[b] Measurement does not meet Oregon DFW recommended criteria because the sweeping velocity within the cell does not exceed the approach velocity.

Table 10. Fish screen hydraulic measurements under high-flow conditions after baffle adjustments (Source: license application and PacifiCorp, 2016a, as modified by staff).

Transect No.[a]	**Location on Transect**									
	Left		Mid-left		Mid-canal		Mid-right		Right	
	Velocity Measurement Type									
	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)	Approach (fps)	Sweeping (fps)
1	**1.36** [b]	2.20	**0.62** [b]	2.44	**1.01** [b]	2.26	**1.00** [b]	1.89	**0.49** [b]	1.02
2	**0.85** [b]	3.02	**0.86** [b]	2.79	**0.46** [b]	2.44	**0.49** [b]	1.67	0.27	1.38
3	**0.91** [b]	3.31	**0.94** [b]	3.26	**1.00** [b]	2.87	**0.93** [b]	2.11	**0.93** [b]	**0.84** [c]
4	**0.78** [b]	3.04	**0.76** [b]	2.89	**0.44** [b]	2.69	**0.49** [b]	1.87	**0.62** [b]	0.84
5	N/A		**0.68** [b]	3.19	**0.49** [b]	2.72	**0.48** [b]	1.87	N/A	
6			**0.70** [b]	2.92	**0.45** [b]	2.66	**0.58** [b]	1.49		
7			**0.72** [b]	3.35	N/A		**0.72** [b]	2.89		

Notes:
fps = feet per second
N/A = not applicable
Values in bold font do not meet Oregon DFW recommended criteria.
[a] Transects began at the upstream portion of the screen and continued sequentially downstream toward the bypass pipe (i.e., transect 1 is the farthest upstream closest to the diversion dam). Because the screen tapers at the downstream end, some measurements were not applicable as the screen narrows as it approaches the screen terminus at the bypass pipe entrance.
[b] Measurement exceeds Oregon DFW recommended 0.4-fps approach velocity criterion.
[c] Measurement does not meet Oregon DFW recommended criteria because the sweeping velocity within the cell does not exceed the approach velocity.

When evaluating all other physical and hydraulic characteristics of the fish screen against Oregon DFW's recommended criteria, the fish screen complies with all criteria except for the spacing of the screen openings. Oregon DFW's recommended criteria specifies that the screen openings for a wedge-wire screen must not exceed 1.75 mm (0.07 inch); however, the screen openings on the project fish screen are 6.35 mm (0.25 inch).

Downstream Fish Bypass Physical Evaluation Results

PacifiCorp (2016a) measured the bypass pipe flows during the low-flow and both high-flow fish screen evaluations to determine whether they meet Oregon DFW's recommendation that bypass flows not exceed 25 cfs. The results of the evaluation show that bypass pipe flows were 12 cfs during low flows, and about 13.7 cfs and 17.1 cfs, respectively, during the pre- and post-baffle-modification high flow evaluations. Therefore, the bypass pipe meets Oregon DFW's recommended criterion for maximum flow. However, because the bypass pipe currently discharges to pool 6 of the fish ladder, it does not meet Oregon DFW's recommendation that it be located near the entrance to, but outside of, the fish ladder so that it discharges to the South Fork near the same water surface elevation as the river (i.e., not perched above) under spring base-flow conditions.

Fish Screen and Bypass Biological Evaluation Results

PacifiCorp conducted a biological evaluation using live fish to determine the effectiveness of the fish screen at safely screening and bypassing downstream migrating fish on July 1, 2015. All test fish were hatchery reared rainbow or steelhead trout obtained from Oregon DFW's Cole Rivers Fish Hatchery located just downstream of the Corp's William Jess Dam. Two 150-fish release groups were released about one hour apart into the diversion canal between the canal headgate at the diversion dam and the fish screen. Test fish ranged in size from 70 mm to 160 mm fork length. A trap was placed in the bypass exit pipe to capture fish that successfully passed the screen and entered the bypass. As shown in table 11, 22 test fish were re-captured in the bypass pipe trap after 4 hours. No apparent injury was noted on recaptured fish and all were alive. The diversion canal was then de-watered and fish were salvaged from the canal upstream of the fish screen via electrofishing. All fish salvaged from the canal were alive and in good condition. PacifiCorp also inspected the fish screen and did not find any fish impinged on the screen, nor did it find any surface irregularities or gaps that could cause fish injury or entrainment into the canal downstream of the screen.

The results of the evaluation suggest that the hatchery fish used in the release predominately stayed in the canal near the release point and were not inclined to migrate downstream toward the fish screen, possibly because the concrete canal is similar to the

Table 11. Summary of fish screen biological evaluation results (Source: license application).

Size Class	Number Released	Number Recaptured in Bypass Pipe Trap (A)	Number Recaptured During Canal Salvage	Total Recaptured	Total Uncaptured (B)	Effectiveness (A/(A+B))
70-99 millimeter	150	13	129	142	8	62%
100-160 millimeter	150	9	111	120	30	23%

concrete raceway environment that the test fish were acclimated to within the fish hatchery. When PacifiCorp salvaged fish from the canal after the 4-hour test period, fish were distributed from the head gate at the upstream end of the canal to the fish screen at the downstream end. Based on visual observation of fish swimming in the canal upstream of the screen and upstream of the headgate in the impoundment after release, it is likely that some of the fish not captured during the test migrated upstream and out of the canal. Fish exiting the canal upstream would result in an overestimate of fish assumed to be entrained and an underestimate of the screen and bypass system effectiveness. The effectiveness value calculated for the larger test fish size class (i.e., 100 to 160 mm fork length) is low (23 percent). This low value was a product of either a high entrainment rate, a high rate of fish swimming upstream and out of the canal, or a combination of both. Larger fish likely have an inherently lower potential for entrainment because they would be unable to fit through the 0.25-inch screen openings or the seals around the screen, and conversely, smaller fish would have a higher potential for entrainment. However, the smaller test fish size class (80 to 99 mm fork length) had an effectiveness value more than double that of the larger size class, indicating a much lower entrainment rate. If entrainment of the larger fish size class was actually high, a high rate of entrainment of the smaller fish size class would also be expected. Furthermore, after canal dewatering and screen inspection, there were no obvious gaps on the screen that could have resulted in downstream canal entrainment. Therefore, these results suggest that the cause for the low effectiveness value of the larger fish size class is likely due to test fish migrating upstream out of the canal during the 4-hour test period and not from a high level of entrainment. Based on the distribution of fish from all size classes throughout the canal during the fish salvage, it is also likely that fish from the smaller size class also migrated upstream out of the canal resulting in an under estimate of effectiveness and an overestimate of downstream entrainment for the smaller size class.

PacifiCorp also evaluated downstream passage time from the bypass pipe exit through the lower portion of the fish ladder and into the South Fork using 30 PIT-tagged

hatchery trout ranging from 80 to 123 mm fork length. Of these 30 fish, three (10 percent) were never detected at an antenna; five (17 percent) were detected within the ladder but were not detected at either the ladder entrance or exit, and thus apparently remained in the ladder; and 22 fish (73 percent) exited the downstream end of the fish ladder, with a minimum travel time of about 8 hours, median travel time of about 195 hours, and maximum travel time of 1,108 hours. Of the 22 fish that exited the downstream end of the fish ladder, one fish migrated back upstream through the fish ladder past the antenna in pool 15 (i.e., a successful upstream passage event).

Similar to the fish screen evaluation results, downstream travel-time estimates may be biased by using hatchery origin test fish, which were raised in a concrete raceway that is similar in nature to a concrete fish ladder pool. Therefore, the travel time estimates derived from PacifiCorp's evaluation may not be representative of downstream travel times for the natural origin trout population of the South Fork.

Downstream Passage Conclusions

In summary, the fish screen was designed to comply with Oregon DFW's recommended interim criteria that were in effect when the screen was designed and constructed in the 1990s. The interim criteria only provided for the safe downstream passage of trout greater than 60 mm in length. The screen was not intended to provide safe downstream passage for trout less than 60 mm; therefore, under PacifiCorp's proposal to continue to operate the screen under its current configuration, it is likely that any trout fry smaller than 60 mm that enter the diversion canal would be entrained into the powerhouse where they would be subject to injury and mortality during turbine passage. Any trout fry that survive passage through the project powerhouse would be discharged to the Middle Fork Canal and would be permanently lost from the South Fork fish population, as occurs under existing conditions.

For trout greater than 60 mm in length, the results of PacifiCorp's biological evaluation suggest that it does, at a minimum, provide a safe downstream passage route for some trout between 80 and 160 mm fork length that enter the diversion canal. Additional downstream passage past the project also occurs for trout of all size classes during high-flow periods of spill over the diversion dam. When inflows to the diversion dam are in excess of the maximum generation capacity of the powerhouse and the minimum flow requirements, which typically occurs from April through June, flows would pass over the ungated spillway on the dam and some fish may find safe downstream passage over the spillway.

Requiring the fish screen to meet Oregon DFW's recommended criteria would provide for the safe downstream passage of all life stages of trout, but would primarily benefit trout fry less than 60 mm some of which are likely entrained under existing conditions. Modifying the bypass pipe so that it discharges to the bypassed reach outside

of the fish ladder (as recommended by Oregon DFW) would eliminate the downstream passage delay that currently occurs when fish are discharged into pool 6 of the ladder. However, information in the project record indicates that entrainment of fish into the diversion canal is low. During a fish migration study at the project in 1986, only 24 trout ranging in size from 60 to 140 mm were captured over 500 hours of sampling, resulting in a total diversion canal entrainment estimate of 228 fish over the entire April through October study period (Pacific Power and Light, 1986a). Because canal entrainment is low, there would be minor benefits to the bypassed reach fish population as a whole from implementing any improvements to the fish screen or bypass pipe.

In addition, we are not aware of any way to modify the existing screen to enable it to comply with Oregon DFW's recommended criteria. Instead, PacifiCorp would need to design and construct an entirely new screen consisting of a much smaller mesh size and a much larger surface area to enable it to effectively screen fry-sized fish less than 60 mm and to reduce approach velocities from the current average of 0.62 foot per second under high-flow conditions to 0.4 foot per second as recommended by Oregon DFW. We agree with PacifiCorp that such a new screen would likely consist of a 47-foot-long primary screen, a 25-foot-long secondary screen, adjustable baffles, and self-cleaning equipment (PacifiCorp, 2016a).

Fish Passage Facility Design Plans and Post-Construction Monitoring Plan

Oregon DFW recommends that PacifiCorp submit draft design plans for the new or modified fish passage facilities to Oregon DFW and FWS within six months of license issuance for agency review and approval, and then file the plans with the Commission for approval.

Oregon DFW also recommends that, within 6 months of completion of the new or modified upstream and downstream fish passage facilities, PacifiCorp consult with Oregon DFW and FWS and prepare and file with the Commission for approval, a post-construction monitoring plan and implementation schedule. The plan would include a hydraulic and a biological evaluation to ensure the facilities operate as specified in the approved design criteria. This would include provisions for studies to determine whether fish death, injury, or delay is occurring; and whether fish have difficulty in locating the ladder entrance, moving through the ladder, or falling back over the spillway on the dam. It would also include provisions to: (1) provide the monitoring results to the agencies, and (2) propose additional project facility modifications (e.g., structural fish screen modification, seasonal project shutdown, and reduced flow diversions for power generation) if the monitoring results show that project facilities are not safely passing fish.

Our Analysis

Providing the design plans for any new or modified fish passage facilities to the agencies before filing them with the Commission would enable the Commission to consider the agencies' concerns prior to their submittal to the Commission for approval.

A hydraulic evaluation of any new or modified fish passage facilities after their completion would ensure that they function within their design criteria and therefore should be effective at providing safe passage for fish past the project. If the fish passage facilities were designed and constructed to comply with agency hydraulic criteria that are already known to provide safe and effective fish passage, there would be no benefits from requiring additional biological monitoring of the facilities after construction and no need to implement future potential actions such as project facility modifications or operational changes to further improve fish passage.

Minimum Flow Auxiliary Flow Release System

Under existing conditions, when the project is not spilling flows over the diversion dam, PacifiCorp releases the 10-cfs minimum flow to the bypassed reach via the fish ladder. During pre-filing, PacifiCorp determined that it could not reliably use the fish ladder to meet its higher proposed minimum flow of 30 cfs. Therefore, in its license application PacifiCorp proposed to construct an auxiliary flow system to more reliably pass the minimum flow. The proposed auxiliary flow system described in the license application would require minor modifications to the upper portion of the fish ladder (i.e., narrowing pools 13 through 15) and would require constructing a flow trough extending from one of the two fish ladder exit orifices to a discharge point in the bypassed reach.

At the January 12, 2018 section 10(j) meeting, Oregon DFW indicated that it was concerned that the proposed modifications to the fish ladder to accommodate the new auxiliary flow system would affect the fish ladder's performance, and noted that any modifications to the fish ladder would need to be evaluated after construction for their effects on fish passage using biological monitoring with live trout.

In response to the 10(j) meeting, PacifiCorp reanalyzed alternatives for providing the higher minimum flow and filed a revised proposal for the auxiliary flow system on February 12, 2018. PacifiCorp no longer proposes to modify the fish ladder to provide the proposed minimum flow. PacifiCorp now proposes to construct in the diversion canal about 150 feet downstream of the diversion dam the following : (1) a 3-foot-wide automated downward-opening gated weir[16] installed on the downstream end of the

[16] The automated gated-weir would adjust based on the upstream water surface elevation in the canal and minimum flow requirements to maintain the required minimum

existing canal overflow section;[17] (2) an 8-foot-long by 5-foot-wide concrete plunge pool; and (3) a 130-foot-long, 2-foot-diameter pipe that extends from the concrete plunge pool to a discharge point in the South Fork adjacent to the fish ladder entrance.

Water would be drawn over the weir into the plunge pool, flow through a 90-degree long-radius bend in the pipe, and discharge to the river adjacent to the fish ladder entrance to enhance attraction flows into the fish ladder. The pipe terminus would be situated about 3 feet above the water surface elevation of the bypassed reach under minimum flow levels.

PacifiCorp states that the revised auxiliary flow system was designed to meet Oregon DFW's fish passage criteria for downstream bypass.

In a March 1, 2018 filing, Oregon DFW states that it has the following concerns with the proposed auxiliary flow system:

- There would be a 1.9- to 3.8-foot drop over the weir into the plunge pool depending on canal water height, creating turbulence in the plunge pool that could subject any fish carried through the system into the pool to delay, confusion, and stress. The large size of the pool could make it attractive for large trout to hold and prey on fry and small juvenile trout trying to migrate downstream.

- As fish move from the large plunge pool to the 2-foot-diameter pipe, hydraulic conditions could change causing injury due to collision with the outside of the pipe. Oregon DFW states that the plunge pool floor should be slightly slanted towards the pipe to prevent stranding of fish when dewatered. Because the fish passing through the system are likely to be fry or juveniles that are at a vulnerable life history stage, Oregon DFW does not recommend a physical fish salvage of the plunge pool if it's dewatered for maintenance.

---

flow in the bypassed reach.

[17] The canal section where the weir would be installed has an existing cut-out in the canal wall where water can spill over the canal section and into a portion of the fish ladder, or onto the rocks on the stream bank between the canal and bypassed reach. Under existing conditions the overflow section is used when the canal exceeds capacity due to a blockage such as the fish screen clogging with debris and backing up water.

- If the pipe is not completely full at the 90-degree bend, flows may begin to rock back and forth in the pipe resulting in the fish flipping over while in the turn causing fish to land on the interior wall of the pipe resulting in injury and mortality.

- At low flows, fish would fall about 3 feet to the bypassed reach water surface as fish exit the pipe and enter the bypassed reach. Oregon DFW believes that the sheer force of impact would result in injury, confusion, and increased predation by larger trout that would set up feeding stations in the vicinity of the pipe exit.

- Oregon DFW argues that the pipe discharge point would cause upstream migration delay as larger trout would be falsely attracted to the pipe outlet. Plunging water is often a stimulus for fish to leap at, such as occurs in the project's fish ladder where fish leap from pool to pool to move upstream. Fish leaping at the pipe entrance can be injured when they contact the edges of the pipe opening.

To address most of these concerns, Oregon DFW recommends that the auxiliary flow system weir be screened to meet Oregon DFW's recommended screening criteria, or be relocated to a point in the canal farther downstream below the existing fish screen. These recommendations would prevent most fish from entrainment into the auxiliary flow system.

Our Analysis

The revised auxiliary flow system would be located in the diversion canal upstream of the fish screen; therefore, any fish entrained into the diversion canal could pass over the weir and into the concrete plunge pool and discharge pipe.

To determine the effects of the auxiliary flow system on fish passage, PacifiCorp modeled the hydraulic conditions over the weir and within the pipe segment of the auxiliary flow system to determine whether they meet Oregon DFW's fish passage criteria and included the results in its February 2018 filing. The modeling results are shown in tables 12 and 13.

Table 12. Modeled hydraulic characteristics of auxiliary flow system canal weir (source: PacifiCorp February 12, 2018, filing).

Weir flow (cfs)	**Upstream water surface elevation (feet)**	**Weir elevation (feet)**	**Water depth over weir (feet)**	**Drop over weir to plunge pool (feet)**	**Plunge pool depth (feet)**
10.8	3374.6	3373.3	1.3	3.8	2.8
30.6	3374.6	3372.0	2.6	1.9	4.7

Table 13. Modeled hydraulic characteristics of auxiliary flow system discharge pipe (source: PacifiCorp February 12, 2018, filing).

Pipe flow (cfs)	**Flow depth (inches)**	**Meets Oregon DFW criteria for water depth (at least 4 inches)**	**Water velocity (ft/sec)**	**Meets Oregon DFW criteria for velocity (at least 2 ft/sec)**	**Discharge impact velocity (ft/sec)**	**Meets Oregon DFW impact velocity (less than 25 ft/sec)**
10.8 cfs	7.0	Yes	14.2	Yes	21.3	Yes
30.6 cfs	12.4	Yes	18.0	Yes	24.8	Yes

The modeling results for the pipe component of the system suggest that any fish that enter the pipe from the plunge pool would pass safely downstream through the pipe. With respect to the other issues raised by Oregon DFW that could affect fish survival through the other components of the auxiliary flow system (e.g., over the weir, through the plunge pool, and through the exit section of the pipe at the bypassed reach), there is no way to definitively determine whether any of these would significantly affect downstream fish passage survival without monitoring studies of fish passing through the system after construction is completed.

Nevertheless, as discussed in more detail in our analysis of the fish screen and bypass system within the *Downstream Fish Passage* subsection, available information suggests that fish entrainment into the diversion canal is low. A study completed in the 1980s estimated that a total of 228 fish were entrained into the diversion canal over the entire April through October study period. Of the total number of fish entrained into the canal, it's likely that under normal operating conditions only a portion would be drawn over the weir and into the auxiliary flow system. This is because, as explained below, the system would only typically withdraw a small proportion of the total canal flow, while the majority of flow (and fish passing downstream) would continue past the auxiliary flow system weir and through the fish screen and bypass system.

As shown in table 14, under PacifiCorp's proposed minimum flow regime, the auxiliary flow system would typically withdraw less than 3 percent of the total canal flow from August through February, increasing to about 8-10 percent of the total canal flow from March through July when minimum flows increase to 30 cfs. Under Oregon DFW's recommended minimum flow regime, the auxiliary flow system would withdraw the same proportion of total canal flow as described above, except from August through October when the proportion of flow diverted would increase from less than 3 percent under PacifiCorp's proposal to about 14-18 percent under Oregon DFW's recommended 30-cfs minimum flow during these 3 months.

The actual number of fish entrained into the auxiliary flow system would be based on the proportion of flow diverted from the canal into the auxiliary flow system as well as fish behavior. Any fish passing downstream along the left canal wall and near the water surface would be more likely to be entrained into the auxiliary flow system, while those in the middle or along the right canal wall and/or occupying positions deeper in the water column would be considerably less likely to be entrained.

If the auxiliary flow system were screened with a fish screen that met Oregon DFW's recommended screening criteria, no fish would enter the system and all fish in the diversion canal would continue through the canal to the project's existing fish screen and bypass system. Similarly, if the withdrawal location for the auxiliary flow system were moved downstream of the existing fish screen as recommended by Oregon DFW, fish greater than about 60 mm in length would be safely returned to the bypassed reach by the existing fish screen and bypass system and would not enter the auxiliary flow system.

Overall, the proposed auxiliary flow system would enable PacifiCorp to balance flow releases between the fish screen bypass pipe, fish ladder, and auxiliary water supply, while enabling the efficient operation of the fish passage facilities and reliably meeting higher instream flow releases up to 30 cfs. The revised auxiliary flow system would also eliminate the need to modify pools 13 through 15 of the fish ladder and any possible effects to the hydraulic conditions within the ladder that might affect fish passage through the existing ladder.

Table 14. Flow distribution through proposed auxiliary flow system and other project facilities (source: staff).

Row		**Month**											
		Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
(1)	South Fork Diversion Dam inflow[a] (cfs)	137	147	154	232	356	221	123	90	76	73	86	110
(2)	PacifiCorp minimum flow (cfs)	20	20	30	30	30	30	30	20	20	20	20	20
(3)	Oregon DFW minimum flow (cfs)	20	20	30	30	30	30	30	**30**	**30**	**30**	20	20
(4)	Upper fish ladder exit orifice flow[b] (cfs)	5	5	5	5	5	5	5	5	5	5	5	5
(5)	Fish bypass flow/ (cfs)	13	13	13	13	13	13	13	13	13	13	13	13
(6)	Total lower ladder flow[c] (cfs) [row 4 + 5]	18	18	18	18	18	18	18	18	18	18	18	18
(7)	Estimated additional auxiliary flow needed to meet PacifiCorp minimum flow[d] (cfs) [row 2 – 6]	2	2	12	12	12	12	12	2	2	2	2	2

(8)	Estimated additional auxiliary flow needed to meet Oregon DFW minimum flow (cfs) [row 3 - 6]	2	2	12	12	12	12	12	**12**	**12**	**12**	2	2
(9)	Canal flow at auxiliary flow weir[e] (cfs)	132	142	149	150	150	150	118	85	71	68	81	105
(10)	% of canal flow in auxiliary flow system under PacifiCorp minimum flow [row 7/9]	1.5%	1.4%	8.1%	8.0%	8.0%	8.0%	10.2%	2.4%	2.8%	2.9%	2.5%	1.9%
(11)	% of canal flow in auxiliary flow system under Oregon DFW minimum flow [row 8/9]	1.5%	1.4%	8.1%	8.0%	8.0%	8.0%	10.2%	**14.2%**	**16.9%**	**17.6%**	2.5%	1.9%

[a] Inflow is based on available flow record for combined South Fork and Imnaha Creek median monthly flows from water year 1934 to 1949 (*see* license application Exhibit E, page E-31, table 5.
[b] Under existing conditions, most of the fish ladder flow is provided by the fish screen bypass pipe which discharges to pool 6 of the fish ladder. PacifiCorp reported in its license application that when it evaluated hydraulic conditions in the upper portion of the fish ladder during both low and high-flow events, the low-flow measurement was 2 cfs and the high flow measurement

was 8 cfs. For the purposes of this analysis we averaged these flows and assumed that an average of 5 cfs would be drawn through the fish ladder exit orifices into the upper portion of the fish ladder year-round.

[c] PacifiCorp reported in its license application that when it evaluated hydraulic conditions in the lower portion of the fish ladder below the bypass pipe exit in pool 6 during both low and high-flow events, the low-flow measurement was 14 cfs and the high flow measurement was 21 cfs. For the purposes of this analysis we averaged these flows and assumed that an average of 18 cfs would be exiting the lower portion of the ladder with the bypass pipe contributing an average of 13 cfs (18 cfs total ladder flow minus 5 cfs average contribution from upper ladder exit orifices).

[d] Estimate is based on balance of flow needed to meet minimum flow after deducting flows provided by exit orifices and bypass pipe flows.

[e] Estimate derived by subtracting fish ladder exit orifice flow from diversion dam inflow, with assumption that remaining inflow up to 150-cfs canal capacity would be in canal at point of withdrawal by AWS weir.

Fish Passage Facilities Operation and Maintenance Plan

PacifiCorp filed a Fish Passage Facilities Operation and Maintenance Plan with its license application. The plan includes procedures and a schedule for inspecting, cleaning, and monitoring the project's fish passage facilities and the remote sensing equipment used to remotely monitor the facilities' performance. Monitoring and maintenance of the fish passage facilities would occur according to the schedule provided in table 15.

Table 15. Fish Passage Facilities Operation and Maintenance Plan Schedule of Activities (Source: PacifiCorp, 2016c).

Downstream Passage Facilities	
Frequency	*Task*
Three times per week	Inspect screen face for buildup not removed during Backwash
Three times per week	Inspect bypass conduits for debris
Monthly	Functional test of screen backwash system
Annually	Inspect screen integrity, seals, backwash drives, and other screen system equipment
As required	Pressure wash screen
As required	Remove screen assembly from canal, or rotate to neutral position, during potentially damaging seasonal conditions
As required	Perform lubrication procedures in accordance with manufacturer's recommendations
Remote Sensing Facilities	
Frequency	*Task*
Daily	Monitor site remotely
Quarter-annually	Calibrate remote sensing instrumentation and controls
Annually	Clean and inspect electrical auxiliary equipment
As required	Inspect site if alarm conditions arise or data is questionable
Upstream Passage Facilities	

Frequency	*Task*
Three times per week	Inspect ladder for debris blockage
Annually	Inspect ladder for excessive bed load and debris in pools
As required	Remove debris jams or excessive bed load and debris in Pools

PacifiCorp proposes to implement the plan under the new license.

Oregon DFW recommends that PacifiCorp implement the plan, but also recommends that it update the plan after completion of Oregon DFW's recommended fish passage facility modifications.

Our Analysis

PacifiCorp's Fish Passage Facilities Operation and Maintenance Plan includes a comprehensive set of measures and schedule for routinely monitoring, inspecting, and maintaining the project's fish passage facilities. Implementing the plan as proposed would adequately ensure that the project fish passage facilities are operating as designed to provide upstream and downstream passage for trout.

Updating the plan after license issuance would enable PacifiCorp to incorporate any modifications to the plan that are needed to reflect any fish passage facility modifications that may be required by any license issued for the project.

Operation Compliance Monitoring

Although compliance measures do not directly affect environmental resources, they do allow the Commission to ensure that a licensee complies with the environmental requirements of a license; therefore, operational compliance monitoring and reporting are standard requirements in Commission-issued licenses. Under the existing license, PacifiCorp monitors compliance with minimum flows at the existing USGS gage no. 14332000 in the South Fork bypassed reach located about 0.25 mile downstream of the diversion dam.

In its license application, PacifiCorp proposes to continue to provide for the operation and maintenance of the USGS gage for minimum flow compliance monitoring, but to expand its use to also include monitoring compliance with its proposed ramping

rates.[18] PacifiCorp also proposes to install a communications link between the USGS gage and PacifiCorp's control systems at the diversion dam so that it can detect and respond to minimum flow or ramping rate deviations in real time.[19]

In order to document compliance with the proposed minimum flows and ramping rate operational requirements, PacifiCorp proposes to report project-induced deviations from required minimum flows and ramping rates within 24 hours of discovery, and to prepare by January 31 of each year, an annual report of deviations for the preceding October 1 to September 30 water year.

In its section 10(j) recommendations, Oregon DFW supports PacifiCorp's proposed operation compliance monitoring measures.

Our Analysis

Installing a communication link between the existing USGS bypassed reach gage and the project's control equipment at the diversion dam, using the gage and link to monitor minimum flows and ramping rates in real time, and notifying the agencies and Commission within 24 hours of discovery would allow the Commission to determine compliance with the minimum flow and ramping rate requirements of any license issued for the project. These proposed compliance monitoring measures would also enable PacifiCorp to quickly respond to any deviations from project operation requirements and implement corrective actions to ensure the protection of aquatic resources in the bypassed reach.

However, PacifiCorp does not propose to monitor or report compliance with its proposed run-of-river mode of operation. Without a means to monitor and document compliance with this proposed operational mode, it is unclear how the Commission could track and enforce this proposed license requirement.

Water Conveyance System Monitoring and Maintenance

The project's aging woodstave pipe has historically been affected by rockslides striking the structure and causing unintended flow releases. In one instance in March 2006, a large boulder from a rockslide punctured the flowline and caused a continuous

[18] There are no requirements in the existing license for ramping rate restrictions.

[19] Under existing conditions, there is no communication link between the USGS gage and PacifiCorp's operating systems; therefore, the only way it can monitor minimum flow compliance is to monitor the real-time data for the South Fork gage presented on the USGS webpage.

spill of approximately 130 cfs of water being diverted at that time into the bypass reach until flow diversions could be shut off.

As discussed in section 3.3.1, *Geology and Soils Resources*, PacifiCorp proposes to replace the existing woodstave flowline and sag pipe with new steel pipe to reduce the potential for future failures.

To address any potential failure of the project's water conveyance system, Oregon DFW recommends the following measures: (1) a monitoring and maintenance plan with provisions for installing technology that would enable the early detection of water conveyance system failure and protocols for stopping flow within an hour of such failure; (2) remediation plans that will include: (a) immediate steps to remedy the failure and bring the waterway back into operation, (b) timing and performance criteria to guide remediation work after a failure, and (c) an annual report on failure events and any actions to remediate environmental impacts from such events; and (3) an environmental damage action plan that includes: (a) protocols for assessing and documenting the immediate and long-term effects on water quality, fish and wildlife, riparian and aquatic organisms, and aquatic and riparian habitat; and (b) a fish and wildlife habitat mitigation plan that ensures compensation for the short-term and long-term loss of individuals and habitat caused by unanticipated project-related events that cause environmental damage.

In its reply comments, PacifiCorp states that its proposed replacement of the existing woodstave pipe and sag pipe would significantly reduce the potential for a water conveyance system failure. PacifiCorp also notes that if a failure were to occur, it would be detected by its existing automated control systems within about 30 minutes and it would take up to another 30 minutes for an operator to respond and cease flow diversions to curtail the spill.

Our Analysis

As discussed in the *Geology and Soils* section, the proposed replacement of the woodstave flowline and sag pipe would substantially reduce the probability of a future failure of the water conveyance system, and if a failure were to occur, PacifiCorp's existing control systems already enable it to quickly detect and respond to a failure by shutting off flow within an hour. Therefore, there would be no benefits from requiring it to develop and install any additional unspecified technology to enable it to detect and respond to water conveyance system failures.

Additionally, the Commission has the authority to ensure that the project is safely maintained and operated, including directing the steps licensees must take to avoid or respond to a structural failure of the project. Part 12 of the Commission's regulations details the Commission's dam safety requirements, including licensee responsibilities with regard to project safety, incident reporting, records maintenance, emergency actions,

inspections, quality control, monitoring, and incident response. In the event of a failure of a project work, a licensee is required to remediate the failure as directed by the Commission. Common practice is to require repair of the failed structure and site clean-up in consultation with the fish and wildlife agencies. These requirements would continue to provide the necessary forum to ensure adequate oversight over the integrity of the project structures and repair and clean-up of any failure of the project works, including the project's water conveyance system; therefore, developing a separate plan for monitoring, maintaining, and mitigating any future failures of the project's water conveyance system would be redundant and unnecessary.

In regard to filing protocols for assessing environmental damage and ensuring compensation for short-term and long-term loss of individuals and habitat caused by unanticipated project-related events, the need to assess and mitigate environmental damage caused by the failure of a project work would be based on the nature of the event, which would be impossible to evaluate until the event occurs. In any event, the FPA does not impose a no-net-loss requirement or require full replacement for lost resources.

Bypassed Reach Sediment Augmentation

The diversion dam obstructs the natural downstream transport of sediment into the bypassed reach, causing sediment to accumulate behind the dam. PacifiCorp periodically dredges the impoundment to remove excess sediment. Dredged sediments are transported off site and are not returned to the river. The reduction in sediment transport to the bypassed reach due to dredging and off-site disposal activities has contributed to the reduction in suitable spawning gravels for the bypassed reach trout community.

PacifiCorp proposes to continue the dredging under the new license on as-needed basis; however, to enhance trout spawning habitat in the bypassed reach, PacifiCorp proposes to dispose of the dredged sediment along the streambank below the dam where it can be redistributed downstream during high flow events. To provide heavy equipment access to the bypassed reach for sediment disposal, PacifiCorp would construct a new 10-foot-wide spur road extending from the flowline vehicle-access bridge near the diversion dam 117 feet down to the bypassed reach streambank. Dredging would occur during the June 15 to September 15 Oregon DFW-recommended in-water work period (Oregon DFW, 2008), and dredged material would be placed on the streambank above the water line so that sediment can be naturally dispersed into the channel later in the year under higher flows.

Oregon DFW supports PacifiCorp's proposed construction of the spur road to facilitate sediment augmentation, but also recommends that PacifiCorp consult with Oregon DEQ, FWS, Forest Service, and Oregon DFW and develop a sediment augmentation plan that defines the quality, quantity, and specific timing of sediment augmentation.

In its reply comments, PacifiCorp disagrees that a written plan is necessary to facilitate the sediment augmentation program. PacifiCorp states that the proposed sediment augmentation would only occur during maintenance dredging of the impoundment, which occurs on an as-needed basis and not on a regular schedule. PacifiCorp states that dredging within the South Fork requires PacifiCorp to obtain Clean Water Act section 404 removal and fill permits via the Corps and Oregon Department of State Lands permitting processes. PacifiCorp states that the agencies would have opportunities to comment on PacifiCorp's proposals for downstream deposition of dredged material via the appropriate permitting processes at the timing of dredging, and therefore, a single implementation plan is inappropriate and insufficient to address each removal and fill activity over the course of the new license.

Our Analysis

The lack of spawning-sized gravel in the bypassed reach is likely due to a combination of obstructed sediment transport at the diversion dam, as well as the steep channel gradient and periodic high flows in the bypassed reach that continually flush gravels downstream.

Constructing a new spur road to provide vehicle access to the bypassed reach would enable PacifiCorp to mechanically deposit dredged sediment along the stream bank where it would be distributed downstream during high flow events. Although much of this material would likely continue to be flushed downstream and out of the reach during high flows, some would likely accumulate behind velocity breaks such as boulders and instream vegetation where it would augment existing gravel deposits and improve spawning habitat, providing some benefits to the trout population.

Although PacifiCorp noted that sediment augmentation would occur on as-needed basis over a 3-month period between June 15 and September 15, and provided a figure that shows the location of the road spur in its March 7, 2017 additional information response, PacifiCorp does not provide much additional detail on the proposed sediment augmentation program. While PacifiCorp indicates that the type and quantity of material would vary over time, it has been dredging sediment from the impoundment under the existing license; therefore, it should have a general idea of the quantity and type (e.g., percent of fines versus coarser material) of sediment that it expects to remove during future maintenance dredging and re-deposit along the bypassed reach. Using this existing information to prepare a plan that identifies the specific location and size of the sediment deposition site, and providing it to the agencies for review and comment would enable the agencies to make recommendations about the specific location where the dredged material should be deposited along the bypassed reach stream bank to maximize the downstream transport of gravel during high flows to enhance trout spawning habitat.

Large Woody Debris

Large woody debris provides refuge for various life history stages of fish, helps in the formation of islands and side channels by redirecting flow and trapping sediments, and contributes to overall habitat complexity. Under existing conditions, large woody debris is rare in the bypassed reach.

Oregon DFW recommends that PacifiCorp relocate any large woody debris collected at the dam to the bypassed reach below the dam where it can be transported downstream during high flow events.

In its reply comments, PacifiCorp states that it agrees that any large woody debris collected within the project impoundment should be placed below the dam when possible. However, large woody debris rarely collects at the dam because it is typically passed over the ungated spillway by high flows.

Our Analysis

Although substantial amounts of large woody debris do not consistently accumulate behind the project diversion dam due, large woody debris could occasionally become lodged at the dam. Collecting and passing the wood downstream would allow the pieces to potentially settle in the bypassed reach, increasing habitat complexity and cover for trout.

Agency Notification and Fish Salvage During Planned Maintenance Outages

Oregon DFW recommends that PacifiCorp salvage live fish from the project waterways during planned maintenance outages. Oregon DFW also recommends that PacifiCorp notify Oregon DFW and FWS at least two weeks prior to initiating planned maintenance outages.

In its reply comments, PacifiCorp states that it supports these recommendations and would notify and consult with the agencies within the specified period to determine where to relocate the salvaged fish.

In an August 23, 2017 telephone conversation with Commission staff,[20] PacifiCorp clarified that the intent of its proposal was to only salvage fish in the diversion canal between the dam and the fish screen as well as in the fish ladder if it were dewatered due to maintenance activities. PacifiCorp did not propose to salvage fish

[20] *See* telephone memo summary between Matt Cutlip FERC staff and Steve Albertelli PacifiCorp staff, filed on September 13, 2017.

downstream of the fish screen because the fish screen effectively limits entrainment into the water conveyance system and there would be serious logistical and safety issues associated with trying to salvage fish within the project's woodstave flowline.

Our Analysis

Available information suggests that the fish screen and bypass system excludes most trout greater than 60mm that enter the project diversion canal from entrainment into the project's water conveyance system downstream of the fish screen. Therefore, there would be few benefits from salvaging fish from the water conveyance system during planned maintenance outages. In addition, about 60 percent of the water conveyance system downstream of the fish screen consists of wood or steel pipeline or rock tunnel that would be dangerous and difficult, if not impossible, to attempt to access to salvage fish.

However, it's possible that fish that enter the diversion canal may be residing in the 215-foot section of canal between the diversion dam and fish screen, and salvaging fish from this section of canal prior to complete dewatering would provide a minor benefit to the fishery resource by returning any salvaged fish back to the river. Similar minor benefits would be accrued from salvaging fish within the ladder if there were ever a need to dewater the ladder for maintenance.

Notifying the agencies two weeks in advance of the activity would give the agencies the time that they would need to make themselves available on the day of the maintenance activities for consultation on where to relocate the fish (e.g., upstream or downstream of the diversion dam).

Emergency Situations

Oregon DFW recommends that PacifiCorp notify the Oregon Emergency Response System within 24 hours of any hazardous substance spill or discharge from the project water conveyance system or other emergency event, with a verbal report on location, duration, and effect on water quality and aquatic life. Oregon DFW also recommends that PacifiCorp take appropriate action to prevent further loss if at any time unanticipated circumstances or emergency situations arise in which fish or wildlife are being endangered, harmed, or killed by the project or its operation; notify Oregon DFW within 24 hours; and comply with restorative measures required by the agencies.

In its reply comments, PacifiCorp states that it already notifies the Oregon Emergency Response System and resource agencies in the event of any emergency situations under the existing license and that it would continue to do so under any new license issued.

Our Analysis

Unexpected operation or maintenance emergencies at the project, such as hazardous substance spills, fires, water conveyance system failures, or other circumstances, could occur during the term of any license issued and cause harm to fish or wildlife. Notifying the agencies within 24 hours of any emergency situation associated with the project would give the agencies the opportunity to visit the site quickly and assess the effects and the effectiveness of the implemented mitigation measures during any of these situations. Such quick assessment would be beneficial because the agencies could provide PacifiCorp and the Commission with recommendations for ways to prevent future accidents or emergencies from occurring. Filing a written report of an incident along with recommendations for Commission approval for corrective actions, would provide a mechanism to reduce or eliminate the likelihood of a future occurrence. However, because there are no specific measures or restorative actions recommended at this time, it would be impossible to analyze or assess the environmental effects of any future potential restorative measures that could be recommended by the agencies in the event of an emergency situation at the project.

Ramping

Ramping occurs when water levels rise or fall in association with the release of flows through a water control structure. Rapid down-ramping of flows has been observed in some rivers to cause stranding of fry and juvenile salmonids along sloping bars and in side-channels and stream margin areas (Hunter, 1992). While adults can also be stranded during rapid flow reductions, younger salmonid life stages such as emergent alevins, fry, and smaller juveniles are most susceptible to stranding mortality due to their poorer swimming abilities. Flow reductions that occur between the start of the spawning period and period of fry emergence can result in dewatered redds, which can lead to egg desiccation and mortality depending on the duration of the flow reduction and whether the spawning gravel remains wetted during the period of lower flows (Reiser and White, 1983). Macroinvertebrates, which serve as prey for fish resources found in the project area, are also susceptible to stranding and desiccation as a result of rapid down-ramping (Kroger, 1973; Brusven et al., 1974; Gislason, 1980) but they can also temporarily withstand dewatering events by migrating downward into the hyporheic zone as flows recede, thus reducing overall mortality (Gislason, 1985).[21] Rapid up-ramping has the potential to flush fry and early stage juveniles downstream, mobilize sediment, and increase turbidity.

[21] The hyporheic zone is the substrate area under a river or stream where the interstitial spaces are filled with water.

To minimize the effects of ramping on water quality and aquatic resources in the bypassed reach, PacifiCorp proposes to implement seasonal ramping rates not to exceed 0.2 foot (2.4 inches) per hour from May 1 to September 30 and 0.3 foot (3.6 inches) per hour from October 1 to April 30. PacifiCorp proposes that these ramping rates would only apply during project-induced ramping events and not during ramping caused by "natural events".

Oregon DFW initially recommended that PacifiCorp implement ramping rate restrictions to ensure that down-ramping rates in the bypassed reach do not exceed 1 inch per hour from May 1 to September 30 and 2 inches per hour from October 1 to April 30.

PacifiCorp disagrees with Oregon DFW's recommended ramping rates. PacifiCorp states that its alternative proposed ramping rates are based on the ramping rate requirements for the Prospect Nos. 1, 2, and 4 Project license (FERC No. 2630) on Red Blanket Creek and the Middle Fork Rogue River. PacifiCorp states that its proposed ramping rates were rounded from inches, as used in the Prospect Nos. 1, 2, and 4 Project license, to the nearest tenth of a foot to correlate units with units of measurement on the South Fork USGS gage that would be used for compliance monitoring. PacifiCorp states that this unit of measurement would also reflect the coarser level of operational control at the Prospect No. 3 Project. PacifiCorp maintains that its proposed rates, if adopted, would be protective of aquatic life in the South Fork bypassed reach as was documented at the Prospect Nos. 1, 2, and 4 Project.

After discussions at the 10(j) meeting, Oregon DFW modified its recommendation and now recommends PacifiCorp implement ramping rate restrictions to ensure that ramping rates do not exceed 0.2 foot per hour year-round.

Our Analysis

Because the project operates in a run-of-river mode, ramping only occurs infrequently during minor operational adjustments to flow regulating equipment such as the turbine wicket gates, PR valve, turbine isolation valve, diversion canal headgate, and fish screen backwater gate. Ramping also occurs infrequently whenever the water conveyance system is dewatered due to unplanned outages or scheduled maintenance activities.

In unregulated rivers, water stage rarely changes more than about 2 inches per hour, except during runoff events (Hunter, 1992); therefore, aquatic organisms typically are not accustomed to large stage changes occurring on a frequent basis. Stage changes in the South Fork due to project operations and maintenance do not occur on a frequent basis under run-of-river operation. Run-of-river operation would continue to protect fisheries in the South Fork from frequent and rapid flow fluctuations that could disrupt spawning activities, interrupt fish movements, and dewater habitats.

Under existing conditions, there are no ramping restrictions at the project. PacifiCorp evaluated ramping rates during natural and project-induced events in the South Fork bypassed reach over a four-year period between 2010 and 2013. Because of the flashy nature of the South Fork, natural up-ramping rates due to runoff from storm events can be substantial. PacifiCorp documented ramping rates during seven, natural storm events over the study period. The ramping rates ranged in magnitude from 0.7 inch per hour to 7.4 inches per hour, with an average ramping rate of 4.9 inches per hour (PacifiCorp, 2015b). For project-induced ramping, PacifiCorp documented ramping rates during five up-ramp and thirteen down-ramp events over the study period. Ramping rates during up-ramps ranged from 7.0 to 11.3 inches per hour, and ramping rates during down-ramps ranged from 0.8 to 8.0 inches per hour (PacifiCorp, 2015b). These data suggest that substantial up-ramping occurs during natural storm events, but the rate of up and down-ramping during project-induced events can exceed that of natural events.

Therefore, project-induced ramping likely leads to some fry and juvenile trout stranding in the project's bypassed reach, displacement of fry and juveniles, some scouring of trout habitats, and increases in stream turbidity. Although some mortality of fry and juvenile trout likely occurs due to the current ramping practices, the populations in the bypassed reach shows no signs of long-term adverse effects due to project operation given that trout densities in the bypassed reach compare favorably to the reach outside of the project's influence.

PacifiCorp's proposed ramping rates would reduce project-induced up-ramping rates by 7.7 to 8.9 inches per hour, depending on season, when compared to the maximum observed up-ramp rate of 11.3 inches per hour under existing conditions. Oregon DFW's recommended 0.2-foot-per–hour rate would reduce maximum project-induced up-ramping rates by 8.9 inches per hour year-round. Both alternatives would likely reduce the turbidity increase in the bypassed reach and the potential for fry to be displaced when flows are increased following a maintenance outage of the water conveyance system.

For down-ramping, PacifiCorp's proposed ramping rates would reduce down-ramping by 4.4 to 5.6 inches per hour, depending on season, compared to existing maximum observed down-ramping rates. Oregon DFW's recommended rates of 0.2 foot per hour would reduce maximum down-ramping rates by 5.6 inches per hour year-round. Both alternatives would provide a minor benefit of lowering the stranding risk of trout fry and juveniles during infrequent project-induced down-ramping events, with the greater benefit coming from Oregon DFW's alternative.

In summary, although some mortality of individual trout fry and juveniles may result due to project-related flow ramping, the benefits of providing any ramping rate restrictions to resident trout populations as a whole in the project reaches would likely be

minor because: (1) under run-of-river operations, project-related ramping in the project reaches would continue to be an infrequent occurrence; and (2) existing information regarding trout densities in project and non-project reaches suggests that project-related ramping has no effect on trout populations as whole, which is consistent with Hunter's (1992) conclusions regarding the effects of ramping on resident trout. There would be a water quality benefit of lower turbidity levels in the bypassed reach during up-ramping under both the proposed and recommended rates with the greater benefit coming from the rate recommended by Oregon DFW.

Flow Continuation

Powerhouse outages occur when the project generating unit unexpectedly trips offline, closing the wicket gates and stopping flow through the unit, in response to natural, mechanical, or electrical disturbances. These events are typically beyond PacifiCorp's control.

Because the powerhouse tailrace discharges through the sag pipe to the Middle Fork Canal and does not discharge back to the South Fork, unintended powerhouse outage events (i.e., unit trips) do not cause flow fluctuations in the South Fork. Historically, however, unit trips could result in rapid up-ramping and flow increases in Daniel Creek and the Middle Fork via the forebay overflow spillway. These events were eliminated when PacifiCorp automated the powerhouse PR valve in 2014. The PR valve is located between the penstock and the generating unit and enables flows to bypass the unit during unit trips and not spill into the overflow channel connecting the forebay to Daniel Creek (which flows to the Middle Fork).

Prior to automation of the PR valve, the stop nut position on the valve was manually set by an operator based on flow levels at the time of the adjustment. If the unit tripped off-line and there was a subsequent increase in inflows to the project, the manual setting of the PR valve stop nut would be insufficient to accept the full flow of the penstock during a unit trip. This would result in a spill in the excess water at the forebay into Daniel Creek and the Middle Fork. The hardware and instrumentation for the PR valve automation were installed in August 2014, and software programming was completed in September 2014. The system was successfully tested during a planned maintenance outage in May 2015.

Oregon DFW initially recommended that PacifiCorp develop a means to provide several hours of flow continuation during powerhouse shutdowns and implement the measures within two years of license issuance. Following discussion at the 10(j) meeting, Oregon DFW withdrew its recommendation because it agreed that the automated PR value sufficiently reduced the risks of forebay spills into Daniel Creek during powerhouse outages.

Our Analysis

Automation of the PR valve enables PacifiCorp to bypass flows around the turbine and continue to discharge them to the Middle Fork Canal during planned or unplanned powerhouse outages, thereby eliminating the potential for water to be spilled at the forebay through the spillway channel into Daniel Creek where it flows to the Middle Fork.

Scheduling of Planned Project Maintenance Activities

PacifiCorp conducts maintenance of the water conveyance system on as-needed basis, but prefers to conduct these activities in the mid to late summer when flows are low and weather conditions are favorable (i.e., warm and dry). These activities usually include concrete work to repair the canal sections or maintenance of the woodstave pipe. To facilitate a dry work environment, major planned maintenance activities in the water conveyance system would typically require closing of the diversion canal headgate and dewatering of the system. However, as previously discussed, planned powerhouse maintenance outages would not require dewatering of the water conveyance system because the PR valve enables PacifiCorp to bypass flows around the unit while performing maintenance.

Oregon DFW originally recommended that PacifiCorp restrict annual maintenance of the water conveyance system to April and May when South Fork flows are naturally high and native species have adapted to the high flow conditions.

PacifiCorp states that maintenance activities that require dewatering of the water conveyance system and discharging flows into the bypassed reach are not feasible during April and May due to the nature of the work and climate constraints at the project site. PacifiCorp states that outages requiring dewatering are generally required for any waterway maintenance, which typically involves concrete canal patching and woodstave pipe maintenance that would be extremely difficult during these months due to adverse weather conditions such as snow cover, heavy rain, and below-freezing temperatures. PacifiCorp argues that because the project operates in a run-of-river mode and the impoundment does not provide any appreciable storage, any increase in flow to the bypassed reach is only a result of reduced diversion via incremental closure of the intake headgate. This allows natural flows to spill over the dam and into the bypassed reach (i.e., there is not any additional stored water released to the bypassed reach).

For these reasons, PacifiCorp disagrees with Oregon DFW's recommendation to conduct maintenance outages in April and May. Instead, PacifiCorp states that if it's necessary to define a regular maintenance outage period, it prefers July through September. Outages during these months would facilitate safe, efficient maintenance of the project water conveyance system during the driest, warmest months of the year and

allow PacifiCorp to increase flows in the bypassed reach and provide thermal buffering for trout during the period when temperatures are the warmest.

In response to discussions of this issue at the 10(j) meeting, Oregon DFW revised its recommendation and now supports PacifiCorp's proposal to conduct planned maintenance outages from July through September.

Our Analysis

Dewatering the water conveyance system to facilitate annual maintenance activities requires closure of the diversion canal headgate at the diversion dam and the subsequent discharge of all inflows to the bypassed reach via the fish ladder and spill over the dam. The up-ramp in flow releases to the bypassed reach could cause an increase in turbidity levels.

Salmonids have evolved in river systems that periodically experience short-term or seasonally elevated suspended sediment or turbidity levels due to climatic events such as winter storms and floods, and are adapted to periodic exposure to elevated levels of turbidity and suspended sediment. Adult and larger juvenile salmonids, in particular, are tolerant of periodic high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjorn and Reiser, 1991). However, if exposure is chronic, physiological stress responses are likely that can increase maintenance energy and reduce feeding and growth (Redding et al., 1987; Lloyd, 1987; Servizi and Martens, 1992).

During the summer and fall, flows are usually at their lowest and clearest time of the year. Median project inflows during this period are 123 cfs, 90 cfs, and 76 cfs during July through September, respectively. Therefore, under the proposed and recommended minimum flows of either 20 or 30 cfs during July through September, the discharge of all inflows to the bypassed reach would cause a short-term flow increase ranging from about 46 to 83 cfs during these months.

However, available information suggests that flow increases of this magnitude during the late summer would cause only minor increases in turbidity. As we said in the water quality affected environment, PacifiCorp evaluated turbidity levels during an up-ramp event in September 2015 that coincided with dewatering the water conveyance system for maintenance. Background turbidities during the 3-day monitoring period before the event were less than 1 NTU in the bypassed reach, increasing to a maximum level of 4.3 NTU for a little less than 2 hours after the headgate was closed and all flows were routed to the bypassed reach, before dropping back to background levels. This short-term increase in turbidity would have minor adverse effects on trout fry rearing in the bypassed reach. However, proposed or recommended ramping rates would likely limit the extent of the turbidity increase.

Passing all flows to the bypassed reach during planned maintenance outages from July through September would provide a minor benefit to water temperatures during this three-month period of the year when flows are at their seasonally lowest levels and temperatures are typically at their highest levels of the year.

Cumulative Effects

Actions with the geographic scope that may affect or have affected fisheries resources in combination with the Prospect No. 3 Project include: PacifiCorp's Prospect Nos. 1, 2, and 4 Hydroelectric Project, road construction and maintenance, timber harvesting, animal grazing, agriculture, rural residences, irrigation, fish stocking, and introduction of non-native fish species.

Historically, resident salmonids in the project area included the native rainbow trout and coastal cutthroat trout. Both brook trout and brown trout were introduced to the Rogue River, likely leading to competition between the native trout species and stocked trout. The stocking of brook trout and brown trout into project area waters has been discontinued for some time.

Construction of the Prospect Nos. 1, 2, and 4 Project as well as the Prospect No. 3 Project resulted in the inundation of trout habitats on the Rogue River, Middle and South Forks of the Rogue River, and Red Blanket Creek. Operation of both projects resulted in reduced flows (relative to historic conditions) in bypassed reaches downstream of the associated diversion dams and increased flows downstream of the Prospect Nos. 1, 2, and 4 Project powerhouses. The project dams have also blocked upstream trout movements, and the project powerhouses have entrained and killed trout passing downstream.

In addition to hydropower construction, historical adverse effects on fisheries and aquatic resources in the Rogue River basin upstream of Lost Creek Lake can be predominantly attributed to timber harvesting, which has exposed some upper basin waters to increased solar radiation, causing higher water temperatures and reduced woody debris habitats (Forest Service, 2001). Heavy grazing on surrounding lands along waterways may also have caused increased stream temperatures due to removal of streamside vegetation and the resulting widening of the stream channel (Forest Service, 2001). Road construction and maintenance has also contributed to fish passage obstructions at impassible culverts and sedimentation of aquatic habitat in streams of the upper basin. To address past adverse effects on aquatic resources in the area, the Forest Service (2001) has set a number of restoration goals for forest lands upstream of the project, including: maintenance of riparian vegetation, placement of large wood in stream channels for habitat, decommissioning of roads, and stabilization of stream channels to prevent erosion and sedimentation.

Other activities such as rural residences have likely contributed to some riparian vegetation removal and irrigation water withdrawals, both of which contribute to stream warming.

Relicensing the project would not involve major new construction or diversion of any additional flows; therefore, we conclude that relicensing the project would not cause additional adverse effects on aquatic resources within the geographic scope of analysis. Certain proposed or recommended aquatic resource measures as discussed in the previous subsections would have beneficial effects of varying degrees on aquatic resources, and thus, if implemented, would contribute cumulative beneficial effects on aquatic resources within the geographic scope of analysis.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

Vegetation

Project lands are dominated by mixed conifer-hardwood forest. Typical tree species are Douglas-fir, white fir, and western hemlock. Other common tree and shrub species include sugar pine, ponderosa pine, incense cedar, vine maple, big leaf maple, chinquapin, California hazel, Pacific dogwood, Pacific ninebark, Oregon white oak, and madrone. An approximately 9-acre stand of old-growth forest is located near the project dam. Over 30 percent of lands around the project are commercial timber lands subject to periodic harvest.

In addition to vascular plant species, PacifiCorp's surveys identified three undescribed species of hypogeous fungi (i.e., truffles) and one hypogeous fungus species that was previously only known to occur in Nevada.

Riparian habitat occurs along all streams associated with the project, including the South Fork, Imnaha Creek, and Daniel Creek, but high-gradient, rocky, narrow channels limit the extent of such habitat. Typical species found in riparian habitats are alders, willows, red-osier dogwood, Douglas' spirea, Pacific ninebark, bulrush, and cattail.

Wetlands in the project area include one wetland associated with the project reservoir, five crossed by the transmission line, and areas supported by leakage from the woodstave flowline and sag pipe.

Special-status Plant Species

Botanical surveys identified seven Forest Service Survey and Manage[22] lichen or fungi species and one fungus species that is on both the Regional Forester's Strategic and Sensitive Species List (Forest Service list) and the Oregon Biodiversity Information Center (ORBIC) list. Table 16 lists these special-status plant species. (Plant species federally or state-listed as threatened or endangered that may occur in the project area are discussed in section 3.3.4.)

Table 16. Special-status plant species identified in the project area (Source: license application as modified by staff).

Species	Total # of Sites	# of Sites on Forest Service land	# of Sites on PacifiCorp land	Status		
				Survey and Manage[1]	Forest Service List[2]	ORBIC[3]
Chaenotheca ferruginea	1	--	1	B	--	--
Clavariadelphus sachalinensis	1	--	1	B	--	3
Leptogium rivale	1	1	--	E	--	--
Rhizopogon masoniae	1	1	--	--	STR	1-X
Rhizopogon truncatus	1	1	--	D	--	4
Sparassis crispa	1	1	--	D	--	--
Spathularia flavida	3	1	2	B	--	--
Tremiscus helvelloides	1	--	1	D	--	--

[1]Forest Service Survey and Manage categories are: B (rare), D (uncommon), and E (rare, status undetermined).
[2]Strategic Oregon species on the Regional Forester's Strategic and Sensitive Species List are on the ORBIC lists 1, 2, or 3 and are suspected or documented as occurring on NFS lands.
[3]ORBIC categories are: 3 (rare, uncommon or threatened, but not immediately imperiled), 1-X (presumed extinct or extirpated), and 4 (not rare and apparently secure, but with cause for long-term concerns).

Leptogium rivale, which is an aquatic lichen, was found on bedrock and large boulders in the South Fork bypassed reach; this species would not be affected by the proposed construction, operation, and maintenance and we do not discuss it further. The other plant species were found on forested slopes 100 feet or more from project

[22] Survey and Manage species are rare and/or isolated species identified in the Northwest Forest Plan for special management.

structures. Some of the sites were associated with abandoned roads, but no sites were found on or along any roads that are actively used and maintained.

Noxious Weeds

The project area contains populations of plants that the Oregon Department of Agriculture (Oregon DA) lists as noxious weeds, including Canada thistle, bull thistle, St. Johnswort, Scotch broom, meadow knapweed, yellow star-thistle, perennial peavine, reed canarygrass, Armenian blackberry, and medusahead rye. Most of the weed populations are along access roads and other areas of frequent soil disturbance.

Wildlife

Black-tailed deer and elk occur throughout the project area. The project is located in Oregon DFW's Rogue Wildlife Unit. Oregon DFW estimates that the current deer and elk populations in the unit area are at 67 percent and 80 percent of the population management objectives, respectively.

Other large and medium sized animals that occur in the project area are black bear, cougar, fisher, bobcat, gray fox, coyote, and ringtail. Beaver, which is a wildlife species culturally important to the Cow Creek Band, may use habitat in the South Fork Rogue River, but PacifiCorp's survey did not identify this species.

Small mammals include Trowbridge's shrew and a variety of rodents including gray squirrel, Douglas' squirrel, Pacific jumping mouse, and the Forest Service Survey and Manage species red tree vole.

A number of passerine bird species and waterfowl, such as mallard and common merganser, occur in the vicinity of the project. Raptors observed in the project area include turkey vulture, red-tailed hawk, Cooper's hawk, and American kestrel. Other raptors, such as bald eagle and osprey, may sometimes occur in the project area, but the 1-acre reservoir does not offer good foraging habitat for these species.

In addition to its general wildlife surveys, PacifiCorp conducted surveys for terrestrial mollusks in the project area. Nine mollusk species were observed, including Siskiyou hesperian, which is listed by the Forest Service as sensitive, and a previously undescribed mollusk species currently designated "Medford No. 1."

Special-status Wildlife Species

Eight wildlife species identified at or near the project have been placed in special categories by federal and state agencies, as shown in table 17. (Animal species federally or state-listed as threatened or endangered are discussed in section 3.3.4.)

Table 17. Special-status wildlife species identified at or near the project (Source: staff).

Species	Status			
	FWS[1]	Survey and Manage[2]	Forest Service List[3]	Oregon Sensitive List[4]
Fisher	SOC		SENS	S-C
Red tree vole	C	C		S
Mountain quail	SOC			S
Olive-sided flycatcher				S
Western pond turtle			SENS	S-C
Cascades frog				S
Coastal tailed frog				S
Siskiyou hesperian			SENS	

[1]FWS categories are C (candidate) and SOC (Species of Concern).
[2]Forest Service Survey and Manage category C includes uncommon species.
[3]Sensitive species on the Regional Forester's Strategic and Sensitive Species List are those species whose population viability is a concern.
[4]Oregon sensitive species categories are S (sensitive species with one or more threats to their populations and/or habitats) and S-C ("sensitive-critical" species with current or legacy threats that are significantly impacting their abundance, distribution, diversity, and/or habitat.

With the exception of red tree vole and western pond turtle, all the species in table 17 have been observed within the project boundary. Tree voles live in conifer or mixed-conifer forests and spend almost all their time in the tree canopy (FWS, 2016). Their principal food is conifer needles, whose filamentous resin ducts they strip away before eating. They make nests of twigs, resin ducts discarded from feeding, and other materials. A possible red tree vole nest was observed in a tree between Imnaha Road and the flowline. However, the decayed nest materials and the lack of needle resin ducts on the ground below the nest suggested that the nest was not in active use.

PacifiCorp's surveys did not identify western pond turtle within the project boundary or the bypassed reach of the South Fork. However, this species has been observed at the nearby Prospect Nos. 1, 2, and 4 Project.

3.3.3.2 Environmental Effects

Vegetation Management

PacifiCorp proposes to implement the Vegetation Management Plan filed with its application that addresses: (1) transmission line right-of-way (ROW) vegetation management; (2) project facility operation and maintenance; (3) project facility

construction, including the currently proposed construction and any future construction that becomes necessary during the license term; (4) noxious weed control and prevention; (5) revegetation; and (6) special-status species management.

Transmission Line ROW Vegetation Management

Transmission line ROW vegetation management would include the following activities: removing hazard trees, providing safe line clearance under the line and on the sides of the ROW, clearing transmission line access roads, and removing slash and debris.

Project Facility Operation and Maintenance

Project facility operation and maintenance would include removing hazard trees, brush around project facilities to allow visual inspection and access, brush on the project spillways, and fallen woody vegetation from fencing; and clearing access roads.

Project Facility Construction

Proposed project facility construction that could affect vegetation resources would include (1) replacing the flowline, sag pipe, vehicle access bridge, and a new spur road extending from the vehicle access bridge to the bypassed reach,[23] upgrading existing wildlife crossings, and installing new crossings; and (2) any currently unplanned construction that might be needed during the license term. PacifiCorp proposes to site staging areas and other disturbances to avoid, where possible, special-status plant species site locations. Access from Imnaha Road for the proposed flowline replacement would occur outside the 100-foot special-status plant species buffer zones that would be established through the Vegetation Management Plan provisions discussed below. In the event of unplanned construction, PacifiCorp would perform noxious weed and special-status plant species surveys within the areas to be cleared or used for access, staging, and disposal; observed noxious weeds and/or special-status plant species would be addressed with the measures presented in the Vegetation Management Plan.

Noxious Weed Control and Prevention

Noxious weed control and prevention at the project would include conducting a new inventory of all project lands within the first year after license issuance to document the location and extent of weed populations. If any unplanned construction is needed

[23] The proposed spur road would be 117 feet long and 10 feet wide to accommodate the use of a small excavator to place dredged sediment on the bank of the bypassed reach.

within 5 years of the initial inventory, the results of that initial inventory would be used to guide weed treatment and control. However, if any unplanned construction is needed more than 5 years after the initial inventory, PacifiCorp would conduct a new weed inventory for the construction.

PacifiCorp proposes to use manual (e.g., pulling or digging), mechanical (e.g., cutting with chainsaws and brush hogs, mowing, or discing), and chemical (herbicide application) control. Most weed control measures on NFS lands within the project boundary would involve manual and mechanical methods because the Forest Service currently allows herbicide use only in select, approved locations. PacifiCorp would develop any weed control methods on NFS lands within the project boundary in coordination with the Forest Service.

For the proposed flowline and sag pipe replacement, PacifiCorp would begin treating weeds one growing season before ground breaking and continue treatment during the year of construction. For any future unplanned construction, PacifiCorp would begin treating weeds as soon as possible within the year that the construction is developed, following site inspection, and before breaking ground. During any activity that involves ground disturbance, erosion control, or maintenance, PacifiCorp would implement the following BMPs to prevent weed establishment:

- Training to encourage weed awareness and prevention efforts among project and contractor staff;
- Planning and scheduling construction and maintenance activities to either treat noxious weeds before the planned maintenance activities occur or perform maintenance activities inside areas with weed infestations before the seeds set and can be spread;
- Ensuring that materials, including sediments (e.g., rock fill), are weed-free;
- Cleaning machinery and other equipment to remove weed seeds and plant parts that could colonize project lands;
- Minimizing ground disturbance, particularly in riparian areas; and
- Revegetating after ground-disturbing activities.

Revegetation

The Vegetation Management Plan includes provisions to revegetate areas disturbed during the flowline replacement with native vegetation using a combination of seeding and planting. Species to be used for seeding would include native grasses and forbs, while planting would include native trees, forbs, and shrubs as appropriate based on site conditions. The plan also specifies that these same procedures would be followed for any construction or routine maintenance activities that disturb an area greater than 0.25 acre, but that site-specific plans to guide revegetation would also be prepared. The

plan does not specifically address revegetation following other proposed construction activities such as the spur road or vehicle access bridge, but does indicate that any construction or routine maintenance activities that disturb less than 0.25 acre would be revegetated by seeding with native grasses and forbs. Revegetated sites would be visited at least once during the year following replanting; any bare areas would be replanted, erosion repaired, and weeds treated. If needed to ensure success, a longer monitoring program would be included in the site-specific revegetation plan.

Special-status Species Management

Special-status plant species have the potential to be disturbed by the proposed flowline construction as well as any future operation and maintenance activities. The Vegetation Management Plan includes provisions to protect these species by establishing a 100-foot radius buffer zone around each of the known sites. In addition to the special-status species, the Vegetation Management Plan would also establish buffer zones around the three undescribed fungi species and the *Gautieria luteotincta* location. New construction and/or general vegetation management would be restricted within the buffer zones. The Vegetation Management Plan provides for light vegetation removal, such as for fuels reduction, within a buffer zone when the special-status plant is not producing sporocarps and the slash resulting from vegetation removal is disposed of outside the buffer zone. Maintaining existing project roads, including ditches, would not be restricted in the buffer zones, but the travelled surface would not be widened by disturbing the adjacent road-cuts within the buffer zones. The Vegetation Management Plan includes a map showing the proposed buffer zones.

No comments were received on the Vegetation Management Plan.

Our Analysis

Several actions proposed by PacifiCorp require vegetation removal. The proposed replacement of the existing woodstave flowline and sag pipe would require clearing 0.4 acre of second-growth forest for temporary construction access and staging. The other proposed construction activities including, rehabilitating the existing vehicle access bridge over the flowline, constructing the new spur road, upgrading existing large animal wildlife crossings, and installing new wildlife crossings for large and small animals would require a negligible amount of vegetation clearing. Normal project maintenance activities would require vegetation removal and alteration

Implementing the actions defined in PacifiCorp's proposed Vegetation Management Plan would minimize adverse effects to surrounding vegetation, minimize the spread of noxious weeds which could reduce the quality of adjacent wildlife habitats, promote the establishment of native communities, and protect identified special status plant species from construction-related disturbances.

Wildlife Connectivity

The project's water conveyance system includes about 5,350 feet of woodstave flowline, 5,805 feet of concrete-lined canal, 416 feet of forebay, 3,254 feet of above-ground penstock, and 734 feet of woodstave sag pipe. These features may be obstacles to deer, elk, and other wildlife moving through the project area.

The flowline, penstock, and sag pipe are sufficiently elevated to provide nearly continuous crossing opportunities for small- and medium-sized animals. There are two existing flowline underpasses, with vertical clearances of 4.5 feet and 5.0 feet, respectively (PacifiCorp, 2013). Tracks indicate that deer and smaller animals use these crossings. It is unlikely, however, that elk, in particular large bull elk, which may have shoulder heights of more than 5 feet, readily utilize the flowline crossings.

There are five existing penstock underpasses, with an average vertical clearance of 6.5 feet and a vertical clearance range of 5.5 feet to 7.3 feet (PacifiCorp, 2013). Deer and elk tracks have been observed at each of the penstock underpasses.

Six 4-foot-wide wildlife crossings over the canal provide passage for a variety of small and large animals. Wildlife also use a vehicle bridge over the canal. Fencing along both sides of the canal and large wildlife crossing structures prevents large- and medium-sized animals from attempting to cross the canal except via the crossing structures and thus reducing risks of falling into the water and potentially drowning.

To enhance wildlife movement, PacifiCorp proposes to: (1) enlarge the six existing 4-foot-wide canal crossings to 12 feet wide, using pre-cast concrete panels covered with a minimum of 2 inches of soil and with woody debris along one side of the fencing to provide small animals with cover from predators; (2) construct a total of five 12-foot-wide crossings either above or beneath the new steel flowline; and (3) construct eight 2-foot-wide canal crossings for small animals, using pre-cast concrete panels and a minimum covering of 2 inches of soil. PacifiCorp would provide Oregon DFW with the proposed locations of the new wildlife crossing and would allow the agency 15 days to review and comment on the locations before installing the crossings.

Oregon DFW recommends that PacifiCorp enhance the movement of wildlife through the project area by doing the following:

(1) widen the six existing canal bridges to 12 feet wide as proposed, but install the five new 12-foot-wide flowline wildlife crossings at locations that would maximize opportunities for wildlife movement as determined through consultation with Oregon DFW, the Forest Service, and FWS; and

(2) install the proposed eight 2-foot-wide small animal crossings over the canal, but the location and design of the crossing should be determined in consultation with Oregon DFW, the Forest Service, and FWS and included in a written plan incorporating agency recommendations.

In its March 1, 2018 filing, Oregon DFW clarified that because the wildlife crossings at the Prospect No. 3 Project would use the same design as crossing features at the Prospect Nos. 1, 2, and 4 Project and extensive camera monitoring efforts at Prospect Nos. 1, 2 and 4 (Albertelli, 2012) indicate that crossings with this design were used substantially by a number of game and non-game species, ODFW agrees that PacifiCorp's crossing design would likely be sufficient to allow passage of terrestrial wildlife at the Prospect No. 3 Project. However, Oregon DFW added that wildlife use of crossing structures is influenced by both the design and placement of crossing structures and that topography, cover, and proximity to human activity can affect use rates of crossing structures (Clevenger and Waltho, 2000; Gagnon et al., 2011). Oregon DFW recommends that if, by the fifth anniversary of any new license, the five new wildlife crossings do not show signs of use by deer and elk, PacifiCorp should be required to install up to five additional crossings at sites determined in consultation with Oregon DFW.[24]

In its reply comments, PacifiCorp notes that it proposes to consult with Oregon DFW on the location of the new crossing structures. However, PacifiCorp states that the existing canal crossings were sited and constructed in consultation with Oregon DFW, and that the agency approved the existing locations and design.

Our Analysis

The six 4-foot-wide bridges over the canal are being used by deer and elk. Widening the bridges to 12 feet may encourage more use by providing more room for elk to cross the canal. Use of 12-foot-wide bridges at the Prospect Nos. 1, 2, and 4 Project indicates that deer and elk will cross structures of this design.

The six 4-foot-wide crossings currently allow animals of all size classes to cross the 5,805-foot-long canal. Increasing the existing canal crossings to 12 feet wide would enhance their use by deer and elk by providing more room for the herd to cross. As PacifiCorp points out, wildlife are likely habituated to using these crossings and thus they should not be moved.

[24] Oregon DFW did not specify which crossings must demonstrate use by deer and elk. However, because deer and elk currently use both the existing 4-foot-wide canal crossings and the penstock underpasses, we assume that Oregon DFW is referring to the new flowline crossings that PacifiCorp is proposing to install.

Installing eight 2-foot-wide canal crossings would further enhance the ability of small animals to cross the canal by reducing the spacing between crossings and creating more opportunities to cross the pipeline. The six enlarged crossings, eight proposed 2-foot wide crossings, and the existing Imnaha Road bridge would provide on average a canal crossing every 387 feet for small animals.

Two underpasses currently allow deer and smaller animals, but not elk, to cross the 5,350-foot-long woodstave flowline. Based on use at the Prospect Nos. 1, 2, and 4 Project, PacifiCorp's proposed designs should adequately pass deer, elk, and other wildlife. PacifiCorp's proposal to install five either over- or under-crossings when it replaces the flowline would enhance the ability of large wildlife such as deer and elk to use habitat on both sides of the flowline. However, preliminary engineering designs of the flowline replacement have identified preliminary locations for the crossing structures (see Volume IV, Appendix F-3). Selecting the crossing locations should consider not only engineering feasibility but also variables that may affect deer and elk use of under and overpasses (e.g., height of structure, cover, topography, human activities). Consulting the appropriate agencies on the new crossing locations would allow the agencies to impart their expertise in selecting locations that optimize their usefulness to wildlife.

Monitoring deer and elk use of the new crossings for five years following their construction should be sufficient to determine whether deer and elk are using the crossings. Because PacifiCorp proposes to construct the flowline crossings in the third year following license issuance, Oregon DFW's recommended timeline for making a decision on installing additional crossings would be based on observed wildlife use from only two annual inspections. Research indicates that wildlife become habituated to crossing structures within two to five years (Clevenger and Waltho, 2003; Dodd et al., 2007). Therefore, setting the duration of the monitoring at the fifth anniversary of the commencement of wildlife crossing operation rather than at the fifth anniversary of license issuance would increase the likelihood that representative monitoring information would be collected to better inform a decision on the effectiveness of the wildlife crossing structures.

Small Animal Openings and Fencing to Prevent Entrapment

Oregon DFW states that the canal could be an important cause of small animal drowning mortality or block dispersal and genetic flow for some species, and believes that impacts are substantial. Therefore, it initially recommended that PacifiCorp provide and evaluate small openings in the fencing and structures to direct small wildlife, such as small mammals, reptiles, and amphibians, to the 2-foot-wide crossings.

Based on staff's analysis in the draft EA, Oregon DFW filed additional

information on March 1, 2018 to support its concern that drowning mortality of small vertebrates is substantial and clarified its recommendation. Oregon DFW now recommends that PacifiCorp install hardware mesh fencing at the base of the existing fencing and around the wildlife crossings to a height of 40 inches to direct small animals to the crossings. To support the addition of the fine mesh fencing, Oregon DFW says there is limited information on the mortality risk for small vertebrates at canals, but that the few studies (Godinho and Onofre, 2013; Garcia, 2009; Traverso and Alvarez, 2000) that do exist documented substantial mortality of small vertebrates. Based on these studies, Oregon DFW estimates that 17,000 small animals would likely drown in the project canal over a 50-year license period. Oregon DFW states that mitigating this mortality is a significant priority because it would mitigate potential mortality risks to sensitive amphibians (coastal tailed frog and Cascades frog) and would enhance prey abundance for northern spotted owl if the owls return to the project area. They also argue that in the absence of site-specific estimates of mortality rates, installing hardware mesh fencing is a cost-effective and prudent mitigation measure to protect small vertebrates from substantial mortality risk, and would improve habitat value for small vertebrates. Further, they conclude that wildlife crossings alone will not mitigate risk for small vertebrates in the absence of fences (Cunnington et al., 2014).

PacifiCorp states that a written plan, prepared in consultation with the agencies, for the small animal crossings location and design is unnecessary because the license application contains a description of the design. Further, PacifiCorp states that consultation with the Forest Service on the small animal crossings over the canal would be inappropriate because those crossings would be located outside the Forest boundary and the Forest Service has not requested such consultation. PacifiCorp did not file a response to Oregon DFW's recommended additional fencing requirements.

Our Analysis

Under existing conditions, small animals can pass through the 2-inch by 4-inch mesh openings in the canal fencing and cross the canal via existing 4-foot-wide crossings. The canal walls consist of rough concrete at an approximately 40-degree angle from the canal bottom, and are regularly covered with bryophyte growth and overhanging vegetation. These conditions can provide traction and potential escape routes for small animals that fall into the canal. However, the canal carries flows ranging from 3 cfs to 150 cfs, and the velocity may sometimes be too great for animals to escape. Therefore, it is likely that small animal drownings occur in the canal. However, there is no information on the record to indicate that such effects are substantial at the project, or that the occasional drowning of individual animals in the project canal is adversely affecting their populations.

As Oregon DFW noted, no site-specific data on morality estimates exist and the published small animal mortality data from non-project canals are limited. Godinho and

Onofre (2013) recorded 401 mortalities from 34 species (59.8 percent small mammal, 28.4 percent reptile, and 11.8 percent amphibian) over 10 months in 4.29 kilometers (14,075 feet) of a Portuguese irrigation canal. Garcia (2009) documented 134 mortalities from 17 species (86.4 percent amphibian, 3.7 percent reptile, and less than 1 percent fish and bird) over 13 months in 2 kilometers (6,562 feet) of Spanish irrigation canal. Traverso and Alvarez (2000) identified 4,598 carcasses from 49 species (90.3 percent reptile and amphibian, 5.9 percent mammal, 3.4 percent crustacean, and less than 1 percent bird) over 1 year in 36 kilometers (118,110 feet) of Spanish canal. While the above cited European studies show that in certain situations, small animal mortality can be substantial, the extent of their applicability to the Prospect No. 3 Project is unknown.[25]

The eight small animal crossing would provide additional crossing opportunities and would be expected to increase habitat connectivity. Adding the fine mesh fencing recommended by Oregon DFW would direct small animals to the potential crossings and would reduce the potential for entrapment and drowning by preventing small animals from accessing the open canal. Some studies indicate that fencing improves use of wildlife crossings, particularly for reptiles and some amphibians. Markle et al. (2017) studied reptile mortality on a highway in southwestern Ontario and found 89 percent fewer dead turtles and 53 percent fewer dead snakes after small-gauge (1/8-inch) fencing had been installed. Cunnington et al. (2014) found that installing small-gauge hardware cloth fencing along an Ontario highway reduced anuran (frogs and toads) mortality by about 40 percent, but that the existence of culverts alone through which anurans could safely pass under the highway did not reduce mortality. These studies suggest that installing finer mesh fencing at the base of the existing canal fencing would enhance the effectiveness of the proposed small animal crossings.

Enhancements that improve connectivity and reduce drowning are likely to be most beneficial for species that have large home ranges (e.g., deer and elk), have low reproductive rates, and occur at low densities because they are less able to rebound quickly from population declines (Rytwinski and Fahrig, 2012). Coastal tailed frog is a good example of a species exhibiting such traits. This species has a restricted range, low reproductive rate (several year larval stage), and limited dispersal capacities (remaining near water sources) (Oregon Conservation Strategy, 2018). Preventing entrainment and drowning of coastal tailed frog and Cascade frog, both species that are of particular management concern because they are exhibiting population declines, would benefit from the addition of a fine mesh fence along the project canal.

[25] Staff could not reproduce Oregon DFW's estimate of 17,000 mortalities over a 50-year license term from the data that they provided to support their estimate. Nor could we calculate an estimate from the available data.

Wildlife Crossing Monitoring Plan

Oregon DFW recommends PacifiCorp develop and implement a plan, in consultation with Oregon DFW and FWS, to monitor the efficacy of large and small wildlife crossings and to install additional crossings if required by Oregon DFW, the Forest Service, and FWS.

PacifiCorp asserts that further monitoring of wildlife use of crossings is unnecessary because the results of its 3-year study of wildlife use at 12-foot-wide crossings of the Middle Fork and North Fork canals at the nearby Prospect Nos. 1, 2, and 4 Project (PacifiCorp, 2012) already demonstrates that herds of large animals, specifically elk, will cross the kind of large wildlife bridges proposed at the Prospect No. 3 Project.

In its March 1, 2018 filing, Oregon DFW states that game camera monitoring such as was conducted at the Prospect Nos. 1, 2, and 4 Project would not be necessary to evaluate the efficacy of the wildlife crossings. Instead, it recommends that PacifiCorp photographically document signs of wildlife use (direct observation, tracks, scat, hair, or other signs) at the crossings during the annual crossing and fencing inspections and include this documentation in its annual report.

Our Analysis

Monitoring the crossings would provide an indication of the use of the crossings by wildlife. Photographically documenting any animal signs on the crossings when the annual crossing and fencing inspection takes place would be an efficient way of conducting this monitoring.

Crossing and Fencing Inspection and Maintenance Program

Oregon DFW recommends that PacifiCorp continue to maintain the existing canal fencing, and prepare in consultation with Oregon DFW, FWS, and the Forest Service, a written annual inspection and maintenance program for the crossings and fencing, and provide the agencies with a written report of the previous year's inspection and maintenance activities by March 1 of each year.

PacifiCorp agrees to maintain the existing fencing along open waterways, but disagrees with the need for a written annual inspection and maintenance program for the crossings and fencing. PacifiCorp states that a license requirement to annually inspect and maintain the fencing would be sufficient to maintain compliance and would render a written plan duplicative and onerous.

Our Analysis

Article 406 of the current license required PacifiCorp to file for Commission approval an annual inspection and maintenance program for the wildlife crossings and fencing. PacifiCorp's existing inspection program defines the timeframe when the crossing and fencing are to be conducted (April), includes a checklist form for the operation personnel to record the condition of the fencing and canals and criteria by which to judge when remedial actions are needed, recommendations for remediation, and internal reporting requirements to ensure that any remediation efforts are completed. The program includes providing an annual summary of the inspections and remedial actions to the Oregon DFW.

Continuing to implement this program would help guide project personnel in their maintenance of project facilities and would continue to demonstrate that PacifiCorp has adequately maintained these project facilities. The program would need to be updated to include the new crossing structures and, if required, any additional fencing, otherwise implementing the program would require little additional effort on PacifiCorp's part.

Effects on Special-Status Wildlife Species

Table 17 lists the special-status wildlife species (with the exception of federally listed threatened, endangered, or proposed species, which are discussed in section 3.3.4) that might occur within the project boundary and be affected by project activities.

In its comments filed March 1, 2018, Oregon DFW stated that installing fine mesh fencing, such as hardware cloth, at the bottom of the existing canal fencing may mitigate potential mortality risk for any Cascades frog and coastal tailed frog entrapped in the project canal.

Our Analysis

Replacing the woodstave flowline and sag pipe, upgrading the existing wildlife crossings, and constructing new crossings would occur over an 8-month period. Reconstructing the vehicle access bridge over the flowline intake and constructing the spur road would occur the year afterwards. These construction activities would result in noise and increased human presence that would disturb wildlife in the vicinity. In addition, the proposed construction would require clearing 0.4 acre of second-growth forest habitat for temporary construction access and staging.

The noise and human activity associated with the proposed construction would be expected to make wildlife, including fisher, red tree vole, mountain quail, and olive-sided flycatcher, avoid the area during construction. Construction would result in minor, short-term habitat loss. Mountain quail, which were observed at three locations near the canal

and forebay, may prefer the brushy scrub-shrub habitat created when revegetating disturbed areas. The second-growth forest cleared for temporary construction access and staging would not provide suitable habitat for the red tree vole, which prefers trees with the structural characteristics typical of old-growth forest.

Higher minimum instream flows and ramping rates may enhance the aquatic habitat that western pond turtle, Cascades frog, and coastal tailed frog use for all or part of their life histories. Western pond turtles have been observed within the boundary of the adjacent Prospect Nos. 1, 2, and 4 Project, but not within the boundary of the Prospect No. 3 Project or surveyed reaches of the South Fork downstream from the project diversion dam. The species is primarily found in rocky streams, large rivers, slow-moving sloughs, and quiet waters, and may travel more than 1 mile overland when streams and rivers dry up in late summer. Female western pond turtles nest in dry, compacted, south-facing terrestrial slopes outside the riparian zone, and suitable nesting habitat may be found within the project boundary.

PacifiCorp's aquatic habitat surveys identified adult and larval stage Cascades frogs and coastal tailed frogs in the South Fork downstream of the project diversion dam (PacifiCorp, 2015d). Cascades frogs have been observed in a wetland area beneath the project sag pipe, but they were not identified at that location during PacifiCorp's wildlife surveys.[26] Cascade frogs breed in pond or lake habitat, and overwinter in aquatic sites that do not freeze solid (e.g., springs and deep lakes) (Pope et al., 2014). During the non-breeding active season this species can utilize stream habitat, such as the South Fork, as well as pond, meadow, and lake habitats. Cascade frogs are known to travel relatively large distances. Juvenile frogs dispersing before their first breeding season have been documented as traveling an average of 1.2 km (0.75 mile), and the distance traveled between overwintering sites and breeding ponds can be greater than 1 km (0.62 mile) (Pope et al., 2014).

Coastal tailed frogs are found in cold, clear, fast-flowing streams within forested areas (Oregon Conservation Strategy, 2018). In the project area, they have only been found in the South Fork.[27] Adults need streambanks, logs, headwater springs, and gravelly seeps for foraging and hiding, and small boulders in streams for egg laying; tadpoles require permanent streams with moss- and sediment-free cobble and boulder

[26] At the adjacent Prospect Nos. 1, 2, and 4 Project, PacifiCorp has observed Cascades frog egg masses in a wetland in a borrow pit and adult frogs in aquatic, wetland, and upland forests within the project boundary (PacifiCorp, 2003a).

[27] At the adjacent Prospect Nos. 1, 2, and 4 Project, PacifiCorp has observed adult tailed frogs in Red Blanket Creek and adult and tadpole tailed frogs in the Middle Fork (PacifiCorp, 2003a).

substrate for clinging to rock surfaces while scraping diatoms and algae (Oregon Conservation Strategy, 2018). Coastal tailed frogs are not known to travel as far from water as Cascades frogs when they use terrestrial habitat. Wahbe et al. (2004) documented mean daily distances on land of 23.3 m (76.4 feet) ± 7.8 m (25.6 feet) for females and 16.8 m (55.1 feet) ± 3.9 m (12.8 feet) for males in British Columbia's south coast region. Bury and Corn (1988) captured recently metamorphosed tailed frogs that had dispersed more than 246 feet from their natal stream reaches in Washington.

It is not known whether breeding or overwintering habitat for the frogs or western pond turtle occurs near the project. However, the project canal is roughly 500 feet north of the South Fork at its closest point, and may be within the range of the two frog species' movements and possibly within the range of western pond turtles. The proposed small animal crossings may improve those species' use of habitat on both sides of the project canal. Installing fine mesh fencing at the bottom of the existing canal fencing would eliminate or reduce the potential for drowning in the project canals.

The mollusk Siskiyou hesperian is locally abundant, and was identified 13 times in PacifiCorp's surveys. Because proposed construction activities would affect a small area and the mollusk is locally abundant, the proposed construction activities and continued operation and maintenance would be unlikely to affect Siskiyou hesperian.

Avian Electrocution and Collision Hazard

The project includes a 6.97-mile-long, 69-kV transmission line. The transmission line ROW extends from the initial substation immediately west of the powerhouse to cross the Middle Fork, then follows the general alignment of the waterway of the Prospect Nos. 1, 2, and 4 Project to end at the Prospect Central substation.

Oregon DFW recommends that PacifiCorp minimize adverse interactions between birds and the project transmission line by taking the following actions:

(1) Retrofit or rebuild any pole involved in a bird fatality to increase safety for large perching birds and construct all new or rebuilt poles following guidelines in the publication entitled *Suggested Practices for Raptor Safety on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee (APLIC), 2006);

(2) Conduct operation and maintenance activities in the project area following the most current spatial and temporal guidelines for avian protection; and

(3) Follow the existing *Agreement for Management of Birds on Powerlines*, among PacifiCorp, Oregon DFW, and FWS, updated June 2006.[28]

PacifiCorp agrees with Oregon DFW's recommendations for raptor protection. PacifiCorp states that its raptor-safe construction standards for transmission line maintenance meet or exceed the APLIC guidelines.

Our Analysis

Several raptor species have been observed in the project area, and the large raptor, bald eagle, may also sometimes occur. Many birds, especially raptors, select power poles for perching and sometimes for nesting. Raptors and other large birds can be electrocuted if they simultaneously contact two energized conductors or an energized part and a grounded part. In addition, collision with the transmission lines may result in avian injury or mortality.

PacifiCorp's corporate-wide Bird Mortality and Problem Nest Reporting Database contains no reports of bird mortalities associated with the project during the period of record (January 1, 2001 through May 2017). Because there is no evidence of bird mortalities at the project and PacifiCorp's transmission line construction standards comply with the APLIC guidelines, the potential for avian electrocution or collision over the term of any new license would be unlikely.

Nonetheless, PacifiCorp's raptor-safe construction standards are detailed in its corporate-wide Avian Protection Plan. The corporate-wide plan's guidelines meet or exceed APLIC guidelines, recommended engineering standards, and management options in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. The plan guidelines include preventative, reactive, and proactive measures. Preventative measures require that all new or rebuilt lines meet PacifiCorp's avian-safe standards and comply with all applicable laws, regulations, and permits. Reactive measures include documenting all bird mortalities, bird-caused outages, and problem nests; conducting remedial measures to prevent re-occurrence of these events; and notifying agencies of mortalities and remedial actions. Finally, it includes provisions for PacifiCorp to provide resources and training on avian issues to

[28] In a September 13, 2017, telephone conversation with staff, Oregon DFW clarified that it recommended following the guidelines of *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC, 2006), which PacifiCorp proposed in its avian protection plan for the Prospect Nos. 1, 2, and 4 Project. Further, Oregon DFW stated that the desired outcome of its avian protection recommendations would be an avian protection plan that contains essentially all the components of the Prospect Nos. 1, 2, and 4 Project plan.

employees, partner with other organizations in programs and research on the effects of bird interactions with power lines, and develop local avian protection plans in targeted areas to modify high-risk structures.

However, the corporate-wide plan's provisions are currently only voluntary, and filing a project-specific avian protection plan that includes the corporate-wide provisions would ensure that protections would be extended through the period of any new license issued for the project. Because Oregon DFW's recommended measures are consistent with PacifiCorp's current guidelines, the filing of a project-specific avian protection plan that incorporates the recommendations would require little effort on PacifiCorp's part.

Cumulative Effects

Project operation and maintenance would have negligible effects on vegetation resources in comparison to the effects of timber harvesting in the project area. While the project's water conveyance system would continue to be a partial barrier to wildlife movement, contributing to the barrier effects created by the Prospect Nos. 1, 2, and 4 Project facilities and rural residential development. PacifiCorp's proposed enhancements to the wildlife crossings would complement efforts at its Prospect Nos. 1, 2, and 4 Project and enhance crossing opportunities in the area.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

According to FWS's IPaC database, two federally listed species potentially occur near the project: the endangered gray wolf and the threatened northern spotted owl. Critical habitat is also designated for northern spotted owl near the project boundary.

We also address the potential occurrence of state-listed threatened or endangered species in this section.

Plants

Federally Listed Species

No federally listed threatened or endangered plant species are known to occur within the project boundary.

State Listed Species

Umpqua Mariposa Lily

The State of Oregon lists this plant as endangered. It is largely restricted to serpentine-derived soils in the Umpqua River Basin and isolated serpentine substrates in Josephine and Jackson counties. Serpentine and similar soils exist relatively close to the project, and serpentine endemic plants such as the Umpqua mariposa lily could potentially be present within the project boundary. However, PacifiCorp's surveys did not identify Umpqua mariposa lily. We therefore do not discuss this species further.

Wayside Aster

The State of Oregon lists this plant as threatened. It occurs in a wide range of habitat types and is often found in relatively open areas of dry, mixed coniferous forest. PacifiCorp's surveys did not identify wayside aster. We therefore do not discuss this species further.

Wildlife

Federally Listed Species

Gray Wolf

The Distinct Population Segment of gray wolves in western Oregon, including Jackson County where the project is located, is federally listed as endangered.[29] No critical habitat has been designated for wolves in Oregon.

Gray wolves have a large home range and use a variety of habitat types where there are unoccupied territories with a sufficient prey base, primarily deer and elk, and isolated den sites. The Rogue wolf pack, consisting of a breeding pair and three offspring, and the Keno pair of wolves are the only known wolves west of the Cascade crest. The area of known activity for the Rogue Pack overlaps the project area. The Rogue Pack's breeding male paired with a female and produced three pups in 2014. Geographic Positioning System (GPS) data indicate that the pack area of use is approximately 355 square miles. GPS data from radio collared individuals of the Rogue Pack suggest that they killed three calves at a ranch near the town of Prospect in January 2018 (The Oregonian, January 16, 2018). In addition to the Rogue Pack animals, the male gray wolf OR-25, which dispersed from the Imnaha Pack in northeastern Oregon, was detected near the project area. Oregon DFW posted an Area of Known Wolf

[29] 32 Fed. Reg. 4001 (1967).

Activity for OR-25 that included the project. OR-25 was found dead on October 29, 2017, in Klamath County east of the project. Gray wolves have not been observed within the project boundary.

Northern Spotted Owl

The northern spotted owl is federally listed as threatened.[30] The project is located partially within and immediately adjacent to a study area for long-term spotted owl studies conducted by the Oregon Cooperative Fish and Wildlife Research Unit at Oregon State University. Field studies have been conducted within the project area in spring 2014, 2015, and 2016. The studies' owl calling stations provided survey coverage of the project. These studies found that three currently unoccupied, historical spotted owl activity centers are within or adjacent to the project. Two of these historical nests are within approximately 0.47 and 0.98 mile, respectively, of the project boundary upstream of the project dam. The third historical nest is on a tract of private timber land approximately 0.59 mile east of the project boundary in the Middle Fork canyon; the tract was clear-cut after the nest was identified. The field studies did not detect any spotted owls in or near the project.

There is no designated spotted owl critical habitat within the existing or proposed project boundary. However, the boundary of the 254,442-acre subunit 4 of the Klamath East critical habitat unit is approximately 400 feet southeast of the existing project boundary upstream of the project dam.

Northern spotted owls are found within mature or old growth forests that contain the structures and characteristics required for their nesting, roosting, and foraging. Nesting, roosting, and foraging habitat generally consists of moderate to high tree canopy closure (60-90 percent); a multilayered, multi-species canopy with large overstory trees with diameters at breast-height of greater than 30 inches; a high incidence of trees with deformities such as large cavities, broken tops, mistletoe infections, and other evidence of decadence; large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for owls to fly. A 9-acre area of nesting, roosting, and foraging habitat exists on NFS lands north of the project dam. This area has large remnant trees and suitable overstory structure for potential nesting use. Several areas of downed wood and large snags are available for prey habitat, and adequate flying space for foraging is present.

Dispersal habitat supports owl transient and colonization phases. Dispersal habitat, at a minimum, consists of forest stands with adequate tree size and canopy closure to provide protection from avian predators and at least minimal foraging

[30] 55 Fed. Reg. 26114-26194 (1990).

opportunities. Most (87 percent or 250 acres) habitat within the project boundary is dispersal habitat. This habitat occurs from the project diversion dam to the north end of the project, near Daniel Creek. Dispersal habitat at the project has over 40 percent canopy cover, limited potential for nesting structures, and the potential to develop into nesting, roosting, and foraging habitat over time.

Capable habitat is spotted owl habitat that is currently unsuitable and that may lack a primary constituent element of their habitat, but has the potential to support dispersing birds in the future or contribute to population growth as trees mature and the canopy fills in. Capable habitat within the project boundary consists of a contiguous 24-acre strip along the project canal and in the area north of the powerhouse. The canal, flowline, and sag pipe are included in the 24-acre capable habitat total because the total area is relatively small (less than 1 acre) and vegetation is able to grow underneath and directly adjacent to these structures. This habitat exhibits limited overstory structure, relatively no downed wood, and a predominance of shrub or riparian hardwood species.

Non-capable habitat within the project boundary consists of 3 acres of project structures and impoundments. Such lands do not currently support owls and will not support them in the future.

State-listed Species

No state-listed threatened or endangered wildlife species have the potential to occur within the project boundary.

3.3.4.2 Environmental Effects

Gray Wolf

Gray wolves have not been documented on project lands and ongoing commercial logging activity on private lands near the project likely discourage wolves from permanently residing in the immediate project vicinity. As wolf populations expand over the long term, transient use of project lands could occur.

In its additional comments filed March 1, 2018, Oregon DFW recommended that PacifiCorp be required to report any wolf sign or sightings at the project, using the agency's online Wolf Reporting Form.

Our Analysis

Gray wolves have not been observed on project lands. The proposed construction activities would be too limited in duration and localized to affect wolves if they were to be passing through the project area. Project operation and maintenance activities, such as

vegetation management, would be infrequent and short term in nature and would not likely have an effect on transient wolves. Therefore, the proposed relicensing would have no effect on gray wolves.

Oregon DFW recommends that PacifiCorp be required to report any wolf sign or sightings to the agency. Although project operation and maintenance is not expected to affect wolves, reporting wolf sightings such as tracks observed during the annual canal inspection surveys would improve agency knowledge of wolf use and behavior in the project area, which may help promote its recovery. Including such information in the annual inspection reports would be an efficient mechanism for reporting any such sightings.

Northern Spotted Owl

Three historical but currently unoccupied spotted owl nests are located near the project boundary.

A spotted owl's home range is considered to be the area within which an owl conducts its activities during a year and that provides important habitat elements for nesting, roosting, and foraging (FWS, 2011). The 1.2-mile radius home ranges of the three historical nests overlap and encompass all of the project except for the westernmost approximately 6.3 miles of the transmission line extending to the Prospect Central substation.

Within their home range, spotted owls have a core area of concentrated use that commonly includes nest sites, roost sites, and foraging areas close to the activity center (FWS, 2011). Core areas represent the areas that are more readily defended by territorial spotted owls and generally do not overlap the core areas of adjacent spotted owl pairs (BLM, 2010). Core areas are considered to be a 0.5-mile radius circle around a nest. The three 0.5-mile radius core areas of the historical nests do not overlap the project except for an approximately 0.52-acre area upstream of the project diversion dam and outside the influence of project activities.

A spotted owl nest patch is the area within a 300-meter (0.19-mile) radius around a nest (BLM, 2010). None of the three historical nest patches are within the project boundary.

Our Analysis

Long-term spotted owl surveys indicate spotted owls do not currently use habitat within the project boundary. However, available habitats could be used for roosting, foraging, and dispersal, and they may nest again near the project in the future.

The proposed construction staging area would be located on PacifiCorp lands at the north end of the flowline-canal junction approximately 1,000 feet east of the Imnaha Road Bridge over the canal. An existing spur road from Imnaha Road would provide access to the staging area. Noise-producing activities that are likely to occur at the proposed staging area and along the flowline and sag pipe include heavy equipment and chainsaw use. In addition, trucks hauling materials and equipment on Imnaha Road would temporarily increase local noise levels.

Adverse effects of noise on spotted owls are most likely to occur during the breeding period. Table 18 shows the distances within which these activities would cause disturbance or disruption of breeding spotted owls if they were present.

Table 18. Disturbance and disruption distances of the northern spotted owl during the breeding season (Source: staff, modified from FWS, 2008).

Source	Disturbance[1] distance	Disruption[2] distance	
	Entire breeding period (1 March—30 September	Critical breeding period (1 March - 15 July)	Late breeding period (16 July-30 September)
Chainsaw use	440 yards (0.25 mile)	65 yards	0
Hauling on open roads	0	0	0
Heavy equipment	440 yards (0.25 mile)	35 yards	0

[1] Disturbance distance is the distance from the source—if a northern spotted owl is present within this disturbance distance, the action is likely to cause the owl to be distracted from its normal activity.

[2] Disruption distance is the distance from the source—if a northern spotted owl is present within this disruption distance, the action is likely to cause the owl to be distracted to such an extent as to disrupt its normal behavior and create the likelihood of harm of loss of reproduction.

Because there are no known active nests and spotted owls are not known to occur in the area of proposed construction activities, replacing the flowline and sag pipe would not disturb or disrupt spotted owl breeding.

The proposed 0.40-acre construction staging would require the clearing of second-growth forest suitable for spotted owl dispersal habitat. This clearing activity would not completely bifurcate the dispersal corridor. Therefore, habitat alteration would be localized and sufficiently minor that it would not adversely affect spotted owls.

PacifiCorp's proposed vegetation management activities (see section 3.3.3, *Terrestrial Resources*) include the removal of hazard trees that may contribute to spotted owl habitat. This incidental tree removal would not affect northern spotted owl forest

habitat at the stand level. Therefore, the proposed vegetation management would not affect spotted owl habitat.

3.3.5 Recreation and Land Use

3.3.5.1 Affected Environment

Recreational use at the project is light with less than 600 visitors recorded over a 15-year period between 1995 and 2010. There are no developed recreational facilities at the project and private land in the lower portion of the project limits public access. Because of the limited recreational use at the project, and no expectation of future increases in use, on March 3, 2010, the Commission exempted PacifiCorp from the requirement to file Form 80 reports.

The Rogue River-Siskiyou National Forest lands surrounding the upper portion of the project provide opportunities for various recreational uses including hunting, fishing, camping, hiking, birdwatching and picnicking but such use is light within the project boundary. Hunting is the primary recreational activity that occurs near the project. The South Fork Rogue River Trail is adjacent to the project boundary and traverses a bluff above the project impoundment at the confluence of Imnaha Creek and the South Fork. Nearby recreation areas support more significant use and include the North Fork Rogue River, the Joseph H. Stewart State Recreation Area, and Crater Lake National Park.

American Whitewater has identified a 6.75-mile-long stretch of the South Fork from Butte Falls Road (approximately 3.75 miles downstream of the dam) to Lost Creek Lake as a whitewater boating opportunity for kayakers. This river segment includes part of the project's bypassed reach and is subject to flow variation due to project operation. Currently there are no commercial whitewater boating trips conducted on the South Fork because of limited access and a short window of opportunity to take advantage of boatable flows. The nearby Middle and North Forks are more accessible and provide Class IV–V[31] whitewater recreation opportunities. PacifiCorp currently provides

[31] American Whitewater uses an American version of an international rating system to compare river difficulty. The scale has six difficulty classes: Class I (low risk, easily navigated fast-moving water with riffles, small waves, and few obstructions); Class II (novice skill level with straightforward rapids and wide clear channels, occasionally requiring maneuvering around obstacles); Class III (intermediate skill level rapids often requiring complex maneuvers to negotiate fast current and tight passages); Class IV (advanced skill level rapids that are predictable but intense and powerful, often requiring precise boat handling with a moderate to high risk of injury); Class V (expert skill level rapids that are extremely long, obstructed and violent with sometimes unavoidable large waves and holes or steep chutes with a high risk of injury); Class VI

boatable flows in excess of minimum flows for two weekends per year at its Prospect Nos. 1, 2, and 4 Hydropower Project (Project No. 2630) below the North Fork diversion dam, which attracts about 50 boaters a year.

Use of the South Fork is limited to a small number of highly-skilled kayakers (approximately 10 to 20 user days per year) because the run is challenging and technical with difficult Class V rapids. Runnable flows are generally available 21 days per year during the spring. The small number of boaters who run this reach of the South Fork enjoy the steep drops, runnable waterfalls, and scenic gorges. The first mile and a half of the run is mostly Class II but the following 2 miles have the most difficult rapids (mostly Class V). After the confluence with the Middle Fork, there is a Class IV rapid and about 3 miles of Class II–III rapids before reaching Lost Creek Lake. Prior to running the reach, boaters can access real-time flow information from the USGS public website that is recorded at the USGS gage located downstream from the diversion dam.

Between May 2014 and May 2015, PacifiCorp conducted a whitewater boating study of a 7-mile-long stretch of the South Fork from Butte Falls Prospect Bridge to the confluence of the North and South Forks in order to determine boating use and demand on the South Fork and the feasibility of providing flows for whitewater boating. Boater flow preferences were also obtained through a focus group meeting and a questionnaire survey of experienced boaters (PacifiCorp, 2015).

Use information derived from the study showed that under current project operations, the recreational boating season on the South Fork extends from approximately April 29 to May 29. Questionnaire responses showed that a small majority of boaters favored 200 cfs as the lowest acceptable flow for running the reach and 350 cfs as an optimal flow. The lowest identified minimum flow was 150 cfs with the highest optimum suggested flow being 400 cfs. Respondents reported the need for frequent portages due to numerous rocks and wood obstacles in the river preventing passage in certain areas. Study results also showed that there are no safe or readily accessible put-in or take-out locations downstream of the Butte Falls Prospect Road Bridge due to private property ownership and the steep topography of the South Fork Canyon.

Several non-recreational land and water uses occur in the project vicinity. These include hydropower production, aquatic and terrestrial habitat, open space, forest management, and timber production.

(extreme rapids that have never or rarely been attempted and are unpredictable, difficult and extremely dangerous) (American Whitewater, 2005).

3.3.5.2 Environmental Effects

Recreation

PacifiCorp does not propose to provide any measures to enhance recreation in the project reach, such as periodic minimum flows to expand whitewater boating opportunities, because only a limited number of highly skilled users would benefit from such enhancements, there are a significant number of obstacles and required portages along the reach, access to the river is restricted, and users would likely prefer to take advantage of nearby whitewater boating opportunities along the North Fork. In addition, no entity has recommended any specific enhancements related to whitewater boating. PacifiCorp, however, does propose to continue to provide for the operation and maintenance of the USGS gage in the bypassed reach to monitor minimum flows for aquatic resources (see section 3.3.2.2). PacifiCorp points out that this would also benefit whitewater boaters by allowing them to obtain real-time flow data from the USGS public website linked to the gage so that they can plan trips to coincide with favorable flows.

Oregon DFW recommends that PacifiCorp allow free public access to project lands and waters for outdoor recreation purposes including wildlife viewing, angling, and hunting. Trout Unlimited also supports the requirement of such access at the project. PacifiCorp agrees to provide free public access to project lands and waters within public safety constraints.

Our Analysis

Under proposed operations, there would be no change in recreation opportunities including whitewater boating flows. Flows of 350 cfs, considered optimal by whitewater kayakers for running the project bypassed reach, would continue to be unavailable and flows of at least 200 cfs, the minimally acceptable flow for kayaking the project reach, would continue to be available for one month in the spring (generally between April 29 and May 29). Other than the occasional use of the bypassed reach by a few skilled whitewater boaters, recreational use of the project area remains limited, amounting to less than 40 users a year. Numerous whitewater boating opportunities on the nearby North Fork appear to be meeting existing needs. Because recreation at the project is low and is expected to remain low for the foreseeable future we do not recommend any recreation enhancements. Continuing to provide for the operation and maintenance of the USGS stream gage to monitor minimum flows would benefit the few paddlers that may use the bypassed reach by providing real-time flow information .

A specific license requirement allowing free public access to project lands and waters for outdoor recreation purposes is not necessary because any license issued for the project would include a standard license requirement that provides for free public access except where necessary to protect life, health, and property.

Land Use

The location of the project within a forested area coupled with the type of activities typically associated with project operation and maintenance could raise the potential for an accidental fire to occur, especially if conditions are dry. PacifiCorp does not propose any specific fire prevention or control measures. Forest Service condition 9, stipulates that PacifiCorp develop a fire and fuels management plan prior to beginning any land disturbing activities. Forest Service condition 9 stipulates that the plan include specific measures to reduce fire danger, prevent the escape of any project-induced fire, and ensure that adequate personnel and equipment are ready to effectively respond in the event of a fire. Forest Service condition 9 also specifies that the plan identify specific protocols for monitoring fire danger and responding to any fire.

Our Analysis

Developing such a plan would minimize the risks of routine project operation and maintenance activities from causing fires and define measures for controlling any such fires before wildfires could adversely affect surrounding environments and land uses.

3.3.6 Aesthetics

3.3.6.1 Affected Environment

The project is located in a heavily forested area of the High Cascades. The local topography has been shaped by regional volcanic activity and glaciation. The visual character of the area is dominated by mixed-coniferous forest and deep, rocky, river canyons. While the landscape has been modified by the development of access roads, trails, parking areas, homes, ranching operations, timber operations and hydropower development, the overall natural appearance of the area remains intact.

The upper portion of the project, on NFS land, is primarily within a Land Management Area designated in the Rogue River National Forest Land and Resource Management Plan (Forest Plan) as a Riparian Reserve. This area contains the diversion dam, the open canal, and portions of the elevated penstock. Also within the project boundaries, but not containing project facilities, are small portions of Management Areas north of the diversion dam that are designated as either Late Successional Reserve, Big Game Winter Range, or Foreground Retention. Visual Quality Objectives (VQO's) for the Late Successional Reserve and the Riparian Reserve Management Areas call for "Retention," which requires the landscape characteristics to appear intact. Any deviations must repeat the form, line, color, texture, and pattern common to the landscape character so that they are not evident (Forest Service, 1990).

The project's hydropower generation facilities are largely restricted from public view. Public viewing of the dam would require a hike to the river bottom of the South Fork Canyon from the west of the project diversion. The impoundment upstream of the diversion dam and the intake structure are visible from the South Fork Rogue River Trail. The diversion dam and intake facilities and the small 1-acre impoundment interrupt the aesthetic consistency of the rock canyon but the impoundment also provides the effect of a reflecting pool below the bluff when viewed from the trail. Those who access NFS lands via Forest Service Road 3775800 (Imnaha Road) cross the hydropower canal on private land, but the visual character of this segment appears more natural than the surrounding private lands that have been subject to extensive timber harvesting. The project powerhouse is visible from both sides of the Middle Fork Canyon, but these viewpoints are from private land with restricted access.

The most visible feature of the project is the transmission line corridor, which runs from the powerhouse through the rural community of Prospect, and then to the Prospect Central substation. Most of the transmission line parallels the Prospect Nos. 1, 2, and 4 Hydropower Project waterway and is located on private land running perpendicular to limited public viewpoints at roads crossings.

3.3.6.2 Environmental Effects

Construction of the new spur road to the bypassed reach could cause temporary landscape disturbances that would be visible to those viewing the project area from the South Fork Rogue River Trail or Imnaha Road. The woodstave flowline, sag pipe, and laydown areas to be used for modifying these facilities would not be visible from Imnaha Road or the South Fork Rogue River Trail; therefore, modifications to these facilities would not be visible to the public. PacifiCorp proposes to implement a Vegetation Management Plan that includes measures to ensure that any project-related disturbances to the landscape within the National Forest are restored so that the Forest Service VQOs for Retention are met. Such measures would include leaving large woody material on site and re-seeding or revegetating disturbed areas so that any deviations in the landscape would repeat the form, line, color, texture, and pattern of the surrounding environment. Existing project features, including the intake structure and reservoir, the power canal, the penstock, the powerhouse, and the transmission line, would continue to be visible. No entity, including the Forest Service, has recommended any measures to address project effects on the visual landscape.

Our Analysis

PacifiCorp's proposal to implement measures in its Vegetation Management Plan to restore disturbed areas so that any landscape deviations are not evident, would ensure that Forest Service VQOs are met. Although existing project facilities would continue to be visible, their impact on the visual quality of the area would be minimal because

difficult access to most portions of the project limits opportunities to view project facilities. The project transmission lines, which are the most visible project features, will continue to follow their present route, which parallels existing waterways from the Prospect Nos. 1, 2, and 4 Project and therefore would continue to have minimal contrast with the surrounding environment.

3.3.7 Cultural Resources

3.3.7.1 Affected Environment

Section 106 requires that the Commission evaluate the potential effects on properties listed or eligible for listing in the National Register. Such properties listed or eligible for listing in the National Register are called historic properties. In this document, we also use the term "cultural resources" for properties that have not been evaluated for eligibility for listing in the National Register. Cultural resources represent things, structures, places, or archeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic. Section 106 also requires that the Commission seek concurrence with the SHPO on any finding involving effects or no effects to historic properties, and allow the Advisory Council on Historic Preservation (Advisory Council) an opportunity to comment on any finding of effects to historic properties. If Native American (i.e., aboriginal) properties have been identified, section 106 also requires that the Commission consult with interested Indian tribes that might attach religious or cultural significance to such properties.

Area of Potential Effect

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by the issuance of a proposed new license within a project's area of potential effect (APE). The APE is determined in consultation with the SHPO and is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The APE includes all lands within the existing project boundary as well as PacifiCorp's proposed boundary modifications. The existing project boundary encloses a total of 336 acres, of which approximately 38 acres are federal lands administered by the Forest Service. The remaining lands are owned by PacifiCorp. PacifiCorp proposes to revise the project to include critical access routes and exclude other areas outside of project influence. The revised project boundary would total 376.2 acres, of which 52.5 acres are lands administered by the Forest Service. The project's APE extends from the South Fork Diversion Dam on the South Fork to the Prospect powerhouse and sag pipe that joins the Prospect No. 3 tailrace with the Middle Fork Canal of the Prospect Nos. 1,

2, and 4 Project. The 6.97-mile-long project transmission line extends from the powerhouse in a westerly direction, crossing Red Blanket Creek, Barr Creek, Mill Creek, and the North Fork Reservoir just north of the town of Prospect before heading southwest to the Prospect Central substation.[32]

Culture Historic Context: Aboriginal Settlement

The project area is located along the Upper Rogue River in the eastern edge of the Pacific Northwest physiographic province and is within the traditional aboriginal homeland of the Upper Takelma Indians (Kendall in Suttles, 1990; PacifiCorp, 2016b, 2017a). Other Pacific Northwest aboriginal groups such as the Siuslawans (Cow Creek Band) also occupied the project area, along with the Klamath and Molalla Tribes (PacifiCorp, 2016b, 2017a). Groups ancestral to these tribes date back to the close of the Pleistocene Epoch, some 11,000 to 13,000 years ago and are associated with the earliest well-documented archeological manifestation in North America known as the Paleo-Indian Period. Over the millennia from Paleo-Indian times to Euro-American contact, aboriginal groups in the region developed from small isolated bands of highly mobile hunter-gatherers to larger and more settled village-based tribal societies that were differentiated by distinctive languages and cultural traditions. Tribal groups in the Pacific Northwest often interacted on the inter-tribal level in complex trading networks exchanging food and raw material such as dried salmon and obsidian. The overall economic trend among many of these tribes (but to a lesser extent among the Molalla and Upper Takelma) was an increase in the reliance of salmon and other anadromous species caught along the streams and rivers in the region. These groups supplemented their diet with a number of plant resources such as acorns, tarweed, and camas (PacifiCorp, 2016b, 2017a). Due to an upland-oriented adaptation, groups associated with the Upper Takelma and Molalla depended more on terrestrial animal resources than on salmon and other aquatic resources. However, in pre-contact times, the Upper Takelma and Molalla probably exchanged local terrestrial resources for salmon with other downriver tribes such as the Klamath and others to the south and west.

Archeological sites affiliated with aboriginal occupations range from simple surface scatters of stone artifacts (called lithic scatters) to more substantive habitation sites that contain stratified cultural deposits of lithics, burned rock, shell, and bone. Often, habitation sites will have semi-subterranean circular house pits. Special activity sites also occur in the archeological record where certain kinds of lithics were quarried or manufactured, or associated with good locations for hunting and fishing, or places

[32] The Oregon SHPO concurred with the original APE in a letter dated October 14, 2015, filed by PacifiCorp on August 25, 2016, and with PacifiCorp's revised APE, which reflected the proposed project boundary changes, by letter dated March 16, 2017, filed with the application on December 30, 2016.

designated for ceremonies and burials. The highest probability for locating archeological sites generally occurs along streams and rivers on terraces above the flood zone.

When diagnostic artifacts are present, archeological occupations can be identified to specific time frames called periods and are further sub-divided into phases, the latter of which are specific to particular geographic regions such as the Upper Rogue River area. Each archeological phase is defined by particular artifacts and in most cases by distinctively-shaped spear or arrow points which are time-sensitive. Simple lithic scatters tend to represent single occupations within a particular archeological phase. On larger sites where stratified cultural deposits exist, there may be multiple phases representing continuous or sequential occupations that span a thousand years or more.

The earliest documented archeological occupations associated with the Upper Rogue River are within the early Archaic Period (that immediately post-dates the Paleo-Indian Period) and date to the Applegate Phase (ca. 10,500 to 8,500 before present [BP]) (Pettigrew and LeBow, 1987). Archeological components associated with the Applegate Phase are characterized by distinctive square-based lanceolate spear points. Groups associated with this archeological phase probably consisted of small bands of hunter-gatherers who utilized local sources of stone for tool manufacture along with some use of obsidian which was being brought into the local area from eastern Oregon. Later occupations of hunter-gatherers in the Upper Rogue River area are associated with the Marial Phase (ca. 8,500 to 4,500 BP) and archeological components dating to this phase show an increase use in obsidian and are characterized by diverging-stemmed spear points. The next period of aboriginal occupations are associated with the Coquille Phase (ca. 4,500 to 2,200 BP) which is characterized by the appearance of broad-necked spear points, and a decline in the use of obsidian. The last archeological phase of aboriginal occupation in the Upper Rogue River area prior to Euro-American contact is the Rogue Phase (ca. 2,200 BP through Euro-American contact). This phase is represented by smaller narrow-necked projectile points (some of which are probably associated with the bow and arrow) and with lower frequencies of obsidian use. Other aspects of the Rogue Phase indicate that populations associated with these later occupations may have originated from outside the Upper Rogue River area (Connolly et al., 1994).

Ethnographic Context: Aboriginal Occupations

The region in and around project area was occupied by Native American groups associated with the Molala, Takelma, and Klamath, who spoke languages affiliated with Plateau Penutian linguistic family. At the time of Euro-American contact these groups continued a lifestyle similar to the archeological groups of the area that were in existence during the late Archaic Period. The upland areas in and around the project were exploited by these Native American groups for hunting, gathering of tubers and berries during parts of the year, and of course, in the processing of large amounts of salmon spawning and running in the Upper Rogue River basin. Incoming Euro-American

occupation and settlement increased during the first half of the 19th Century forcing aboriginal groups out of their traditional lands, and resulting in a number of treaties drafted in the 1850s and 1860s. The Molala Treaty of 1855 relocated some of the Molala people to the Grand Ronde Reservation further west in Oregon, while some of them went to the later established Klamath Reservation, which was formed in 1864 by the Klamath Lake Treaty. The Klamath were terminated as a recognized Indian tribe in 1954, but regained federal recognition in 1986; they were able to restore some of their lands within their original reservation where many members affiliated with the Klamath Tribes live today. The Cow Creek Band signed a treaty in 1853 and settled on reservation lands along Cow Creek, but were disrupted by the Rogue River Wars (1855-1856). Shortly thereafter, many of the Takelma and Cow Creek Band peoples were removed to the Grand Ronde and Siletz Reservations, the latter of which was established in 1855. However, like the Klamath Tribes, peoples affiliated with the Takelma and Cow Creek Band lost their federal recognition in 1954. The Cow Creek Band again received federal recognition in 1982 and is now established as the Cow Creek Band of Umpqua Tribe of Indians. The Siletz are also federally recognized again as the Confederated Tribes of the Siletz Indians. Indian people residing in the Grand Ronde Reservation are federally recognized as the Confederated Tribes of the Grand Ronde. These three tribal groups, the Cow Creek, Siletz and Grand Ronde, are the aboriginal groups who have closest affinity with the project area.

Culture Historic Context: Euro-American Occupations

Euro-Americans entered the interior regions of the Pacific Northwest through exploration by the turn of the nineteenth century and established fur trading posts in the early 1800s. More direct contact among indigenous Native Americans and incoming Euro-Americans centered on the attraction and exploitation of sea mammals and other fur-bearing animals along the coast and at major river systems in the region, leaving the native peoples in the Upper Rogue River relatively undisturbed until the Rogue River Wars of 1851-1856. Nevertheless, exploration parties such as the Applegate party, led by Jesse Applegate, passed through the region establishing the Applegate Trail located about 35 miles southwest of the project area (PacifiCorp, 2017a).

Euro-American homesteaders moved up the Rogue River in the 1860s and 1870s. At the same time, vast stands of virgin forests in the area were also being cut for lumber. In 1870, the Town of Deskins was established as a local commercial center on the Rogue River and was renamed Prospect in 1889 (PacifiCorp, 2016b).

Throughout the end of the nineteenth and into the early twentieth century, the town of Prospect and surrounding area prospered in varying degrees through ranching, agriculture, and timber harvesting. With the advent of the automobile, tourism also took hold and flourished in the region, especially at such nearby places as Crater Lake, which had been regularly visited by tourists earlier in the 1890s.

Along with its scenic beauty, the Upper Rogue River was also recognized as an ideal place for the development of hydroelectricity in locations where earlier water conveyance systems had been used for gold mining since the 1850s. In an effort to generate cheap electricity for the nearby Gold Hill mine, the Condon Water and Power Company (Condon) constructed the first hydroelectric plant, Prospect No. 1, and associated water conveyance features on the Upper Rogue River in 1911. Along with providing power to the mill and mining facilities at Gold Hill, Prospect No. 1 generated electricity for the growing communities of Medford, Ashland, Jacksonville, and other nearby towns. With a steady and reliable source of electricity, Prospect No. 1 was a key factor in the sustained development and prosperity of these towns, and also contributed to the region's agricultural boom (especially orchards) in the early twentieth century.

With the continuing demand for electricity in the region, Condon's successor, Copco, constructed the remaining hydropower facilities on the Upper Rogue River in the 1920s through 1940s (Prospect No. 2 [1920s], No. 3 [1930s] , and No. 4 [1940s]). In 1961, Copco, and the associated Prospect hydropower facilities, merged with other regional hydropower facilities operated by Pacific Power and Light, which later became PacifiCorp.

Along with historic structures, towns, and industrial sites, the archeological remains of Euro-American occupations occur as homestead sites, lumber camps, mining and construction areas, trash dumps, and other types of historic artifact scatters and associated foundation remains. Other associated cultural features, such as roads, trails, ditches, and cut tree stumps, often occur near or on Euro-American archeological sites.

Archaeological and Architectural Investigations

PacifiCorp conducted archaeological archival searches and surveys within the project's APE in 2014 and 2015, and again in 2016 when the APE was modified to include areas subject to proposed project boundary modifications (PacifiCorp, 2017a, 2017b). The archaeological surveys consisted of systematic pedestrian walkovers of the project's APE in all areas that were accessible by foot. All archeological resources encountered in the APE were mapped and recorded on standard Oregon State Archaeological forms, and photographed. The architecture survey was carried out in 2014 and consisted of a review of all of the Prospect No. 3 Project facilities, including written and photo record documentation. Additional non-project related architectural features were also located within the APE. The archeological and architectural work was conducted by PacifiCorp's contractor Historical Research Associates, Inc. (HRA). National Register evaluations were submitted to the Oregon SHPO for review and concurrence.

Pre-Contact and Historic Archaeological Resources Located within the APE

Five archaeological resources were located within the APE—two were isolated artifact finds (Isolate 2169-2i and Isolate 2169-3i), and three were sites (Site 35JA927, Site 35JA928, and Site 35JA122) (PacifiCorp, 2016b, 2017b). The two isolated finds consisted of a glass bottle and two tobacco tins, dating to the twentieth century. Site 35JA928 consisted of a sparse scatter of historic debris dating to the early to mid-twentieth century, and was probably related to construction of the project facilities nearby. Site 35JA927 consisted of a light lithic scatter of pre-contact age. Site 35JA122 consisted of another pre-contact lithic scatter originally located and mapped in 1980. This site consisted of 47 lithic artifacts (including some biface fragments), found on the surface and below the surface through shovel tests. Its boundaries appear to extend beyond the APE. When the site was visited by HRA archaeologists in 2016, the site boundaries were expanded beyond the original 1980 boundary. A total of 18 historic period artifacts (consisting of pull-tab cans) were also identified on the site during the 2016 visit. Of the five archaeological resources located, only Site 35JA122 was not evaluated for its National Register eligibility because the extent of the site went beyond the project's APE. The four remaining archaeological resources we determined not to be eligible for the National Register.

Architectural Resources Located within the APE

Two historic districts and two non-project features were located within the project's APE. The first historic district consists of 12 structures associated with the Prospect No. 3 Project. Of these 12 structures, nine were determined to be contributing elements (eligible for the National Register) to the Prospect Hydroelectric Project Historic District [33] and include the Prospect No. 3 Impoundment, South Fork Diversion Dam and Spillway, South Fork Diversion Dam Intake and Control Building, South Fork Diversion Dam Fish Passage, South Fork Conduit, Prospect sag pipe,[34] Prospect No. 3 Powerhouse, Prospect No. 3 Powerhouse Tailrace and Spillway, and Prospect Transmission Line. All nine structures were built in 1932. The remaining three structures associated with the Prospect No. 3 Project, the South Fork Canal Gauge Station (built in 1949), Prospect No. 3 Control House (circa 1995), and Wildlife Crossing (circa 1990), were determined to be non-contributing elements (not eligible for the National Register). The second historic district located within the project's APE is the Crater Lake Highway Historic District, which consists of the original Crater Lake Highway

[33] The Prospect Hydroelectric Project Historic District includes contributing elements from each of the four Prospect developments including the Prospect Nos. 1, 2, and 4 Project (FERC Project No. 2630), and Prospect No. 3 Project (FERC Project No. 2337).

[34] The Prospect sag pipe is also a part of the Prospect Nos. 1, 2, and 4 Project.

constructed between 1910 and 1925. In the 1960s, the modern alignment of Highway 62 replaced the Crater Lake Highway. The historic aspect of the Crater Lake Highway, known as Mill Creek Drive, extends across the northwestern sector of the APE leading north where it runs into Highway 62. Nye Ditch is another non-project feature that runs within the project's APE. The Nye Ditch is an existing unlined earthen irrigation ditch, which was originally excavated between 1920 and 1921. The Nye Ditch consists of an upper and lower portion. The upper portion was used until the 1950s but the 6.5-mile-long lower portion between Prospect and Cascade Gorge is still in use. Its National Register eligibility remains undetermined. The last non-project related architectural feature within the project's APE is Oregon Department of Transportation (DOT) Bridge 16017. The bridge was built in 1963 along Highway 62 and consists of a 167-foot-long reinforced concrete deck-girder structure that spans the Prospect Nos. 1, 2, and 4 Project flumes. Oregon DOT Bridge 16017 has been determined not to be eligible for the National Register.

Traditional Cultural Properties

During the pre-application process, consulting parties associated with the involved Indian tribes were contacted by PacifiCorp. To date no TCPs have been identified within the project's APE.

3.3.7.2 Environmental Effects

Archaeological Resources

Project effects are adverse when an activity directly or indirectly alters the characteristics of a historic property that qualifies it for inclusion in the National Register. Any adverse effects must be resolved in consultation with the Oregon SHPO.

None of the archaeological sites were found to be eligible for listing on the National Register. The eligibility of one site (Site 35JA122) has not been evaluated because its boundaries extend beyond the project's APE and is not subject to disturbance from continued operation and maintenance or proposed modifications to project facilities. PacifiCorp concludes that none of the existing or planned project activities associated with relicensing of the Prospect No. 3 Project would have adverse effects to any of the archaeological sites located within the project's APE. The Oregon SHPO concurs with this finding (See PacifiCorp letter, filed August 25, 2016, and associated Oregon SHPO letter dated July 6, 2016 in this filing), as do we. The Oregon SHPO recommends that any future potential adverse effects to the unevaluated archeological site 35JA122 be handled through PacifiCorp's HPMP. As discussed below, the HPMP includes measures to protect this site.

Traditional Cultural Properties

PaciCorp did not locate any TCPs within the project's APE. However, if any TCP were to be identified in the future, PacifiCorp would consult with the involved Indian tribes and treat or manage it, accordingly.

Architectural Resources

PacifiCorp proposes to remove and replace the woodstave water conveyance system at the head of the project and the combination of woodstave and steel sag pipe that connects the project tailrace and the Middle Fork Canal. Both sections would be replaced with similarly sized steel pipe as was removed. Both these features are contributing elements of the Prospect Hydroelectric Project Historic District. PacifiCorp concluded and the Oregon SHPO concurred that these actions would adversely affect historic properties (see PacifiCorp letter, filed August 25, 2016, and associated Oregon SHPO letter dated July 13, 2016 in this filing). We concur.

Historic Properties Management Plan

In accordance with the Advisory Council and Commission's *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects*, and to address project-related adverse effects to existing and potential historic properties, PacifiCorp developed a HPMP.[35] The HPMP includes measures for the management of the existing contributing elements associated with the Prospect Hydroelectric Project Historic District, identified archaeological resources, and other historic resources within the project's APE. PacifiCorp's HPMP also includes protocols for consulting with the Oregon SHPO, Forest Service, and involved Indian tribes, for determining National Register eligibilities for any new cultural resources and any project-related adverse effects to them, and resolving such effects. PacifiCorp's HPMP also provides additional procedures and protocols for: (1) unanticipated discovery of historic properties; (2) treatment of human remains; (3) emergency responses; (4) responses to vandalism; and (5) training of personnel for protection and maintenance of historic properties, and notification of new discoveries.

[35] On September 2, 2016, PacifiCorp submitted a draft HPMP to the Oregon SHPO for review and comment; the Oregon SHPO comments were received on October 5, 2016 (see PacifiCorp letter, filed on November 14, 2016). On February 6, 2017, Commission staff provided comments on the draft HPMP (see Commission letter issued February 6, 2017). On March 8, 2017, PacifiCorp filed a revised HPMP (dated February 2017), addressing the comments received as of March 8, 2017. PacifiCorp filed a revised HPMP on September 8, 2017, addressing additional comments from the Oregon SHPO.

The HPMP also includes specific provisions to mitigate adverse effects to the two contributing elements of the Prospect Hydroelectric Project Historic District through recordation, as recommended by the Oregon SHPO.

In a letter dated April 7, 2017, the Oregon SHPO recommended that PacifiCorp modify the HPMP to: (1) concisely and specifically describe situations in which no consultation is needed versus when consultation is needed; (2) clarify information on specific site and property information and concisely describe how PacifiCorp would manage the historic sites; (3) provide a historic structures plan (similar to the one provided in the North Umpqua Hydroelectric Project (FERC No. 1927) HPMP) that includes an in-depth analysis on the character-defining features of the architectural contributing elements in relation to permitted maintenance and maintenance requiring additional consultation; and (4) state that PacifiCorp would hold annual meetings involving the HPMP and prepare a 5-year rolling action plan.

On September 8, 2017, PacifiCorp filed a revised HPMP, responding to Oregon SHPO comments. PacifiCorp adopted all of the Oregon SHPO's recommendations, except for incorporating a historic structures plan, setting up annual meetings to discuss the HPMP, and preparing a 5-year rolling action plan. PacifiCorp states that a historic structures plan is not warranted here because: (1) the existing HPMP already includes the necessary measures to protect the project features; (2) the small size and scale of the project does not warrant a separate plan; and (3) incorporating a separate historic structures plan to the HPMP would be redundant and unduly complicate its implementation. PacifiCorp states that carrying out annual meetings with the Oregon SHPO and the other consulting groups and implementing a 5-year rolling action plan are also not necessary because of the limited scope and associated actions involving the resources and this project. PacifiCorp notes that the Prospect No. 3 Project HPMP is designed to follow and complement the HPMP for the Prospect Nos. 1, 2, and 4 Project, which contains the remaining contributing elements of the larger Prospect Hydroelectric Project Historic District.

The Forest Service's 4(e) condition 10 stipulates that PacifiCorp implement a HPMP for the project.

Our Analysis

PacifiCorp's September 2017 HPMP provides a process and protocols for addressing any potential adverse effect to historic properties for the term of a new license. The measures defined in the HPMP are suitable for the size and scope of resources affected by the Prospect No. 3 Project. Implementing the HPMP as proposed by PacifiCorp would complement the measures implemented at the Prospect Nos. 1, 2, and 4 Project to protect cultural resources. Considering the scale, size, and number of historic properties involved, we find that implementing PacifiCorp's HPMP would

adequately protect cultural resources.

Commission staff proposes to execute a PA that would stipulate that PacifiCorp implement the September 2017 HPMP. With execution of the PA, any potential project-related adverse effect to historic properties would be adequately resolved for the term of a new license.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms of the existing license. There would be no changes to the physical, biological, or cultural resources of the area.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Prospect No. 3 Hydroelectric Project's use of the South Fork for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Consistent with the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,[36] the Commission compares the project cost to an estimate of the cost of obtaining the same amount of power using the likely alternative source of power for the region (cost of alternative power). As described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for construction, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only

[36] See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

As proposed, the 7.2-MW project would generate an average of 30,186 MWh annually.

Table 19 summarizes the assumptions and economic information we use in our analysis. This information was provided by the applicant in its license application. We find that the values provided by the applicant are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs, net investment (the total investment in power plant facilities remaining to be depreciated), relicensing costs, and normal operation and maintenance costs.

Table 129. Parameters for the economic analysis of the Prospect No. 3 Hydroelectric Project (Source: staff).

Assumption	Value	Source
Period of analysis (years)	30	Staff
Term of financing (years)	20	Staff
Relicense cost	$1,885,000	PacifiCorp
Net investment cost	$5,126,907	PacifiCorp
Annual operation and maintenance	$635,458	PacifiCorp
Power value	$43.39/MWh	PacifiCorp
Interest rate	8 percent	Staff
Discount rate	8 percent	Staff

Note: All costs are in 2016 dollars.

4.2 COMPARISON OF ALTERNATIVES

4.2.1 No-action Alternative

Under the no-action alternative, the project would continue to operate as it does now. The project would have an installed capacity of 7.2 MW, and generate an average of 35,050 MWh of electricity annually. The average annual cost of alternative power would be $1,520,820, or about $43.39/MWh. The average annual project cost would be

$1,336,825, or about $38.14/MWh. Overall, the project would produce power at a cost that is $183,995, or about $5.25/MWh, less than the cost of alternative power.

4.2.2 Applicant's Proposal

PacifiCorp proposes to replace the existing woodstave flowline and sag pipe with steel pipe to reduce leakage, rupture from rockfall, and erosion. PacifiCorp estimates that this cost would be $13,778,000, or $781,950 levelized annual cost. PacifiCorp also propose to rehabilitate the vehicle access bridge over the flowline with a permanent structure following flowline replacement, at a cost of $222,000, or $13,290 levelized annual cost.

Under the applicant's proposal, the proposed project would have a total capacity of 7.2 MW, an average annual generation of 30,186 MWh, and an average annual power value of $1,309,771 ($43.39/MWh). With an annual production cost (levelized over the 30-year period of analysis) of $1,640,395 ($54.34/MWh), the project would produce energy at a cost which is $330,624, or about $10.95/MWh, more than the cost of alternative power.

4.2.3 Staff Alternative

Table 20 shows the staff's recommended additions, deletions, and modifications to the applicant's proposed environmental protection and enhancement measures and the estimated cost of each.

Based on the same total capacity and average annual generation as PacifiCorp's proposal, the project under the staff alternative would have an average annual power value of $1,309,771 ($43.39/MWh). With an annual production cost (levelized over the 30-year period of our analysis) of $1,649,615 ($54.65/MWh), the project would produce energy at a cost which is $339,844, or about $11.26/MWh, more than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 20 gives the cost for each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) costs over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost. All costs are from the license application unless otherwise noted.

Table 20. Cost of mitigation and enhancement measures considered in assessing the environmental effects of the continued operation of the Prospect No. 3 Project (Source: applicant and staff).

Environmental Measure	Entity	Capital Cost (2016$)	Annual Cost (2016$)	Levelized Annual Cost (2016$)
Geology and Soils				
1. Modify and implement ESCP, in coordination and with approval from Forest Service, to include 4(e) condition 8.	PacifiCorp, Forest Service, staff	$15,000	$5,000	$5,250
2. Prepare a plan to control erosion, dust, and slope stability prior to any future ground-disturbing, land-clearing, or spoil producing activities.	Oregon DFW	Undefinable	Undefinable	Undefinable
3. Prepare a road plan (Forest Service 4(e) condition 11) for review and approval.	Forest Service, staff	$10,000[a]	$0	$780
Aquatic				
1. Construct new auxiliary flow system in diversion canal for minimum flow releases.	PacifiCorp, staff	$477,000	$0	$37,240
2. Modify the fish ladder to ensure the safe upstream passage of all juvenile and adult trout.	Oregon DFW, Trout Unlimited	$250,000	$0	$19,520
3. Modify the fish screen to ensure the safe downstream passage of all juvenile and adult trout.	Oregon DFW, Trout Unlimited	$1,470,000	$0	$114,780
4. Extend the fish screen bypass pipe to discharge into bypass reach.	Oregon DFW, Trout Unlimited	$200,000[a]	$0	$18,910
5. Install a fish screen on the proposed auxiliary flow system, or relocate the proposed system to withdraw water from the diversion canal at a point downstream of the fish screen.	Oregon DFW	$500,000[b]	$0	$47,275
6. Submit draft fish passage facility design plans to Oregon DFW and FWS for review.	Oregon DFW	$2,000[a]	$0	$150

Environmental Measure	Entity	Capital Cost (2016$)	Annual Cost (2016$)	Levelized Annual Cost (2016$)
7. Develop and implement a post-construction hydraulic and biological monitoring plan for new fish passage facilities.	Oregon DFW	$80,000[a]	$0	$6,240
8. Implement the Fish Passage Facilities O&M Plan.	PacifiCorp, staff, Oregon DFW	$0	$5,000	$5,000
9. Update the Fish Passage Facilities O&M Plan after completion of any fish passage facility modifications required by the license.	Oregon DFW	$1,000[a]	$0	$78
10. Notify Oregon DFW and FWS of planned maintenance outages and salvage fish during outages.	PacifiCorp, staff, Oregon DFW	$0	$0	$0
11. Construct new spur road at diversion dam to enable sediment augmentation in bypassed reach.	PacifiCorp, staff	$125,000	$0	$9,760
12. Continue run-of-river operation.	PacifiCorp, staff	$0	$0	$0
13. Maintain minimum flow of 30 cfs from March 1 through July 31, and 20 cfs from August 1 through February 28 in the bypassed reach.	PacifiCorp, staff	$0	$211,050[c]	$211,050
14. Maintain a minimum flow of 30 cfs from March 1 to October 31, and 20 cfs from November 1 to February 28 in the bypassed reach.	Oregon DFW	$0	$296,093[d]	$296,093
15. Implement ramping rates of 0.2 foot per hour from May 1 through September 30, and 0.3 foot per hour from October 1 through April 30.	PacifiCorp	Minimal	Minimal	Minimal
16. Implement ramping rates of 0.2 foot per hour year round.	Oregon DFW, staff	Minimal	Minimal	Minimal
17. Operate and maintain the existing USGS gage in the bypassed reach.	PacifiCorp, staff, Oregon DFW	Included in routine O&M	Included in routine O&M	Included in routine O&M

Environmental Measure	Entity	Capital Cost (2016$)	Annual Cost (2016$)	Levelized Annual Cost (2016$)
18. Install communication link between USGS gage and the project's flow control monitoring system.	PacifiCorp, staff	$35,000	$0	$2,730
19. Report minimum flow and ramping deviations and prepare annual summary report.	PacifiCorp, staff	$0	$5,000	$5,000
20. Develop operation compliance monitoring plan that incorporates PacifiCorp's proposed operational reporting procedures and additional provisions.	staff	$10,000[a]	$0	$780
21. Conduct planned annual maintenance activities from July through September.	PacifiCorp, staff, Oregon DFW	$0	$0	$0
22. Develop a plan to eliminate or reduce failure of the water conveyance system.	Oregon DFW	Undefinable[e]	Undefinable	Undefinable
23. Notify Oregon DFW of any unanticipated or emergency situations, accidental spill, or water conveyance system failure.	Oregon DFW, staff	$0	$0	$0
24. Prepare and file reports of operational deviations and emergency incidents that describes the incident.	staff	$0	$0	$0
25. Notify Oregon DFW and FWS prior to plan maintenance outages and salvage live trout during outages.	PacifiCorp, staff, Oregon DFW	$0	$0	$0
26. Develop a trout salvage plan.	staff	$10,000[a]	$0	$780
27. Develop site-specific plans for remediation in the event of a water conveyance system failure.	Oregon DFW	Undefinable[e]	Undefinable	Undefinable
28. Annual report on water conveyance system failure, remediation, and monitoring measures.	Oregon DFW	$0	$1,000[a]	$1,000
29. Develop a fish and wildlife habitat mitigation plan.	Oregon DFW	Undefinable[e]	Undefinable	Undefinable

Environmental Measure	Entity	Capital Cost (2016$)	Annual Cost (2016$)	Levelized Annual Cost (2016$)
30. Develop a sediment and dredging plan.	Oregon DFW, staff	$10,000[a]	$0	$780
31. Pass any large woody debris collected at the diversion dam downstream into the bypassed reach.	PacifiCorp, staff, Oregon DFW	$0	$0	$0
Terrestrial				
1. Upgrade six existing wildlife crossings, construct five new large animal crossings, and construct eight new small animal crossings.	PacifiCorp, staff, Oregon DFW	$259,000	$2,000	$21,540
2. Continue existing annual inspection and maintenance program for wildlife crossings, provide photo documentation of wildlife use, and prepare an annual inspection and maintenance report and provide it to the agencies.	Oregon DFW, staff	$0	$2,000[a]	$2,000
3. Install fine mesh fencing along the base of the canal fencing and crossings.	Oregon DFW, staff	$35,000[a]	$0	$2,730
4. Install five new large animal crossings if monitoring results show no use of new crossings by deer and elk after five years.	Oregon DFW	$100,000[a]	$0	$9,455
5. Implement measures to minimize adverse interactions between the transmission line and birds.	PacifiCorp, staff, Oregon DFW	Undefinable[e]	Undefinable	Undefinable
6. Conduct O&M following the most current spatial and temporal guides for avian protection.	PacifiCorp, staff, Oregon DFW	Undefinable[e]	Undefinable	Undefinable
7. Follow the existing Agreement for Management of Birds on Powerlines among PacifiCorp, Oregon DFW, and FWS.	PacifiCorp	$0	$0	$0

Environmental Measure	Entity	Capital Cost (2016$)	Annual Cost (2016$)	Levelized Annual Cost (2016$)
8. Prepare project-specific avian protection plan that includes the measures in the existing agreement, a database of dead birds found near project facilities, and annual reports of any dead birds found near project facilities.	Oregon DFW, staff	$0	$1,000	$1,000
9. Implement the Vegetation Management Plan.	PacifiCorp, staff	$0	$3,000	$3,000
Recreation and Land Use				
Develop and implement a Forest Service-approved fire and fuels management plan.	Forest Service, staff	$7,000	$0	$367
Cultural				
Implement the HPMP (FS 4(e) condition 10).	PacifiCorp, Forest Service, staff	$0	$3,000	$3,000

[a] From staff.

[b] Staff estimate includes additional costs of modifying the canal at the auxiliary flow system weir location and constructing a fish screen with self-cleaning system, or the additional costs associated with moving the proposed withdrawal location of the auxiliary flow system to a point downstream of the existing diversion canal fish screen which would have additional costs for canal wall modifications at the new location as well as additional pipe and associated support structures for doubling the length of required pipe.

[c] Staff estimate for annual lost generation of 4,864 MWh.

[d] Staff estimate for annual lost generation of 6,824 MWh.

[e] The recommendation is non-specific with respect to what measures would be needed to meet the requirements; therefore, there is no way to determine a cost for implementing them.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPARISON OF ALTERNATIVES

In this section we compare the developmental and non-developmental effects of PacifiCorp's proposal, PacifiCorp's proposal as modified by staff, the staff alternative with all agency mandatory conditions, and the no-action alternative.

PacifiCorp's proposal and the staff alternative are similar except we recommend some additional notification and reporting procedures for operational deviations and emergency situations at the project. We also recommend that PacifiCorp implement a 0.2 foot per hour ramping rate year-round, rather than 0.2 foot per hour from May through September and 0.3 foot per hour from October through April as it proposes. We also recommend installing fine mesh screening along the project canal to prevent entrapment and drowning of small animals, monitoring of the wildlife crossings, and photographically documenting and reporting signs of wildlife use of the wildlife crossings observed during the annual fence inspections. The staff alternative includes all of the non-administrative mandatory conditions specified by the Forest Service under FPA section 4(e) (Conditions 8-11).

The environmental effects of the staff alternative and PacifiCorp's proposal are essentially the same. Both alternatives would result in short-term minor impacts from ground disturbance, vegetation removal, and disturbance of wildlife during construction. Proposed measures would minimize the adverse effects to the greatest extent practicable. Both alternatives would also result in long-term benefits to aquatic resources from increased minimum flows, ramping rate requirements, and spawning gravel augmentation; wildlife resources from wildlife crossing improvements and continuing avian protection; and cultural resources. Staff's recommended measures would improve Commission administration of the license and ensure timely identification of any needed corrective actions.

5.2 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

This section contains the basis for, and a summary of, our recommendations for issuing a new license for the Prospect No. 3 Hydroelectric Project.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative as the preferred alternative. This alternative includes elements of the applicant's proposal, all of the section 4(e) conditions, most of the resource agency recommendations, and some additional measures.

We recommend the staff alternative because: (1) issuing a new license would allow PacifiCorp to continue operating the project as a beneficial and dependable source of electric energy; (2) the 7.2 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended environmental measures would protect geology and soils, water quality, fisheries, terrestrial, threatened and endangered species, recreation, aesthetic, and cultural resources.

In the following section, we make recommendations as to which environmental measures proposed by the applicant or recommended or required by agencies and other entities should be included in any license issued for the project. In addition to the applicant's proposed environmental measures, we recommend additional staff-recommended environmental measures to be included in any license issued for the project. We also discuss which measures we do not recommend including in the license.

Measures Proposed by the Applicant

Based on our environmental analysis of PacifiCorp's proposal discussed in section 3 and the costs discussed in section 4, we recommend including the following environmental measures proposed by PacifiCorp in any license issued for the project.

- Finalize the draft ESCP filed with the license application to minimize the effects of ground-disturbing activities from the flowline and sag pipe replacements.

- Augment trout spawning gravel below the diversion dam with dredged gravel from the impoundment into the bypassed reach, which would require a new spur road extending down to the river bank.

- Continue to operate the project in a run-of-river mode.

- Increase minimum flows to the bypassed reach from 10 cfs year-round to 30 cfs from March 1 to July 31, and 20 cfs from August 1 to February 28, as measured at the existing USGS gage, or inflow, whichever is less, to improve juvenile and adult trout habitat.

- Construct an auxiliary flow system in the diversion canal to pass the higher minimum flow to the bypassed reach more reliably.

- Continue to use the USGS gage located in the bypassed reach 0.25 mile downstream of the diversion dam to monitor compliance with proposed minimum flows and ramping rates, and install a communication link between the gage and project control systems to provide real-time monitoring of project operation requirements.

- Report minimum flow and ramping rate deviations within 24 hours of discovery and file annual compliance summary reports.

- Implement the Fish Passage Facilities Operations and Maintenance Plan filed with the license application to ensure that the project's fish passage facilities are operating effectively.

- Pass large woody debris collected at the dam downstream into the bypassed reach to enhance aquatic habitat.

- To protect water quality, restrict to July through September planned maintenance activities requiring the dewatering of the water conveyance system and release of all flows to the bypassed reach.

- Notify Oregon DFW and FWS two weeks prior to planned maintenance outages and salvage live fish during outages.

- Widen the five existing 4-foot-wide wildlife crossings to 12 feet, install a total of five 12-foot-wide wildlife crossings over or under the project flowline, and construct eight 2-foot-wide wildlife crossings over the canal to enhance wildlife habitat connectivity.

- Continue to protect birds from electrocution and collision through implementation of PacifiCorp's corporate-wide Avian Protection Plan that includes measures for designing all new or rebuilt lines to meet avian-safe standards; documenting all bird mortalities, bird-caused outages, and problem nests; and notifying agencies of mortalities and remedial actions.

- Implement a Vegetation Management Plan filed with the license application to promote the establishment and maintenance of native plant communities, protect sensitive plant species, promptly revegetate disturbed areas, and control noxious weeds.

- Implement a HPMP to protect cultural resources.

Additional Staff-Recommended Measures

In addition to the measures described above, we recommend the following modifications and additional staff-recommended measures, which includes the 4(e) conditions filed by the Forest Service:

- Develop a road plan for reconstructing the vehicle access bridge over the flowline and constructing the new road spur.

- Develop a plan to guide the proposed disposal of the dredged gravel in the bypassed reach.

- Develop a plan to guide the proposed trout salvage procedures during planned maintenance activities that require dewatering of the diversion canal or fish ladder.

- Restrict ramping rates in the bypassed reach to 0.2 foot per hour year-round during adjustments to project flow control facilities or startup or shutdown of the water conveyance system;

- develop an operation compliance monitoring plan that includes PacifiCorp's stream flow monitoring provisions, with additional procedures for monitoring and reporting compliance with the project's operating requirements such as run-of-river operation and ramping rates;

- Notify the Oregon Emergency Response System within 24 hours, and the Commission within 10 days, of any accidental spills or water conveyance system failures. Notify Oregon DFW within 24 hours, and the Commission within 10 days, of any deviations from run-of-river, minimum flow, or ramping rate requirements; emergency circumstance in which fish or wildlife are being endangered, harmed, or killed by the project or its operation; take immediate reasonable action to remediate the incident or deviation from project operating requirements; and within 30 days of the initial notification

of the incident or deviation, file a detailed report with the Commission for approval that identifies: (a) the nature and chronology of the event, (b) the circumstances that led up to the event, (c) any observed or reported adverse environmental impacts resulting from the event, (d) corrective actions taken, and (e) any recommended measures to ensure similar events do not occur in the future.

- Develop a wildlife crossing plan that provides for constructing the proposed new wildlife crossings at locations selected after consultation with Oregon DFW, FWS, and the Forest Service and installing fine mesh fencing to a height of 40 inches at the base of the existing canal fencing and around the large and small animal crossings.

- Revise the existing wildlife crossing and fencing inspection program to include the new crossings and fine mesh fencing, annually inspect and maintain the wildlife crossings and fencing at the project, photographically document any signs of wildlife use of the crossings and provide Oregon DFW, FWS, and the Forest Service with annual reports of these activities, and file a report summarizing the first 5 years of deer and elk use of the new flowline crossings and including any proposals for improving the new flowline crossings or providing additional deer and elk access across the flowline.

- Develop a project-specific avian protection plan that adopts the provisions of PacifiCorp's corporate-wide Avian Protection Plan applicable to the project, considers APLIC's guidelines in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*, and includes a provision to provide annual reports of bird mortalities associated with the project to Oregon DFW and FWS.

- Develop a fire and fuels management plan that describes PacifiCorp's responsibilities for prevention, reporting, emergency response, and investigation of fires related to project operation.

The following explains the basis for the additional staff-recommended measures that would have significant effects on project economics or environmental resources, as well as the basis for not recommending some measures proposed by agencies.

Road Plan

Forest Service condition 11 requires the development of a road plan prior to reconstructing the vehicle access bridge over the flowline and constructing the new road spur. The plan would include plans and specifications, a description of all slide removals, a description of slump repairs, and identification of disposal sites for materials removed from slides.

Implementing the road plan would provide for early identification and resolution of any road stability and erosion issues like slumps and slides. Implementing the plan would minimize the potential for erosion and sedimentation along the vehicle access bridge and road spur.

In section 4, we estimate the levelized annual cost of developing the plan would be $780, and do not expect the plan to incur any additional implementation costs when compared to PacifiCorp's proposal. We conclude that the benefits of the plan would justify the cost.

Sediment Dredging and Disposal Plan

Oregon DFW recommends that PacifiCorp develop a plan to guide PacifiCorp's proposed sediment augmentation program in the bypassed reach. PacifiCorp has identified the location of the spur road that would be used to facilitate the deposition of dredged sediment along the bypassed reach and proposes a 3-month window for the time when the dredging and disposal would occur; however, PacifiCorp provides little detail on the specific location or size of the sediment disposal site along the river.

Developing a sediment and dredging plan in consultation with the agencies would allow the agencies to apply their expertise in selecting a disposal site that would maximize the transport of sediment downstream into the bypassed reach during high flows to enhance trout spawning habitat. We recommend that the plan identify the specific location and size of the disposal site along the bypassed reach stream bank.

In section 4, we estimate the levelized annual cost of developing the plan would be $780, and do not expect the plan to incur any additional implementation costs when compared to PacifiCorp's proposal. We conclude that the benefits of the plan would justify the cost.

Trout Salvage Plan

PacifiCorp proposes to salvage and relocate live trout that are stranded in the diversion canal between the diversion dam and fish screen, or in the fish ladder, during any planned maintenance activities that require dewatering of either of these facilities. However, PacifiCorp does not describe how or when it would salvage and relocate fish. Therefore, we recommend that PacifiCorp consult with the agencies and develop a trout salvage plan that includes the specific methods (e.g., electrofishing, dip-netting) and schedule for safely rescuing and relocating fish during any planned maintenance activities that require dewatering the diversion canal or fish ladder. We estimate that the levelized annual cost of developing the plan would be $780, and conclude that the benefits of defining the specific procedures to enable the safe rescue of trout would justify the cost.

Ramping

Under existing conditions, there are no ramping rate restrictions at the project. To protect aquatic resources in the bypassed reach from rapid stage changes due to the project, Oregon DFW recommends that PacifiCorp restrict ramping in the bypassed reach to 0.2 foot (2.4 inches) per hour year round. PacifiCorp instead proposes to implement ramping rates of 0.2 foot per hour from May 1 to September 30, and 0.3 foot (3.6 inches) per hour from October 1 to April 30. PacifiCorp states these rates are based on the rates and periods specified in the Prospect Nos. 1, 2, and 4 Project license, but are rounded to the nearest tenth of a foot instead of being expressed in inches.

In section 3.3.2, our analysis indicates that ramping in the bypassed reach occurs due to natural fluctuations in river flows as well as infrequently during minor operational adjustments to project flow regulating equipment such as the turbine wicket gates, PR valve, and fish screen backwater gate. Ramping also occurs infrequently whenever the water conveyance system is dewatered due to unplanned outages or scheduled maintenance activities. From 2010 to 2013, project-induced ramping in the bypassed reach occurred about 5 times per year. Although some turbidity increases and mortality of fry and juvenile trout likely occurs due to the current ramping practices, the population in the bypassed reach shows no signs of long-term adverse effects due to ramping given that trout densities in the bypass reach compare favorably to the reach of the South Fork outside of the project's influence. Therefore, either Oregon DFW's recommended or PacifiCorp's proposed ramping rates would provide only a minor benefit to the bypassed reach trout population by reducing turbidity levels and stranding risks of trout fry and juveniles, with the greater benefit coming from Oregon DFW's more-restrictive ramping rate.

Although there would be only minor incremental benefits from implementing Oregon DFW's recommended 1.2 inch per hour more-restrictive ramping rate from October 1 to April 30, the project can meet such a restrictive rate without incurring significant additional costs. Therefore, we conclude that the minor incremental benefit to aquatic resources is warranted.

Operation Compliance Monitoring Plan

Currently, PacifiCorp monitors compliance with minimum flows at the existing USGS gage no. 14332000 in the South Fork bypassed reach located about 0.25 mile downstream of the diversion dam. PacifiCorp proposes to continue to use the USGS gage for minimum flow compliance monitoring, but would also now use it to monitor compliance with its proposed ramping rates. PacifiCorp also proposes to install a communications link between the USGS gage and PacifiCorp's control systems at the diversion dam so that it can detect and respond to minimum flow or ramping rate deviations in real time.

In order to document compliance with the proposed minimum flows and ramping rate operational requirements, PacifiCorp proposes to notify the Commission of project-induced deviations from required minimum flows and ramping rates within 24 hours of discovery, and to prepare by January 31 of each year, an annual report of deviations for the preceding October 1 to September 30 water year.

PacifiCorp's proposed compliance monitoring gage would be suitable for monitoring compliance with the minimum flow and ramping rate requirements, but its proposal to only provide a written report of operational deviations once per year in an annual report is insufficient for the Commission to track compliance with the terms of the license in the short term. Additionally, PacifiCorp does not provide a means to monitor and document compliance with run-of-river operation, nor does it explain how it would distinguish between natural and project-induced ramping events. In order for the Commission to track and enforce the operational requirements of the license, PacifiCorp would need to provide written reports of operational deviations within 30 days, provide more information on how it would monitor compliance with run of river operation, and explain how it would distinguish between natural and project-induced ramping events.

Therefore, we recommend that PacifiCorp develop an operation compliance monitoring plan that includes the following:

(1) a provision to maintain a log of project operation;
(2) a description of how PacifiCorp would document compliance with run-of-river, minimum flow, and ramping rate requirements of the license,

including a description of how it would distinguish between natural and project-induced ramping events;

(3) a provision to notify Oregon DFW within 24 hours, and the Commission within 10 days, of any deviations from project operating requirements (i.e., minimum flows, project-induced ramping rates, run-of-river operation); and file a detailed report of any such deviations within 30 days of the event that identifies: (a) the nature and chronology of the event, (b) the circumstances that led up to the event, (c) any observed or reported adverse environmental impacts resulting from the event, (d) any corrective actions taken, and (e) any recommended measures to ensure similar events do not occur in the future; and

(4) a provision to send to Oregon DFW and U.S. Fish and Wildlife Service by January 31 of each year, an annual compliance summary report for the preceding October 1 to September 30 monitoring year (and provide copies to the Commission upon request).

In section 4, we estimate the levelized annual cost of developing the plan with staff's recommended provisions would be $780, and conclude that the compliance benefits justify the cost.

Notification and Reporting on Hazardous Substance Spills and Emergency Situations

Oregon DFW recommends that PacifiCorp notify the Oregon Emergency Response System within 24 hours of any hazardous substance spill or discharge from the project water conveyance system or other emergency event, with a verbal report on location, duration, and effect on water quality and aquatic life. Oregon DFW also recommends that PacifiCorp take appropriate action to prevent further loss if at any time unanticipated circumstances or emergency situations arise in which fish or wildlife are being endangered, harmed, or killed by the project or its operation; and in such cases notify Oregon DFW within 24 hours and comply with restorative measures required by the agencies. We recommend that PacifiCorp provide the recommended notifications, but also recommend that PacifiCorp notify the Commission within 10 days of any such incidents, and note that any corrective actions that PacifiCorp would take at the recommendation of the agencies and that would result in long-term changes to project facilities or operations would require prior Commission approval.

Further, in the event of any incident described above, we also recommend that PacifiCorp file with the Commission, a detailed report within 30 days of the incident that identifies: (a) the nature and chronology of the event, (b) the circumstances that led up to the event, (c) any observed or reported adverse

environmental impacts resulting from the event, (d) any corrective actions taken, and (e) any recommended measures to ensure similar events do not occur in the future. We estimate there would be minimal additional costs for these reporting requirements and conclude that the benefits would be justified.

Wildlife Crossing Plan

PacifiCorp proposes to enlarge the six existing wildlife crossings over the project canal from 4 to 12 feet, install a total of five 12-foot-wide wildlife crossings either over or under the project flowline when it replaces the woodstave pipe with steel, and construct eight 2-foot-wide small wildlife crossings over the canal. PacifiCorp would select the locations of the new crossings in consultation with Oregon DFW. PacifiCorp would allow Oregon DFW 15 days to review and comment on the proposed locations of the flowline and canal wildlife crossings. Oregon DFW recommends installing the proposed crossings and enlarging the existing crossings as proposed, but requests that they and the Forest Service and FWS be provided 30 days to review and comment on the locations of the new crossings.

We recommend that PacifiCorp also consult with the Forest Service and FWS in selecting the locations because of their management responsibilities and expertise that would maximize the benefits to wildlife. Selecting the 2-foot-wide crossing locations in consultation with the agencies would improve the likelihood of their use by wildlife. Similarly, while the designs for wildlife underpasses and overpasses along the flowline have been developed based on their use at the Prospect Nos. 1, 2, and 4 Project, the type and locations have not been finalized. Consulting with the above agencies on the final design (over or under) and locations of the flowline crossings would improve the likelihood of their use by deer and elk for similar reasons noted for the small animal crossings. The additional consultation time sought by Oregon DFW would not unduly burden the selection process and implementation of the measures. Further, allowing the agencies 30 days to review and comment on PacifiCorp's proposed locations would allow the agencies to inspect the locations in the field if desired. Therefore, we recommend that PacifiCorp file a wildlife crossing plan that describes the locations of the canal crossings and how the agencies' concerns are accommodated by the plan.

PacifiCorp would annually inspect and maintain the wildlife crossings and canal fencing but is opposed to developing a written inspection and maintenance plan recommended by Oregon DFW because a license requirement requiring it to maintain the crossings and fencing is sufficient. Following the 10(j) meeting Oregon DFW clarified that the existing inspection and maintenance program would be an adequate, low-cost means to monitor maintenance and use of the

wildlife crossings.

Pursuant to Article 406 of the current license, PacifiCorp developed an annual inspection and maintenance program that requires inspecting the crossings and fencing in April of each year to assess their condition and recommend remedial measures. The approved plan includes a checklist form for operation personnel to record the condition of the fencing and canals and criteria by which to judge when remedial actions are needed, and reporting requirements. Continuing to implement this program would ensure detection and repair of any problems with the crossings and fencing in a timely manner. The program would need to be updated to include the new crossing structures and fencing (discussed below), otherwise implementing the program would require little additional effort by PacifiCorp.

Oregon DFW also recommends that PacifiCorp report any observed wolf use of the crossings and photographically document signs of wildlife use (direct observation, tracks, scat, hair, or other discernable signs) when conducting the annual inspection of the crossings and fencing. The information would document use of the wildlife crossings and improve the agencies' knowledge of wolf use of the project area. Such efforts could easily be done at little or no cost to PacifiCorp as part of their annual inspection and maintenance program.

We recommend that PacifiCorp file a revised Annual Maintenance Program for Wildlife Crossings and Fencing that includes the new crossings and small animal fencing, a provision to provide photographic documentation of any observed animal signs (including wolf crossings) of use of the wildlife crossings, and a provision to file an annual report by January 30 of each year with Oregon DFW, FWS, and the Forest Service. The Commission does not need a copy of the reports, unless specifically requested by Commission staff. We find the benefit of these efforts to be worth the small additional cost of updating the program and filing the annual report with the agencies ($2,000).

Installation of Fine Mesh Fencing to Protect Small Animals

To prevent small animals from passing through the existing 2-inch by 4-inch spacing in the canal fencing where they could be entrapped and drown in the project's canal, Oregon DFW recommends that PacifiCorp install fine mesh (hardware cloth) fencing to a height of 40 inches at the base of the existing canal fencing and along the existing and new wildlife crossings.

Our analysis in section 3.3.3 indicates that there is no site-specific data on entrapment and drowning rates of small animals in the project's canal, nor any indication that the existing level of small animal drownings in the canal is

adversely affecting most small animal populations in the project area. The studies cited by Oregon DFW of small animal mortality in irrigation canals in Europe show high losses, but the applicability of those studies to the project is unknown. However, as Oregon DFW points out, two sensitive frog species (Cascades frog and coastal tailed frog) are known to occupy the project area and have been experiencing population declines throughout their range. Both of these species are known to occur in the South Fork and may become entrapped in the canal while traveling through the project area during dispersal or seasonal movements between habitat patches. A study by Cunnington et al. (2014) suggests that PacifiCorp's proposed small animal crossings would be ineffective for safe passage of small animals across the canal without fine mesh fencing to prevent them from entering the canal elsewhere along its alignment. Given that the frog species populations are relatively small and declining, installing the fine mesh fencing to prevent canal entrapment and direct the frogs to the new small animal crossings would likely benefit these species.

The canal is 5,805 feet long, and fencing both sides and the canal crossings would require about 11,610 feet of additional fine mesh fence, which we estimate would cost $35,000 for materials and installation, or a levelized annual cost of $2,730. We find that the benefits of protecting the sensitive Cascades frog and coastal tailed frog would justify this cost. Therefore, we recommend that PacifiCorp install fine mesh fencing along both sides of the canal fence and wildlife crossings, and consult with Oregon DFW when selecting the specific type of fencing material.

Avian Protection

Raptors and other large birds can be injured or killed by electrocution or collision with transmission lines. To protect birds in the project area, Oregon DFW recommends that PacifiCorp follow the APLIC guidelines in constructing, rebuilding, or retrofitting any transmission line poles, and submit to Oregon DFW and FWS annual reports on avian mortalities.

As discussed in section 3.3.3, *Terrestrial Resources*, PacifiCorp applies its current corporate-wide Avian Protection Plan to the Prospect No. 3 transmission line. Oregon DFW's recommended measures are consistent with PacifiCorp's current corporate guidelines. However, PacifiCorp's corporate program includes measures that are not applicable to the project. Assurance for continued raptor protection at the project can only be provided by a requirement for raptor protection in any license issued for the project. Therefore, filing a project-specific avian protection plan that incorporates the applicable provisions of the corporate program would address the agency's recommendations and would require little or no additional cost or effort on PacifiCorp's part. We find that the benefits of the

project-specific avian protection plan would justify the little or no additional cost.

We recommend that PacifiCorp develop and implement an avian protection plan, in consultation with Oregon DFW and FWS, that: (1) adopts the provisions of PacifiCorp's existing corporate-wide Avian Protection Plan that apply to the project; (2) considers APLIC's guidelines in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*; and (3) includes a provision to send annual reports on avian mortality associated with the project to Oregon DFW and FWS and file copies with the Commission upon request.

Fire and Fuels Management Plan

As discussed in *Our Analysis* in section 3.3.5.2, there is a risk that project operation and maintenance activities could cause a fire. PacifiCorp does not propose any fire prevention or management measures to mitigate this risk. Forest Service condition 9 stipulates that PacifiCorp prepare and implement, after Commission approval, a Forest Service-approved fire and fuels management plan that would include specific measures to reduce fire danger, prevent the escape of any project-induced fire, and ensure that adequate personnel and equipment are available to effectively respond in the event of a fire. Preparing and implementing a fire and fuels management plan, as stipulated by condition 9, would ensure that adequate fire prevention and response measures are taken. Preparing the plan would have an annual levelized cost of about $367 and would be worth the benefit of ensuring the protection of life, property, and environmental resources.

Measures Not Recommended by Staff

Staff finds that some of the measures recommended by other interested parties would not contribute to the best comprehensive use of South Fork water resources, do not exhibit a sufficient relationship to project environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures.

Erosion and Sediment Control Plans for Future Actions

Oregon DFW recommends that PacifiCorp develop site-specific erosion control plans 90 days before commencing any land-clearing, spoil-producing, or ground-disturbing activities at the project.

PacifiCorp proposes, Forest Service condition 8 stipulates, and we recommend that PacifiCorp consult with Oregon DFW and the Forest Service and finalize the proposed ESCP for the flowline, sag pipe, and vehicle access bridge

replacements, and new spur road construction to minimize the potential for erosion and sedimentation from these major ground-disturbing activities. However, the need for additional erosion control plans would be based on, among other things, the nature of the activity, the extent of ground disturbance, and the likelihood that the activity would cause soil erosion. Because these activities are as yet unspecified, it would be impossible to determine the extent of ground disturbance associated with the activities and the potential for soil erosion until such activities are proposed.

Minimum Flows

Under the existing license, PacifiCorp maintains a 10-cfs minimum flow year-round in the bypassed reach. To enhance aquatic habitat for rainbow and cutthroat trout, PacifiCorp proposes to maintain a 30-cfs minimum flow from March 1 to July 31, and 20-cfs minimum flow from August 1 to February 28. Oregon DFW recommends the same flow regime except for the period of August 1 to October 31 when it recommends a 30-cfs minimum flow (an additional 10 cfs over PacifiCorp's proposal).

Our analysis in section 3.3.2, *Aquatic Resources*, indicates that the additional 10 cfs during this 3-month period would not affect trout spawning habitat, and when compared to PacifiCorp's proposal would have only minor effects on both species' fry habitat (reduction of 3 percentage points), cutthroat juvenile habitat (increase of 4 percentage points), and rainbow trout juvenile and adult habitat (increase of 1 percentage point). The additional 10-cfs increase under Oregon DFW's recommendation would have the greatest effect on cutthroat trout adult habitat, ranging from a 15- to 16-percentage point increase during these months when compared to PacifiCorp's proposal. In section 4, we estimate that the increased levelized annual cost of the 10-cfs higher minimum flows would be $85,043 over that of the cost of PacifiCorp's proposed minimum flows.

Although Oregon DFW's recommended minimum flows would increase cutthroat trout habitat by 15 to 16 percentage points compared to PacifiCorp's proposal, cutthroat trout are rare in the bypassed reach, comprising only 5 percent of the total trout observed during fisheries surveys. In addition, as noted above, the additional 10-cfs minimum flow would provide minor increases, if any, in trout habitat for the other life stages evaluated by the model, including rainbow trout, which are the dominant trout species in the bypassed reach (comprising 91 percent of the total observed during fisheries surveys). Therefore, we conclude that the additional habitat gains from providing a flow of 30 cfs during the months of August, September, and October as recommended by Oregon DFW would not justify the additional annualized cost of $85,043. For this reason, we do not recommend Oregon DFW's recommended minimum flows.

Fish Ladder

To provide upstream fish passage at the diversion dam, PacifiCorp proposes to continue to operate and maintain the existing concrete pool and weir fish ladder.

Oregon DFW and Trout Unlimited recommend that PacifiCorp continue to operate and maintain the fish ladder, but also recommend that it modify the fish ladder to ensure that it complies with Oregon DFW's recommended criteria for passage of native migratory fish across the full range of project operating conditions. This would include: vertical slots that are at least 12 inches wide, pool to pool surface water differentials (i.e., jump height) not exceeding 0.75 foot (9 inches), pool depths of at least 2 feet, velocities within the vertical slots not exceeding 8 fps, and maximum energy dissipation within pools of 4 foot pounds per second per cubic foot.

We estimate that the levelized annual costs of Oregon DFW and Trout Unlimited's recommended modifications to the fish ladder would be $19,520

Our analysis in section 3.3.2, *Aquatic Resources,* indicates that the existing ladder passes trout between 110 mm and 207 mm fork length, which represents the majority (73 percent) of trout sampled in the bypassed reach in 2014. PacifiCorp's studies showed that the upstream travel time through the ladder is about one day or less for most upstream migrants. Oregon DFW and Trout Unlimited's recommended fishway modifications would improve upstream passage effectiveness for smaller size classes of trout (i.e., less than 110 mm) and may reduce upstream passage travel time for larger trout. However, because non-anadromous trout less than 100 mm have not been documented using the ladder and do not typically make long upstream migrations, and the bypassed reach predominately consists of larger size classes of trout (i.e., greater than 110 mm) and upstream travel time for these larger trout is already about one day or less, the incremental benefits of the recommendation to the trout population are not worth the costs. Therefore, we do not recommend any modifications to the fish ladder to improve upstream fish passage.

Fish Screen System

To prevent fish entrainment into the powerhouse and provide downstream passage past the diversion dam, PacifiCorp proposes to continue to operate and maintain the existing fish screen within the diversion canal. Oregon DFW and Trout Unlimited recommend that PacifiCorp modify the existing screen to ensure that it complies with Oregon DFW's recommended fish passage criteria.

Our analysis in section 3.3.2, *Aquatic Resources,* indicates that the fish screen generally prevents trout that are 60 mm or greater from entering the powerhouse and instead pass downstream to the bypassed reach. However, trout fry less than 60 mm pass through the screen and are likely entrained into the powerhouse and are permanently lost from the South Fork population due to turbine mortality or subsequent discharge into the Middle Fork Canal after exiting the powerhouse. Under these current downstream passage conditions, the trout density of the bypassed reach is 0.072 fish/m^2, which is comparable to that of the unregulated reach of the South Fork upstream of the diversion dam (0.043 fish/m^2). Replacing the existing fish screen with Oregon DFW's recommended screen would reduce entrainment losses of predominately fry-sized trout less than 60 mm; however, because the trout density of the bypassed reach is already comparable to that of the unaffected upstream reach, we do not expect a substantial increase in the trout density of the bypassed reach as a result of the reduced entrainment provided by the recommended screen.

In section 4, we estimate that the levelized annual cost of Oregon DFW and Trout Unlimited's recommended screen, including the costs for lost power generation during removal of the existing screen and construction of the new screen, would be $114,780. We conclude that because the trout density of the bypassed reach is not likely to substantially increase as a result of installing and operating the recommended screen, the $114,780-annual cost is not justified. Therefore, we do not adopt Oregon DFW and Trout Unlimited's recommendation for a new fish screen at the project under the staff alternative.

Fish Screen Bypass Pipe

The existing fish screen and bypass system passes screened fish into an 18-inch-diameter pipe that discharges to pool 6 of the fish ladder. PacifiCorp proposes to continue to operate the bypass pipe under its current configuration. Oregon DFW and Trout Unlimited recommend that PacifiCorp modify the bypass pipe so that it discharges directly to the South Fork outside of the fish ladder.

As discussed in section 3.3.2, *Aquatic Resources,* although the results of PacifiCorp's biological evaluation of the downstream screen and bypass system were likely affected by the use of hatchery trout that didn't appear to be inclined to migrate, the results indicate that trout did not move quickly through the fish ladder once they exited the bypass pipe, with a median travel time between the pipe terminus and the ladder entrance (exit for downstream migrants) of 195 hours (8 days). Therefore, under existing conditions naturally produced trout passing downstream through the fish screen and bypass system are likely experiencing some delay when attempting to exit the fish ladder and reenter the South Fork below the dam. Nevertheless, as we said above in our analysis and

recommendations for the fish screen, the trout density of the bypassed reach is already comparable to the unaffected reach upstream of the diversion dam. Therefore, any modifications to the bypass pipe to reduce downstream passage delay and increase passage of trout fry downstream to the bypassed reach would likely result in a minimal increase in the trout density of the bypassed reach. In section 4, we estimate that the levelized annual cost of the recommended bypass pipe modifications would be $18,910, and conclude that the minor benefits of the measure would not justify the cost. Therefore, under the staff alternative, we do not recommend any modifications to the bypass pipe.

Fish Screen on Auxiliary Flow System

To more reliably pass minimum flows to the bypassed reach, PacifiCorp proposes to construct an auxiliary flow system in the diversion canal about 150 feet downstream of the canal intake at the diversion dam that consists of the following new facilities: (1) a 3-foot-wide automated downward-opening gated weir installed in the left canal wall at the existing canal overflow section; (2) an 8-foot-long by 5-foot-wide concrete plunge pool; and (3) a 130-foot-long, 2-foot-diameter pipe extending from the concrete plunge pool to a discharge point in the South Fork adjacent to the fish ladder entrance.

Water would be drawn over the weir into the plunge pool, flow through a 90-degree long-radius bend in the pipe, and discharge to the river adjacent to the fish ladder entrance to enhance attraction flows into the fish ladder. The pipe terminus would be situated about 3 feet above the water surface elevation of the bypassed reach under minimum flow levels.

Because the auxiliary flow system weir would be constructed in the diversion canal upstream of the fish screen, fish passing downstream through the canal could be drawn over the weir and into the system. For this reason, PacifiCorp designed the pipe segment of the system to meet Oregon DFW's criteria for safe downstream fish passage. However, in Oregon DFW's March 1, 2018 filing, it states that all of the components of the system do not meet its recommended criteria and raises several issues with the proposed configuration that it believes would adversely affect any fish entrained into the system. The issues raised by Oregon DFW include the following: (1) fish dropping a distance of up to 4 feet over the weir into the plunge pool would be disoriented when they enter the turbulent conditions within the pool; (2) adult trout could reside in the plunge pool and prey on disoriented fish as they pass over the weir and into the plunge pool; (3) fish passing from the plunge pool into the pipe could be injured when they strike the outside edge of the pipe at the transition between the two structures; (4) during low flow conditions, the pipe would not be full and water flowing through the bend in the pipe could rock back and forth, causing fish to flip

over and be injured when they strike the interior wall of the pipe; (5) fish exiting the pipe to the bypassed reach during minimum flow levels would fall 3 feet and impact the water surface, causing injury; (6) adult trout could be falsely attracted to water flowing from the pipe exit section and jump at the pipe, causing injury when they strike the pipe exterior; and (7) adult trout could set up feeding stations in the bypassed reach at the pipe terminus and prey on smaller fish as they exit the pipe.

To address most of these concerns, Oregon DFW recommends that PacifiCorp prevent fish entrainment into the system by either installing a fish screen on the weir that meets its recommended screening criteria, or relocating the weir so that it withdraws water from the diversion canal at a point downstream of the existing canal fish screen.

In section 3.3.2, our analysis indicates that the pipe component of the auxiliary flow system would likely provide safe passage for any fish that enter the pipe, but there is no way to definitively determine whether fish would safely pass through the entire system (including through the plunge pool and pipe exit) unless PacifiCorp monitored fish passage through the system using live fish after it is completed and put into operation. However, our analysis also indicates that fish entrainment into the diversion canal is nevertheless low, and under normal operating conditions only a portion of any fish in the canal would be drawn over the weir and into the auxiliary flow system. This is because the system would typically only withdraw a small proportion of the total canal flow (i.e., between about 1.5 and 18 percent depending on minimum flow requirements and inflow conditions), while the majority of flow and fish passing downstream would continue past the auxiliary flow system weir and through the diversion canal fish screen and bypass system. Therefore, because there is a low potential for fish to be entrained into the auxiliary flow system, there would be only minor passage benefits from requiring PacifiCorp to either install a fish screen on the system, or to move it so that it withdraws water from a location downstream of the existing diversion canal fish screen.

In section 4.3, we estimate the levelized annual costs of either of Oregon DFW's recommended screening alternatives for the auxiliary flow system would be $47,275, and conclude that the minor passage benefits of excluding fish from entering the auxiliary flow system would not justify the cost. Therefore, we do not recommend them in the staff alternative.

Fish Passage Facility Design and Post-construction Monitoring Plans

Oregon DFW recommends that PacifiCorp submit draft design plans for any new or modified fish passage facilities to Oregon DFW and FWS for review

and approval prior to filing them with the Commission. Oregon DFW also recommends that PacifiCorp develop a post-construction monitoring plan and schedule, with provisions for a hydraulic and biological evaluation of any new or modified fish passage facilities to ensure that the facilities operate within their design criteria and are effective at passing fish.

As stated above, we are not recommending any modifications to the project's existing fish passage facilities under the staff alternative. In addition, although PacifiCorp's proposed auxiliary flow system could affect downstream passage conditions for trout, our analysis in section 3.3.2 indicates that any project effects on downstream passage would be minor. Therefore, there would be minimal benefits from requiring PacifiCorp to prepare and submit fish passage facility design plans to the agencies for review and approval, or to conduct any post-licensing hydraulic or biological evaluations of the project's fish passage facilities. We conclude that the minor benefits would not justify the levelized annual cost of $150 for the design-review process or $6,240 for the post-licensing hydraulic and biological evaluations, and we do not recommend these measures.

Updates to Fish Passage Facilities Operation and Maintenance Plan

Oregon DFW recommended that PacifiCorp implement its proposed Fish Passage Facilities Operation and Maintenance Plan filed with the license application; however, Oregon DFW also recommended that PacifiCorp consult with Oregon DFW and FWS and update the plan after completion of any modifications to fish passage facilities required by the license.

In the draft EA, we recommended that PacifiCorp implement the plan as filed, and noted that the plan already included a provision to be updated after PacifiCorp completed any modifications to fish passage facilities required by the license. Although we were not recommending any modifications to project facilities for the purpose of improving fish passage conditions in the draft EA, we were recommending that PacifiCorp construct its proposed auxiliary flow system within the existing footprint of the fish ladder. Because the proposed modifications to the ladder could affect maintenance of the fish ladder, we recommended that PacifiCorp update the plan as recommended.

However, as we said, PacifiCorp is now proposing and we are recommending in the staff alternative, a revised auxiliary flow system that would no longer require modifications to the fish ladder. Therefore, we are no longer recommending any modifications to the project's existing fish passage facilities. Although the new proposed auxiliary flow system could function as a downstream fish passage facility if any trout entrained into the diversion canal are drawn over the weir and into the system, the primary purpose of the auxiliary flow system is to

pass flows from the diversion canal to the bypassed reach to meet minimum flow requirements. PacifiCorp would need to regularly inspect and maintain the auxiliary flow system to ensure that it is operating to meet this purpose. For these reasons, there is no justification at this time for requiring PacifiCorp to update the plan after license issuance as recommended by Oregon DFW.

Water Conveyance System Monitoring and Maintenance

Oregon DFW recommends that PacifiCorp develop several plans to address the potential for future failures of the project's water conveyance system. These include a monitoring and maintenance plan with provisions for installing technology that would enable the early detection of water conveyance system failure and protocols for stopping flow within an hour of such failure, a remediation plan to guide remediation work after a failure occurs, and an environmental damage action plan to ensure compensation for all short- and long-term loss of fish and wildlife individuals and habitat caused by all unanticipated project-related events that cause environmental damage.

As noted above, we are already recommending that PacifiCorp replace the aging woodstave flowline and sag pipe, which would significantly reduce the potential for a water conveyance system failure. If a failure were to occur, PacifiCorp's existing control systems would enable it to quickly detect the failure, shut off flow diversion, and cease the unintended discharge. Oregon DFW's recommendation is too vague to determine what additional measures it seeks, the benefit of the measures, or the cost. Therefore, continued operation of the project's existing automated control systems coupled with the proposed replacement of the woodstave components of the water conveyance system would adequately minimize any potential adverse effects due to a failure. There would be minimal benefits from requiring PacifiCorp to develop and install any additional unspecified technology to enable it to detect and respond to a water conveyance system failures.

Additionally, the Commission has the authority to ensure that safety is maintained at all licensed projects, including directing the steps licensees must take to avoid or respond to a structural failure of the project. Part 12 of the Commission's regulations details the Commission's dam safety requirements, including Commission and licensee responsibilities with regard to project safety, incident reporting, records maintenance, emergency actions, inspections, quality control, monitoring, and incident response. These requirements would continue to provide the necessary forum for ensuring adequate oversight over the integrity of the project structures, including the project's water conveyance system; therefore, developing a separate plan for monitoring, maintaining, and mitigating any future failures of the project's water conveyance system would be unnecessary.

In regard to filing plans for assessing environmental damage and ensuring compensation for short-term and long-term loss of individuals and habitat caused by unanticipated project-related events, the FPA does not impose a no-net-loss requirement or require full replacement for lost resources. Therefore, we have no justification for requiring any compensatory mitigation to address the loss of fish and wildlife resources or habitat due to a future potential water conveyance system failure.

Additional Wildlife Crossings

Oregon DFW recommends that PacifiCorp install up to five additional large wildlife crossings if the monitoring results do not show that deer and elk are using the project's wildlife crossings by the fifth year following license issuance.

Monitoring deer and elk use for five years after the new crossings are operational would show whether deer and elk are successfully crossing the flowline. However, it is premature to require up to five more crossings if deer and elk are not observed using the crossings. We estimate it would cost $100,000 ($9,455 annualized) to construct up to five additional crossings as recommended by Oregon DFW. A better and more efficient approach is to monitor the crossings as recommended by Oregon DFW, and then report the results with any proposals to either modify or add new crossings. Doing so permits staff to consider the monitoring results and potentially find a more efficient solution to any identified problem. Therefore, we are recommending that PacifiCorp monitor deer and elk use for five years following the construction of the new crossings and file a report summarizing the monitoring results with proposals, if any, for adding new crossings or modifying the existing crossings to ensure deer and elk can cross the flowline.

License Term

Oregon DFW recommends that the term of any license issued for the project be no longer than 30 years. A determination on the license term would be made in any order issuing a license and according to Commission policy on establishing license terms.

5.3 UNAVOIDABLE ADVERSE EFFECTS

Continued operation of the fish screen would continue to cause minor entrainment losses of trout when the screen is in the screening position, particularly in fry-sized fish less than 60 mm. There would be additional minor losses of all size classes of trout when the screen is rotated out of the screening

position during cleaning cycles or plane-mode operation during icing or heavy debris loading, but these events are limited to about 5 percent of the time. Any fish entrained into the diversion canal that are not screened by the project's fish screen and bypass system would be routed through the Prospect No. 3 Project powerhouse to the Middle Fork Canal. From the Middle Fork Canal, the fish would be conveyed through the Prospect Nos. 1, 2, and 4 Project water conveyance system into North Fork Reservoir where they may take up residence, be spilled into the North Fork during periods of high flows or maintenance shutdowns, or be entrained into one or multiple of the Prospect Nos. 1, 2, and 4 Project powerhouses. Any fish that are spilled over the North Fork diversion dam or survive passage through both projects' powerhouses would be discharged to the North Fork and would be permanently lost from the South Fork in the project area.[37] There is a minor potential for some fish entrained into the diversion canal to be passed into the auxiliary flow system and injured during downstream passage through the system into the bypassed reach.

For those fish that are effectively screened and routed into the diversion canal bypass system, there would be some delay in exiting the ladder and entering the bypassed reach. Some smaller trout less than 110 mm fork length would likely be unable to successfully pass upstream via the fish ladder, and larger fish would likely continue to experience some minor passage delay when ascending the ladder. Individual trout fry may experience stress or mortality due to short-term turbidity increases, stranding, or displacement during ramping associated with dewatering of the water conveyance system for maintenance activities. Implementation of ramping rate restrictions would minimize adverse effects on trout fry. The overall long-term effects of these project activities on the trout population, however, would continue to be minimal.

Replacing the woodstave flowline and sag pipe with steel pipes would require clearing 0.40 acre of second-growth forest. Continued project O&M would result in the maintenance of low-growing vegetated wildlife habitat around and under project facilities. The water conveyance system would be a minor impediment to large animal movement through the project area, and the open waterways would be a minor drowning hazard for small animals.

[37] The South Fork and North Fork Rogue River combine at Lost Creek Lake; therefore, some trout that survive downstream passage through both projects could reenter the lower portion of the South Fork at Lost Creek Lake. The fish would not be able to move back upstream into the project area because of existing natural passage barriers in the South Fork bypassed reach.

5.4 SUMMARY OF SECTION 10(j) RECOMMENDATIONS AND 4(e) CONDITIONS

5.4.1 Recommendations of Fish and Wildlife Agencies

Under the provisions of section 10(j) 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, or enhancement of fish and wildlife resources affected by the project. In response to our Ready for Environmental Analysis notice, Oregon DFW submitted 33 recommendations pursuant to 10(j) on May 12, 2017.

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.

In the draft EA, we determined that 16 of the 33 recommendations filed by Oregon DFW pursuant to section 10(j) on May 12, 2017, were within the scope of section 10(j). Of the 16 recommendations that we considered to be within the scope of section 10(j), we determined that seven recommendations in whole and two in part may be inconsistent with the purpose and requirements of the FPA or other applicable law. We sent a letter to Oregon DFW on October 18, 2017, informing them of the inconsistencies.

To try to resolve the inconsistencies, Commission staff conducted a 10(j) meeting with Oregon DFW in Salem, Oregon on January 12, 2018. We discussed the following recommendations: (1) fish ladder modifications, (2) screen and bypass system modifications, (3) fish passage facility post-construction hydraulic and biological monitoring plans, (4) minimum flows, (5) timing of planned maintenance activities, (6) ramping rates, (7) flow continuation, (8) design of wildlife crossings, and (9) wildlife crossing monitoring plan. During the meeting, we resolved the flow continuation inconsistency, but not the others.

In an attempt to resolve some of the remaining inconsistencies, on March 1, 2018, Oregon DFW revised some of its section 10(j) recommendations and submitted additional information to support other 10(j) recommendations that it did not modify.[38] The modified recommendations resulted in a final total of 31

[38] In addition, Oregon DFW included a new recommendation (construct a fish screen on a proposed auxiliary flow release system) that was unrelated to

recommendations submitted by Oregon DFW pursuant to section 10(j) of the FPA. Table 21 lists the 31 recommendations and indicates whether or not they are included under the staff alternative. Out of the final total of 31 recommendations submitted pursuant to section 10(j), we consider 14 to be within the scope of section 10(j). Of these 14 recommendations, we wholly adopt 9 under the staff alternative, adopt 2 in part, and do not adopt the remaining 3 recommendations.

Recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA. These recommendations along with recommendations considered within the scope of section 10(j) that we adopt under the Staff Alternative are discussed in more detail in the specific resource sections of this document and in section 5.2, *Comprehensive Development and Recommended Alternative*. The specifics of each recommendation's inconsistency and our determinations are discussed below.

Fish Ladder

In the draft EA, we did not recommend Oregon DFW's recommendation that PacifiCorp modify the fish ladder to ensure it complies with Oregon DFW's recommended fish passage criteria. Necessary modifications would include: vertical slots that are at least 12 inches wide, pool to pool surface water differentials (i.e., jump height) not exceeding 0.75 foot (9 inches), pool depths of at least 2 feet, velocities within the vertical slots not exceeding 8 feet per second, and maximum energy dissipation within pools of 4 foot pounds per second per cubic foot.

As discussed in section 3, the existing ladder passes trout between 110 mm and 207 mm fork length, which represent the majority (73 percent) of trout sampled in the bypassed reach in 2014. PacifiCorp's studies showed that the upstream travel time through the ladder is about one day or less for most upstream migrants. Oregon DFW's recommended fish ladder modifications would improve upstream passage effectiveness for smaller size classes of trout (i.e., less than 110 mm) and may reduce upstream passage travel time for larger trout. However, because trout less than 100 mm have not been documented using the ladder and do not typically make long upstream migrations, and the bypassed reach predominately consists of larger size classes of trout (i.e., greater than 110 mm) and upstream travel time for these larger trout is already about one day or less, we

---

resolving the section 10(j) inconsistencies. Oregon DFW did not identify the new recommendation as a section 10(j) recommendation; therefore, the recommendation is considered under section 10(a) of the FPA (*See PP&L Montana*, 92 FERC ¶61,261 (2000)) and addressed in section 5 of this EA.

concluded that the incremental benefits of Oregon DFW's recommendation to the trout population are not worth the costs. Therefore, we made a preliminary determination that the recommended plan may be inconsistent with the comprehensive planning standard of section 10(a) of the FPA and the equal consideration provision of section 4(e) of the FPA.

At the 10(j) meeting, Oregon DFW reiterated its position that the existing ladder does not meet its recommended criteria that have been documented to provide effective fish passage for salmonids in the Pacific Northwest. The jump heights between some pools in the ladder are very high, ranging from 12 to 20 inches and that the National Marine Fisheries Service doesn't allow jump heights greater than 12 inches for adult salmon. Oregon DFW asserted that the project's fish ladder is utilized by trout that are much smaller than adult salmon, and while it is recommending a 9-inch jump height between pools, 6 inches may actually be more appropriate for juvenile salmonids. Oregon DFW also pointed out that PacifiCorp's pre-filing studies showed a low passage rate with only about 10 percent of the 35 trout used in the study successfully ascending the ladder.

Oregon DFW also stated that the hydraulic conditions in the ladder are poor because the lower portion of the ladder has significantly more flow than the upper portion given the release point of the fish screen bypass pipe halfway through the fish ladder. Oregon DFW indicated that based on its experience at Winchester Dam on the Umpqua River, non-uniform flow through the ladder can cause eddies where fish get confused, sometimes orienting themselves in a downstream direction within the ladder, leading to delay or passage failure.

Oregon DFW also stated that it disagreed with staff's analysis in the EA that juvenile trout do not make upstream migrations. In support of its contention, Oregon DFW showed several videos of juvenile steelhead attempting to migrate upstream by jumping over weirs on middle Rogue River Basin tributaries during high flow conditions. Oregon DFW noted that it is its belief that the resident trout of the project area are descendants of steelhead that occupied the project area prior to the construction of dams that blocked passage; therefore, they behave similarly to juvenile steelhead and the ladder should be modified to improve passage conditions for juveniles. Oregon DFW also reiterated its position that any trout, regardless of size, that wants to move upstream past the diversion dam should be able to do so to ensure the survival of the species and exchange of genetic material between populations, which is especially important given the changing climatic conditions now and in the future.

No resolution was reached on this issue at the meeting.

After reviewing the additional information filed by Oregon DFW and taking into consideration its comments at the 10(j) meeting, we continue to find that the $19,520 annual cost of modifying the fish ladder would not be justified by the benefits, and would not be in the public interest; therefore, there is no resolution of this issue.

Modified Fish Screen and Bypass System for Diversion Canal

In the draft EA, we did not recommend Oregon DFW's recommendation that PacifiCorp modify the existing fish screen to ensure that it meets current Oregon DFW fish screen criteria. We did not recommend this measure because the existing fish screen generally prevents trout that are 60 mm or greater from entering the powerhouse. Replacing the existing fish screen with Oregon DFW's recommended screen would reduce entrainment losses of predominately fry-sized trout less than 60 mm; however, because the trout density of the bypassed reach is already comparable to that of the unaffected upstream reach, staff does not expect a substantial increase in the trout density of the bypassed reach as a result of the reduced entrainment provided by Oregon DFW's recommended screen. Additionally, the only way to meet current ODFW criteria would be to replace the existing screen with a larger screen with a greater surface area, smaller screen openings, and a new cleaning system, that when coupled with lost generation during construction would cost an estimated $114,780 annually. We therefore concluded that the benefits of replacing the screen and bypass system do not justify this cost, and made a preliminary determination that the recommended fish screen would be inconsistent with the comprehensive planning standard of section 10(a) and equal consideration provision of section 4(e) of the FPA.

At the 10(j) meeting, Oregon DFW indicated that the screen was constructed under the terms of the prior license using interim criteria provided by Oregon DFW in the 1990s. The screen does not meet current Oregon DFW criteria and it is Oregon DFW's position that relicensing is the appropriate time to upgrade the screen to current environmental standards to ensure the protection of trout for the term of the new license. These upgrades would include a new cleaning system so that the screen doesn't rotate out of the screening position during cleaning cycles as it does now, and that has lower velocities and smaller screen openings so that it adequately protects trout fry smaller than 60 mm.

Oregon DFW noted that protecting individual trout fry is very important in this system because resident trout are small and have low fecundities relative to larger anadromous salmonids with residents only producing about 400 to 800 eggs, compared to the thousands of eggs produced by one anadromous fish. Therefore, resident trout produce lower numbers of offspring overall and every fry should be protected to the maximum extent possible. Oregon DFW also stated

that there are other factors affecting the trout fry of the bypassed reach including ramping practices and maintenance outages, which is why the fry size-class is proportionately lower in the bypassed reach (17 percent of total) than the unregulated reach upstream.

Oregon DFW also stated that it has observed adult brown trout on the North Umpqua River preying on trout fry in the fish ladder, and that the bypassed pipe exit should be extended so that it discharges directly to the South Fork to avoid fry losses due to adult trout predation.

No resolution was reached on this issue at the meeting.

After reviewing the additional information filed by Oregon DFW and taking into consideration its comments at the 10(j) meeting, we continue to find that the annual cost of constructing a new fish screen ($114,780) and bypass pipe ($18,910) to meet Oregon DFW's recommended criteria would not be justified by the benefits, and would not be in the public interest; therefore, there is no resolution of this issue.

Post-construction Hydraulic and Biological Monitoring of Fish Passage Facilities.

In the draft EA, we did not recommend Oregon DFW's recommendation that PacifiCorp develop a post-construction monitoring plan and schedule with provisions for a hydraulic and biological evaluation of any new or modified fish passage facilities to ensure that the facilities operate within their design criteria and are effective at passing fish.

At the time, we were only recommending minor modifications to pools 13 through 15 of the fish ladder to accommodate construction of the auxiliary flow system, and our analysis indicated that these minor modifications would not substantially affect the hydraulic conditions within the fish ladder. Therefore, there would be minimal benefits from requiring PacifiCorp to conduct any post-licensing hydraulic or biological evaluations of the project's fish passage facilities, and the minimal benefits did not justify the cost of the monitoring. For these reasons, we made a preliminary determination that the recommended monitoring plans would be inconsistent with the comprehensive planning standard of section 10(a) and equal consideration provision of section 4(e) of the FPA.

At the 10(j) meeting, Oregon DFW stated that it is concerned that essentially splitting the three upper pools of the fish ladder in half to accommodate construction of the auxiliary flow system would significantly alter the hydraulics and could make conditions even worse than they are now as the jump heights for

all three pools already exceed Oregon DFW's criteria. Oregon DFW stated it is not aware of any instances where an entity has modified a fish ladder to this extent to accommodate construction of another project facility. Further, there is no way to know with certainty what the effect would be, especially considering that the final design of the facility can change significantly after the preliminary design. Therefore, they concluded that staff's determination that the modifications to pools 13-15 would cause only minor changes to hydraulics could be invalid. Oregon DFW also indicated that if the ladder is modified to meet Oregon DFW's criteria then the biological monitoring isn't as important.

No resolution was reached on this issue at the meeting.

In its February 12, 2018 filing, PacifiCorp revised its proposed action and is no longer proposing to construct the auxiliary flow system within the existing footprint of the fish ladder. Instead, the new system would be constructed in the diversion canal about 150 feet downstream of the diversion dam. We evaluate the new proposed release structure in this EA and in section 5.2 we are recommending the new proposal in the staff alternative.

Because we are not recommending any modifications to the project's existing fish passage facilities in the staff alternative, and PacifiCorp's new proposal for its auxiliary flow system would have only minor effects on downstream trout passage if any trout enter the system, we conclude that there would be little to no benefit from further hydraulic and biological monitoring of any of the project's fish passage facilities, and the minor benefits do not justify the $6,240 annual cost. There is no resolution of this issue.

Fish Passage Facilities Operation and Maintenance Plan

Oregon DFW recommended that PacifiCorp implement its proposed Fish Passage Facilities Operation and Maintenance Plan filed with the license application; however, Oregon DFW also recommended that PacifiCorp consult with Oregon DFW and FWS and update the plan after completion of any modifications to fish passage facilities required by the license.

In the draft EA, we recommended that PacifiCorp implement the plan as filed, and noted that the plan already included a provision to be updated after PacifiCorp completed any modifications to fish passage facilities required by the license. Although we were not recommending any modifications to project facilities for the purpose of improving fish passage conditions in the draft EA, at the time we were recommending that PacifiCorp construct its proposed auxiliary flow system within the existing footprint of the fish ladder, and we noted that these proposed modifications to the ladder could affect the proposed maintenance

of the fish ladder. Therefore, we adopted this recommendation in the draft EA and found no inconsistency between the recommendation and the FPA.

However, as we said, PacifiCorp is now proposing and we are recommending in the staff alternative a revised auxiliary flow system that would not require modifications to the fish ladder to accommodate its construction. Therefore, we are no longer recommending any modifications to the project's existing fish passage facilities. Although the new proposed auxiliary flow system could function as a downstream fish passage facility if any trout entrained into the diversion canal are drawn over the weir and into the system, the primary purpose of the auxiliary flow system is to pass flows from the diversion canal to the bypassed reach to meet minimum flow requirements. PacifiCorp would need to regularly inspect and maintain the auxiliary flow system to ensure that it is in compliance with the minimum flow requirements of the license. For these reasons, there is no justification for requiring PacifiCorp to update the plan after license issuance. We are making a determination that Oregon DFW's recommendation to update the Fish Passage Facilities Operation and Maintenance Plan after license issuance is inconsistent with the substantial evidence standard of section 313(b) of the FPA. There is no resolution of this issue.

Minimum Flows

In the draft EA, we did not recommend Oregon DFW's recommended 30-cfs minimum flow during the low-flow months of August, September, and October. Instead, we recommended PacifiCorp's proposed 20-cfs minimum flow during this 3-month period.

We found that Oregon DFW's recommendation would predominately benefit adult cutthroat trout habitat, increasing it by 15 to 16 percentage points compared to PacifiCorp's proposal; however, cutthroat trout are rare in the bypassed reach, comprising only 5 percent of the total trout observed during fisheries surveys. The additional 10-cfs minimum flow would provide minor increases, if any, in trout habitat for the other life stages evaluated by the model, including rainbow trout, which are the dominant trout species in the bypassed reach (comprising 91 percent of the total observed during fisheries surveys). Therefore, we concluded that the additional habitat gains from requiring a flow of 30 cfs during the months of August, September, and October as recommended by Oregon DFW would not justify the additional annualized cost of $85,043. For this reason, we did not adopt Oregon DFW's recommended 30-cfs minimum flow from August through October, and made a preliminary determination that this recommendation was inconsistent with the comprehensive planning standard of section 10(a) of the FPA and the equal consideration provision of section 4(e) of the FPA.

At the 10(j) meeting, Oregon DFW pointed out that late summer and early fall is the low-flow period and the additional 10 cfs is needed to protect trout fry that are vulnerable to predation by larger trout. Oregon DFW said that, regardless of the modeling results which showed that a higher minimum flow would reduce fry habitat availability, higher flows during this period would have a beneficial cumulative effect on the trout population. This is because the higher flows would inundate more fry habitat along the stream bank and create better habitat conditions in the center of the channel for adult fish, thereby segregating the two size classes spatially and reducing fry predation by larger trout. Oregon DFW also believes that higher flows during the late summer and fall would improve passage conditions farther downstream in the bypassed reach where there are several instream impediments and barriers that are exacerbated by low flows.

No resolution was reached on this issue at the meeting.

After reviewing the additional information filed by Oregon DFW and taking into consideration its comments at the 10(j) meeting, we continue to find that the $85,043 annual cost of a 30-cfs minimum flow from August 1 through October 31 would not be justified by the limited benefits, and would not be in the public interest; therefore, there is no resolution of this issue.

Ramping Rates

In the draft EA, we did not recommend Oregon DFW's recommendation that PacifiCorp limit down-ramping in the bypassed reach to 1 inch per hour from May 1 to September 30, and 2 inches per hour from October 1 to April 30. Instead, we recommended PacifiCorp's proposed alternative ramping rates of 0.2 foot (2.4 inches) per hour from May 1 to September 30, and 0.3 foot (3.6 inches) per hour from October 1 to April 30,

As we said in the draft EA, project-induced ramping in the bypassed reach occurs infrequently during minor operational adjustments to flow regulating equipment such as the turbine wicket gates, PR valve, turbine isolation valve, diversion canal headgate, and fish screen backwater gate. Ramping also occurs infrequently whenever the water conveyance system is dewatered due to unplanned outages or scheduled maintenance activities. From 2010 to 2013, project-induced ramping in the bypassed reach occurred about 5 times per year. Although some turbidity increases and mortality of fry and juvenile trout likely occurs due to the current ramping practices, the population in the bypassed reach shows no signs of long-term adverse effects due to ramping given that trout densities in the bypass reach compare favorably to the reach of the South Fork outside of the project's influence. Therefore, either Oregon DFW's recommended

or PacifiCorp's proposed ramping rates would provide only a minor benefit to the bypassed reach trout population by reducing turbidity levels and stranding risks of trout fry and juveniles.

We concluded that PacifiCorp's proposed alternative ramping rates would likely provide similar benefits to Oregon DFW's recommended ramping rates at a lower level of effort and cost to comply with them. This is because PacifiCorp indicated that the project has a coarse level of operational control and therefore it is unclear if it could meet the more restrictive ramping rate without modifying project facilities. For these reasons we found that PacifiCorp's alternative ramping rates would strike a reasonable balance between protecting trout fry, juveniles, and water quality and additional costs to the project. The minor incremental benefits, if any, of Oregon DFW's recommended ramping rates would not justify any additional effort or costs to implement them. We therefore made a preliminary determination that this recommendation was inconsistent with the comprehensive planning standard of section 10(a) of the FPA, including the equal consideration provision of section 4(e) of the FPA.

At the 10(j) meeting, Oregon DFW stated that its recommendation was based on the widely accepted Hunter (1992) study, which found that ramping rates of 1 to 2 inches per hour were necessary to fully protect juvenile salmonids from adverse effects of ramping. PacifiCorp indicated that it reviewed the existing USGS bypassed reach gage data and concluded that the gage records frequently fluctuate by as much as 0.1 foot without any appreciable flow change, suggesting that the existing USGS gage instrumentation isn't precise enough to accurately determine if the project is meeting such restrictive ramping rates of 1 or 2 inches per hour.

Staff pointed out that compliance with such restrictive rates would be difficult if one could not differentiate between an actual ramping event due to a project-induced flow change and a non-flow-related water surface fluctuation as detected at the gage, because in either case PacifiCorp would have to report a recorded fluctuation greater than 1 inch per hour as a deviation and file a summary report explaining why it was deviating from the required ramping rate. Staff also explained that if the license required such a restrictive rate, then PacifiCorp would have to do whatever it takes, including upgrading equipment as needed regardless of the cost, to ensure it meets the ramping rate. The ramping rate could not be modified post-licensing unless PacifiCorp filed an application to amend the license.

Oregon DFW indicated that the Prospect Nos. 1, 2, and 4 Project license includes both ramping rate targets and not to exceed thresholds, and questions whether PacifiCorp could apply similar ramping rate requirements at the Prospect

No. 3 Project. PacifiCorp indicated that it is comfortable it could meet a ramping rate equal to 0.2 foot per hour, but likely couldn't meet a ramping rate that is more restrictive with the project's existing flow regulating equipment and given the limitations of the compliance gage.

No resolution was reached on this issue at the meeting.

On March 1, 2018, Oregon DFW modified its ramping rate recommendation and is now recommending that PacifiCorp implement a ramping rate in the bypassed reach of 0.2 foot per hour year-round.

After taking into consideration Oregon DFW's comments and modified recommendation, we have revised our analysis of Oregon DFW's ramping rate recommendation in section 3.3.2 and costs in section 4.3. Because Oregon DFW's revised ramping rate recommendation would provide some minor benefits to trout fry and water quality and PacifiCorp can meet the revised ramping rate without incurring any significant additional costs, we are now recommending the modified ramping rate under the staff alternative. Therefore, the inconsistency between the ramping rate recommendation and the FPA has been resolved.

Timing of Scheduled Maintenance Activities

In the draft EA, we did not recommend Oregon DFW's recommendation that PacifiCorp restrict planned maintenance activities requiring the release of all flows to the bypassed reach to the months of April and May, when flows are naturally high, for the protection of aquatic resources in the bypassed reach.

We determined that scheduling planned maintenance activities during April or May would minimize adverse effects on trout fry when compared to completing the work later in the summer and early fall; however, it would also be difficult if not impossible to complete the required maintenance during April or May due to likely inclement weather conditions such as snow, heavy rain, and temperatures. Such inclement weather conditions and corresponding difficulties in completing the work during this period would also, at times, likely extend the period of time that the project is shut down for the maintenance activity. Staff therefore concluded that the minor benefits to trout fry of scheduling planned maintenance activities during April or May would not justify the difficulties that would be encountered from trying to complete the maintenance during this period, and made a preliminary determination that this recommendation was inconsistent with the comprehensive planning standard of section 10(a) of the FPA and the equal consideration provision of section 4(e) of the FPA.

At the 10(j) meeting, Oregon DFW indicated that it was concerned that high late summer flows such as whitewater releases at the Prospect Nos. 1, 2, and 4 Project that could be as high as 800 or 900 cfs would be very unnatural and have significant adverse effects on aquatic resources. PacifiCorp responded that the Prospect No. 3 impoundment has little to no storage and therefore cannot release flows of this magnitude. Staff responded that the analysis in the draft EA showed that with the higher minimum flows evaluated in the EA (either 20 or 30 cfs) during this period, the discharge of all flows to the bypassed reach for the maintenance activities would only increase flows by about an additional 46 to 83 cfs over minimum flows during these months, which is nowhere near as severe of an increase as 800 or 900 cfs. Staff also noted that PacifiCorp's pre-filing water quality data shows that bypassed reach turbidity during a September shutdown only spiked to a little over 4 NTU for about 2 hours before returning quickly to background levels of about 0 NTU. Thus, the turbidity impacts of shutdowns during this period were minor.

No resolution was reached on this issue at the meeting.

On March 1, 2018, Oregon DFW revised its recommendation for the timing of planned maintenance activities. Oregon DFW is now recommending that PacifiCorp conduct planned maintenance activities from July 1 through September 30, and that PacifiCorp notify and consult with Oregon DFW if emergency situations require it to complete work outside of this period. Oregon DFW's revised recommendation is consistent with PacifiCorp's proposed alternative as described in its June 17, 2017 reply comments. In section 3.3.2, we analyzed the effects of this recommendation on aquatic resources, and in section 5.2 we are recommending it under the staff alternative. Therefore, the inconsistency between the recommendation and the FPA has been resolved.

Flow Continuation

In the draft EA, we did not recommend Oregon DFW's recommendation that PacifiCorp develop a means to provide several hours of flow continuation during powerhouse outages to prevent a rapid drop in tailrace flows and an up-ramp in the South Fork.

We determined in the EA that there was no justification for the measure because PacifiCorp's automation of the powerhouse PR valve in 2014 already enables it to bypass flows around the unit and continue discharging them to the Middle Fork Canal during unplanned powerhouse outages. Automation of the PR valve also eliminated the need to dewater the water conveyance system and up-ramp flows in the bypassed reach during planned powerhouse outages, thereby eliminating any subsequent down-ramping of the bypassed reach when the

powerhouse is brought back online. Because the project already provides flow continuation during both planned and unplanned powerhouse outages, there is no justification for requiring PacifiCorp to develop and implement any additional unspecified measures to provide flow continuation during powerhouse outage events. For these reasons we made a preliminary determination that the recommendation is inconsistent with the substantial evidence standards of section 313(b) of the FPA based on a lack of justification for the measure.

At the 10(j) meeting, Oregon DFW questioned whether the project as currently configured and operated causes unintended discharges to Daniel Creek as it did historically. PacifiCorp clarified that with automation of the PR valve in 2014, the project no longer discharges flows to Daniel Creek during unit trips, and that this only occurred in the past when the unit tripped off-line and there was a simultaneous natural flow increase in the South Fork as often occurs during storm events. Flows now bypass the unit and continue to discharge to the Middle Fork Canal via the sag pipe during unit trips, even when coupled with a simultaneous natural flow increase.

At the meeting, staff questioned whether Oregon DFW believed there was still a need for the recommended flow continuation measure given the clarification provided by PacifiCorp. Oregon DFW responded that there wouldn't be a need for additional measures because the project is already capable of providing flow continuation as currently configured. In its March 1, 2018 filing, Oregon DFW withdrew its recommendation for flow continuation.

Design of Small Animal Crossings

In the draft EA, we did not recommend that PacifiCorp provide and evaluate small openings in the canal fencing and structures to direct small wildlife, such as small mammals, reptiles, and amphibians, to the proposed canal crossings because of the lack of information to indicate that the existing level of small animal drownings in the canal is substantial or that the occasional drowning of individual animals is adversely affecting their populations. While Oregon DFW did not indicate how it would prevent small animals from entering the canal, our analysis indicated that directing small animals to the proposed crossings would require at a minimum installing fine-mesh fencing at the base of the existing fencing to prevent small animals from passing through the existing 2-inch by 4-inch mesh. We estimated that the cost of fencing and installation would have a levelized annual cost of at least $2,730, and found that the benefits would not justify this cost, and that the addition of the 2-foot-wide crossings would be adequate to protect and enhance small animal connectivity at the project.

No resolution was reached on this issue at the meeting.

In its March 1, 2018 filing Oregon DFW revised its recommendation. Oregon DFW now recommends that PacifiCorp install fine-mesh fencing at the base of the existing fencing and around the wildlife crossings to a height of 40 inches to direct small animals to the crossings. In support, they cite research (Cunnington et al., 2014) suggesting that the proposed crossings alone would not mitigate risk for small vertebrates in the absence of fencing. Oregon DFW states that mitigating drowning mortality is a significant priority because it would mitigate potential losses to the sensitive amphibians coastal tailed frog and Cascades frog and would protect other small mammals from drowning, thereby enhancing prey abundance for northern spotted owl if that species returns to the project area. Based on reported drownings at irrigation canals in Europe, they estimated that 17,000 animals would be drown in the project canal over a 50-year license term.

The new information provided by Oregon DFW indicates that preventing entrainment and drowning of coastal tailed frog and Cascades frog, two species that are of particular management concern because they are exhibiting population declines, would benefit from installation of a fine-mesh fencing along the project canal and that the benefits are worth the cost. Because we are recommending it under the staff alternative, there is no inconsistency between the recommendation and the FPA.

Wildlife Crossing Monitoring Plan

In the draft EA, we did not recommend that PacifiCorp develop and implement a plan to monitor the efficacy of large and small wildlife crossings and to install additional crossings if required by Oregon DFW, the Forest Service, and FWS.

We found that monitoring results from the nearby Prospect Nos. 1, 2, and 4 Project are sufficient to demonstrate that all size classes of wildlife would use the proposed crossings.

No resolution was reached on this issue at the meeting.

In its March 1, 2018 filing, Oregon DFW revised its recommendation. Acknowledging that game camera monitoring such as was conducted at the Prospect Nos. 1, 2, and 4 Project would not be necessary, Oregon DFW now recommends as an adequate low cost alternative that PacifiCorp photographically document signs of wildlife use at the crossings during the annual crossing and fencing inspections and include this documentation in its annual report.

In section 3.3.3, we analyzed the effect of this recommendation on wildlife resources and in section 5.2 we are recommending it under the staff alternative because PacifiCorp could provide the requested information at little cost through its existing program and the information would document use of the crossings and any problems that might arise. Therefore, there is no inconsistency between the recommendation and the FPA.

Table 21. Fish and wildlife recommendations for the Prospect No. 3 Project (Source: staff).

Recommendation	**Agency**	**Within the scope of section 10(j)**	**Annualized cost**	**Adopted? and basis for preliminary determination of inconsistency**
1. Modify the fish ladder to ensure the safe upstream passage of all juvenile and adult trout by ensuring the facility complies with current Oregon DFW fish passage criteria	Oregon DFW	Yes	$19,520	Not adopted.[a]
2. Modify the fish screen and bypass system to ensure the safe downstream passage of all juvenile and adult trout by ensuring the facilities comply with current Oregon DFW fish passage criteria.	Oregon DFW	Yes	$133,690	Not adopted.[a]
3. Submit draft fish passage facility design plans to Oregon DFW and FWS for review.	Oregon DFW	No, providing design plans to agencies is not a specific measure to protect, mitigate, or enhance fish and wildlife.	$150	Not adopted.

4. Develop a post-construction hydraulic and biological monitoring plan for new fish passage facilities.	Oregon DFW	Yes	$6,240	Not adopted.[a]
5. Implement the Fish Passage Facilities O&M Plan, and consult with Oregon DFW and FWS and update the plan after completion of any modifications to fish passage facilities.	Oregon DFW	No, for consultation. Yes, for implementing the plan.	$5,078	Adopted in part.[b] We recommend that PacifiCorp implement the plan as filed without any additional updates required at this time.
6. Notify Oregon DFW and FWS two weeks prior to planned maintenance outages and salvage live fish during outages.	Oregon DFW	No, for notification. Yes, for fish salvage.	$0	Adopted.
7. Maintain a minimum flow of 30 cfs from March 1 to October 31, and 20 cfs from November 1 to February 28, as measured at the USGS gage in the bypassed reach.	Oregon DFW	Yes	$296,093	Adopted in part.[a]
8. Implement a ramping rate of 0.2 foot per hour year round.[c]	Oregon DFW	Yes	Minimal	Adopted.

9. Operate and maintain the existing USGS gage in the bypassed reach for operation compliance monitoring purposes.	Oregon DFW	Yes	$19,950	Adopted.
10. Conduct planned maintenance activities during July through September.[d]	Oregon DFW	Yes	$0	Adopted.
11. Develop a water conveyance system monitoring and maintenance plan to eliminate or reduce failure of the water conveyance system, and include measures for early detection of waterway failure and protocols for stopping flow in less than one hour.	Oregon DFW	No, the measure is not a specific fish and wildlife measure but rather a project maintenance measure.	Undefinable. The recommendation is too non-specific as to the nature of the "early detection system" in order to estimate a cost.	Not adopted.
12. Notify Oregon Emergency Response System within 24 hours of an accidental spill or water conveyance system failure.	Oregon DFW	No, notification is not a specific measure to protect, mitigate, or enhance fish and wildlife	$0	Adopted

13. In the event of a water conveyance system failure, develop site-specific plans for remediation in consultation with, and approved by, Oregon DFW, FWS, Forest Service, and Oregon DEQ.	Oregon DFW	No, the measure is non-specific with respect to what measures are needed to comply with the recommendation.	Undefinable	Not adopted
14. Annual report on water conveyance system failure, remediation, and monitoring measures.	Oregon DFW	No, reports are not specific measures to protect, mitigate, or enhance fish and wildlife.	$1,000	Not adopted
15. Develop a fish and wildlife habitat mitigation plan that ensures compensation for the short-term and long-term loss of individuals and habitat caused by unanticipated project events that cause environmental damage.	Oregon DFW	No, the measure is non-specific with respect to what measures are needed to comply with the recommendation	Undefinable	Not adopted

16. Develop site-specific erosion control plans 90 days prior to any land clearing, land disturbing, or spoil producing activities at the project.	Oregon DFW	No. The recommendation provides for future measures whose implementation would be dependent on a future event and the associated unpredictable, event-specific circumstances.	Undefinable	Not adopted, however, the staff alternative includes a recommendation for an ESCP to address the proposed flowline and sag pipe replacement.
17. Construct new spur road at diversion dam to facilitate sediment augmentation in the bypassed reach, and develop a plan with specific procedures to guide sediment augmentation for aquatic habitat enhancement.	Oregon DFW	Yes, for gravel augmentation; No for construction of a spur road, which is not a fish and wildlife measure.	$10,540	Adopted.
18. Pass any large woody debris collected at the diversion dam downstream into the bypassed reach.	Oregon DFW	Yes	$0	Adopted.

19. Install five new 12-foot-wide wildlife crossings, widen the six existing crossings to 12 feet, and consult with the agencies on the appropriate location to install the new crossings.	Oregon DFW	Yes, except for consultation	$21,540	Adopted.
20. Install eight new 2-foot-wide crossing structures for small animals, and install fine-mesh fencing to a height of 40 inches at the base of the existing canal fencing and around the large and small animal crossings.	Oregon DFW	Yes	Costs for installing the 2-foot crossing included in above cost for 12-foot-wide wildlife crossings; fine-mesh fencing is an additional $2,730.	Adopted.
21. Continue existing wildlife crossing inspection and maintenance program with provisions to photograph any signs of wildlife use (including wolves), and provide annual reports to the agencies.	Oregon DFW	Yes, except for annual reports	$2,000	Adopted.

22. Install up to five additional large wildlife flowline crossings, if monitoring shows no deer and elk use of the new crossing structures after 5 years of monitoring.	Oregon DFW	No, a reservation of authority to require future potential measures is not a specific measure to protect, mitigate, or enhance fish and wildlife.	$9,455	Not adopted; however, we recommend that PacifiCorp monitor use and file a summary of the first 5 years of deer and elk use of the flowline crossings and proposals for any measures needed to provide deer and elk access across the flowline.
23. Retrofit or rebuild any power pole involved in a bird fatality in accordance with APLIC guidelines	Oregon DFW	No. The recommendation provides for future measures whose implementation would be dependent on a future event and the associated unpredictable, event-specific circumstances.	Undefinable.	Not adopted. However, we recommend the development of project-specific avian protection plan that considers the APLIC guidelines when replacing or retrofitting existing power poles based on reported fatalities and any proposal to mitigate future fatalities.

24. Follow the most current spatial and temporal guidelines for avian protection during any project operation and maintenance activities	Oregon DFW	No, a general requirement to comply with unspecified guidelines for avian protection measures is not a specific measure to protect, mitigate, or enhance fish and wildlife.	Undefinable	Not adopted; unclear and speculative.
25. Follow the APLIC guidelines for raptor protection.	Oregon DFW	No. A recommendation to generally comply with guidelines is not a specific fish and wildlife measure.	Undefinable. The guidelines are too broad and non-project specific to estimate a cost.	Not adopted. However, we recommend the development of project-specific avian protection plan that considers the APLIC guidelines.
26. Develop a database of dead birds found near project facilities, and prepare annual reports and provide them to the agencies.	Oregon DFW	No, databases and annual reports are not specific measures to protect, mitigate, or enhance fish and wildlife.	$1,000	Adopted through development of project-specific avian protection plan.

27. Notify Oregon DFW in the event of any emergency or unanticipated situations that endanger, harm, or kill wildlife	Oregon DFW	No, notification is not a specific measure to protect, mitigate, or enhance fish and wildlife	$0	Adopted; however, we recommend the agency notification occur within 24 hours, and Commission notification within 10 days.
28. Comply with any reasonable restorative measures required by the agencies where fish and wildlife are being endangered, harmed, or killed during unanticipated or emergency situations	Oregon DFW	No, as-yet unspecified future potential measures are not specific measures to protect, mitigate, or enhance fish and wildlife	Undefinable	Not adopted.
29. Amend the license at any time during the license term if unanticipated effects on fish and wildlife occur or if there is a change in the Endangered Species Act status of a species affected by the project	Oregon DFW	No, as-yet unspecified future potential measures are not specific measures to protect, mitigate, or enhance fish and wildlife	Undefinable	Not adopted.

30. Consult with all appropriate local, state, or federal agencies before repairing or modifying the hydroelectric project, and obtain and comply with all required permits.	Oregon DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife	Undefinable	No. However, before filing an amendment application, a licensee must consult with all applicable agencies.
31. Limit the term of the license to 30 years.	Oregon DFW	No, not a specific measure to protect, mitigate, or enhance fish and wildlife.	Not applicable	The Commission will make its determination regarding the term of any new license in the license order, based on the record and Commission policy on setting license terms.

[a] Preliminary findings that recommendations found to be within the scope of section 10(j) are inconsistent with the comprehensive planning standard of section 10(a) of the FPA, including the equal consideration provision of section 4(e) of the FPA, are based on staff's determination that the costs of the measures outweigh the expected benefits.

[b] Preliminary findings that recommendations found to be within the scope of section 10(j) are inconsistent with the substantial evidence standards of section 313(b) of the FPA are based on a lack of evidence to support the reasonableness of the recommendation or a lack of justification for the measure.

[c] Oregon DFW initially recommended a ramping rates of 1 inch per hour from May 1 through September 30, and 2 inches per hour from October 1 to April 30, but revised its recommendation to 0.2 foot per hour year-round based on discussions at the 10(j) meeting.

[d] Oregon DFW initially recommended that PacifiCorp conduct planned maintenance activities during the months of April and May, but revised its recommendation to July through September based on discussions at the 10(j) meeting.

5.4.2 Land Management Agency's Section 4(e) Conditions

Of the Forest Service's 11 conditions, we consider seven (conditions 1, 2, 3, 4, 5, 6, and 7) to be administrative or legal in nature and we do not analyze these conditions in this EA. Table 22 summarizes our conclusions with respect to the other four 4(e) conditions filed by the Forest Service, which we include in the staff alternative.

Table 22. Forest Service 4(e) conditions for the Prospect No. 3 Project (Source: staff).

Condition	Annualized Cost	Adopted?
No. 8: ESCP	$5,250	Yes
No. 9: Fire and Fuels Management Plan	$367	Yes
No. 10: HPMP	$3,000	Yes
No. 11: Road Plan	$780	Yes

5.5 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C.§ 803(a)(2)(A), 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. We reviewed 26 comprehensive plans that are applicable to the Prospect No. 3 Project, located in Oregon.[39] No inconsistencies were found.

[39] (1) Bureau of Land Management. 1995. Medford District resource management plan. Department of the Interior, Medford, Oregon. June 1995; (2) Bureau of Land Management. Forest Service. 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. Washington, D.C. April 13, 1994; (3) Department of the Army, Corps of Engineers. Portland District. 1993. Water resources development in Oregon. Portland, Oregon; (4) Forest Service. 1990. Rogue River National Forest land and resource management plan. Department of Agriculture, Medford, Oregon. July 1990; (5) Hydro Task Force and Strategic Water Management Group. 1988. Oregon comprehensive waterway management

plan. Salem, Oregon; (6) National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993; (7) Northwest Power and Conservation Council. 2016. The Seventh Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2016-02. February 2016; (8) Oregon Department of Energy. 1987. Oregon final summary report for the Pacific Northwest river study. Salem, Oregon. November 1987; (9) Oregon Department of Environmental quality. 1978. Statewide water quality management plan. Salem, Oregon. November 1978; (10) Oregon Department of fish and Wildlife. 1987. The statewide trout management plan. Portland, Oregon. November 1987; (11) Oregon Department of Fish and Wildlife. 1987. Trout mini-management plans. Portland, Oregon. December 1987; (12) Oregon Department of Fish and Wildlife. 2003. Oregon's elk management plan. Portland, Oregon. February 2003; (13) Oregon Department of Fish and Wildlife. 1993 Oregon black bear management plan: 1993-1998. Portland, Oregon; (14) Oregon Department of Fish and Wildlife. 1993. Oregon wildlife diversity plan. Portland, Oregon. November 1993; (15) Oregon Department of Fish and wildlife. 2006. Oregon cougar management plan. Roseburg, Oregon. May 2006; (16) Oregon Department of Fish and Wildlife. 1995. Biennial report of the status of wild fish in Oregon. Portland, Oregon. December 1995; (17) Oregon Department of Fish and Wildlife. 1996. Species at risk: Sensitive, threatened, and endangered vertebrates of Oregon. Portland Oregon. June 1996; (18) Oregon Department of Fish and Wildlife. 2009. 25-year Recreational angling enhancement plan. Salem, Oregon. February 2009; (19) Oregon Department of State Lands. Oregon natural heritage plan. Salem, Oregon. 2003; (20) Oregon State Game Commission. 1963-1975: Fish and wildlife resources – 18 basins. Portland, Oregon. 21 reports; (21) Oregon State Parks and Recreation Department. Oregon Outdoor Recreation Plan (SCORP): 2003-2007. Salem Oregon. January 2003; (222) Oregon State Parks and Recreation Division. 1987. Recreational values on Oregon Rivers. Salem, Oregon. April 1987; (23) Oregon Water Resources Board. 1973. Surface area of lakes and reservoirs. Salem, Oregon; (24) Oregon Water Resources Commission. 1987. State of Oregon water use programs. Salem, Oregon; (25) U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.; and (26) U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986. c.

6.0 FINDING OF NO SIGNIFICANT IMPACT

On the basis of our independent analysis, we conclude that approval of the proposed action, with our recommended measures, would not constitute a major federal action significantly affecting the quality of the human environment. Preparation of an environmental impact statement is not required.

7.0 LITERATURE CITED

American Whitewater. 2005. Safety code of American Whitewater, Section VI. Available at: https://www.americanwhitewater.org/content/Wiki/safety: international_scale_of_river_difficulty. Accessed August 28, 2017.

Andersson, Susan. 2016. Dispersal of young-of-the-year brown trout (*Salmo trutta* L.) from spawning beds – Effects of parental contribution, body length and habitat. Department of Wildlife, Fish, and Environmental Studies. Swedish University of Agricultural Sciences.

Behnke, R.J. 1992. Native trout of western North America. American Fisheries Society Monograph 6. 275 pp.

Bjornn, T.C. and Reiser, D.W. 1991. Habitat requirements of salmonids in streams. Pages 83-138 in W.R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitat. Special Publication 19. American Fisheries Society, Bethesda, MD.

Bojarska, K., Kwiatkowska, M., Skórka, P., Gula, R., Theuerkauf, J., and H. Okarma. 2017. Anthropogenic environmental traps: where do wolves kill their prey in a commercial forest? Forest Ecology and Management 397:117-125.

Brusven, M.A., C. MacPhee, and R. Biggam. 1974. Benthic insect: effects of water fluctuations on benthic insects. pp. 67-69. In: Anatomy of a river: An evaluation of water requirements for the Hell's Canyon Reach of the Snake River conducted March, 1973. K. Bayha and C. Koski, (eds). Pacific Northwest River Basins Commission, Vancouver, WA.

Byrd, G.V., Reynolds, J.H., and P.L. Flint. 2009. Persistence rates and detection probabilities of bird carcasses on beaches of Unalaska Island, Alaska, following the wreck of the M/V Selendang Ayu. Marine Ornithology 37:197-204.

Cunnington, G.M., Garrah, E., Eberhardt, E., and L. Fahrig. 2014. Culverts alone do not reduce road mortality in anurans. Ecoscience 21(1):69-78.

Gislason, J.C. 1980. Effects of flow fluctuation due to hydroelectric peaking on the benthic insects and periphyton of the Skagit River, Washington. Doctoral Dissertation. University of Washington, Seattle, WA.

Gislason, J.C. 1985. Aquatic insect abundance in a regulated stream under

fluctuating and stable diel flow patterns. North American Journal of Fisheries Management 5:39-46.

Godinho, S. and N. Onofre. Terrestrial vertebrates mortality in irrigation canals of Vale da Ribeira de Seda (Cabeção-Alto Alentejo- Portugal). Silva Lusitana 21(1):21-42.

Hunter, M.A. 1992. Hydropower flow fluctuations and salmonids: a review of the biological effects, mechanical causes and options for mitigation. Technical Report Number 119. Washington Department of Fish and Wildlife, Olympia, Washington.

Kroger, R.L. 1973. Biological effects of fluctuating water levels in the Snake River, Grand Teton National Park, Wyoming. American Midland Naturalist 89:47-481.

Markle, C.E., Gillingwater, S.D., Levick, R., and P. Chow-Fraser. 2017. The true cost of partial fencing: evaluating strategies to reduce reptile road mortality. Wildlife Society Bulletin 41(2):342-350.

NMFS (National Marine Fisheries Service). 2011. Anadromous salmonid passage facility design. NMFS, Northwest Region. Portland, Oregon.

Oregon Conservation Strategy. 2018. Coastal tailed frog, Available at: http://oregonconservationstrategy.org/stategy-species/coastal-tailed-frog/. Accessed March 8, 2018.

Oregon DFW (Oregon Department of Fish and Wildlife). 2008. Oregon guidelines for timing of in-water work to protect fish and wildlife resources. Available at: http://www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_Work2008.pdf. Accessed July 18, 2017.

PacifiCorp. 2003a. Prospect Nos. 1, 2, and 4 Project, FERC Project No. 2630, Final License Application. Exhibit E—Environmental Exhibit. June 2003.PacifiCorp. 2003b. Instream flow technical report Prospect Nos. 1, 2, and 4 Hydroelectric Project Relicensing FERC No. 2360. June 2003.

PacifiCorp. 2012. Large animal crossing evaluation report. Medford, Oregon. February 2012.

PacifiCorp. 2013. Proposed study plans and additional information for the integrated licensing process. Portland, Oregon. December 20, 2013.

PacifiCorp. 2015a. Initial study report, instream flow. May 2015.

_____. 2015b. Initial study report, ramping. May 2015.

_____. 2015c. Initial study report, whitewater boating. May 2015.

_____. 2015d. Initial study report, fish habitat. May 2015.

_____. 2016a. Updated study report, fish passage facilities. Prepared by Alden Research Laboratory, Inc. and Meridian Environmental, Inc. May 2016.

_____. 2016b. Prospect No. 3 Hydroelectric Project, FERC Project No. 2337, Final License Application for Major Project—Existing Dam, Volume II, Exhibit E—Environmental Exhibit, December 2016.

_____. 2016c. Prospect No. 3 Hydroelectric Project, FERC Project No. 2337, Final License Application for Major Project—Existing Dam, Volume III, Exhibit E—Environmental Exhibit Appendices, Appendix B, Fish Passage Facilities Operation and Maintenance Plan, December 2016.

_____. 2017a. Prospect No. 3 Hydroelectric Project Federal Energy Regulatory Commission (FERC) Project No. P-2337 Historic Properties Management Plan, February 2017, filed March 7, 2017.

_____. 2017b. Filing of Addendum to the Updated Cultural Resource Study Report (SHPO Report No. 28848) and SHPO Letter of Concurrence (SHPO Case No. 13-0210), for the Prospect No. 3 Hydroelectric Project (FERC No. P-2337-077), filed March 20, 2017.

Pacific Power & Light Company. 1986(a). South Fork Rogue River diversion and its relationship to fish populations in the vicinity: a brief summary of current knowledge. Prepared by K.L. Pratt. Portland, Oregon. 14 pp. plus appendices. Filed on December 30, 1986.

_____. 1986(b). Stream discharge study: Prospect No. 3 Hydroelectric Project, South Fork Rogue River. Campbell-Craven Environmental Consultants. Tigard, Oregon. Prepared for Pacific Power & Light Company. October 24, 1986. Filed under docket P-2337-000 on December 30, 1986.

Pope, K., Brown, C., Hayes, M., Green, G., and D. Macfarlane. 2014. Cascades frog conservation assessment. Gen. Tech. Rep. PSW-GTR-244. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA. 116 pp.

Redding, J. M., C. B. Schreck, and F. H. Everest. 1987. Physiological effects on coho salmon and steelhead of exposure to suspended solids. Transactions of the American Fisheries Society 116: 737–744.

Reiser, W.R. and R.G. White. 1983. Effects of complete redd dewatering on salmonid egg-hatching success and development of juveniles. Transactions of American Fisheries Society 112:532-540.

Rytwinski, T. and L. Fahrig. 2012. Do species life history traits explain population responses to roads? A meta-analysis. Biological Conservation, 147: 87-98.

Servizi, J.A., and D.W. Martens. 1992. Effects of temperature, season, and fish size on acute lethality of suspended sediments to coho salmon. Canadian Journal of Fisheries and Aquatic Sciences, 49:1389-1395.

Traverso, J.M., and Y.A. Alvarez. 2000. Vertebrate mortality in the Dehesas canal. Quercus 167:28-30.

U.S. Bureau of Land Management (BLM). 2010. Biological assessment for the Dead Stew Project. Ashland, Oregon. 25 pp.

U.S. Fish and Wildlife Service. 2011. Revised recovery plan for the northern spotted owl (*Strix occidentalis caurina*). Portland, Oregon.

U.S. Forest Service. 1990. Rogue River National Forest land and resource management plan. Department of Agriculture, Medford Oregon. July 1990.

_____. 2001. Water quality restoration plan for the Upper Rogue River watershed. Rogue River National Forest. Prospect Ranger District. August 2001. 19 pp. and appendices.

_____. 2014. Stream inventory handbook level I and II, Version 2.14. Pacific Northwest Region (Region 6).

Wahbe, T.R., Bunnell, F.L., and R.B. Bury. 2004. Terrestrial movements of juvenile and adult tailed frogs in relation to timber harvest in coastal British Columbia. Canadian Journal of Forest Research 34:2455-2466.

Washington DFW (Washington Department of Fish and Wildlife). 2000. Draft fish protection screen guidelines for Washington State. Available at: http://wdfw.wa.gov/publications/00050/wdfw00050.pdf. Access July 28, 2017.

8.0 LIST OF PREPARERS

Dianne Rodman—Project Coordinator, Terrestrial Resources and Threatened and Endangered Species (Ecologist; M.S., Biology)

Matt Cutlip—Aquatic Resources (Fisheries Biologist; B.S., Fisheries Science)

Kim Nguyen—Geology and Soils, Developmental Analysis (Civil Engineer; B.S., Civil Engineering)

Frank Winchell— Cultural Resources (Archaeologist; Ph.D., M.A., B.S., Anthropology)

Suzanne Novak – Recreation. Land Use and Aesthetic Resources (Outdoor Recreation Planner; M.S. Recreational Resources Management; B.S., Conservation and Resource Development)

APPENDIX A

Staff Responses to Comments on Draft Environmental Assessment

The draft EA was issued on October 17, 2017, and comments on the draft EA were due on December 1, 2017. The following entities filed comments: Kevin Goodrich (October 23, 2017), PacifiCorp (November 21, 2017), Oregon DEQ (November 24, 2017), Oregon DFW (November 30, 2017), Forest Service (November 30, 2017), and American Whitewater (December 1, 2017).

We summarize the comments below, respond to the comments, and indicate, where applicable, how the EA was modified as a result. The comments are grouped by resource area or topic for convenience.

Geology and Soils

Comment: PacifiCorp states that Draft Article 001 would require it to file an ESCP at least 60 days prior to the start of construction of the woodstave flowline and sag pipe replacements, but it is unclear if the ESCP required by Draft Article 001 and Forest Service condition 8 is a revision of the ESCP that PacifiCorp already filed with the FLA, or a requirement for an additional ESCP that is specific to construction of these facilities.

Response: The ESCP required by Draft Article 001 would be a revision of the ESCP filed with the FLA that includes the additional components listed in Forest Service condition 8 and be based on final design flowline and sag pipe replacements and site-specific conditions.

Comment: PacifiCorp requests that the due date for the Road Plan required by Forest Service condition 11 and included in Draft Article 001 be changed from one year prior to construction of the bridge and spur road to a new due date that is 60 days prior to construction of the replacement of the flowline. PacifiCorp states that development of final designs for flowline replacement will occur throughout the first and second years following license issuance, and construction of the flowline will occur in the third year following license issuance.

Response: Because Forest Service condition 11 it is a mandatory condition, the Commission does not have discretion in modifying its content. However, based on PacifiCorp's arguments we have modified the staff recommendation such that the Road Plan be filed with the Commission for approval 60 days prior to construction of the replacement flowline. PacifiCorp will need to submit the Road Plan for Commission approval after it has obtained any necessary approvals from the Forest Service, so it will need to plan accordingly.

Water Quality

Comment: Oregon DEQ states that the dissolved oxygen standard of 8 mg/L for the trout spawning through emergence period is incorrect; the correct standard is 11 mg/L.

Response: We have revised the text as requested.

Comment: Oregon DEQ states that the staff recommended alternative does not include measures recommended by Oregon DFW pursuant to section 10(j) of the FPA that Oregon DEQ will include as mandatory conditions in the water quality certification for the project. These measures include higher minimum flows, more-restrictive ramping rates, and a requirement to comply with all federal and state water quality standards. Oregon DEQ contends that the Commission must include the disputed measures listed above as conditions of the license.

Response: Although pursuant to the CWA, the Commission must include timely issued CWA conditions in any license issued for a project, Commission staff develops its Staff Recommended Alternative, including recommended license conditions, pursuant to section 10(a) of the FPA. Neither the CWA nor section 10(a) of the FPA obligate Commission staff to include the CWA conditions under the Staff Recommended Alternative.

Fisheries Resources

Comment: Oregon DFW states that its 10(j) recommendations are based on its expertise and current statutory responsibilities and should be adopted to mitigate, protect, and enhance the environmental resources that are affected by the project. Oregon DFW asserts that the project's fish passage facilities should be upgraded to current environmental standards, and that the project and licensee have the financial resources to do so. Oregon DFW contends that the staff alternative falls short of the intent of relicensing; that is, to bring old projects with outdated facilities up to current standards to adequately mitigate project impacts.

Response: The FPA does not require licensed projects to meet current environmental standards. Nor does the FPA require that every environmental impact be fully mitigated. Rather, the FPA requires that in the Commission's judgement based on the case-specific circumstances, the license conditions reflect an appropriate balance of all public interest considerations. For the reasons discussed in the EA and consistent with the FPA, the EA concludes that staff's recommended environmental measures would provide an adequate level of protection and enhancement for fisheries resources of the project area.

Comment: Oregon DFW disagrees with staff's conclusion that the benefits of improving upstream fish passage would be minor and would not justify the costs. Oregon DFW

argues that upgrading outdated fish passage facilities to be consistent with current fish passage criteria as required by state law, and would provide more than minor benefits to fish populations. Oregon DFW asserts that the scientific literature supports the need for fish passage for resident trout. Oregon DFW cites Behnke (1992), which states that "Resident stream trout may undertake considerable movement (or migration) in some circumstances. A basic explanation for these deviations from expected movement patterns might be that the option to move or not move at any life stage is determined by the potential survival advantage of one option over the other. In a high-elevation, high-gradient stream of Colorado, where productivity is low and environmental regimes are harsh, brook trout populations are likely to encounter periods of food shortage. If they do not move, they are more likely to die of starvation than they are if they search for greater opportunities)." Oregon DFW concludes that based on available habitat types in the project area, the trout need to move to find food, suitable spawning habitats, and rearing habitats.

Oregon DFW also disagrees that juvenile trout do not typically make upstream migrations. It contends that upstream passage of juvenile fish is well documented for resident trout as well as anadromous fish. Oregon DFW states it has developed its design criteria for fish ladders and road crossings to accommodate the upstream movement of juveniles. However, because of the project's existing ladder design, smaller fish are currently unable to use the ladder, and therefore would not have been documented during the relicensing studies. Oregon DFW asserts that the Rogue River watershed is different than other watersheds in western Oregon. It argues that the Rogue is ecologically similar to northern California, and is much hotter and drier in summer than the rest of coastal Oregon and thus, Rogue fish have adapted to extreme conditions by moving around a lot as juvenile fish. Oregon DFW provides support for this statement by noting that a pronounced upstream migration has been observed in summer in places like the mainstem of Bear Creek. There, juvenile salmonids have been observed struggling to move upstream at weirs and fish ladders at sizes under 100 mm. Oregon DFW also asserts that a pronounced upstream migration is even more noticeable with fall rains in October through December.

Response: We agree that some individuals within resident trout populations, including younger life stages such as fry and juveniles can and do make upstream migrations. Nevertheless, our analysis indicates there is no evidence of any mass movements or large congregations of trout fry or juveniles in the upper bypassed reach near the fish ladder entrance, nor does it suggest there are significant adverse effects on the trout population as a whole due to the passage conditions within the existing fish ladder. Therefore, there would be only minor benefits to the trout population from modifying the ladder to be consistent with current Oregon DFW criteria.

Comment: Oregon DFW disagrees with staff's recommendation to not require a new fish screen, and asserts that state law (ORS 498.306) requires PacifiCorp to install,

operate, and maintain screening or bypass devices to provide adequate protection for fish populations at the project. Oregon DFW argues that trout fry and juveniles, as well as adults, are known to make extensive migrations within a stream to meet basic life cycle needs. Oregon DFW states that the fry population makes up only 17 percent of the total population in the bypassed reach, and increased fry survival through the project would increase the overall fry population. Oregon DFW also argues that the screen bypass pipe exit within pool 6 of the ladder increases fry mortality because larger trout hold in the fish ladder and consume fry as they exit the pipe.

Response: As discussed in the EA, the proportion of trout fry in the bypassed reach population is smaller (17 percent) than the population in the unregulated reach of the South Fork upstream of the project (37 percent). Thus, we concluded in the EA that operation of the fish screen coupled with current ramping practices is having an adverse effect on trout fry within the bypassed reach. Nevertheless, the reduction in fry abundance is minor and we see no evidence that such minor losses are causing a significant adverse effect on the trout population as a whole because the overall density of trout in the bypassed reach compares favorably to the population in the South Fork upstream. For these reasons, any modifications to the fish screen or bypass to improve downstream passage survival for trout fry would not appreciably change the overall trout population density in the bypassed reach, the minor benefits would not be worth the cost, and we do not recommend them.

Comment: Oregon DFW asserts that the proposed upgrades to the project's water conveyance system warrant monitoring and maintenance plans for these facilities. Oregon DFW contends that past events have damaged the water conveyance system and caused severe bank erosion resulting in the discharge of tons of sediment to the South Fork. Oregon DFW states that its recommended monitoring and maintenance plans would reduce or eliminate future impacts, and the plans would identify mitigation measures for the licensee to quickly implement should a failure occur.

Response: We acknowledge in the EA that failure events have occurred in the past; however, with PacifiCorp's proposed upgrade of the woodstave flowline and sag pipe to a steel pipe we expect a much lower probability of a future failure. And if a failure were to occur, PacifiCorp has existing monitoring systems in place to quickly detect the failure and cease the unintended discharge. Further, Part 12 of the Commission's regulations and the staff recommended measures include requirements for incident reporting, records maintenance, emergency actions, inspections, quality control, monitoring, and corrective actions in the event of a failure. For these reasons, Oregon DFW's recommended monitoring and maintenance plans are unnecessary.

Comment: Oregon DFW disagrees with staff's recommended 20-cfs minimum flow during August through October, and continues to assert that a 30-cfs minimum flow during this period is necessary to protect trout fry, juvenile, and sub-adult life stages.

Oregon DFW asserts that these low flow months reduce the overall amount of habitat for larger sub-adult trout in the 100 mm – 200 mm size class. Oregon DFW's states that, based on its expert knowledge of fish in the South Fork, trout of this size class are nearing the adult spawning size and are extremely vulnerable to losses. Oregon DFW states that table 1 of the draft EA reveals a large number of these sub-adult trout in the river below the diversion dam, with 73.4 percent in the 100 mm – 200 mm size class declining to 9.2 percent for trout greater than 200 mm. Oregon DFW argues this indicates a reduction in survival from the sub-adult to adult life stages. Oregon DFW concludes that this loss can be attributed to a lack of habitat (as measured by usable weighted area) at a crucial life history stage as young trout become spawning adults. Oregon DFW states that its higher recommended minimum flow during these months also provides much needed protection for fry and smaller juvenile trout, which are very vulnerable during low flow months. Oregon DFW contends that trout at these vulnerable life stages are poor swimmers and must rely on river bank habitats for survival. Increasing the amount of usable bank habitat clearly provides an increased chance of survival.

Response: The lack of trout in the older age classes (i.e., sizes greater than 200 mm) is likely because most trout in western streams first spawn in their second to fourth years and mortality after the first spawning event is very high (Behnke, 1992). Therefore, we do not expect older age classes in the South Fork to be as abundant as younger age classes. We also note that PacifiCorp's survey results show that proportionately, the largest size class of trout comprises a higher percentage of the total population observed in the bypassed reach (9 percent of observed trout) than in the unregulated reach of the South Fork upstream of the impoundment (5 percent of observed trout), further suggesting that a lack of available habitat due to minimum flows is not the cause of the low numbers of older age classes of trout.

With respect to Oregon DFW's contention that higher flows are needed to protect fry and juveniles, the modeling results indicate that Oregon DFW's recommended higher flows would actually reduce useable habitat for rainbow trout fry by 4 percentage points and provide only a 1 percentage point increase in useable habitat for juvenile and adult rainbow trout, when compared to the staff alternative. Therefore, the minor, if any, habitat gains would not be worth the $85,043 annualized cost.

Comment: Oregon DFW states that its recommended upgrades to the fish ladder, screen, and bypass pipe warrant the development of a fish passage facility design and post-construction monitoring plan to ensure the facilities operate as designed to provide effective fish passage. Additionally, Oregon DFW states that even without its recommended modifications, the construction of the proposed auxiliary water release system would affect the fish ladder and that alone should trigger the need for a post-construction hydraulic and biological monitoring plan for the fish passage facilities.

Response: In its February 2018 filing, PacifiCorp revised its proposal for the auxiliary flow system and is no longer proposing to modify the fish ladder to accommodate the construction of this facility. The revised proposal includes a new system that would include a downward-opening weir located in the diversion canal wall about 150 feet downstream of the intake, a concrete plunge pool, and a pipe that discharges flows to the bypassed reach adjacent to the fish ladder entrance. In section 5.2 of the EA we are recommending PacifiCorp's revised proposal under the staff alternative. Because the revised proposal for the auxiliary flow system would have only minor effects on downstream fish passage, and we are not recommending any other modifications to project fish passage facilities, the minor benefits of a fish passage facility design and post-construction monitoring plan would not justify the cost.

Comment: Oregon DFW disagrees with staff's recommendation to not require erosion and sediment control plans 90 days prior to any ground-disturbing activities at the project. Oregon DFW contends that it is widely known that elevated turbidity levels have impacts on trout egg incubation (suffocation), fry growth (gill irritation), and even larger size trout by reducing the amount of usable rearing habitat by filling, or making the sparse amount of available spawning gravels unusable due to increased fines. Further, macroinvertebrate are also susceptible to losses due to turbidity increases, which impacts trout by eliminating a food source. Oregon DFW would like the opportunity through development of these plans to assess impacts to spawning, rearing, and migration from ground based operations that disturb sediment and to recommend measures that could eliminate or reduce the harmful effects of soil erosion and turbidity increases on aquatic resources.

Response: We agree that major ground-disturbing activities such as replacement of the woodstave flowline and construction of the road spur could potentially cause erosion and sedimentation of aquatic habitats. Therefore, we are recommending erosion and sediment control plans for these major construction activities. However, for other future ground-disturbing activities that are as yet unspecified, the need for erosion control plans would be based on, among other things, the nature of the activity and the likelihood that it would cause soil erosion. For example, routine project operation and maintenance activities that require ground disturbance such as installing conduit, fence posts, or signage in upland environments far away from a waterbody would not need an erosion and sediment control plan to control erosion and sedimentation of aquatic habitat. Therefore, a broad license requirement that PacifiCorp develop an erosion and sediment control plan 90 days prior to any ground-disturbing activity at the project is unnecessary.

Comment: Oregon DFW disagrees with several points made in the discussion of unavoidable adverse effects on aquatic resources. Oregon DFW asserts that the discussion neglects to mention that all life history stages of trout (fry through adult) are unprotected during screen cleaning events in the canal. The fry losses during these events, coupled with the mesh size of the screen that doesn't protect fish smaller than

65mm, results in robust losses to the trout fry life stage. Oregon DFW indicates that it has argued in the past that effects on fry populations can be substantial "given that the fecundity of a single female adult rainbow trout can be 200 to 1,000 eggs" (Scott and Crossman, 1973). Oregon DFW has found that sexual maturity for rainbow trout females generally occurs at age-3+ and older (D. Meyer, Rock Creek Fish Hatchery Manager, March 2006). Losses due to stranding, displacement, or stress due to turbidity may be considered minimal, but over a license term of 40-50 years, these losses can decimate a small trout population. Oregon DFW contends that at other projects when fish are entrained into unscreened canals or penstocks they will pass through a turbine and any surviving fish could be returned to the same stream in a tailrace. However, at the Prospect No. 3 Project, water passing through the powerhouse discharges to the Middle Fork Canal for use by the Prospect Nos. 1, 2, and 4 Project, and thus does not return to the South Fork. Oregon DFW states that this transfer of water out of the South Fork basin has caused a cumulative loss of fish because fish that are not effectively screened in the Prospect No. 3 diversion canal are passed through both the Prospect No. 3 powerhouse and the Prospect Nos. 1, 2, and 4 Project powerhouses. Any fish that survive entrainment through both projects would be released to the North Fork and permanently lost from the South Fork populations.

Response: For the reasons already discussed and explained in the EA, we disagree that the fry losses are causing a substantial adverse effect on the trout populations of the bypassed reach. There is no evidence that project operation including existing ramping practices and fish screen operation have decimated the trout population of the bypassed reach. Nevertheless, we have modified the unavoidable adverse effects section of the EA to include additional discussion of losses due to fish screen cleaning cycles as well as entrainment losses due to operation of the Prospect Nos. 1, 2, and 4 Project.

Comment: PacifiCorp states that the project diversion dam is ungated and the impoundment has a surface area of about 1 acre and water retention time of less than one hour. PacifiCorp therefore contends that run-of-river operation is inherent to the project's design, and staff's recommendation to require PacifiCorp to monitor and document compliance with run-of-river operation is unnecessary. PacifiCorp states that there are no gages directly upstream of the dam in the South Fork or Imnaha Creek to measure inflow to the project and that such gages would be needed to show compliance with run-of-river operation.

Response: Although we agree that the configuration of the project may provide only a limited opportunity for operational flexibility, PacifiCorp proposed in its license application to continue to operate the project in a run-of-river mode and we recommend that it do so. Therefore, to enable the Commission to ensure that this mode of operation is implemented as proposed, it will be necessary for PacifiCorp to document and report compliance with run-of-river operation. This is typically required of all licensees.

We acknowledge that there are no existing stream gages directly upstream of the project diversion dam that can be used to show compliance with run-of-river operation; however, staff's recommendation did not specify that stream gages must be used for this purpose. There are other methods that could be used to verify compliance with run-of-river operation (e.g., generation and instream flow records). PacifiCorp should consult with Commission staff when preparing the operation compliance monitoring plan required by Draft Article 006 to discuss methods for documenting compliance with run-of-river operation and the other operational requirements of the license.

Comment: PacifiCorp asserts that the statement on page 132 of the EA that indicates that PacifiCorp's proposed ramping rates are consistent with the ramping rates required by the Prospect Nos. 1, 2, and 4 Project license is inaccurate. Instead, the statement should say that the proposed ramping rates are based on the rates and periods specified in the Prospect Nos. 1, 2, and 4 license, but are rounded to the nearest tenth of a foot instead of being expressed in inches to correlate compliance units with units on the gage and to reflect the coarse level of operational control at the project.

Response: We have revised the text as requested.

Comment: PacifiCorp requests that staff clarify that the staff-recommended ramping rate restrictions and reporting requirements in the draft license articles would not apply to natural increases or decreases in river flows (e.g., natural ramping due to high flows from precipitation events). PacifiCorp seeks assurance that it will not be required to notify or report ramping rate deviations from natural events that are not caused by the project.

Response: We see no reason to add the requested language. Draft Article 005 already specifies that the staff-recommended ramping rate restrictions "do not apply to changes in river flows due to natural increases or decreases." While we see no reason at this time that PacifiCorp would need to report ramping rate exceedances that are caused by natural flow fluctuations and are not attributable to the project, as we said in our Comprehensive Development analysis in section 5.2, PacifiCorp has not described how it would definitively distinguish between natural and project-induced ramping rate exceedances. Therefore, we are recommending that PacifiCorp describe in the operation compliance monitoring plan required by Draft Article 006 how it would distinguish between these two types of ramping events. Commission staff would review this information in the operation compliance monitoring plan when it's filed for Commission approval and determine at that time what constitutes a ramping rate deviation that is caused by the project and thus must be reported as a deviation.

Comment: PacifiCorp requests that the due date for the operation compliance monitoring plan required by Draft Article 006 be extended to one year from license issuance. PacifiCorp argues that it needs another six months to design, install, and

program the required communication link between the USGS gage and the project's automated control systems at the dam and complete the required agency consultation.

Response: Extending the due date would provide additional time to finalize the design of the communication link and complete the required agency consultation; therefore, we have revised the due date as requested.

Comment: PacifiCorp disagrees with the requirement in Draft Article 007 that it notify the Oregon Emergency Response System (OER System) of any deviations from project operational requirements (e.g., minimum flows and ramping rates). PacifiCorp states that the purpose of the OER System is to coordinate and manage state resources in response to natural and technological emergencies that affect public safety; therefore, any requirements to notify the OER System should be limited to a spill or release of a hazardous substance, a water conveyance system failure, or a project failure that initiates an imminent threat to life or property.

Response: We agree with PacifiCorp that it is unnecessary to report operational deviations to the OER System. We have modified Draft Article 007 to eliminate this requirement.

Comment: PacifiCorp disagrees with staff's recommendation that it notify the Commission within 10 days and then file a report within 30 days of any deviations from project operation requirements or emergency situations at the project. PacifiCorp questions the benefit of notifying the Commission within 10 days and then filing a report 20 days later. PacifiCorp asserts that the 30-day reporting requirement is sufficient to notify and report on the deviation or emergency event, and therefore the 10-day notification requirement is unnecessary.

Response: We see no reason to remove the 10-day notification requirement. The intent of this requirement is to notify the Commission that an event occurred, prior to the subsequent filing of a detailed report on the circumstances that caused the event. We would have no objection to PacifiCorp notifying the Commission sooner than the 10-day deadline (e.g., within 24 hours when it notifies the other agencies) if it believes this would be more fruitful.

Comment: PacifiCorp requests an extension of the due date for the Sediment and Dredging Plan required by Draft Article 008. PacifiCorp contends that it cannot identify the specific location and size of the sediment disposal site along the bypassed reach stream bank until the final design and alignment of the road spur are completed, which wouldn't occur until after it prepares the Road Plan. Therefore, PacifiCorp requests that the Sediment and Dredging Plan due date be extended to 6 months after the filing of the Road Plan and at least 60 days prior to any dredging within the project impoundment.

Response: We have no objection to extending the due date, provided that the plan is filed prior to any dredging within the impoundment. Therefore, we have modified the due date as requested.

Comment: Oregon DFW asserts that a new license for the project should be established for a period not to exceed 30 years, in order for continuing impacts to fish and wildlife to be reassessed at that time. Oregon DFW notes that the EA does not include proposals to significantly modify project structures or operations to address long-standing impacts to fish and wildlife resources. Oregon DFW argues that a longer license term will only delay bringing the project up to date with new environmental protection measures expected to be implemented in the future.

Response: As we said in the draft EA, the Commission will make its determination on the license term in any license issued for the project.

Terrestrial Resources

Comment: The Forest Service states that the special-status wildlife species table in the draft EA should be revised to indicate that the fisher is a Forest Service Sensitive Species.

Response: We have revised the table as requested.

Comment: In its November 30, 2017 filing, Oregon DFW argues that just because the 12-foot-wide crossings were effective at the Prospect Nos. 1, 2, and 4 Project does not necessarily mean that they would be effective at the Prospect No. 3 Project. In its March 1, 2018 filing following the 10(j) meeting, Oregon DFW clarified that it agrees that the proposed crossing design would likely be sufficient to allow passage of terrestrial wildlife at the Prospect No. 3 Project based on monitoring results at the Prospect Nos. 1, 2, and 4 Project. However, because wildlife use of crossing structures is influenced by both the design and placement of crossing structures, monitoring would be necessary to show effective placement. In support of its assertion, Oregon DFW cites studies that indicate topography, cover, and proximity to human activity can affect use rates of crossing structures (Clevenger and Waltho, 2000; Gagnon et al., 2011) and variability in use observed over a three-year period at the Prospect Nos. 1, 2, and 4 Project (crossings with similar designs varied from three to 114 elk per crossing structure between 2008 and 2011). Oregon DFW states this variability highlights the importance of proper crossing placement to ensure adequate use of structures by wildlife. Oregon DFW further states that the extensive game camera monitoring effort conducted for the Prospect Nos. 1, 2, and 4 Project would not be needed at the Prospect No. 3 Project. Oregon DFW now recommends annual documentation of signs of wildlife use at crossing structures (coincident with annual crossing inspections) as a low-cost alternative that meets the goal of verifying successful placement of new crossings at the project. This alternative better aligns needs and benefits of monitoring with costs and additional effort required. Visual

inspection and photo documentation of signs of wildlife use would indicate successful placement of new bridges, and continued use of upgraded crossings

Response: We revised the EA to address the various factors that might affect wildlife use of the crossings and recommend that PacifiCorp select the crossing locations in consultation with the resource agencies to better ensure the best use of the crossings. As discussed in section 5.2, photo documenting animal use of the crossing during PacifiCorp's annual crossing and fence inspection would be a reasonable and low cost method of documenting wildlife use of the crossings.

Comment: In its March 30, 2018 filing Oregon DFW further states that it may require additional wildlife crossings by the fifth anniversary of the new license if new large game crossings do not show signs of use by deer and elk. Oregon DFW also requests that PacifiCorp operators report any wolf sign or sightings, as it is uncertain whether wolves would make use of canal crossing structures and wolves may take advantage of these fenced habitat features, which can affect mortality risk for local game species (Bojarska et al., 2017).

Response: Because only preliminary designs and locations of the crossings over the new steel flowline have been developed, we are now recommending that a wildlife crossing plan that provides for selecting the type (over or under) and locations of the flowline crossings in consultation with Oregon DFW, Forest Service, and FWS. For the reasons discussed in section 5.2, we are also recommending that PacifiCorp monitor use of the crossings for five years following their construction and file a report with recommendations, if any, for adding or modifying the crossings to provide access across the flowline. However, it is premature to require up to five new crossings now.

Comment: In its March 30, 2018 filing, Oregon DFW states while the new 2-foot-wide animal crossings would protect and enhance small animal habitat connectivity at the project, alone they do not effectively mitigate the risk of small animal drowning events in the canal and that fences are necessary to support the functionality of small animal crossings. Oregon DFW acknowledges there is not site-specific information on small animal mortality at the project, but based on mortalities documented at irrigation canals in Europe, it estimates that 17,000 small animal (amphibians, rodents, reptiles) mortalities would occur at the project over a 50-year license term. Oregon DFW further states that hardware mesh fencing would protect species of conservation concern to ODFW (coastal tailed frog and Cascades frog) and the Forest Service that have been observed during license application surveys (2000 and 2001) at the nearby Prospect Nos. 1, 2, and 4 Hydroelectric Project. They add that Cascades frogs have also been observed in the Prospect No. 3 Project area (PacifiCorp, 2015). Oregon DFW further argues that mitigation that prevents drowning mortality of small vertebrates would improve prey availability for the northern spotted owl, which can increase the suitability of the project

area for spotted owl foraging, in the event that owls return to the project area over the 50-year license term.

Response: We revised the EA to include the new information provided by Oregon DFW. Although there is no site-specific data on entrapment and drowning rates of small animals in the project's canal, nor any evidence that the existing level of small animal drownings in the canal is adversely affecting small animal populations in the project area, we find for the reasons discussed in section 5.2 that the benefits of protecting the Cascades frog and coastal tailed frog are worth the cost of installing and maintaining fine mesh fencing along the canal and its various crossings. Therefore, we recommend that PacifiCorp install fine mesh fencing along the canal fence and both sides of the wildlife crossings, and consult with Oregon DFW when selecting the specific type of fencing material.

Comment: PacifiCorp states that its proposal includes a total of eight small animal crossings over the canal.

Response: We have revised the text to clarify the number of small animal crossings that PacifiCorp intends to install.

Comment: PacifiCorp requests an extension of the due date for the map submittal and agency consultation required by Draft Article 014 (now Article 015). PacifiCorp contends that field visits outside the access-limiting winter season, agency consultation, additional engineering design, and coordination with the flowline replacement would require 24 months before the filing could be prepared.

Response: Based on new information provided by Oregon DFW and PacifiCorp, we have modified our recommendation to require a wildlife crossing plan be filed within two year of license issuance.

Threatened and Endangered Species

Comment: PacifiCorp states that the EA does not reflect that the project is located within the Rogue Pack's area of known wolf activity. The Forest Service likewise provided additional information on the status gray wolf O-25, which was detected near the project.

Response: We have revised the final EA accordingly.

Recreation and Aesthetics

Comment: American Whitewater (AW) states that if a 40-year license is issued for the project, the presently low use and demand for whitewater recreation at the project could change during the new license term. AW points out that, because whitewater boating

equipment and skill levels of paddlers have advanced over the last 40 years, similar advancements could occur over the next 40 years thereby opening up new opportunities for whitewater recreation at the project. Therefore, in order to address any recreational needs that might arise during the license term, AW requests that during year 20 of the license, PacifiCorp conduct an evaluation of recreational needs that would cover the remaining 20 years of the license term. AW asks that this assessment be more detailed than what would normally be involved in a Form 80 assessment of project use and include a provision for the Commission to take action if evaluation results show that recreational needs are not being met, or will not be met during the remaining license term.

Response: While it is possible that advancements in whitewater recreation technologies could occur over the next 40 years, such speculation alone is not enough to justify requiring PacifiCorp to conduct a study in year 20 of the license. Besides, any license issued would contain sufficient provisions to reexamine recreation needs and add new reasonable recreation facilities that may be prescribed by the Commission during the term of that license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested federal or state agencies, after notice and opportunity for hearing (see standard Article 17).

Comment: AW is concerned that the standard FERC license article that provides for free public access to project lands and waters, except where necessary to protect life, health, and property, might be used as a basis to restrict whitewater boating, which has an inherent risk. While AW points out that PacifiCorp has been supportive of whitewater recreation at its projects, it is concerned that if any license issued for the project is ever transferred to a new party, the new licensee might not be as supportive and therefore restrict whitewater boating access to the project. To avoid this possibility, AW recommends that language in the standard public access article be clarified to identify whitewater boating as an appropriate use of the project.

Response: There is no need to modify the standard license article as requested by AW because any license issued would already contain sufficient provisions to require public access to project lands and waters for recreation. Standard article 18 would require PacifiCorp or any subsequent licensee to allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes. Whitewater boating can be an appropriate use of project lands and waters. If, over the term of any new license issued by the Commission, PacifiCorp or any other subsequent licensee for the project, decides to exercise its discretion to limit liability by restricting whitewater recreation access, and AW believes the restriction to be unreasonable, it can raise the issue with the Commission under Article 18.

Comment: AW requests that, in requiring PacifiCorp to continue to use the USGS gage located downstream of the diversion dam to monitor compliance with minimum flow requirements, the Commission should also acknowledge the benefits of the gage in providing real-time flow information for recreationists.

Response: We agree that real-time flow information provided by the USGS gage would also be beneficial for whitewater recreationists at the project. Sections 3.3.5.1 and 3.3.5.2 of the final EA have been revised to reflect this benefit and to state that such data is available to the public on the USGS website.

Comment: PacifiCorp points out that the affected environment description in section 3.3.5.1 of the draft EA incorrectly states that PacifiCorp currently provides minimum flows for two weekends per year at its Prospect Nos. 1, 2, and 4 Project (Project No. 2630) for whitewater boating. PacifiCorp clarifies that the flows provided for whitewater boating at the Prospect Nos. 1, 2, and 4 Project are "boatable flows in excess of minimum flows, between 250 and 450 cfs, not to exceed inflow" rather than minimum flows as stated in section 3.3.5.1 of the draft EA.

Response: The text in sections 3.3.5.1 of the final EA is revised accordingly.

Comment: PacifiCorp advises that the Prospect No. 3 Project's existing transmission lines parallel the alignment of the Prospect Nos. 1, 2, and 4 Project's waterways, including the Middle Fork and North Fork Canals, rather than the existing Prospect 1, 2, and 4 Project transmission lines, as stated in the *Our Analysis* discussion in section 3.3.6.2 of the draft EA.

Response: The text in section 3.3.5.2 of the final EA is revised accordingly.

Cultural Resources

Comment: PacifiCorp points out that footnote 26 on page 99 of the draft EA, which discusses the Oregon State Historic Preservation Officer's (Oregon SHPO) concurrence with the project's Area of Potential Effect (APE), does not include an additional concurrence letter filed by the Oregon SHPO regarding subsequent additions to the APE. PacifiCorp states that this letter was dated March 16, 2017, and filed with the Commission on March 20, 2017.

Response: We revised footnote 26 (now footnote 32) to indicate that the Oregon SHPO concurred with PacifiCorp's revised APE, which reflects the proposed project boundary modifications filed with the final license application on December 30, 2016.

Comment: PacifiCorp advises that use of the Nye Ditch, a non-project feature within the Prospect No. 3 Project's APE, did not completely cease in the 1950's as indicated in

section 3.3.7.1 of the draft EA. PacifiCorp points out that the Nye Ditch consists of two portions (a lower portion and an upper portion) and that the upper portion located north of Prospect was used until the 1950's but the 6.5-mile-long lower portion between Prospect and Cascade Gorge is still in use.

Response: The text in section 3.3.7.1 of the final EA is revised accordingly.

APPENDIX B

DRAFT LICENSE CONDITIONS RECOMMENDED BY STAFF

On May 9, 2017, the U.S. Forest Service filed preliminary 4(e) conditions containing 11 conditions, and on November 30, 2017, filed modified conditions nos. 3 and 11.

I. MANDATORY CONDITIONS RECOMMENDED BY COMMISSION STAFF

We recommend including the following mandatory conditions in any license issued for the project:

Forest Service conditions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

II. ADDITIONAL LICENSE ARTICLES RECOMMENDED BY COMMISSION STAFF

We recommend including the following license articles in any license issued for the project. The license articles are in addition to the section 4(e) conditions submitted by the U.S. Forest Service.

Draft Article 001. *Requirement to File Plans for Commission Approval*

The U.S. Forest Service's (Forest Service) section 4(e) conditions require the licensee to prepare certain plans in consultation with the Forest Service for its review and implement certain measures without prior Commission approval. Each such plan must also be submitted to the Commission for approval. These plans and their due dates for filing with the Commission are listed below.

Forest Service Condition	Plan Name	Due Date
Condition 8	Erosion and Sediment Control Plan	Sixty days prior to the start of construction of the woodstave flowline and sag pipe replacement, which is expected to begin within two years of license issuance
Condition 9	Fire and Fuels Management Plan	Sixty days prior to any ground-disturbing activities at the project

Condition 11	Road Plan	Sixty days prior to the construction of the flowline, which is expected to begin within two years of license issuance

The licensee must include with the Erosion and Sediment Control Plan required by condition 8, documentation that the licensee developed the plan in consultation with the Forest Service and Oregon Department of Fish and Wildlife. The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project specific information.

The licensee must include with the Fire and Fuels Management Plan required by condition 9 and Road Plan required by condition 11, documentation that the licensee developed the plan in consultation with and approval from the Forest Service.

The Commission reserves the right to make changes to any plan submitted. Upon Commission approval, the plan becomes a requirement of the license, and the licensee must implement the plan or changes in project operations or facilities, including any changes required by the Commission.

Draft Article 002. *Auxiliary Minimum Flow Release System*. Within six months of license issuance, the licensee must file for Commission approval a construction schedule for the auxiliary minimum flow release system described in section E.5.1.1 and shown on Figure 1 of PacifiCorp's letter filed on February 12, 2018, that describes modifications to its proposed action based on Commission staff's recommendations in the Draft Environmental Assessment.

Draft Article 003. *Minimum Flows in the South Fork Rogue River Bypassed Reach*. The licensee must operate the project to maintain a minimum flow of 30 cubic feet per second (cfs) from March 1 to July 31, and 20 cfs from August 1 to February 28 or inflow, whichever is less, in the South Fork Rogue River bypassed reach as measured at the existing U.S. Geological Survey stream gage located about 0.25 mile downstream of the diversion dam.

The minimum flow requirements may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement among the licensee, Oregon Department of Fish and Wildlife, and U.S.

Fish and Wildlife Service. If the minimum flow is so modified, the licensee must notify the Commission as soon as possible, but no later than 10 days, after each such incident.

Draft Article 004. *Run-of-River Operation*. The licensee must operate the project in a run-of-river mode for the protection of aquatic resources in the South Fork Rogue River bypassed reach. The licensee must at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, the sum of project outflows approximate the sum of inflows to the project reservoir.

Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee, Oregon Department of Fish and Wildlife, and U.S. Fish and Wildlife Service. If the flow is so modified, the licensee must notify the Commission as soon as possible, but no later than 10 days after each such incident.

Draft Article 005. *Ramping Rates*. The licensee must operate the project to restrict ramping rates in the bypassed reach to 0.2 foot per hour as measured at the existing U.S. Geological Survey stream gage located about 0.25 mile downstream of the diversion dam.

The ramping rate restrictions do not apply to changes in river flows due to natural increases or decreases. The ramping rate requirements may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee, Oregon Department of Fish and Wildlife, and U.S. Fish and Wildlife Service. If the ramping rates are so modified, the licensee must notify the Commission as soon as possible, but no later than 10 days, after each such incident.

Draft Article 006. *Operation Compliance Monitoring Plan.* Within one year of license issuance, the licensee must file with the Commission for approval, an operation compliance monitoring plan that describes how the licensee will monitor and report compliance with the operational requirements of this license. The plan, at a minimum, must include:

(1) a detailed description of how the licensee will monitor and document compliance with the run-of-river, minimum flow, and ramping rate requirements of the license, including a description of how the licensee will differentiate between natural and project-induced ramping events;

(2) a provision to install a communication link between the U.S. Geological Survey (USGS) stream gage in the bypassed reach located about 0.25 mile downstream of the diversion dam and the project's automated control systems, and use the USGS

gage to monitor compliance with the minimum flow and ramping rate requirements of the license in real time;

(3) a provision to maintain a log of project operation;

(4) a provision to notify the Oregon Department of Fish and Wildlife (Oregon DFW) within 24 hours, and the Commission within 10 days, of any deviations from project operating requirements (i.e., minimum flows, project-induced ramping rates, run-of-river operation); and file with the Commission, a detailed report of any such deviations within 30 days of the event that identifies: (a) the nature and chronology of the event, (b) the circumstances that led up to the event, (c) any observed or reported adverse environmental impacts resulting from the event, (d) any corrective actions taken, and (e) any recommended measures to ensure similar events do not occur in the future;

(5) a provision to prepare and send to Oregon DFW and U.S. Fish and Wildlife Service (FWS) (with copies filed with the Commission upon request) an operation compliance monitoring report by January 31 of each year following license issuance that documents compliance with the operational requirements of the license for the preceding October 1 to September 30 monitoring period; and

(6) an implementation schedule.

The licensee must prepare the plan after consultation with Oregon DFW and FWS. The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project specific information.

The Commission reserves the right to require changes to the plan. The licensee must not begin implementing the plan until the Commission notifies the licensee that the plan is approved. Upon Commission approval the licensee must implement the plan, including any changes required by the Commission.

Draft Article 007. *Notification and Reporting of Unanticipated Events or Emergencies.*

Upon the occurrence of unanticipated events or emergencies that may affect project operation or the environment, the licensee must take certain actions and provide notifications to resource agencies and the Commission, as specified below.

(1) In the event of a hazardous substance spill, unintended discharge from the project's water conveyance system, or other emergency event, the licensee must notify the Oregon Emergency Response System within 24 hours, and the Commission within 10 days.

(2) In the event of an unanticipated circumstance or emergency situation in which fish or wildlife are being endangered, harmed, or killed by the project or its operation, the licensee must notify the Oregon Department of Fish and Wildlife within 24 hours, and the Commission within 10 days.

(3) In the event of any incidents described in items (1) and (2) above, the licensee must also take immediate reasonable action to remediate the deviation or incident, and prepare and file a report with the Commission within 30 days of the deviation or incident that describes: (a) the nature and chronology of the event, (b) the circumstances that lead-up to the event, (c) any observed or reported adverse environmental impacts resulting from the event, (d) any corrective actions taken, and (e) any recommended measures to reduce the likelihood of similar events occurring in the future.

The Commission reserves the right to require changes to project operations or facilities based on the information contained in the reports and any other available information.

Draft Article 008. *Sediment and Dredging Plan.* Within six months of the filing of the Road Plan and at least 60 days prior to any dredging within the project's impoundment on the South Fork Rogue River, the licensee must file for Commission approval a Sediment and Dredging Plan for dredging the impoundment and placing the dredged material along the bypassed reach stream bank for the purpose of enhancing downstream trout spawning habitat. The plan must identify the specific location and size of the sediment disposal site along the bypassed reach stream bank.

The licensee must prepare the plan after consultation with Oregon Department of Fish and Wildlife (Oregon DFW). The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to Oregon DFW, and specific descriptions of how Oregon DFW's comments are accommodated by the plan. The licensee must allow a minimum of 30 days for Oregon DFW to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project specific information.

The Commission reserves the right to require changes to the plan. The licensee must not begin implementing the plan until the Commission notifies the licensee that the

plan is approved. Upon Commission approval the licensee must implement the plan, including any changes required by the Commission.

Draft Article 009. *Fish Passage Facilities Operations and Maintenance Plan.* The Fish Passage Facilities Operations and Maintenance Plan filed on December 30, 2016, as Appendix B of Volume III of the Final License Application Exhibit E, is approved and must be implemented according to the schedule included in the plan, except that the provision in Section 4.0, *Plan Updates,* to update the plan after license issuance is not required.

The approved Fish Passage Facilities Operations and Maintenance Plan must not be amended without prior Commission approval. The Commission reserves the right to make changes to the Fish Passage Facilities Operations and Maintenance Plan.

Draft Article 010. *Large Woody Debris Management*. The licensee must, to the extent practicable and in consideration of the safety of project personnel and structures, place any large woody debris removed upstream of the project diversion dam, at locations downstream of the dam that, during high flow events, could reasonably be expected to result in the transport of the large woody debris.

Draft Article 011. *Trout Salvage Plan*. Within six months of license issuance, the licensee must file for Commission approval a Trout Salvage Plan for the relocation of trout trapped in the project diversion canal or fish ladder during planned maintenance activities that result in the dewatering of the diversion canal or fish ladder. At a minimum, the plan must include the following: (1) provision to notify the Oregon Department of Fish and Wildlife (Oregon DFW) and U.S. Fish and Wildlife Service (FWS) at least two weeks in advance of any planned canal or fish ladder maintenance shutdowns that would dewater either the diversion canal or fish ladder; (2) a specific description of the procedures for capturing, handling, and relocating any fish trapped in the diversion canal between the diversion dam and fish screen, or fish ladder; and (3) an implementation schedule.

The licensee must prepare the plan after consultation with Oregon DFW and FWS. The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project specific information.

The Commission reserves the right to require changes to the plan. The licensee must not begin implementing the plan until the Commission notifies the licensee that the

plan is approved. Upon Commission approval the licensee must implement the plan, including any changes required by the Commission.

Draft Article 012. *Maintenance Activities*. The licensee must conduct planned maintenance activities that will dewater the water conveyance system and require the release of all flows to the bypassed reach from July 1 to September 30.

Draft Article 013. *Reservation of Authority to Prescribe Fishways*. Authority is reserved to the Commission to require the licensee to construct, operate, and maintain fishways as may be prescribed by the Secretary of the Interior pursuant to section 18 of the Federal Power Act.

Draft Article 014. *Vegetation Management Plan.* The Vegetation Management Plan filed on December 30, 2016, as Appendix C of the final License Application Exhibit E is approved and made part of this license.

Draft Article 015. *Wildlife Crossing Plan*. Within two years of license issuance, the licensee must file for Commission approval a wildlife crossing plan that includes (1) a map showing the location of eight new 2-foot-wide small animal crossings to be installed over the project canal; (2) a map showing the location and type (over or under) of five 12-foot-wide wildlife crossings provided across the steel flowline based on the designs shown on Exhibit F, drawing F-4 of the license application; (3) a provision to enlarge the six existing 4-foot-wide large wildlife crossings over the project canal to 12 feet in width; (4) a provision to install a 40-inch-tall fine mesh fencing at the base of the existing wildlife fencing along both sides of the canal and the existing and new large and small animal crossings to prevent small animals from entering the canal or crossing the canal except via the crossings; (5) a provision to monitor deer and elk use of the new flowline crossings for five years following their installation via photographic methods as described in the Wildlife Crossing and Inspection Program required by Article 016, and filing a report by December 31 of the sixth year following installation that summarizes deer and elk use of the new crossings and includes recommendations, if any, for adding new crossings or modifying the existing crossings to ensure deer and elk can cross the flowline; (6) a detailed construction schedule for installing the crossings and new fencing.

The enlarged 12-foot-wide crossings over the canal will consist of pre-cast concrete panels covered with a minimum of two inches of native soil and woody debris along one side of the canal fencing to provide simulated ground cover for small mammals and herptiles. Large boulders must be installed at a minimum of four-foot intervals in a ten-foot radius from the crossing entrances to prevent vehicle access. The eight new two-foot-wide small animal crossings will consist of a pre-cast concrete panel with a minimum of two inches of native soil covering. The licensee must select the locations of the new small animal and flowline crossings and the fine-mesh fencing material after

consultation with the U.S, Forest Service, Oregon Department of Fish and Wildlife, and U.S. Fish and Wildlife Service.

The licensee must include in its filing documentation of consultation, copies of comments and recommendations on the plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. No land-disturbing or land-clearing activities must begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

Within 30 days of installing all the new large and small wildlife crossings, enlarging the existing crossings, and installing the fine-mesh fencing, the licensee must file with the Commission photographs and as-built specifications of each of the new and modified crossings and new fencing.

Draft Article 016. *Wildlife Crossing and Fencing Inspection Program*. Within two years of license issuance, the licensee must file for Commission approval a revised wildlife crossing and fencing inspection program that addresses the new crossings and fencing required by Article 015. The revised program must include the provisions of the program filed July 13, 1989, and a provision to photographically document any signs of wildlife use of the crossings observed during the inspections, and to file a written report of the previous year's inspection and maintenance activities with the U.S. Forest Service, Oregon Department of Fish and Wildlife, and U.S. Fish and Wildlife Service (and file a copy with the Commission upon request) by January 31 of each year following Commission approval of the program.

The Commission reserves the right to require changes to the inspection program. Upon Commission approval, the licensee must implement the program, including any changes required by the Commission.

Draft Article 017. *Avian Protection Plan*. Within six months of license issuance, the licensee must file for Commission approval an Avian Protection Plan specific to the project.

The project-specific plan, at a minimum, must: (1) adopt the provisions of the licensee's corporate-wide Avian Protection Plan applicable to the project; (2) address how the licensee considered the Avian Power Line Interaction Committee's guidelines in

"Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006;" and (3) include a provision to provide annual reports to the Oregon Department of Fish and Wildlife (Oregon DFW) and the U.S. Fish and Wildlife Service (FWS) (with copies filed with the Commission upon request).

The licensee must prepare the plan after consultation with Oregon DFW and FWS. The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. No land-disturbing or land-clearing activities must begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

Draft Article 018. *Programmatic Agreement and Historic Properties Management Plan*. The licensee must implement the "Programmatic Agreement Between the Federal Energy Regulatory Commission and the Oregon Historic Preservation Officer for Managing Historic Properties that May be Affected by Issuance of a License to PacifiCorp for the Continued Operation of the Prospect No. 3 Hydroelectric Project in Jackson County, Oregon (FERC No. 2337-077)," executed on XXXX, and including but not limited to the Historic Properties Management Plan (HPMP) for the project. In the event that the Programmatic Agreement is terminated, the licensee must continue to implement its approved HPMP. The Commission reserves the authority to require changes to the HPMP at any time during the term of the license.

Draft Article 019. *Use and Occupancy*. (a) In accordance with the provisions of this article, the licensee must have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee must also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a

covenant of a conveyance made under the authority of this article is violated, the licensee must take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee must require multiple use and occupancy of facilities for access to project lands or waters. The licensee must also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee must: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the impoundment shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project impoundment. No later than January 31 of each year, the licensee must file with the Commission a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of

the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee must consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee must determine that the proposed use of the lands to be conveyed is not inconsistent with any approved report on recreational resources of an Exhibit E; or, if the project does not have an approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed must not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; ; and (ii) the

grantee must take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee must not unduly restrict public access to project lands and waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project must be consolidated for consideration when revised Exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article must not apply to any part of the public lands and reservations of the United States included within the project boundary.